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PATENT APPLICATION

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Sir/Madam:

Transmitted herewith for filing is the patent application of Chien-Min Sung for METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX comprising 37 pages of specification and claims.

☐ This application claims the benefit of U.S. application no. filed .

Enclosed also are:

☒ 4 sheet(s) of drawings.

☐ Applicant claims small entity status under 37 CFR 1.9(b) & 1.27(c).

☐ An Assignment, with cover sheet, from the inventors to _____.

☐ Declaration and Petition.

☐ Power of Attorney.

☐ A Preliminary Amendment.

☒ A Certificate of Mailing by "Express Mail" certifying a filing date of 09/09/2005, by use of Express Mail Label No.: EV 738 039 795 US.

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Judy Anderson

Judy Anderson

IPR2024-00533
Samsung Electronics Co. Ltd. et al v. Chien-Min Sung
Samsung's Exhibit 1053
Ex. 1053, Page 1

☒ Nonpublication Request Under 35 USC 122(b)(2)(B)(i).

☐ Information Disclosure Statement under 37 C.F.R. § 1.97, PTO Form-1449 with listed references attached (if indicated as being attached by the Information Disclosure Statement).

The filing fee has been calculated as shown below.

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Please address all future correspondence in connection with the above-identified patent application to the attention of the undersigned at the address associated with:

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Dated this 9th day of September, 2005.

Respectfully submitted,

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Enclosures

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METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX

FIELD OF THE INVENTION

The present invention relates generally to tools having superabrasive particles embedded in an organic material matrix and associated methods. Accordingly, the present invention involves the chemical and material science fields.

BACKGROUND OF THE INVENTION

Many industries utilize a chemical mechanical polishing (CMP) process for polishing certain work pieces. Particularly, the computer manufacturing industry relies heavily on CMP processes for polishing wafers of ceramics, silicon, glass, quartz, and metals. Such polishing processes generally entail applying the wafer against a rotating pad made from a durable organic substance such as polyurethane. A chemical slurry is utilized that contains a chemical capable of breaking down the wafer substance and an amount of abrasive particles which act to physically erode the wafer surface. The slurry is continually added to the rotating CMP pad, and the dual chemical and mechanical forces exerted on the wafer cause it to be polished in a desired manner.

Of particular importance to the quality of polishing achieved is the distribution of the abrasive particles throughout the pad. The top of the pad holds the particles by means of fibers or small pores, which provide a friction force sufficient to prevent the particles from being thrown off of the pad due to the centrifugal force exerted by the pad's spinning motion. Therefore, it is important to keep the top of the pad as flexible as possible, to keep the fibers as erect as possible, and to assure that there is an abundance of open pores available to receive newly applied abrasive particles.

One problem that arises with regard to maintaining the pad surface, however, is an accumulation of polishing debris coming from the work piece, the abrasive slurry, and the pad dresser. This accumulation causes a "glazing" or hardening of the top of the pad, mats the fibers down, and thus makes the pad surface less able to hold the abrasive particles of the slurry. These effects significantly decrease the pad's overall polishing performance. Further, with many pads, the pores used to hold the slurry, become clogged, and the overall asperity of the pad's polishing surface becomes depressed and matted. A CMP pad dresser can be used to revive the pad

surface by "combing" or "cutting" it. This process is known as "dressing" or "conditioning" the CMP pad. Many types of devices and processes have been used for this purpose. One such device is a disk with a plurality of superhard crystalline particles such as diamond particles attached to a metal-matrix surface.

Ultra-large-scale integration (ULSI) is a technology that places at least 1 million circuit elements on a single semiconductor chip. In addition to the tremendous density issues that already exist, with the current movement toward size reduction, ULSI has become even more delicate, both in size and materials than ever before. Therefore, the CMP industry has been required to respond by providing polishing materials and techniques that accommodate these advances. For example, lower CMP polishing pressures, smaller size abrasive particles in the slurry, and polishing pads of a size and nature that do not over polish the wafer must be used. Furthermore, pad dressers that cut asperities in the pad which can accommodate the smaller abrasive particles, and that do not overdress the pad must be used.

There are a number of problems in attempting to provide such a pad dresser. First, the superabrasive particles must be significantly smaller than those typically used in currently know dressing operations. Generally speaking, the superabrasive particles are so small that a traditional metal matrix is often unsuitable for holding and retaining them. Further, the smaller size of the superabrasive particles, means that the particle tip height must be precisely leveled in order to uniformly dress the pad. Traditional CMP pad dressers can have particle tip height variations of more than 50 μm without compromising dressing performance. However, such a variation would render a dresser useless if it were required to dress a CMP pad and achieve a uniform asperity depth of 20 μm or less, for example.

In addition to issues with properly holding very small superabrasive particles, the tendencies of metal to warp and buckle during a heating process, cause additional issues in obtaining a CMP pad dresser having superabrasive particle tips leveled to within a narrow tolerance range. While other substrate materials such as polymeric resins have been know, such materials typically are not able to retain superabrasive particles to a degree that is sufficient for CMP pad dressing.

As a result, a CMP pad dresser that is suitable for dressing a CMP pad that meet the demands placed upon the CMP industry by the continual reductions in semiconductor size is still being sought.

SUMMARY OF THE INVENTION

Accordingly, the present invention provides superabrasive tools and methods that are, without limitation, suitable to groom the CMP pads used for the delicate polishing applications as recited above. In one aspect, a method is provided for improving retention of superabrasive particles held in a solidified organic material layer of an abrading tool, where a portion of each of the superabrasive particles protrude out of the solidified organic material layer. The method may include securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece. As an example, the arrangement of the plurality of superabrasive particles may be configured to uniformly distribute drag forces across substantially each superabrasive particle.

Various methods are contemplated for minimizing the mechanical stress impinging on the superabrasive particles held in the abrading tool. One example may include superabrasive particle arrangement according to protrusion height. As such, each of the plurality of superabrasive particles may protrude to a predetermined height above the solidified organic material layer. In one aspect, the predetermined height may produce a cutting depth of greater than about 20 microns when used to abrade a work piece. In another aspect, the predetermined height may produce a cutting depth of from about 1 micron to about 20 microns when used to abrade a work piece. In yet another aspect, the predetermined height may produce a cutting depth of from about 10 micron to about 20 microns when used to abrade a work piece.

Arranging superabrasive particles such that they define a profile may also prove to be useful in distributing impinging mechanical forces. As such, the superabrasive particles may protrude to a predetermined height that is along a designated profile. In one aspect, the plurality of superabrasive particles may be arranged such that their tips protrude to less than about 40 microns above the organic material matrix. In another aspect, the plurality of superabrasive particles may be arranged such that their tips protrude to less than about 30 microns above the organic material matrix. In yet another aspect, the plurality of superabrasive particles are arranged such that their tips protrude to less than about 20 microns above the organic material matrix. Thus the designated profile defines the extent to which a plurality of superabrasive particles protrude from the solidified organic material layer. In one

aspect, the designated profile may be a plane. In another aspect, the designated profile may have a slope. In yet another aspect, the designated profile may have a curved shape. In a further aspect, the designated profile may have a dome shape. Additionally, though it is intended that the plurality of superabrasive particles be arranged according to the designated profile, a small amount of deviation therefrom may be likely.

The size of the plurality of superabrasive particles may also affect the distribution of mechanical forces. In one aspect, the plurality of superabrasive particles may be of substantially the same size. Any superabrasive particle size that would provide benefit to the methods and tools of the present invention are considered to be within the present claim scope. In one specific aspect, the plurality of superabrasive particle may be from about 30 microns to about 250 microns in size. In another aspect, the plurality of superabrasive particles are from about 100 microns to about 200 microns in size. Additionally, variations in the size of the plurality of superabrasive particles or the variation thereof may also affect the distribution of mechanical forces. This is particularly true for tools in which impinging mechanical forces vary depending on superabrasive particle location, such as with circumferentially rotating tools. In one aspect, superabrasive particles in a central location of the abrading tool may be larger in size than superabrasive particles in a peripheral location on the abrading tool.

The orientation of the plurality of superabrasive particles may also affect the distribution of mechanical forces in the abrading tool. In one aspect, securing the plurality of superabrasive particles includes arranging the plurality of superabrasive particles according to a predetermined attitude. Though various attitudes are possible, in one specific aspect the predetermined attitude is a uniform attitude across substantially all of the plurality of superabrasive particles. In another aspect, the plurality of superabrasive particles are substantially configured with an apex portion oriented towards a work piece. In addition to uniform attitudes, some aspects include variations in attitude across the abrading tool. For example, in one aspect superabrasive particles in a central location on the abrading tool may be configured with an apex or an edge portion oriented towards a work piece, and superabrasive particles in a peripheral location on the abrading tool may be configured with a face oriented towards the work piece.

The arrangement or distribution of superabrasive particle along the surface of an abrading tool may also function to effectively distribute mechanical forces. In one aspect, the plurality of superabrasive particles may be arranged as a grid. In another aspect, the plurality of superabrasive particles may be evenly spaced at a distance of from about 2 times to about 4 times the average size of the superabrasive particles. In yet another aspect, the plurality of superabrasive particles may be evenly spaced at a distance of from about 3 times to about 5 times the average size of the superabrasive particles. In a further aspect, superabrasive particles in a central location on the abrading tool may be spaced farther apart than superabrasive particles in a peripheral location on the abrading tool.

The present invention further encompasses superabrasive tools having improved superabrasive particle retention. As such, in one aspect a superabrasive tool may include a solidified organic material layer and a plurality of superabrasive particles secured in the solidified organic material layer in an arrangement according to the methods recited herein.

Any superabrasive material capable of being utilized according to the methods provided herein would be considered to be within the scope of the present invention. For example, the plurality of superabrasive particles may include, without limitation, diamond, polycrystalline diamond, cubic boron nitride, polycrystalline cubic boron nitride, and combinations thereof.

Various organic materials are also contemplated to hold and secure the superabrasive particles. For example, and without limitation, the solidified organic material layer may include amino resins, acrylate resins, alkyd resins, polyester resins, polyamide resins, polyimide resins, polyurethane resins, phenolic resins, phenolic/latex resins, epoxy resins, isocyanate resins, isocyanurate resins, polysiloxane resins, reactive vinyl resins, polyethylene resins, polypropylene resins, polystyrene resins, phenoxy resins, perylene resins, polysulfone resins, acrylonitrile-butadiene-styrene resins, acrylic resins, polycarbonate resins, polyimide resins, and mixtures thereof. The solidified organic material layer may also include additional components that modify the characteristics of the material. In one aspect, a reinforcing material may be disposed within at least a portion of the solidified organic material layer. The reinforcing material may be, without limitation, ceramics, metals, or combinations thereof. Examples of ceramic materials include alumina, aluminum carbide, silica, silicon carbide, zirconia, zirconium carbide, and mixtures thereof.

There has thus been outlined, rather broadly, various features of the invention so that the detailed description thereof that follows may be better understood, and so that the present contribution to the art may be better appreciated. Other features of the present invention will become clearer from the following detailed description of the invention, taken with the accompanying claims, or may be learned by the practice of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a cross-sectional view of a CMP pad dresser made in accordance with one embodiment of the present invention.

FIG. 2 is a cross-sectional view of superabrasive particles disposed on a temporary substrate in accordance with one embodiment of the present invention.

FIG. 3 is a cross-sectional view of superabrasive particles disposed on a temporary substrate in accordance with one embodiment of the present invention.

FIG. 4 is a cross-sectional view of superabrasive particles disposed on a temporary substrate in accordance with one embodiment of the present invention.

FIG. 5 is a cross-sectional view of superabrasive particles disposed in an organic material layer in accordance with one embodiment of the present invention.

FIG. 6 is a cross-sectional view of a CMP pad dresser in accordance with one embodiment of the present invention.

FIG. 7 is a cross-sectional view of superabrasive particles disposed along a layer of organic material in accordance with one embodiment of the present invention.

FIG. 8 is a cross-sectional view of superabrasive particles being pressed into a layer of organic material in accordance with one embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Definitions

In describing and claiming the present invention, the following terminology will be used in accordance with the definitions set forth below.

The singular forms "a," "an," and, "the" include plural referents unless the context clearly dictates otherwise. Thus, for example, reference to "a particle" includes reference to one or more of such particles, and reference to "the resin" includes reference to one or more of such resins.

As used herein, "organic material" refers to a semisolid or solid complex amorphous mix of organic compounds. As such, "organic material layer" and "organic material matrix" may be used interchangeably, refer to a layer or mass of a semisolid or solid complex amorphous mix of organic compounds. Preferably the organic material will be a polymer or copolymer formed from the polymerization of one or more monomers.

As used herein, "superhard" and "superabrasive" may be used interchangeably, and refer to a crystalline, or polycrystalline material, or mixture of such materials having a Vicker's hardness of about 4000 Kg/mm^2 or greater. Such materials may include without limitation, diamond, and cubic boron nitride (cBN), as well as other materials known to those skilled in the art. While superabrasive materials are very inert and thus difficult to form chemical bonds with, it is known that certain reactive elements, such as chromium and titanium are capable of chemically reacting with superabrasive materials at certain temperatures.

As used herein, "metallic" refers to a metal, or an alloy of two or more metals. A wide variety of metallic materials is known to those skilled in the art, such as aluminum, copper, chromium, iron, steel, stainless steel, titanium, tungsten, zinc, zirconium, molybdenum, etc., including alloys and compounds thereof.

As used herein, "particle" and "grit" may be used interchangeably, and when used in connection with a superabrasive material, refer to a particulate form of such material. Such particles or grit may take a variety of shapes, including round, oblong, square, euhedral, etc., as well as a number of specific mesh sizes. As is known in the art, "mesh" refers to the number of holes per unit area as in the case of U.S. meshes.

As used herein, "mechanical bond" and "mechanical bonding" may be used interchangeably, and refer to a bond interface between two objects or layers formed primarily by frictional forces. In some cases the frictional forces between the bonded objects may be increased by expanding the contacting surface areas between the objects, and by imposing other specific geometrical and physical configurations, such as substantially surrounding one object with another.

As used herein, "leading edge" means the edge of a CMP pad dresser that is a frontal edge based on the direction that the CMP pad is moving, or the direction that the pad is moving, or both. Notably, in some aspects, the leading edge may be considered to encompass not only the area specifically at the edge of a dresser, but may also include portions of the dresser which extend slightly inward from the actual

edge. In one aspect, the leading edge may be located along an outer edge of the CMP pad dresser. In another aspect, the CMP pad dresser may be configured with a pattern of abrasive particles that provides at least one effective leading edge on a central or inner portion of the CMP pad dresser working surface. In other words, a central or inner portion of the dresser may be configured to provide a functional effect similar to that of a leading edge on the outer edge of the dresser.

As used herein, "centrally located particle," "particle in a central location" and the like mean any particle of a tool that is located in an area of the tool that originates at a center point of the tool and extends outwardly towards the tool's edge for up to about 90% of the radius of the tool. In some aspects, the area may extend outwardly from about 20% to about 90% of the radius. In other aspects, the area may extend out to about 50% of the radius. In yet another aspect, the area may extend out to about 33% of the radius of a tool.

As used herein, "peripherally located," "particles in a peripheral location" and the like, mean any particle of a tool that is located in an area that originates at the leading edge or outer rim of a tool and extends inwardly towards the center for up to about 90% of the radius of the tool. In some aspects, the area may extend inwardly from about 20% to 90% of the radius. In other aspects, the area may extend in to about 50% of the radius. In yet another aspect, the area may extend in to about 33% of the radius of a dresser (i.e. 66% away from the center).

As used herein, "working end" refers to an end of a particle which is oriented towards the work piece being abraded by a tool. Most often the working end of a particle will be distal from a substrate to which the particle is attached.

As used herein, "ceramic" refers to a hard, often crystalline, substantially heat and corrosion resistant material which may be made by firing a non-metallic material, sometimes with a metallic material. A number of oxide, nitride, and carbide materials considered to be ceramic are well known in the art, including without limitation, aluminum oxides, silicon oxides, boron nitrides, silicon nitrides, and silicon carbides, tungsten carbides, etc.

As used herein, "grid" means a pattern of lines forming multiple squares.

As used herein, "attitude" means the position or arrangement of a superabrasive particle in relation to a defined surface, such as a substrate to which it is attached, or a work piece to which it is to be applied during a work operation. For

example, a superabrasive particle can have an attitude that provides a specific portion of the particle in orientation toward the work piece.

As used herein, "substantially" refers to situations close to and including 100%. Substantially is used to indicate that, though 100% is desirable, a small deviation therefrom is acceptable. For example, substantially all superabrasive particles includes groups of all superabrasive particles and groups of all superabrasive particles minus a relatively small portion of superabrasive particles.

As used herein, "mechanical force" and "mechanical forces" refer to any physical force that impinges on an object that causes mechanical stress within or surrounding the object. Example of mechanical forces would be frictional forces or drag forces. As such, the terms "frictional force" and "drag force" may be used interchangeably, and refer to mechanical forces impinging on an object as described.

As used herein, "mechanical stress" refers to a force per unit area that resists impinging mechanical forces that tend to compact, separate, or slide an object.

As used herein, the term "profile" refers to a contour above an organic material layer surface to which the superabrasive particles are intended to protrude.

As used herein, a plurality of items, structural elements, compositional elements, and/or materials may be presented in a common list for convenience. However, these lists should be construed as though each member of the list is individually identified as a separate and unique member. Thus, no individual member of such list should be construed as a de facto equivalent of any other member of the same list solely based on their presentation in a common group without indications to the contrary.

Concentrations, amounts, and other numerical data may be expressed or presented herein in a range format. It is to be understood that such a range format is used merely for convenience and brevity and thus should be interpreted flexibly to include not only the numerical values explicitly recited as the limits of the range, but also to include all the individual numerical values or sub-ranges encompassed within that range as if each numerical value and sub-range is explicitly recited. As an illustration, a numerical range of "about 1 to about 5" should be interpreted to include not only the explicitly recited values of about 1 to about 5, but also include individual values and sub-ranges within the indicated range. Thus, included in this numerical range are individual values such as 2, 3, and 4 and sub-ranges such as from 1-3, from 2-4, and from 3-5, etc.

This same principle applies to ranges reciting only one numerical value. Furthermore, such an interpretation should apply regardless of the breadth of the range or the characteristics being described.

The Invention

The present invention provides organic material-based CMP pad dressers including methods for their use and manufacture. Though much of the following discussion relates to CMP pad dressers, it should be understood that the methods and tools of the presently claimed invention are equally applicable to any tool that utilizes abrasive or superabrasive materials, all of which are considered to be within the scope of the present invention. The inventor has found that the retention of a superabrasive particle in an organic material layer can be improved by arranging the superabrasive particles in the organic material layer such that mechanical stress impinging on any individual superabrasive particle is minimized. By reducing the stress impinging on each individual superabrasive particle they can be more readily retained in a solidified organic material layer, particularly for delicate tasks.

Accordingly, one aspect of the present invention provides a method of improving retention of superabrasive particles held in a solidified organic material layer of an abrading tool having a portion of the superabrasive particles protruding out of the solidified organic material layer. The method can include securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece. Though various methods of minimizing mechanical stress are possible, in one aspect the arrangement of the plurality of superabrasive particles may be configured to uniformly distribute frictional forces across substantially each superabrasive particle. Such a uniform distribution of frictional force prevents any individual superabrasive particle from being overstressed and pulling out of the solidified organic material layer.

Various configurations or arrangements are contemplated for minimizing the mechanical stress impinging on the superabrasive particles held in the abrading tool. One potentially useful parameter may include the height that the superabrasive particles protrude above the organic material layer. A superabrasive particle that protrudes to a significantly greater height than other superabrasive particles will experience a greater proportion of the impinging mechanical forces and thus is more prone to pull out of the solidified organic material layer. Thus an even height

distribution of superabrasive particles may function to more effectively preserve the integrity of the abrading tool as compared to abrading tools lacking such an even height distribution. As such, in one aspect, a majority of the plurality of superabrasive particles may protrude to a predetermined height above the solidified organic material layer. Though any predetermined height that would be useful in an abrading tool would be considered to be within the presently claimed scope, in one specific aspect the predetermined height may produce a cutting depth of less than about 20 microns when used to abrade a work piece. In another specific aspect, the predetermined height may produce a cutting depth of from about 1 micron to about 20 microns when used to abrade a work piece. In yet another specific aspect, the predetermined height may produce a cutting depth of from about 10 micron to about 20 microns when used to abrade a work piece. It should also be noted that the leveling of superabrasive particles to a predetermined height may be dependent on superabrasive particle spacing. In other words, the farther superabrasive particles are separated, the more the impinging forces will affect each superabrasive particle. As such, patterns with increased spacing between the superabrasive particles may benefit from a smaller variation from predetermined height.

It may also be beneficial for the superabrasive particles to protrude from the solidified organic material layer to a predetermined height or series of heights that is/are along a designated profile. Numerous configurations for designated profiles are possible, depending on the particular use of the abrading tool. In one aspect, the designated profile may be a plane. In planar profiles, the highest protruding points of the superabrasive particles are intended to be substantially level. It is important to point out that, though it is preferred that these points align with the designated profile, there may be some height deviation between superabrasive particles that occur due to limitations inherent in the manufacturing process.

In addition to planar profiles, in another aspect of the present invention the designated profile has a slope. Tools having sloping surfaces may function to more evenly spread the frictional forces impinging thereon across the superabrasive particles, particularly for rotating tools such as disk sanders and CMP pad dressers. The greater downward force applied by higher central portions of the tool may offset the higher rotational velocity at the periphery, thus reducing the mechanical stress experienced by superabrasive particles in that location. As such, the slope may be continuous from a central point of the tool to a peripheral point, or the slope may be

discontinuous, and thus be present on only a portion of the tool. Similarly, a given tool may have a single slope or multiple slopes. In certain aspects, the tool may slope in a direction from a central point to a peripheral point, or it may slope from a peripheral point to a central point. Various slopes are contemplated that may provide a benefit to solidified organic material layer tools. It is not intended that the claims of the present invention be limited as to specific slopes, as a variety of slopes in numerous different tools are possible. In one aspect, however, a CMP pad dresser may benefit from an average slope of 1/1000 from the center to the periphery.

As a variation on tools having a slope, in certain aspects the designated profile may have a curved shape. One specific example of a curved shape is a dome shape tool. Such curved profiles function in a similar manner to the sloped surfaces. Tools may include such curved profiles in order to more effectively distribute the frictional forces between all of the superabrasive particles, thus reducing failures of individual particles and prolonging the life of the tool.

As has been mentioned herein, while it is intended that the tips of the superabrasive particles align along the designated profile, some level of deviation may occur. These deviations may be a result of the design or manufacturing process of the tool. Given the wide variety of sizes of superabrasive particles that may potentially be utilized in a given tool, such deviations may be highly dependent on a particular application. Also, when referring to the designated profile, it should be noted that the term "tip" is intended to include the highest protruding point of a superabrasive particle, whether that point be an apex, an edge, or a face. As such, in one aspect a majority of the plurality of superabrasive particles are arranged such that their tips vary from the designated profile by from about 1 micron to about 150 microns. In another aspect, the plurality of superabrasive particles are arranged such that their tips vary from the designated profile by from about 5 microns to about 100 microns. In yet another aspect, the plurality of superabrasive particles are arranged such that their tips vary from the designated profile by from about 10 microns to about 75 microns. In a further aspect, the plurality of superabrasive particles are arranged such that their tips vary from the designated profile by from about 10 microns to about 50 microns. In another aspect, the plurality of superabrasive particles are arranged such that their tips vary from the designated profile by from about 50 microns to about 150 microns. In yet another aspect, the plurality of superabrasive particles are arranged such that their tips vary from the designated profile by from about 20 microns to about 100 microns.

In a further aspect, the plurality of superabrasive particles are arranged such that their tips vary from the designated profile by from about 20 microns to about 50 microns. In another aspect, the plurality of superabrasive particles are arranged such that their tips vary from the designated profile by from about 20 microns to about 40 microns. Additionally, in one aspect, the plurality of superabrasive particles are arranged such that their tips vary from the designated profile by less than about 20 microns. In another aspect the plurality of superabrasive particles are arranged such that their tips vary from the designated profile by less than about 10 microns. In yet another aspect, the plurality of superabrasive particles are arranged such that their tips vary from the designated profile by less than about 5 microns. In yet another aspect, the plurality of superabrasive particles are arranged such that their tips vary from the designated profile by less than about 1 microns. In a further aspect, a majority of the plurality of superabrasive particles are arranges such that their tips vary from the designated profile to less than about 10% of the average size of the superabrasive particles.

Variations in superabrasive particle size between different locations on the tool may also help to more evenly distribute the frictional forces impinging thereon. Larger superabrasive particles will most likely experience greater frictional force than would smaller particles. Additionally, in the case circumferentially rotating tools such as CMP pad dressers, superabrasive particles located near the periphery will most likely experience greater frictional force than particles located more centrally due to the greater rotational velocity at the periphery. In such a case, frictional forces may be distributed across the CMP pad by locating larger superabrasive particles more centrally to offset this increase. As a result, the frictional forces are more evenly spread across all superabrasive particles, thus reducing particle failure. As such, in one aspect superabrasive particles in a central location of the abrading tool are larger in size than superabrasive particles in a peripheral location on the abrading tool. In another aspect, superabrasive particles in a central location of the abrading tool may be smaller than superabrasive particles in a peripheral location on the abrading tool. This configuration may provide benefit to circumferentially rotating tools, where the mechanical stresses on superabrasive particles are greater at the periphery. The larger superabrasive particles extend deeper into the organic material layer, and are thus more firmly supported therein. Also, for CMP pad dressers, larger particles at the periphery may provide more slurry clearance than smaller particles. Additionally, although a variety of sizes are contemplated, in one aspect the plurality

of superabrasive particle may be from about 30 microns to about 500 microns in size. In another aspect the plurality of superabrasive particles are from about 100 microns to about 200 microns in size. It is also contemplated that the plurality of superabrasive particles may be of substantially the same size.

Variations in the attitude of superabrasive particles in the solidified organic material layer may also function to more effectively distribute frictional forces across the abrading tool. Orienting superabrasive particles in particular locations of the abrading tool such that similar apexes, edges, and/or faces are exposed may allow a more even distribution of frictional forces, particularly if the densities of superabrasive particles in those locations are concomitantly arranged. As such, in one aspect securing the plurality of superabrasive particles in the solidified organic material layer may include arranging the plurality of superabrasive particles according to a predetermined attitude. In various aspects, the predetermined attitude may be a uniform attitude across substantially all of the plurality of superabrasive particles. In other words, similar apexes, edges, or faces for substantially all of the superabrasive particles in the abrading tool may be facing the same direction. In one aspect, the plurality of superabrasive particles may be substantially configured with an apex portion oriented towards a work piece. As such, impinging frictional forces may be reduced by orienting the plurality of superabrasive particles such that their tips or apexes are substantially oriented towards the work piece. This may be partially due to the smaller surface area of the apex region of the superabrasive particles coming in contact with the work piece during abrading as compared to the larger surface areas of the edge or face regions. Also, the attitude of the plurality of superabrasive particles can also vary depending on the location of particles on the abrading tool. For example, in one aspect superabrasive particles in a central location on the abrading tool may be configured with an apex or an edge portion oriented towards a work piece, and superabrasive particles in a peripheral location on the abrading tool may be configured with a face oriented towards the work piece. In another aspect, superabrasive particles in a central location on the abrading tool may be configured with an apex portion oriented towards a work piece, superabrasive particles in a peripheral location on the abrading tool may be configured with a face oriented towards the work piece, and superabrasive particles in a middle location on the abrading tool may be configured with an edge oriented towards the work piece.

It may be preferable to utilize superabrasive particles smaller than about 40 microns when orienting face portions towards the work piece. In this case, the face is not big enough to overstress those superabrasive particles. Faces also have the advantage of having four edges that can be used to cut the work piece.

The distribution of frictional forces may also be varied through the arrangement or distribution of the superabrasive particles in the solidified organic material layer. For example, in one aspect the plurality of superabrasive particles may be arranged as a grid. Though the even or uniform spacing of the superabrasive particle can exhibit wide variation across abrading tools, in one specific aspect the plurality of superabrasive particles may be evenly spaced at a distance of from about 2 times to about 4 times the average size of the superabrasive particles. In another specific aspect the plurality of superabrasive particles may be evenly spaced at a distance of from about 3 times to about 5 times the average size of the superabrasive particles. In yet another specific aspect the plurality of superabrasive particles may be evenly spaced at a distance of from about 3 times to about 4 times the average size of the superabrasive particles. In a further aspect, the plurality of superabrasive particles may be evenly spaced at a distance of from about 4 times to about 5 times the average size of the superabrasive particles. In yet another aspect, the plurality of superabrasive particles may be evenly space at a distance of from about 100 microns to about 800 microns. As has been discussed herein, however, if all superabrasive particles are evenly spaced, those particles near the periphery will experience greater mechanical stress due to the higher rotational velocity of the abrading tool at that location. The larger the tool, the greater the disparity in the impinging mechanical forces between the center of the tool and the periphery. Because of this, it may be beneficial to vary the spacing of the superabrasive particle depending on location to more effectively distribute frictional forces across the abrading tool. In one aspect, for example, superabrasive particles in a central location on the abrading tool may be spaced farther apart than superabrasive particles in a peripheral location on the abrading tool. In this way, the increased frictional forces due to the greater density of superabrasive particles in the central location may offset the increased frictional forces at the periphery due to the greater rotational velocity of the abrading tool.

Turning to organic material layers, numerous organic materials are known to those skilled in the art which would be useful when utilized in embodiments of the present invention, and are considered to be included herein. The organic material

layer can be any curable resin material, resin, or other polymer with sufficient strength to retain the superabrasive grit of the present invention. It may be beneficial to use an organic material layer that is relatively hard, and maintains a flat surface with little or no warping. This allows the abrading tool to incorporate very small superabrasive particles at least partially therein, and to maintain these small superabrasive particles at relatively level and consistent heights. Additionally, various organic materials may act to absorb mechanical forces impinging on the superabrasive particles disposed therein, and thus spread and equalize such forces across the abrading tool.

Methods of curing the organic material layer can be any process known to one skilled in the art that causes a phase transition in the organic material from at least a pliable state to at least a rigid state. Curing can occur, without limitation, by exposing the organic material to energy in the form of heat, electromagnetic radiation, such as ultraviolet, infrared, and microwave radiation, particle bombardment, such as an electron beam, organic catalysts, inorganic catalysts, or any other curing method known to one skilled in the art. In one aspect of the present invention, the organic material layer may be a thermoplastic material. Thermoplastic materials can be reversibly hardened and softened by cooling and heating respectively. In another aspect, the organic material layer may be a thermosetting material. Thermosetting materials cannot be reversibly hardened and softened as with the thermoplastic materials. In other words, once curing has occurred, the process is essentially irreversible.

Organic materials that may be useful in embodiments of the present invention include, but are not limited to: amino resins including alkylated urea-formaldehyde resins, melamine-formaldehyde resins, and alkylated benzoguanamine-formaldehyde resins; acrylate resins including vinyl acrylates, acrylated epoxies, acrylated urethanes, acrylated polyesters, acrylated acrylics, acrylated polyethers, vinyl ethers, acrylated oils, acrylated silicons, and associated methacrylates; alkyd resins such as urethane alkyd resins; polyester resins; polyamide resins; polyimide resins; reactive urethane resins; polyurethane resins; phenolic resins such as resole and novolac resins; phenolic/latex resins; epoxy resins such as bisphenol epoxy resins; isocyanate resins; isocyanurate resins; polysiloxane resins including alkylalkoxysilane resins; reactive vinyl resins; resins marketed under the Bakelite trade name, including polyethylene resins, polypropylene resins, epoxy resins, phenolic resins, polystyrene

resins, phenoxy resins, perylene resins, polysulfone resins, ethylene copolymer resins, acrylonitrile-butadiene-styrene (ABS) resins, acrylic resins, and vinyl resins; acrylic resins; polycarbonate resins; and mixtures and combinations thereof. In one aspect of the present invention, the organic material may be an epoxy resin. In another aspect, the organic material may be a polyimide resin. In yet another aspect, the organic material may be a polyurethane resin. In yet another aspect, the organic material may be a polyurethane resin.

Numerous additives may be included in the organic material to facilitate its use. For example, additional crosslinking agents and fillers may be used to improve the cured characteristics of the organic material layer. Additionally, solvents may be utilized to alter the characteristics of the organic material in the uncured state. Also, a reinforcing material may be disposed within at least a portion of the solidified organic material layer. Such reinforcing material may function to increase the strength of the organic material layer, and thus further improve the retention of the superabrasive particles. In one aspect, the reinforcing material may include ceramics, metals, or combinations thereof. Examples of ceramics include alumina, aluminum carbide, silica, silicon carbide, zirconia, zirconium carbide, and mixtures thereof.

Additionally, in one aspect a coupling agent or an organometallic compound may be coated onto the surface of each superabrasive particle to facilitate the retention of the superabrasive particles in the organic material matrix via chemical bonding. A wide variety of organic and organometallic compounds are known to those of ordinary skill in the art and may be used. Organometallic coupling agents can form chemicals bonds between the superabrasive particles and the organic material matrix, thus increasing the retention of the particles therein. In this way, the organometallic coupling agent acts as a bridge to form bonds between the organic material matrix and the surface of the superabrasive particles. In one aspect of the present invention, the organometallic coupling agent can be a titanate, zirconate, silane, or mixture thereof.

Specific non-limiting examples of silanes suitable for use in the present invention include: 3- glycidoxypropyltrimethoxy silane (available from Dow Corning as Z-6040); γ-methacryloxy propyltrimethoxy silane (available from Union Carbide Chemicals Company as A-174); β-(3,4-epoxycyclohexyl)ethyltrimethoxy silane, γ-aminopropyltriethoxy silane, N-(β-aminoethyl)-γ-aminopropylmethyldimethoxy silane (available from Union Carbide, Shin-etsu Kagaku Kogyo K.K., etc.); and

additional examples of suitable silane coupling agents can be found in U.S. Pat. Nos. 4,795,678, 4,390,647, and 5,038,555, which are each incorporated herein by reference.

Specific non-limiting examples of titanate coupling agents include: isopropyltriisostearoyl titanate, di(cumylphenylate)oxyacetate titanate, 4-aminobenzenesulfonyldodecylbenzenesulfonyl titanate, tetraoctylbis (ditridecylphosphite) titanate, isopropyltri(N-ethylamino-ethylamino) titanate (available from Kenrich Petrochemicals. Inc.), neoalkyoxy titanates such as LICA-01, LICA-09, LICA-28, LICA-44 and LICA-97 (also available from Kenrich), and the like.

Specific non-limiting examples of aluminum coupling agents include acetoalkoxy aluminum diisopropylate (available from Ajinomoto K.K.), and the like.

Specific non-limiting examples of zirconate coupling agents include: neoalkoxy zirconates, LZ-01, LZ-09, LZ- 12, LZ-38, LZ-44, LZ-97 (all available from Kenrich Petrochemicals, Inc.), and the like. Other known organometallic coupling agents, e.g., thiolate based compounds, can be used in the present invention and are considered within the scope of the present invention.

The amount of organometallic coupling agent used depends on the coupling agent and on the surface area of the superabrasive particles. Typically, 0.05% to 10% by weight of the organic material layer is sufficient.

The superabrasive particles used in embodiments of the present invention may be selected from a variety of specific types of diamond (e.g., polycrystalline diamond) and cubic boron nitride (e.g., polycrystalline cBN). It may be useful to select a superabrasive material capable of chemically bonding with a reactive material, such as those described herein. Further, these particles may take a number of different shapes as required to accommodate a specific purpose for the tool into which it is anticipated that they will be incorporated. However, in one aspect, the superabrasive particle may be diamond, including natural diamond, synthetic diamond, and polycrystalline diamond (PCD). In yet another aspect, the superabrasive particle may be cubic boron nitride (cBN), either single crystals or polycrystalline. In yet another aspect, the superabrasive particle may be a member selected from the group consisting of SiC, Al_2O_3, Zr O_2, and WC.

Numerous uses of aspects of the present invention will be apparent to one skilled in the art in possession of the present disclosure. Superabrasive particles can

be arranged into tools of various shapes and sizes, including one-, two-, and three-dimensional tools. Tools may incorporate a single layer or multiple layers of superabrasive particles and may exhibit improved retention through the distribution of impinging frictional forces. In one aspect, for example, a superabrasive tool having improved superabrasive particle retention is provided. The superabrasive tool may include a solidified organic material layer and a plurality of superabrasive particles secured in the solidified organic material layer in an arrangement according to the methods recited herein.

Superabrasive particles can be arranged in various configurations that may help to distribute the frictional forces impinging on the too. For example, in one aspect each of the plurality of superabrasive particles may protrude to a predetermined height above the solidified organic material layer. By minimizing the variance in the protrusion of the plurality of superabrasive particles above the solidified organic material layer, mechanical forces impinging on individual superabrasive particles can be minimized. Though the predetermined height may vary between tool applications, in one aspect the predetermined height may be greater than about 20 microns. In another aspect the variation from the predetermined height may be from about 1 micron to about 20 microns. In yet another aspect the variation from the predetermined height may be from about 5 microns to about 20 microns. In a further aspect the variation from the predetermined height may be from about 10 microns to about 20 microns. Superabrasive particles may also be arranged according to the methods disclosed herein with respect to arrangement or distribution, attitude, size, etc.

One example of a tool incorporating a single layer of superabrasive particles in an organic material matrix is a CMP pad dresser. As recited herein, traditional metal matrix CMP pad dressers are not suitable for bonding very small superabrasive particles. It is intended that the scope of the present invention include superabrasive particles of all conceivable sizes that would be useful in dressing a CMP pad. Aspects of the present invention, however, specifically allow the retention of superabrasive particles in a CMP pad dresser of sizes that have not previously been feasible for use in metal tools with particles exposed and arranged in a pattern. In one aspect, superabrasive particles may range in size from about 30 microns to about 250 microns. In another aspect, superabrasive particles may range in size from about 100

microns to about 200 microns. In yet another aspect, superabrasive particles can range from 100 microns to 150 microns.

Embodiments of the present invention also provide CMP pad dressers with improved superabrasive particle retention as recited herein. Referring to FIG. 1, the CMP pad dresser 20 may include an organic material layer 14 and superabrasive particles 12 held in the organic material layer 14 in an arrangement according to the various methods presented herein. Such an arrangement may increase the retention of the superabrasive particles 12 in the organic material layer 14 due to a substantially even distribution of frictional forces across all the superabrasive particles in the tool. This distribution of forces improves retention by minimizing mechanical stress impinging on any individual particle. Additionally, in one aspect the organic material layer 14 may be coupled to a support substrate 22.

In order for the CMP pad dresser 20 to condition a CMP pad, the superabrasive particles 12 should protrude at least partially from the organic material layer 14. The protruding superabrasive particles 12 can cut into the CMP pad to a depth that is essentially the distance of the protrusion. In one aspect of the present invention, the superabrasive particles can protrude to a predetermined height. The heights of each superabrasive particle can be essentially the same, or they may vary depending on the particular application of the dresser. For example, superabrasive particles near the center of the CMP pad dresser may protrude to a greater height than the superabrasive grit near the dresser periphery.

Various methods for making a CMP pad dresser according to embodiments of the present invention may be contemplated by one of skill in the art. Generally, a method for making a CMP pad dresser may include disposing superabrasive particles in an organic material layer according to an arrangement such that the superabrasive particles protrude at least partially from the organic material layer. As described herein, the superabrasive particles may be arranged in order to distribute frictional forces across the tool in order to improve retention. In one aspect of the present invention, a reinforcing material may also be applied to at least a portion of the organic material layer in the proximity of the superabrasive grit to further improve retention. The reinforcing material may also protect the organic material layer from acid and provide wear resistance. In one aspect, the reinforcing material may be a ceramic powder. As discussed herein, the ceramic powder may be any ceramic powder known to one skilled in the art, including alumina, aluminum carbide, silica,

silicon carbide, zirconia, zirconium carbide, and mixtures thereof. In one aspect the ceramic powder is silicon carbide. In another aspect, the ceramic powder is aluminum carbide. In yet another aspect, the ceramic powder is silica.

Disposing superabrasive grit according to an arranged pattern may be accomplished by applying spots of glue to a substrate, by creating indentations in the substrate to receive the particles, by adhesive transfer, vacuum transfer, or by any other means known to one skilled in the art. Additional methods may be found in U.S. Pat. Nos. 6,039,641 and 5,380,390, which are incorporated herein by reference.

Orienting superabrasive particles according to a particular attitude can be accomplished by various methods, all of which would be considered to be within the scope of the present invention. For example, in various aspects the plurality of superabrasive particles may have an apex oriented away from the plane of the organic material matrix. In one specific aspect, superabrasive particles may be picked up and positioned with a surface containing numerous flared holes providing suction. An apex portion of a superabrasive particle is sucked into the flared section of each of the holes in the surface. Because the flared portion and the holes are smaller than the superabrasive particles, the particles will be held in a pattern along the surface. Also, due to the shape of the flared sections, the apex portions of the superabrasive particles will be oriented towards the surface. This pattern of superabrasive particles can then be disposed along a substrate having an adhesive or directly into an organic material matrix. Accordingly, the tips of the superabrasive particles will have the same orientation or attitude and also be substantially leveled.

In another aspect, it may be desired to orient apexes and edges away from the plane of the organic material matrix. This can be accomplished by applying a micro sieve such as nylon or other similar template-like material to a substrate that is coated with an adhesive. The holes in the micro sieve may be, without limitation, approximately ½ the size of the superabrasive particles. A template oriented on the micro sieve can position the superabrasive particles in a pattern. Apexes and edges but not the faces of the superabrasive particles can pass through the micro sieve and into the adhesive. Those faces that do adhere to the adhesive through the micro sieve will not affect the cutting of the tool, as they will be recessed in height as compared to superabrasive particles having tips and edges oriented towards the adhesive, and thus will not contact the CMP pad during dressing.

Following casting of such a tool in an organic material matrix, a portion of the organic material can be removed along with the sieve to expose the superabrasive particles. Care should be taken, however, to carefully control the amount of organic material matrix removed when exposing the superabrasive particles. Removing too much will overexposed the superabrasive particles, and thus cause increased pullout. Removing too little will not expose the superabrasive particles sufficiently to allow efficient penetration for cutting, debris removal, and slurry flow.

One potential method for controlling the depth of removal of the organic material matrix may include disposing stopping aids in the organic material matrix at a controlled depth. The stopping aids can be any material known to one skilled in the art, and may be disposed in the organic material matrix prior to, during, or following curing of the organic material matrix. The stopping aids may also be disposed onto a tool substrate prior to adding the organic material matrix. In one aspect, graphite strips can be glued to stainless steel bars that are placed radially within the organic material matrix where superabrasive particle placement is not required. After curing the organic material matrix, the epoxy and graphite can be abraded away. Abrading will stop when the abrading tool reaches the harder stainless steel bars.

Various reverse casting methods may be utilized to manufacture the CMP pad dresser of the present invention. As shown in FIG. 2, a spacer layer 36 may be applied to a working surface 32 of a temporary substrate 34. The spacer layer 36 has superabrasive particles 38 at least partially disposed therein, which protrude at least partially from the spacer layer 36 opposite the working surface 32 of the temporary substrate 34. Any method of disposing superabrasive particles into a spacer layer such that the superabrasive particles protrude to a predetermined height may be utilized in the present invention. In one aspect, as shown in FIG. 3, the spacer layer 36 is disposed on working surface 32 of the temporary substrate 34. A fixative may be optionally applied to the working surface 32 to facilitate the attachment of the spacer layer 36 to the temporary substrate 34. Superabrasive particles 38 are disposed along one side of the spacer layer 36 opposite to the working surface 32. A fixative may be optionally applied to the spacer layer 36 to hold the superabrasive particles 38 essentially immobile along the spacer layer 36. The fixative used on either surface of the spacer layer may be any adhesive known to one skilled in the art, such as, without limitation, a polyvinyl alcohol (PVA), a polyvinyl butyral (PVB), a polyethylene

glycol (PEG), a pariffin, a phenolic resin, a wax emulsion, an acrylic resin, or combinations thereof. In one aspect, the fixative is a sprayed acrylic glue.

A press 42 may be utilized to apply force to the superabrasive particles 38 in order to dispose the superabrasive particles 38 into the spacer layer 36, as shown in FIG 2. The press 42 may be constructed of any material know to one skilled in the art able to apply force to the superabrasive particles 38. Examples include, without limitation, metals, wood, plastic, rubber, polymers, glass, composites, ceramics, and combinations thereof. Depending on the application, softer materials may provide a benefit over harder materials. For example, if unequal sizes of superabrasive particles are used, a hard press may only push the largest superabrasive particles through the spacer layer 36 to the working surface 32. In one aspect of the present invention, the press 42 is constructed of a porous rubber. A press 42 constructed from a softer material such as a hard rubber, may conform slightly to the shape of the superabrasive particles 38, and thus more effectively push smaller as well as larger superabrasive particles through the spacer layer 36 to the working surface 32.

The spacer layer may be made from any soft, deformable material with a relatively uniform thickness. Examples of useful materials include, but are not limited to, rubbers, plastics, waxes, graphites, clays, tapes, grafoils, metals, powders, and combinations thereof. In one aspect, the spacer layer may be a rolled sheet comprising a metal or other powder and a binder. For example, the metal may be a stainless steel powder and a polyethylene glycol binder. Various binders can be utilized, which are well known to those skilled in the art, such as, but not limited to, a polyvinyl alcohol (PVA), a polyvinyl butyral (PVB), a polyethylene glycol (PEG), a pariffin, a phenolic resin, a wax emulsions, an acrylic resin, and combinations thereof.

In another aspect, shown in FIG. 4, the superabrasive particles 38 may be disposed along the working surface 32 of the temporary substrate 34. An adhesive may be optionally applied to the working surface 32 to hold the superabrasive particles 38 essentially immobile along the temporary substrate 34. A spacer layer 36 may then be applied to the working surface 32 such that the superabrasive particles 38 become disposed therein, as shown in FIG. 2. A press 42 may be utilized to more effectively associate the spacer layer 36 with the working surface 32 and the superabrasive particles 38.

Referring now to FIG. 5, an at least partially uncured organic material 62 may be applied to the spacer layer 36 opposite the working surface 32 of the temporary

substrate 34. A mold 66 may be utilized to contain the uncured organic material 62 during manufacture. Upon curing the organic material 62, an organic material layer 64 is formed, bonding at least a portion of each superabrasive particle 38. A permanent substrate 68 may be coupled to the organic material layer 64 to facilitate its use in dressing a CMP pad. In one aspect, the permanent substrate 68 may be coupled to the organic material layer 64 by means of an appropriate fixative. The coupling may be facilitated by roughing the contact surfaces between the permanent substrate 68 and the organic material layer 64. In another aspect, the permanent substrate 68 may be associated with the organic material 62, and thus become coupled to the organic material layer 64 as a result of curing. The mold 66 and the temporary substrate 34 can subsequently be removed from the CMP pad dresser.

As shown in FIG. 6, the spacer layer has been removed from the organic material layer 64. This may be accomplished by peeling, grinding, sandblasting, scraping, rubbing, abrasion, etc. The distance of the protrusion of the superabrasive particles 38 from the organic material layer 64 will be approximately equal to the thickness of the now removed spacer layer. The organic material layer 64 may be acid etched to further expose the superabrasive particles 38.

One distinction between the various methods of disposing superabrasive particles into the spacer layer may be seen upon removal of the spacer layer. In those aspects where the superabrasive particles are pressed into the spacer layer, the spacer layer material in close proximity to a superabrasive particle will be deflected slightly towards the working surface of the temporary substrate. In other words, the spacer layer material surrounding an individual superabrasive particle may be slightly concave on the side opposite of the working surface due to the superabrasive particle being pushed into the spacer layer. This concave depression will be filled with organic material during the manufacture of the dresser, and thus the organic material will wick up the sides of the superabrasive particle once the organic material layer is cured. For those aspects where the spacer layer is pressed onto the superabrasive particles, the opposite is true. In these cases, the spacer layer material in close proximity to a superabrasive particle will be deflected slightly away from the working surface of the temporary substrate. In other words, the spacer layer material surrounding an individual superabrasive particle may be slightly convex on the side opposite of the working surface due to the spacer layer being forced around the superabrasive particle. This convex protrusion may cause a slight concave depression

in the organic material layer surrounding each superabrasive particle. This slight concave depression may decrease retention, resulting in premature superabrasive grit pullout from the organic material layer. For these aspects, various means of improving retention may be employed by one skilled in the art. For example, the spacer layer may be heated to reduce the slightly convex protrusion of the spacer layer surrounding a superabrasive particle prior to curing the organic material layer. Also, additional organic material may be applied to the slight concave depression in the organic material layer surrounding the superabrasive particle.

The temporary substrate may be made of any material capable of supporting the organic material layer and withstanding the force of the press as described herein. Example materials include glasses, metals, woods, ceramics, polymers, rubbers, plastics, etc. Referring back to FIG. 2, the temporary substrate 34 has a working surface 32 upon which the spacer layer 36 is applied. The working surface 32 can be level, sloped, flat, curved, or any other shape that would be useful in the manufacture of a CMP pad dresser. The working surface 32 may be roughened to improve the orientation of the superabrasive particles 38. When a superabrasive particle is pressed onto a very smooth temporary substrate, it may be more likely that a flat surface of the superabrasive particle will align parallel to the temporary substrate. In this situation, when the spacer layer is removed the flat surface of the superabrasive particle will protrude from the organic material layer. Roughening the surface of the temporary substrate will create pits and valleys that may help to align the superabrasive grit such that the tips of individual superabrasive particle will protrude from the organic material layer.

An alternative aspect of the present invention comprises a method of disposing superabrasive particles in an organic material layer. The method may include providing an organic material arranged as a layer, disposing superabrasive particles on the organic material, pressing the superabrasive particles into the organic material, and curing the organic material to form an organic material layer. FIG. 7 shows a permanent substrate 82 upon which a layer of organic material 84 is applied. Superabrasive particles 86 are disposed along the surface of the layer of organic material 84. A fixative may be utilized to at least partially immobilize the superabrasive particles 86 to the layer of organic material 84. The superabrasive particles 86 may be arranged according to an arrangement by any means known to

one skilled in the art. Figure 7 shows superabrasive particles arranged by means of a template 88.

Turning to FIG. 8, a press 92 may be utilized to dispose the superabrasive particles 86 at least partially into the layer of organic material 84. In one aspect, the superabrasive particles 86 protrude above the layer of organic material 84 to a predetermined height. The layer of organic material 84 is subsequently cured to form a solidified organic material layer. In one aspect the organic material layer is a thermoplastic resin. In this case the thermoplastic can be softened by heating in order to receive the superabrasive particles 86, and subsequently cooled to cure the thermoplastic into a solidified organic material layer. The layer of organic material 84 can be any organic material known to one skilled in the art, with the proviso that the uncured organic material be viscous enough to support the superabrasive particles prior to curing, or another form of physical support for the superabrasive particles be provided.

The following examples present various methods for making the coated superabrasive particles and tools of the present invention. Such examples are illustrative only, and no limitation on present invention is meant thereby.

Examples

Example 1

80/90 mesh diamond particles (MBG-660, Diamond Innovations) are arranged with a template on a 100 mm diameter, 10 mm thick flat base plate. The diamond particles form a grid pattern with an inter-diamond pitch of about 500 microns. The plate is placed at the bottom of a steel mold and covered with a polyimide resin powder. Subsequently, the entire assembly is pressed to 50 MPa pressure and 350° C for 10 minutes. The polyimide consolidated plate is 7 mm thick with nickel coated diamond particles forming a grid on one side. A conventional grinding wheel with silicon carbide grit is used to grind the surface to expose the diamond particles to about 60 microns. The final product is a pad conditioner with uniformly exposed diamonds.

Example 2

The same procedure is followed as Example 1, however a phenolic resin is used in place of the polyimide resin, and the forming temperature is reduced to 200° C.

Example 3

The same procedure is followed as Example 1, however the base plate is precoated with a layer of clay that is about 60 microns thick. After hot pressing, the clay is scraped off, exposing the diamond particles protruding from the polyimide resin layer.

Example 4

The same procedure is followed as Example 1, however the pressed polyimide resin disk is 1 mm thick and is glued on a 420 stainless steel backing to form a pad conditioner.

Example 5

80/90 mesh diamond particles are mixed with an epoxy binder to form a slurry. The slurry is spread over a polyethylene terephthalate (PET) sheet. A blade is used to thin the slurry so that it contains one layer of diamond particles. The epoxy is then cured by an UV light to harden. Subsequently, circular disks are punched out of the epoxy sheet. The disks are glued with an acrylic onto stainless steel substrates with the diamond facing away from the glue. A fine sand paper is used to polish the exposed surface and remove the epoxy until approximately half the height of the diamond particles are exposed. The final product is a pad conditioner with diamond particles securely embedded in an epoxy matrix.

Example 6

80/90 mesh diamond particles are arranged by a template on a PET sheet. Subsequently, an epoxy resin is deposited to cover the single layer of diamond particles. After curing, the PET sheet is punched to form disks. The disks are then glued on stainless steel substrates, and the top surface is then sanded off.

Example 7

A 108 mm diameter plastic sheet is covered on both sides with an adhesive. One side is pressed into a steel mold with a smooth surface that exhibits a slightly concave profile. The slope of the concave profile is about 1/1000. A transition in the concave profile toward the center of the mold functions to avoid a sharp point at the center of the completed tool. About 5 mm from the peripheral edge of the mold the slope increases in order to smoothly transition to the mold edge.

80/90 mesh diamond particles are distributed onto a thin sheet coated with an adhesive that is less tacky than the adhesive coated on the plastic sheet. The diamond particles are arranged on the sheet in a grid having a diamond-to-diamond spacing of

about 700 microns. The diamond particles are then transferred to the plastic sheet in the mold. The mold is then enclosed in a ring mold.

An epoxy is poured into the ring mold until the thickness exceeds about 10 mm. The mold system is enclosed in a vacuum environment (10^{-3} torr) to remove air bubbles during the curing of the epoxy. After hardening, the epoxy layer is removed from the mold and the diamond particles are exposed to about 1/3 of the average diamond size. Excess epoxy is machined away from the back of the epoxy layer opposite to the diamond particles to leave a thickness of about 1 mm. The diamond attached epoxy layer is glued to a stainless steel (410) substrate, with the diamonds facing away from the substrate.

Example 8

An acrylic mold is machined to exhibit a radius with a very gentle dishing having an average tangential slope of no greater than 1/1000. The mold is covered with a double stick adhesive. A nylon sieve with an opening of about 100 microns is pressed against the other side of the adhesive. A stainless steel template with holes larger than one diamond size but smaller than two diamond sizes is placed on the top of the nylon sieve. Diamond particles (80/90 mesh, MBG-660 manufactured by Diamond Innovations) are dispersed over the template. The mold is turned upside down to allow diamonds not stuck in the adhesive to fall out. The remaining diamond particles are stuck to the adhesive but, because of the nylon sieve, the large portions of the diamond particles cannot penetrate though to the adhesive. As a result, the diamond particles are stuck with an edge or a tip in the adhesive.

The acrylic mold is placed in a retaining ring and epoxy resin is mixed and poured over the mold and diamond particles. The mold is placed under vacuum to remove air during curing of the epoxy material. The mold is removed mechanically, and the nylon sieve is removed by using a lathe to trim the surface.

Of course, it is to be understood that the above-described arrangements are only illustrative of the application of the principles of the present invention. Numerous modifications and alternative arrangements may be devised by those skilled in the art without departing from the spirit and scope of the present invention and the appended claims are intended to cover such modifications and arrangements. Thus, while the present invention has been described above with particularity and detail in connection with what is presently deemed to be the most practical and preferred embodiments of the invention, it will be apparent to those of ordinary skill

in the art that numerous modifications, including, but not limited to, variations in size, materials, shape, form, function and manner of operation, assembly and use may be made without departing from the principles and concepts set forth herein.

CLAIMS

What is claimed is:

1. A method of improving retention of superabrasive particles held in a solidified organic material layer of an abrading tool, a portion of each of said superabrasive particles protruding out of the solidified organic material layer, comprising:

securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece.

2. The method of claim 1, wherein the arrangement of the plurality of superabrasive particles is configured to uniformly distribute drag forces across substantially each superabrasive particle.

3. The method of claim 1, wherein a majority of the plurality of superabrasive particles protrudes to a predetermined height above the solidified organic material layer.

4. The method of claim 3, wherein the predetermined height produces a cutting depth of less than about 20 microns when used to abrade a work piece.

5. The method of claim 3, wherein the predetermined height produces a cutting depth of from about 1 micron to about 20 microns when used to abrade a work piece.

6. The method of claim 3, wherein the predetermined height produces a cutting depth of from about 10 micron to about 20 microns when used to abrade a work piece.

7. The method of claim 3, wherein the superabrasive particles protrude to a predetermined height that is along a designated profile.

8. The method of claim 7, wherein the designated profile is a plane.

9. The method of claim 7, wherein the designated profile has a slope.

10. The method of claim 7, wherein the designated profile has a curved shape.

11. The method of claim 10, wherein the designated profile has a dome shape.

12. The method of claim 7, wherein a majority of the plurality of superabrasive particles are arranged such that their tips vary from the designated profile to less than about 10% of the average size of the superabrasive particles.

13. The method of claim 3, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 40 microns.

14. The method of claim 3, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 30 microns.

15. The method of claim 3, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to about 20 microns.

16. The method of claim 1, wherein the plurality of superabrasive particles are of substantially the same size.

17. The method of claim 1, wherein the plurality of superabrasive particle are from about 30 microns to about 500 microns in size.

18. The method of claim 1, wherein the plurality of superabrasive particles are from about 100 microns to about 200 microns in size.

19. The method of claim 1, wherein superabrasive particles in a central location of the abrading tool are smaller in size than superabrasive particles in a peripheral location on the abrading tool.

20. The method of claim 1, wherein securing the plurality of superabrasive particles includes arranging the plurality of superabrasive particles according to a predetermined attitude.

21. The method of claim 20, wherein the predetermined attitude is a uniform attitude across substantially all of the plurality of superabrasive particles.

22. The method of claim 20, wherein the plurality of superabrasive particles are substantially configured with an apex portion oriented towards a work piece.

23. The method of claim 20, wherein superabrasive particles in a central location on the abrading tool are configured with an apex or an edge portion oriented towards a work piece, and superabrasive particles in a peripheral location on the abrading tool are configured with a face portion oriented towards the work piece.

24. The method of claim 1, wherein the plurality of superabrasive particles are arranged as a grid.

25. The method of claim 24, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 3 times to about 5 times the average size of the superabrasive particles.

26. The method of claim 24, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 100 microns to about 800 microns.

27. The method of claim 20, wherein arranging the superabrasive particles according to a predetermined attitude further comprises:

applying an adhesive to a substrate;

applying a flexible sieve to the adhesive;

disposing superabrasive particles across a template positioned on the flexible sieve such that a portion of the superabrasive particles adhere to the adhesive by either an edge or an apex portion; and

removing the template and the un-adhered superabrasive particles from the flexible sieve.

28. The method of claim 27, wherein the flexible sieve is a nylon sieve.

29. The method of claim 1, wherein superabrasive particles in a central location on the abrading tool are spaced farther apart than superabrasive particles in a peripheral location on the abrading tool.

30. A superabrasive tool having improved superabrasive particle retention, comprising:

a solidified organic material layer; and

a plurality of superabrasive particles secured in the solidified organic material layer in an arrangement as recited in claim 1.

31. The tool of claim 30, wherein each of the plurality of superabrasive particles protrudes to a predetermined height above the solidified organic material layer.

32. The tool of claim 31, wherein the predetermined height is greater than about 20 microns.

33. The tool of claim 31, wherein variation from the predetermined height is from about 1 micron to about 20 microns.

34. The tool of claim 31, wherein variation from the predetermined height is from about 5 microns to about 20 microns.

35. The tool of claim 31, wherein variation from the predetermined height is from about 10 microns to about 20 microns.

36. The tool of claim 31, wherein the plurality of superabrasive particles protrude to a predetermined height is along a designated profile.

37. The tool of claim 36, wherein the designated profile is a plane.

38. The tool of claim 36, wherein the designated profile has an average slope from a high point near a center location of the tool to a low point near a peripheral edge of the tool.

39. The tool of claim 38, wherein the average slope is about 1/1000.

40. The tool of claim 36, wherein the designated profile has a curved shape.

41. The tool of claim 31, wherein the plurality of superabrasive particles are arranged such that their tips protrude to about 10% of the average size of the superabrasive particles.

42. The tool of claim 31, wherein the plurality of superabrasive particles are arranged such that their tips protrude from about 20 to about 30 microns.

43. The tool of claim 30, wherein the arrangement is a grid.

44. The tool of claim 43, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 3 times to about 5 times the average size of the superabrasive particles.

45. The tool of claim 43, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 100 microns to 800 microns.

46. The tool of claim 30, wherein superabrasive particles in a central location on the tool are spaced farther apart than superabrasive particles in a peripheral location on the tool.

47. The tool of claim 30, wherein superabrasive particles in a central location on the tool are larger in size than superabrasive particles in a peripheral location on the tool.

48. The tool of claim 30, wherein the plurality of superabrasive particles are arranged according to a predetermined attitude.

49. The tool of claim 48, wherein the plurality of superabrasive particles are substantially configured with an apex portion oriented towards a work piece.

50. The tool of claim 48, wherein superabrasive particles in a central location on the tool are configured with an apex or an edge portion oriented towards a work piece, and superabrasive particles in a peripheral location on the tool are configured with a face portion oriented towards the work piece.

51. The tool of claim 30, wherein the plurality of superabrasive particles include a member selected from the group consisting of diamond, polycrystalline diamond, cubic boron nitride, polycrystalline cubic boron nitride, and combinations thereof.

52. The tool of claim 51, wherein the plurality of superabrasive particles includes diamond.

53. The tool of claim 30, wherein the plurality of superabrasive particles are from about 30 microns to about 500 microns in size.

54. The tool of claim 53, wherein the plurality of superabrasive particles are from about 100 microns to about 200 microns in size.

55. The tool of claim 30, wherein the solidified organic material layer comprises a member selected from the group consisting of amino resins, acrylate resins, alkyd resins, polyester resins, polyamide resins, polyimide resins, polyurethane resins, phenolic resins, phenolic/latex resins, epoxy resins, isocyanate resins, isocyanurate resins, polysiloxane resins, reactive vinyl resins, polyethylene resins, polypropylene resins, polystyrene resins, phenoxy resins, perylene resins, polysulfone resins, acrylonitrile-butadiene-styrene resins, acrylic resins, polycarbonate resins, polyimide resins, and mixtures thereof..

56. The tool of claim 55, wherein the solidified organic material layer is an epoxy resin.

57. The tool of claim 55, wherein the solidified organic material layer is a polyurethane resin.

58. The tool of claim 55, wherein the solidified organic material layer is a polyimide resin.

59. The tool of claim 30, further comprising a reinforcing material disposed within at least a portion of the solidified organic material layer.

60. The tool of claim 59, wherein the reinforcing material is a material selected from the group consisting of ceramics, metals, or combinations thereof.

61. The tool of claim 60, wherein the reinforcing material is a ceramic.

62. The tool of claim 61, wherein the ceramic comprises a member selected from the group consisting of alumina, aluminum carbide, tungsten carbide, silica, silicon carbide, silicon nitride, zirconia, zirconium carbide, and mixtures thereof.

63. The tool of claim 59, wherein the reinforcing material is an organometallic coupling agent.

64. The tool of claim 30, wherein the tool is a polishing or grinding pad.

65. The tool of claim 30, wherein the tool is a CMP pad dresser.

66. The tool of claim 30, wherein the tool is for shaping dental materials.

ABSTRACT

Superabrasive tools and their methods of manufacture are disclosed. In one aspect, a method of improving retention of superabrasive particles held in a solidified organic material layer of an abrading tool, a portion of each of said superabrasive particles protruding out of the solidified organic material layer is provided. The method may include securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece. As an example, the arrangement of the plurality of superabrasive particles may be configured to uniformly distribute frictional forces across substantially each superabrasive particle.

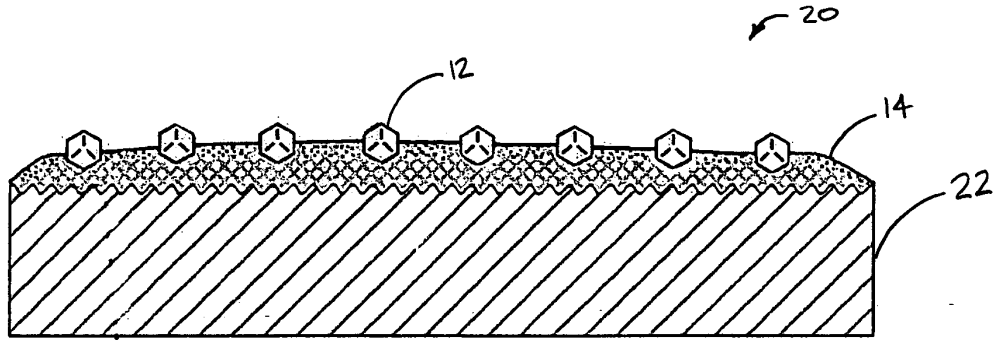


FIG. 1

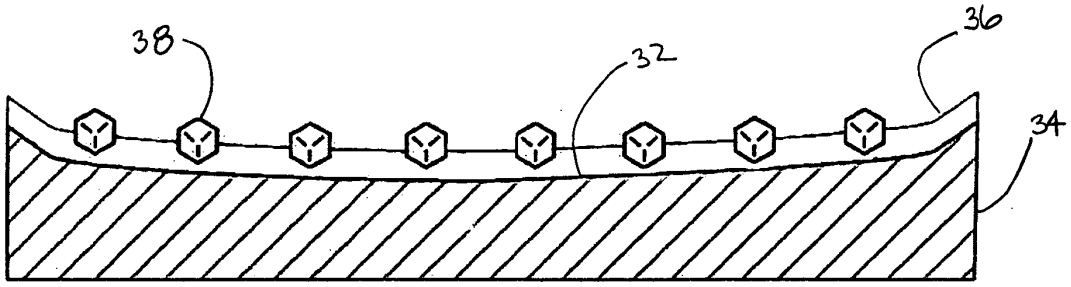


FIG. 2

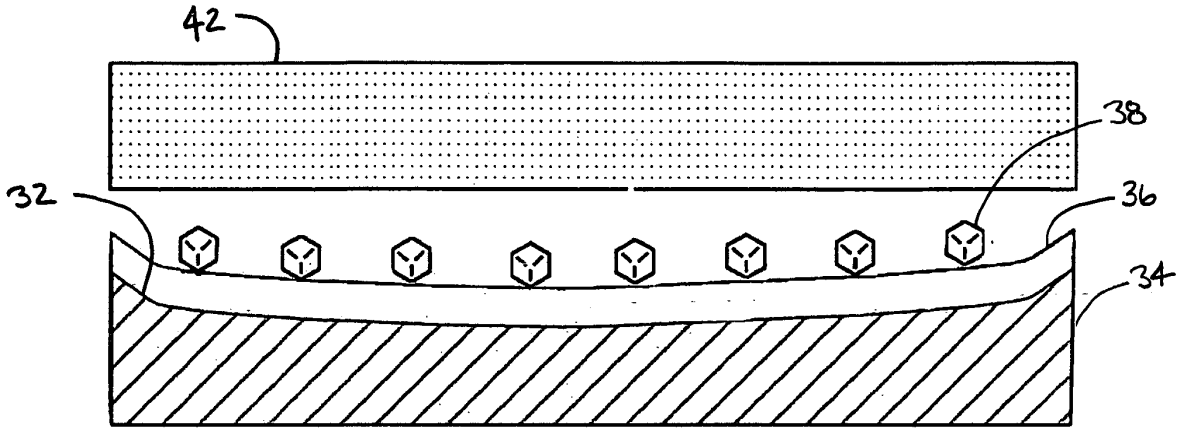


FIG. 3

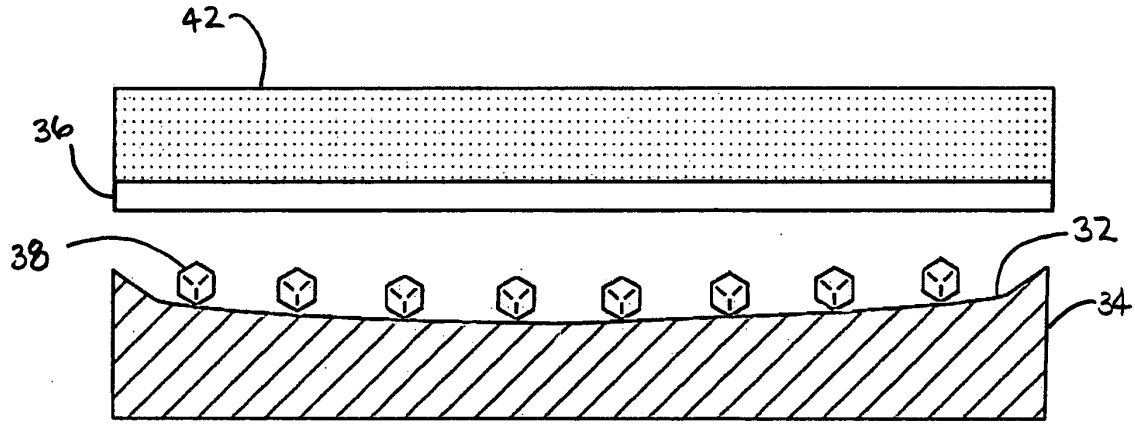


FIG. 4

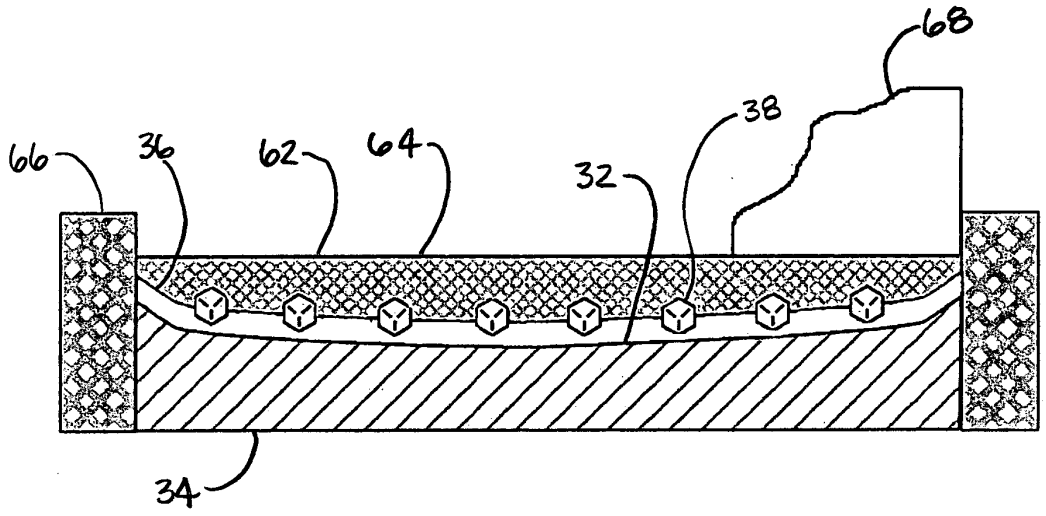


FIG. 5

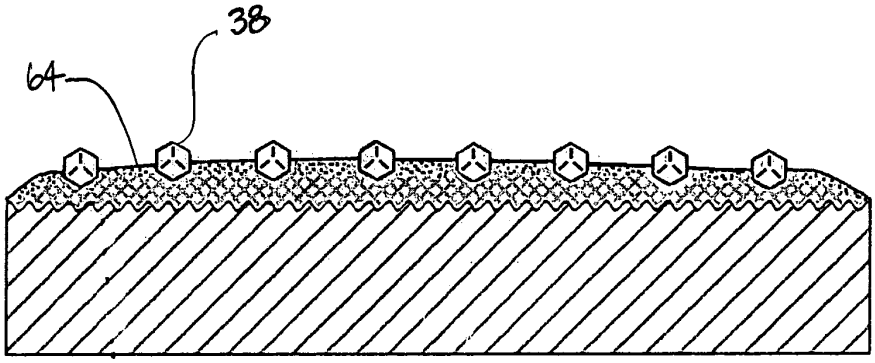


FIG. 6

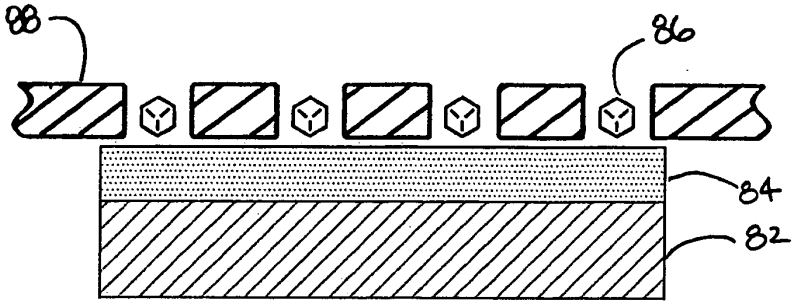


FIG. 7

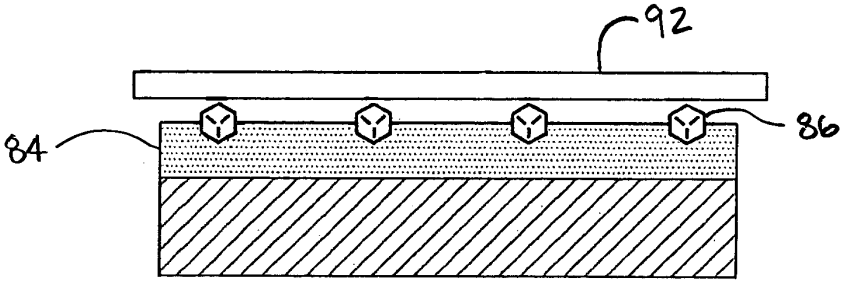


FIG. 8

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

ART UNIT:

EXAMINER:

APPLICANT: Chien-Min Sung

SERIAL NO.:

FILED: 9/9/05

CONFRM. NO.:

FOR: METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX

ATTORNEY DOCKET NO. 25023

NONPUBLICATION REQUEST UNDER 35 U.S.C. 122(b)(2)(B)(i)

CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.10

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Sir/Madam:

I hereby certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral agreement, that requires publication at eighteen months after filing.

I hereby request that the attached application not be published under 35 U.S.C. 122(b).

Dated this 9th day of September, 2005.

Respectfully submitted,

David W. Osborne
Attorney for Applicant
Registration No. 44,989

THORPE NORTH & WESTERN, LLP
Customer No. 20,551
P.O. Box 1219
Sandy, Utah 84091-1219
Telephone: (801) 566-6633

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PATENT APPLICATION FEE DETERMINATION RECORD
Substitute for Form PTO-875

Application or Docket Number: 11223786

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))							300
SEARCH FEE (37 CFR 1.16(k), (i), or (m))							500
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))							200
TOTAL CLAIMS (37 CFR 1.16(i))	66 minus 20 =	* 46	X$ 25		OR	X$50	2300
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1 minus 3 =	*	X$100			X$200	
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR						
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))			N/A			N/A	
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	3300

APPLICATION AS AMENDED – PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDI-TIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDI-TIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X =		OR	X =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X =		OR	X =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					N/A		OR	N/A	
					TOTAL ADD'T FEE		OR	TOTAL ADD'T FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDI-TIONAL FEE ($)	OR	RATE ($)	ADDI-TIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X =		OR	X =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X =		OR	X =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					N/A		OR	N/A	
					TOTAL ADD'T FEE		OR	TOTAL ADD'T FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
11/223,786	09/09/2005	Chien-Min Sung	25023

CONFIRMATION NO. 8266

FORMALITIES LETTER

20551
THORPE NORTH & WESTERN, LLP.
8180 SOUTH 700 EAST, SUITE 200
P.O. BOX 1219
SANDY, UT 84070

Date Mailed: 09/27/2005

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
  Applicant must submit $ **300** *to complete the basic filing fee for a non-small entity. If appropriate, applicant may make a written assertion of entitlement to small entity status and pay the small entity filing fee (37 CFR 1.27).*
- The oath or declaration is missing. *A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.*
  Note: If a petition under 37 CFR 1.47 is being filed, an oath or declaration in compliance with 37 CFR 1.63 signed by all available joint inventors, or if no inventor is available by a party with sufficient proprietary interest, is required.

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- Additional claim fees of $**2300** as a non-small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.
- To avoid abandonment, a surcharge (for late submission of filing fee, search fee, examination fee or oath or declaration) as set forth in 37 CFR 1.16(f) of $130 for a non-small entity, must be submitted with the missing items identified in this letter.

SUMMARY OF FEES DUE:

Total additional fee(s) required for this application is $**3430** for a Large Entity

- **$300** Statutory basic filing fee.
- **$130** Surcharge.

- The application search fee has not been paid. Applicant must submit **$500** to complete the search fee.
- The application examination fee has not been paid. Applicant must submit **$200** to complete the examination fee for a large entity

- Total additional claim fee(s) for this application is **$2300**

  - **$2300** for **46** total claims over 20.

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APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
11/223,786	09/09/2005	Chien-Min Sung	25023

CONFIRMATION NO. 8266

FORMALITIES LETTER

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SANDY, UT 84070

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11/21/2005 MBERHE 00000047 11223786

01 FC:1011 300.00 OP
02 FC:1111 500.00 OP
03 FC:1311 200.00 OP
04 FC:1051 130.00 OP
05 FC:1202 2300.00 OP

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

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  Applicant must submit $ **300** *to complete the basic filing fee for a non-small entity. If appropriate, applicant may make a written assertion of entitlement to small entity status and pay the small entity filing fee (37 CFR 1.27).*
- The oath or declaration is missing. *A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.*
  Note: If a petition under 37 CFR 1.47 is being filed, an oath or declaration in compliance with 37 CFR 1.63 signed by all available joint inventors, or if no inventor is available by a party with sufficient proprietary interest, is required.

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

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- To avoid abandonment, a surcharge (for late submission of filing fee, search fee, examination fee or oath or declaration) as set forth in 37 CFR 1.16(f) of $130 for a non-small entity, must be submitted with the missing items identified in this letter.

SUMMARY OF FEES DUE:

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- The application examination fee has not been paid. Applicant must submit **$200** to complete the examination fee for a large entity

- Total additional claim fee(s) for this application is **$2300**

  - **$2300** for **46** total claims over 20.

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Total Number of Pages in This Submission: 6

Application Number	11/223,786
Filing Date	09/09/2005
First Named Inventor	Chien-Min Sung
Art Unit	3723
Examiner Name	Unknown
Attorney Docket Number	25023

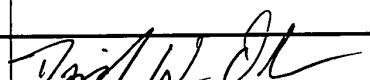
ENCLOSURES *(Check all that apply)*

- [✓] Fee Transmittal Form
- [✓] Fee Attached
- [ ] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [ ] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [✓] Reply to Missing Parts/ Incomplete Application
  - [✓] Reply to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) _____
  - [ ] Landscape Table on CD
- [ ] After Allowance Communication to TC
- [ ] Appeal Communication to Board of Appeals and Interferences
- [ ] Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- [ ] Proprietary Information
- [ ] Status Letter
- [✓] Other Enclosure(s) (please Identify below):

Declaration, Power of Attorney & Petition

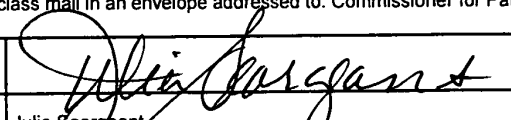
Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name			
Signature			
Printed name	David W. Osborne		
Date	11/15/2005	Reg. No.	44,989

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below:

Signature			
Typed or printed name	Julia Sergeant	Date	11/15/2005

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and1.14. This collection is estimated to 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

OIPE IAP65 NOV 18 2005 PATENT & TRADEMARK OFFICE

PTO/SB/17 (12-04v2)
Approved for use through 07/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Effective on 12/08/2004.
Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

FEE TRANSMITTAL
For FY 2005

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT	($)	3,430.00

Complete if Known	
Application Number	11/223,786
Filing Date	09/09/2005
First Named Inventor	Chien-Min Sung
Examiner Name	Unknown
Art Unit	3723
Attorney Docket No.	25023

METHOD OF PAYMENT (check all that apply)

☑ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____

☑ Deposit Account Deposit Account Number: 20-0100 Deposit Account Name: Thorpe North & Western

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☐ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, **except for the filing fee**

☑ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☑ Credit any overpayments

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

Application Type	FILING FEES Fee ($)	FILING FEES Small Entity Fee ($)	SEARCH FEES Fee ($)	SEARCH FEES Small Entity Fee ($)	EXAMINATION FEES Fee ($)	EXAMINATION FEES Small Entity Fee ($)	Fees Paid ($)
Utility	300	150	500	250	200	100	1,000.00
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee ($)	Small Entity Fee ($)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

Total Claims	Extra Claims	Fee ($)	Fee Paid ($)
66 - 20 or HP =	46	x 50	= 2,300.00

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims	Extra Claims	Fee ($)	Fee Paid ($)
_____ - 3 or HP =	_____	x _____	= _____

HP = highest number of independent claims paid for, if greater than 3.

Multiple Dependent Claims Fee ($)	Fee Paid ($)
_____	_____

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee ($)	Fee Paid ($)
_____ - 100 =	_____ / 50 =	_____ (round up to a whole number)	x _____	= _____

4. OTHER FEE(S)

	Fees Paid ($)
Non-English Specification, $130 fee (no small entity discount)	
Other (e.g., late filing surcharge): late filing surcharge	130.00

SUBMITTED BY

Signature		Registration No. (Attorney/Agent) 44,989	Telephone (801) 566-6633
Name (Print/Type)	David W. Osborne		Date 11/15/2005

This collection of information is required by 37 CFR 1.136. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

BEST AVAILABLE COPY

OIPE IAP65 NOV 18 2005 PATENT & TRADEMARK OFFICE

DECLARATION, POWER OF ATTORNEY AND PETITION

As a below named inventor, I hereby declare: that my residence, post office address, and citizenship are as stated below next to my name; that I verily believe I am the original, first, and sole inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX, the specification of which was filed on September 9, 2005, as THORPE NORTH & WESTERN, LLP Docket No. 25023, and given United States Application No. 11/223,786; that I have reviewed and understand the contents of the above-identified specification, including the claims; and that I acknowledge the duty to disclose information which is material to patentability as defined in § 1.56(a) of Title 37 of the Code of Federal Regulations.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful, false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of Title 18 of the United States Code, and that such willful, false statements may jeopardize the validity of the application or any patent issuing thereon..

I hereby appoint as its attorneys and/or agents all registered patent practitioners/attorneys associated with Customer Number 20,551; all with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

BEST AVAILABLE COPY

All correspondence concerning this application should be directed to **David W. Osborne** at the address associated with the above-mentioned Customer Number. (Even though an attorney is listed, please associate the above-mentioned Customer Number with this case.).

Wherefore, I pray that Letters Patent be granted to me for the invention or discovery described and claimed in the foregoing specification and claims, declaration, power of attorney, and this petition.

Signed at Taipei Taiwan, this 1 day of November, 2005.

INVENTOR:

Chien-Min Sung

Residence: (City, State): Taipei County, Taiwan
Citizenship: United States of America
Post Office Address: 64 Chung-San Rd, Ying-Ko Factory
Taipei County, Taiwan 23911
ROC

OIPE IAP65
NOV 18 2005
PATENT & TRADEMARK OFFICE

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
11/223,786	09/09/2005	Chien-Min Sung	25023

CONFIRMATION NO. 8266

FORMALITIES LETTER

20551
THORPE NORTH & WESTERN, LLP.
8180 SOUTH 700 EAST, SUITE 200
P.O. BOX 1219
SANDY, UT 84070

Date Mailed: 09/27/2005

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

11/21/2005 MBERHE 00000047 11223786

01 FC:1011	300.00 OP
02 FC:1111	500.00 OP
03 FC:1311	200.00 OP
04 FC:1051	130.00 OP
05 FC:1202	2300.00 OP

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The statutory basic filing fee is missing.
  Applicant must submit $ **300** *to complete the basic filing fee for a non-small entity. If appropriate, applicant may make a written assertion of entitlement to small entity status and pay the small entity filing fee (37 CFR 1.27).*
- The oath or declaration is missing. *A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.*
  Note: If a petition under 37 CFR 1.47 is being filed, an oath or declaration in compliance with 37 CFR 1.63 signed by all available joint inventors, or if no inventor is available by a party with sufficient proprietary interest, is required.

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- Additional claim fees of $**2300** as a non-small entity, including any required multiple dependent claim fee, are required. Applicant must submit the additional claim fees or cancel the additional claims for which fees are due.
- To avoid abandonment, a surcharge (for late submission of filing fee, search fee, examination fee or oath or declaration) as set forth in 37 CFR 1.16(f) of $130 for a non-small entity, must be submitted with the missing items identified in this letter.

SUMMARY OF FEES DUE:

Total additional fee(s) required for this application is $**3430** for a Large Entity

- **$300** Statutory basic filing fee.
- **$130** Surcharge.

- The application search fee has not been paid. Applicant must submit **$500** to complete the search fee.
- The application examination fee has not been paid. Applicant must submit **$200** to complete the examination fee for a large entity

- Total additional claim fee(s) for this application is **$2300**

  - **$2300** for **46** total claims over 20.

Replies should be mailed to: Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

A copy of this notice MUST be returned with the reply.

Office of Initial Patent Examination (571) 272-4000, or 1-800-PTO-9199, or 1-800-972-6382
PART 2 - COPY TO BE RETURNED WITH RESPONSE

OIPE IAP65 NOV 18 2005 PATENT & TRADEMARK OFFICE

PTO/SB/21 (09-04)
Approved for use through 07/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission: 6

Application Number	11/223,786
Filing Date	09/09/2005
First Named Inventor	Chien-Min Sung
Art Unit	3723
Examiner Name	Unknown
Attorney Docket Number	25023

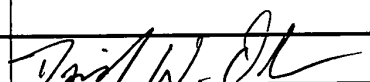
ENCLOSURES *(Check all that apply)*

- [x] Fee Transmittal Form
- [x] Fee Attached
- [ ] Amendment/Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [ ] Extension of Time Request
- [ ] Express Abandonment Request
- [ ] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [x] Reply to Missing Parts/ Incomplete Application
  - [x] Reply to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Drawing(s)
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
- [ ] Terminal Disclaimer
- [ ] Request for Refund
- [ ] CD, Number of CD(s) _____
  - [ ] Landscape Table on CD
- [ ] After Allowance Communication to TC
- [ ] Appeal Communication to Board of Appeals and Interferences
- [ ] Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- [ ] Proprietary Information
- [ ] Status Letter
- [x] Other Enclosure(s) (please Identify below):

Declaration, Power of Attorney & Petition

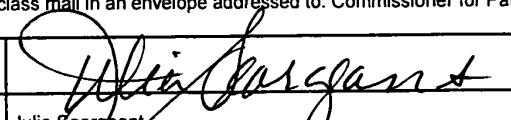
Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name			
Signature			
Printed name	David W. Osborne		
Date	11/15/2005	Reg. No.	44,989

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below:

Signature			
Typed or printed name	Julia Sergeant	Date	11/15/2005

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and1.14. This collection is estimated to 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

OIPE IAP65 NOV 18 2005 PATENT & TRADEMARK OFFICE

PTO/SB/17 (12-04v2)
Approved for use through 07/31/2006. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Effective on 12/08/2004.
Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

FEE TRANSMITTAL
For FY 2005

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT	($)	3,430.00

Complete if Known	
Application Number	11/223,786
Filing Date	09/09/2005
First Named Inventor	Chien-Min Sung
Examiner Name	Unknown
Art Unit	3723
Attorney Docket No.	25023

METHOD OF PAYMENT (check all that apply)

☑ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): _____

☑ Deposit Account Deposit Account Number: 20-0100 Deposit Account Name: Thorpe North & Western

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☐ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, **except for the filing fee**

☑ Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 ☑ Credit any overpayments

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

Application Type	FILING FEES Fee ($)	FILING FEES Small Entity Fee ($)	SEARCH FEES Fee ($)	SEARCH FEES Small Entity Fee ($)	EXAMINATION FEES Fee ($)	EXAMINATION FEES Small Entity Fee ($)	Fees Paid ($)
Utility	300	150	500	250	200	100	1,000.00
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee ($)	Small Entity Fee ($)
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

Total Claims	Extra Claims	Fee ($)	Fee Paid ($)
66 - 20 or HP =	46	x 50	= 2,300.00

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims	Extra Claims	Fee ($)	Fee Paid ($)
_____ - 3 or HP =	_____	x _____	= _____

HP = highest number of independent claims paid for, if greater than 3.

Multiple Dependent Claims Fee ($)	Fee Paid ($)
_____	_____

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets	Extra Sheets	Number of each additional 50 or fraction thereof	Fee ($)	Fee Paid ($)
_____ - 100 =	_____	/ 50 = _____ (round up to a whole number)	x _____	= _____

4. OTHER FEE(S)

	Fees Paid ($)
Non-English Specification, $130 fee (no small entity discount)	
Other (e.g., late filing surcharge): late filing surcharge	130.00

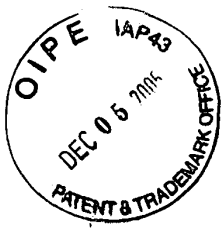
SUBMITTED BY

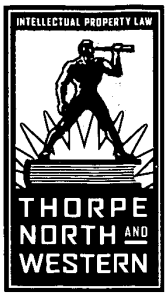
Signature		Registration No. (Attorney/Agent) 44,989	Telephone (801) 566-6633
Name (Print/Type)	David W. Osborne		Date 11/15/2005

This collection of information is required by 37 CFR 1.136. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

JPW





M. Wayne Western
Registered Patent Attorney
western@tnw.com

David W. Osborne
Registered Patent Attorney
osborne@tnw.com

Todd B. Alder, Ph.D.
Registered Patent Attorney
alder@tnw.com

December 1, 2005

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

TRANSMITTAL OF INFORMATION DISCLOSURE STATEMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Re: U.S. Patent Application No. 11/223,786 filed 9/9/2005
Applicant: Chien-Min Sung
Title: **METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX**
Group Art Unit: 3723
Attorney Docket No. 25023

Sir/Madam:

Transmitted herewith for filing and pursuant to 37 C.F.R. §§ 1.56 and 1.97 is an Information Disclosure Statement. Enclosed also are the following designated documents, as required under 37 C.F.R. §§ 1.97 and 1.98:

☒ Form **PTO/SB/08A** list of 7 references submitted for consideration.

☐ Legible copies of the listed references or their relevant portions.

☒ Legible copies of the listed non-patent documents and foreign documents or their relevant portions are included.

☒ Copies of U.S. patents and/or publications are not included pursuant to the Official Gazette Notice, dated Aug. 5, 2003, waiving the requirement of 37 C.F.R. 1.98(a)(2)(i).

☐ All English translations of each non-English reference, if any, within the possession, custody, control or availability of anyone designated in 37 C.F.R. § 1.56(c) (see 37 C.F.R. § 1.98(c)).

The following are included within the Information Disclosure Statement if applicable and as required under 37 C.F.R. § 1.98:

☐ Concise explanation of relevance of each reference not in English and unaccompanied by an English translation.

☐ Statement that certain listed references not enclosed are substantially cumulative of an enclosed reference.

☐ Statement that certain listed references not enclosed were previously cited by or submitted to the Office in prior application no. , filed on _____, which is relied upon for an earlier filing date under 35 U.S.C. § 120.

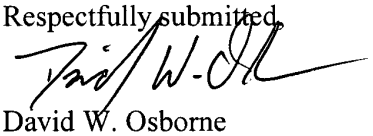
In order to secure consideration of the items designated above, one or more of the following, if required, is also enclosed:

☐ Statement under 37 C.F.R. § 1.97(e)(1) or (2).

☐ Check No. _____, which includes the amount of $180.00 (amount in § 1.17(p)) constituting the submission fee set forth in 37 C.F.R. § 1.17(p).

In the event that 37 C.F.R. § 1.97(c) applies and the Examiner is not satisfied that the Statement meets the requirements of 37 C.F.R. § 1.97(e), or in any other event remediable by a fee, please credit any over payment or charge any additional fees to Deposit Account No. 20-0100 of the undersigned.

Respectfully submitted,



David W. Osborne
Attorney for Applicant
Registration No. 44,989

THORPE NORTH & WESTERN, LLP
Customer No. 20,551
P.O. Box 1219
Sandy, Utah 84091-1219
Telephone: (801) 566-6633

TBA
MWW/DWO/TBA/jmw

OIPE IAP43 DEC 05 2005 PATENT & TRADEMARK OFFICE

PATENT APPLICATION
ATTORNEY DOCKET NO. 25023

IN THE UNITED STATES PATENT & TRADEMARKS OFFICE

ART UNIT: 3723

EXAMINER:

APPLICANT: CHIEN-MIN SUNG

SERIAL NO.: 11/223,786

FILED: 9/9/2005

CONFRM. NO.: 8266

FOR: METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX

CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8

DATE OF DEPOSIT: 12/1/05

I hereby certify that this paper or fee (along with any paper or fee referred to as being attached or enclosed) is being deposited with the United States Postal Service with sufficient postage on the date indicated above and is addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Judy Wzgra

INFORMATION DISCLOSURE STATEMENT UNDER 37 C.F.R. § 1.97

Mail Stop Amendment
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Sir/Madam:

Please find, pursuant to 37 C.F.R. § 1.98(a)(1), the enclosed Form **PTO/SB/08A** which contains a list of all patents, publications, or other items that have come to the attention of one or more of the individuals designated in 37 C.F.R. § 1.56(c). Applicant respectfully submits that this Information Disclosure Statement is filed pursuant to:

☒ 37 C.F.R. § 1.97 (b)(1) or (3), within three months of the filing date of the application, or before a first office action on the merits, whichever occurs last;

☐ 37 C.F.R. § 1.97 (c), after a first office action on the merits, but before a Final Office Action or a Notice of Allowance, whichever occurs first, and is accompanied by either 1) a statement in accordance with 37 C.F.R. § 1.97(e), or 2) the fee set forth in§1.17(p); or

☐ 37 C.F.R. § 1.97 (d), after a Final Office Action or Notice of Allowance, whichever occurs first, but on or before payment of the issue fee, and is accompanied by both 1) a statement in accordance with 37 C.F.R. § 1.97(e), and 2) the fee set forth in§1.17(p).

While no representation is made that any of these references may be "prior art" within the meaning of that term in accordance with 35 U.S.C. §§ 102 or 103, the enclosed list of references is disclosed so as to comply with the duty of disclosure set forth in 37 C.F.R. § 1.56.

Moreover, while no representation is made that a specific search of office files or patent office records has been conducted or that no better art exists, the undersigned attorney of record believes that the references listed, together with any other references which may have been previously submitted or listed, are the closest to the claimed invention (taken in its entirety) of which the undersigned is presently

aware, and no art which is closer to the claimed invention (taken in its entirety) has been knowingly withheld.

☐ A legible copy of each listed U.S. Patent or publication (or relevant portion thereof) which was not previously submitted to, or cited by, the Patent Office is enclosed pursuant to 37 C.F.R. §§ 1.97 and 1.98.

☒ A legible copy of each of the listed non-patent literature and foreign documents or their relevant portions is enclosed.

☒ Copies of cited U.S. patents and/or publications are NOT enclosed pursuant to the Official Gazette Notice, dated Aug. 5, 2003, waiving the requirement of 37 C.F.R. § 1.98(a)(2)(i).

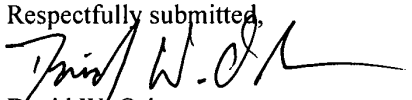
☐ Copies of the references listed in the accompanying Form PTO/SB/08A AND PTO/SB/O8B are NOT enclosed because, under 37 C.F.R. § 1.98(d), they were previously cited by or submitted to the Office in application number , which is relied upon for an earlier filing date under 35 U.S.C. § 120.

For all listed references that are not either in the English language, or accompanied by a translation into English, a concise explanation of relevance as required under 37 C.F.R. § 1.98(a)(3) is enclosed attached to each.

The Commissioner is hereby authorized to charge any additional fees associated with this communication or to credit any overpayment to Deposit Account No. 20-0100.

Dated this 1 day of December, 2005.

Respectfully submitted,



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Enclosure

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PTO/SB/08A (08-03)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
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First Named Inventor	Chien-Min Sung
Art Unit	3723
Examiner Name	
Attorney Docket Number	25023

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 4,925,457	05-15-1990	deKok et al.	
		US- 5,049,165	09-17-1991	Tselesin	
		US- 5,380,390	01-10-1995	Tselesin	
		US- 6,346,202	02-12-2002	Molnar	
		US- 2002-0042200	04-11-2002	Fawcett	
		US- 2005-0118939	06-02-2005	Duescher	
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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]- Number[4] – Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
		WO 2004/094106	11-04-2004	INTEL CORPORATION		

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1]Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentially is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

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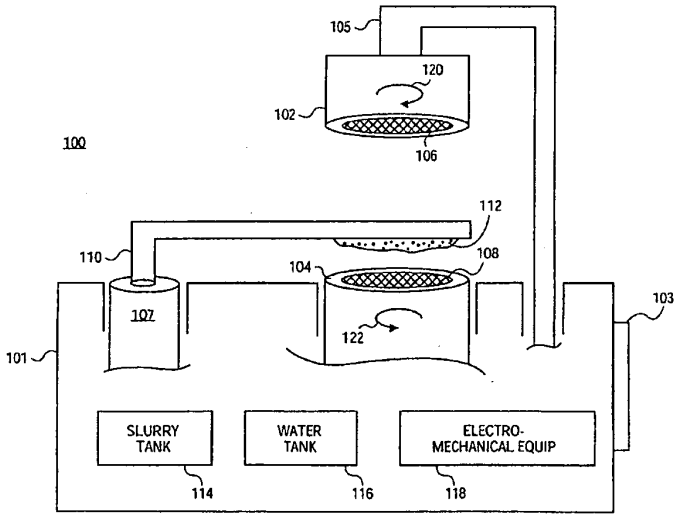
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: DIAMOND CONDITIONING OF SOFT CHEMICAL MECHANICAL PLANARIZATION/POLISHING (CMP) POLISHING PADS



(57) Abstract: Conditioning of chemical mechanical planarization (CMP) using conventional diamond-embedded abrasive strips are well suited to condition conventional "hard" polishing but not soft polishing pads because the diamonds not only remove waste material, but they also damage the polishing surface of the pad. Embodiments of the present invention condition soft polishing pads using diamond strips without damaging the soft polishing pad (108).

WO 2004/094106 A1

DIAMOND CONDITIONING OF SOFT CHEMICAL MECHANICAL PLANARIZATION/POLISHING (CMP) POLISHING PADS

BACKGROUND

1. Field

[0001] Embodiments of the present invention relate to chemical mechanical planarization/polishing (CMP) and, in particular, to conditioning of CMP polishing pads.

2. Discussion of Related Art

[0002] Chemical mechanical planarization/polishing (CMP) is a process technology first developed in the mid-1980s to enable production of integrated circuits on substrates or wafers. CMP processes are used prepare wafers and to fabricate semiconductor devices or structures on the wafers. A CMP process may be used to planarize (*i.e.*, make flat) a semiconductor layer on a wafer, an insulating layer on the semiconductor layer, and a conductive layer on the insulating layer in predetermined patterns.

[0003] A typical CMP system includes a wafer carrier and a platen mounted in a housing. A polishing pad is secured to the platen and the wafer to be polished is secured in the wafer carrier. A typical CMP process operates as follows. The wafer carrier rotates the wafer and/or the platen rotates the polishing pad. Chemical slurry is applied to the surface of the polishing pad and the wafer is brought into contact with the polishing pad and is polished (or planarized). The combination of applying the chemical slurry and the mechanical rotation leads to the term "chemical-mechanical planarization."

[0004] As the wafer is polished, the chemical slurry and materials removed from the wafer tend to glaze the surface of the polishing pad, making the polishing pad slick and reducing the polishing rate and efficiency. It is thus important that the polishing pad surface be clean and free of surface irregularities. The process of cleaning the polishing pad is sometimes referred to a "conditioning" or "refreshing."

[0005] One method of conditioning polishing pads is to abrade them with a conventional diamond-embedded abrasive disk or strip. Although conventional diamond-embedded abrasive strips are well suited to condition "hard" polishing pads used for rough polishing,

they are not well suited to condition "soft" polishing pads used for fine polishing. When a soft polishing pad is conditioned with a diamond-embedded abrasive disk, the diamonds not only remove waste material, but they also damage the polishing surface of the pad.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] In the drawings, like reference numbers generally indicate identical, functionally similar, and/or structurally equivalent elements. The drawing in which an element first appears is indicated by the leftmost digit(s) in the reference number, in which:

[0007] Figure 1 is schematic diagram of a chemical mechanical planarization/polishing (CMP) polishing system according to an embodiment of the present invention;

[0008] Figure 2 is a flowchart illustrating a process performed by a CMP polishing system in according to embodiments of the present invention;

[0009] Figure 3 illustrates an example soft polishing pad according to an embodiment of the present invention;

[0010] Figure 4 illustrates operation of a conditioning arm according to an embodiment of the present invention; and

[0011] Figure 5 illustrates a diamond conditioner according to an embodiment of the present invention.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

[0012] Figure 1 is schematic diagram of a chemical mechanical planarization (CMP) polishing system 100 according to an embodiment of the present invention. The CMP polishing system 100 includes a housing 101, a polishing head 102, a control panel 103, a platen 104, a spindle 105, a wafer 106, a base 107, a soft polishing pad 108, a conditioning arm 110, a diamond (or artificial diamond) conditioner 112, a slurry tank 114, a spindle 115, a water tank 116, and electromechanical equipment 118. The slurry tank 114 and/or the water tank 116 may be located in or separate from the housing 101. The electromechanical equipment 118 may include vertical drivers, rotational drivers,

controllers, or other equipment generally used to operate arms, motors, and other devices in CMP polishing systems.

[0013] The platen 104 is mounted in the housing 101 and may be rotated by a motor (not shown) in the electromechanical equipment 118. The polishing head 102 is mounted on the spindle 105 and may be rotated by a motor (not shown) in the electromechanical equipment 118. The wafer 106 is mounted with the surface to be polished face down and away from the polishing head 102. The soft polishing pad 108 mounted to the platen using an adhesive. During polishing of the wafer 106, the polishing head 102 may be rotated in a direction opposite to the rotation of the polishing pad 108 may be, as shown by arrows 120 and 122. Alternatively, the polishing head 102 may rotate while the platen 104 remains stationary. Alternatively still, the polishing head 102 may be stationary while the platen 104 rotates. The slurry tank 114 delivers slurry to the surface of the soft polishing pad 108 during wafer 106 polishing.

[0014] The conditioning arm 110 pivots in its base 107 when conditioning the soft polishing pad 108. A motor (not shown) in the electromechanical equipment 118 may move the conditioning arm 110. The water tank 116 may dispense a rinsing solution, such as potable water or de-ionized (DI) water, to the surface of the soft polishing pad 108 during conditioning of the soft polishing pad 108.

[0015] Figure 2 is a flowchart illustrating a process 200 performed by the CMP polishing system 100 according to embodiments of the present invention. A machine-readable medium with machine-readable instructions thereon may be used to cause a processor to perform the process 200. Of course, the process 200 is only an example process and other processes may be used. The example process 200 may be used to remove metal, oxides, glass, silicon, etc. Although the example process 200 is described with reference to wafers, the example process 200 may be used for semiconductors, memory disks, or other suitable objects requiring smoothness, planarity, fine polishing, etc., such as lenses and mirrors.

[0016] In a block 202 the head 102 holds the wafer 106 and rotates the wafer 106 against the soft polishing pad 108 as slurry from the slurry tank 114 is applied to the surface of the

soft polishing pad 108 and the platen 104 applies a force to the wafer 106. In a block 204, the head 102 disengages the wafer 106 from contact with the soft polishing pad 108 and the slurry stops flowing to the surface of the soft polishing pad 108.

[0017] In a block 206, the soft polishing pad 108 is conditioned using the diamond conditioner 112. In one embodiment of the present invention, the platen 104 rotates the soft polishing pad 108, rising solution from the water tank 116 rinses the soft polishing pad 108, e.g., by supplying DI water to the surface of the soft polishing pad 108, and the conditioning arm 110 with the diamond conditioner 112 sweeps across (e.g., back and forth) the soft polishing pad 108. Although polishing of the soft polishing pad 108 may be described in some embodiments as being performed *ex situ* (between wafer 106 polishings), polishing of the soft pat 108 in other embodiments may be performed *in situ* (while wafers 106 are being polished), or some combination of both. Of course, the soft polishing pad 108 may be conditioned according to embodiments of the present invention prior to polishing any wafers 106.

[0018] One or a combination of the following process parameters may be modified to improve the process for soft pad 108 conditioning using the diamond conditioner 112 to ensure that the conditioning arm 110 with the diamond conditioner 112 do not destroy or significantly reduce the lifetime of the soft polishing pad 108. In fact, according to embodiments of the present invention, the lifetime of the soft polishing pad 108 is significantly increased. Increased soft polishing pad 108 lifetime results in reduced labor costs and costs of parts, as well as improved processes, (*e.g.*, soft polishing pads 108 do not have to be changed as often).

[0019] In one embodiment, the conditioning arm 110 applies approximately 0.25 psi to the soft polishing pad 108 through the diamond conditioner 112 as opposed to approximately three psi applied using conventional hard polishing pad techniques..

[0020] In known soft polishing pad conditioning methods, the platen and thus the soft polishing pad does not rotate. In embodiments of the present invention, the rotational speed of the platen 104 and thus the soft polishing pad 108 may be approximately one hundred revolutions per minute 100 (rpm)

[0021] In known soft polishing pad conditioning methods, there may be no DI water flowing to the soft conditioning pad. In one embodiment of the present invention, the volumetric flow rate of DI water from the DI water tank 116 may may be one gallon per minute (gpm). Alternatively, the volumetric flow rate may be anywhere from zero to approximately seven gallons per minute.

[0022] In known soft polishing pad conditioning methods, there is no diamond conditioner used, thus no down force applied to a soft polishing pad In one embodiment, the down force applied to the soft polishing pad by the diamond conditioner 112 may be 0.25 psi.

[0023] In known soft polishing pad conditioning methods, no diamond conditioner is used. n known hard polishing pad conditioning methods, the diamond conditioner makes at least ten sweeps. In one embodiment, the diamond conditioner 112 makes one sweep across the soft polishing pad.

[0024] Figure 3 illustrates the example soft polishing pad 108 according to an embodiment of the present invention. The example soft polishing pad 108 includes several pores 302 and may be made from napped poromerics-porous urethane layers on a mylar or compressible urethane substrate. In an alternative embodiment, the example soft polishing pad 108 may be a soft pad made with tangled polyester fibers coated with polyurethane. In another embodiment, the example soft polishing pad 108 may be a felt sheet of fibers impregnated with micro porous elastomer. Alternatively still, the example soft polishing pad 108 may be a porous thermoplastic resin matrix, typically polyurethane, reinforced with a fibrous network such as a felted mat of polyester fibers. An example of a suitable soft pad includes any of the Politex® Series polishing pads available from Rodel Holdings in Wilmington, Delaware.

[0025] The soft polishing pads 108 according to embodiments of the present invention are to be distinguished from known hard polishing pads, which include micro porous polyurethane polishing pads that are relatively hard and not as compressible when compared to other types of polishing pads and polyurethane impregnated felt polishing

pads. Examples of hard pads include the SUBA 1000 Series polishing pads and the SUBA® Pads available from Rodel in Phoenix, Arizona.

[0026] Figure 4 illustrates operation of the conditioning arm 110 according to an embodiment of the present invention. When the soft polishing pad 108 is moving and a wafer 106 is being polished, the conditioning arm 110 (and the diamond conditioner 112) remain in the position 402 situated adjacent to the perimeter of the soft polishing pad 108. After a predetermined number of wafers have been polished by the soft polishing pad 108, or when the polishing rate has been decreased due to build up of slurry and other debris, the conditioning arm 110 is pivoted at one end by the base 107, lowered onto the soft polishing pad 108, and swept along an arc indicated by the arrows 408 from the position 402 across the surface of the soft polishing pad 108 (as shown by phantom lines) to a second position 406 adjacent to the other side of the perimeter of the soft polishing pad 108 (also shown by phantom lines).

[0027] Figure 5 illustrates the diamond conditioner 112 according to an embodiment of the present invention. The diamond conditioner 112 includes a base 502 having diamonds 504. The base 502 may be any suitable rigid substrate. The diamonds 504 may be synthetic diamonds, natural diamonds, etc.

[0028] The diamonds 504 may be placed on the base 502 using chemical vapor deposition (CVD). Alternatively, the diamonds 404 may be embedded in the base 502. For example, the diamond conditioner 112 may be formed by embedding diamond particles in nickel coated on the surface of a rigid substrate according to well-known or proprietary techniques.

[0029] Embodiments of the invention can be implemented using hardware, software, firmware, or a combination of hardware and software. In implementations using software, the software may be stored on a computer program product (such as an optical disk, a magnetic disk, a floppy disk, etc.) or a program storage device (such as an optical disk drive, a magnetic disk drive, a floppy disk drive, etc.).

[0030] The above description of illustrated embodiments of the invention is not intended

to be exhaustive or to limit the invention to the precise forms disclosed. While specific embodiments of, and examples for, the invention are described herein for illustrative purposes, various equivalent modifications are possible within the scope of the invention, as those skilled in the relevant art will recognize. These modifications can be made to the invention in light of the above detailed description.

[0031] In the above description, numerous specific details, such as particular processes, materials, devices, and so forth, are presented to provide a thorough understanding of embodiments of the invention. One skilled in the relevant art will recognize, however, that the embodiments of the present invention can be practiced without one or more of the specific details, or with other methods, components, etc. In other instances, well-known structures or operations are not shown or described in detail to avoid obscuring the understanding of this description.

[0032] Various operations have been described as multiple discrete operations performed in turn in a manner that is most helpful in understanding embodiments of the invention. However, the order in which they are described should not be construed to imply that these operations are necessarily order dependent or that the operations be performed in the order in which the operations are presented.

[0033] Reference throughout this specification to "one embodiment" or "an embodiment" means that a particular feature, structure, process, block, or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, the appearances of the phrases "in one embodiment" or "in an embodiment" in various places throughout this specification are not necessarily all referring to the same embodiment. Furthermore, the particular features, structures, or characteristics may be combined in any suitable manner in one or more embodiments.

[0034] The terms used in the following claims should not be construed to limit the invention to the specific embodiments disclosed in the specification and the claims. Rather, the scope of embodiments of the invention is to be determined entirely by the following claims, which are to be construed in accordance with established doctrines of claim interpretation.

CLAIMS

What is claimed is:

1. A method of conditioning a chemical mechanical planarization (CMP) polishing pad, comprising:

conditioning a soft polishing pad using diamond conditioner.

2. The method of claim 1, further comprising:

rotating a soft polishing pad on a platen;

rinsing the soft polishing pad; and

passing a diamond conditioner over the soft polishing pad.

3. The method of claim 2, further comprising:

applying zero pounds per square inch (psi) to the soft polishing pad from the platen.

4. The method of claim 1, wherein passing the conditioning arm having the diamond conditioner thereon over the soft polishing pad comprises passing the diamond conditioner over the soft polishing pad during wafer polishing.

5. The method of claim 1, wherein passing the conditioning arm having the diamond conditioner thereon over the soft polishing pad comprises passing the diamond conditioner over the soft polishing pad between wafer polishings.

6. The method of claim 1, further comprising rotating a wafer against the soft polishing pad.

7. The method of claim 6, further comprising applying a slurry to the surface of the soft polishing pad.

8. A chemical mechanical planarization (CMP) system, comprising:

a head mounted in a housing;

a wafer mounted to the head;

a platen mounted in the housing;

a soft polishing pad mounted to the platen;

a pad conditioning arm mounted in the housing; and

a diamond conditioner mounted to the pad conditioning arm.

9. The system of claim 8, further comprising a slurry tank mounted in the housing.

10. The system of claim 9, further comprising a water tank mounted in the housing.

11. The system of claim 8, further comprising electromechanical equipment mounted in the housing.

12. A chemical mechanical planarization (CMP) apparatus, comprising:

a soft polishing pad adhered to a platen in a housing; and

a pad conditioning arm mounted in the housing, the pad conditioning arm having a diamond conditioner attached thereto.

13. The CMP apparatus of claim 12, wherein the soft polishing pad comprises napped poromerics-porous urethane layers on a substantially compressible substrate.

14. The CMP apparatus of claim 13, wherein the soft polishing pad comprises napped poromerics-porous urethane layers on a mylar substrate.

15. The CMP apparatus of claim 12, wherein the soft polishing pad comprises napped poromerics-porous urethane layers on a substantially compressible urethane substrate.

16. The CMP apparatus of claim 12, wherein the diamond conditioner comprises a diamond strip.

17. The CMP apparatus of claim 12, wherein the diamond strip comprises synthetic diamonds embedded in a base.

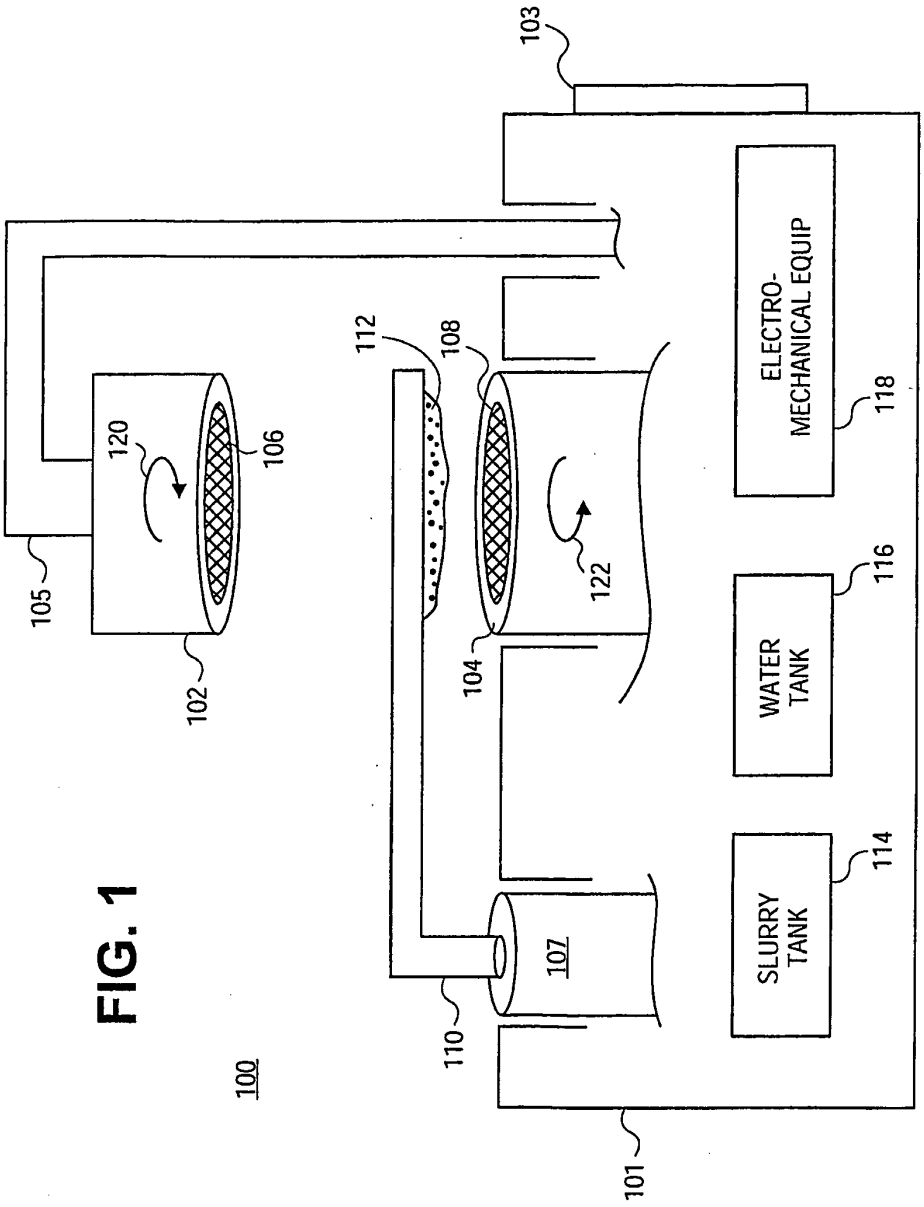

103
ELECTRO-MECHANICAL EQUIP
118
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SLURRY TANK
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FIG. 1

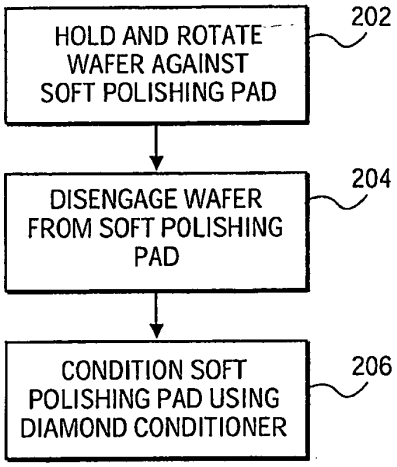

HOLD AND ROTATE WAFER AGAINST SOFT POLISHING PAD
202
DISENGAGE WAFER FROM SOFT POLISHING PAD
204
CONDITION SOFT POLISHING PAD USING DIAMOND CONDITIONER
206

FIG. 2

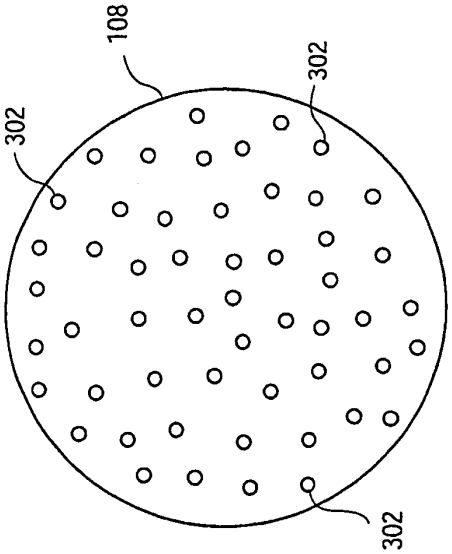


FIG. 3

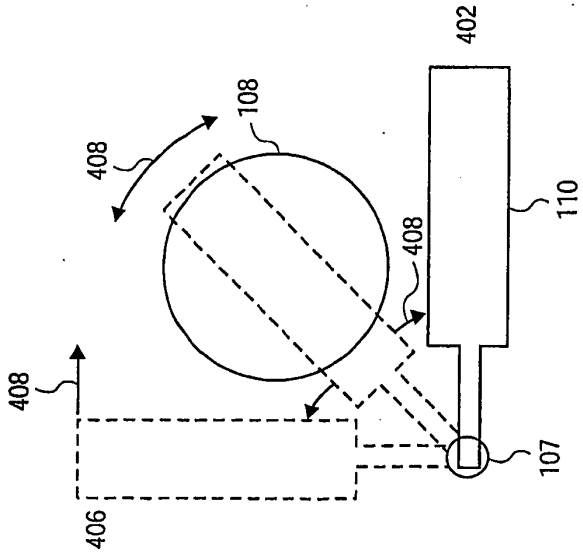


FIG. 4

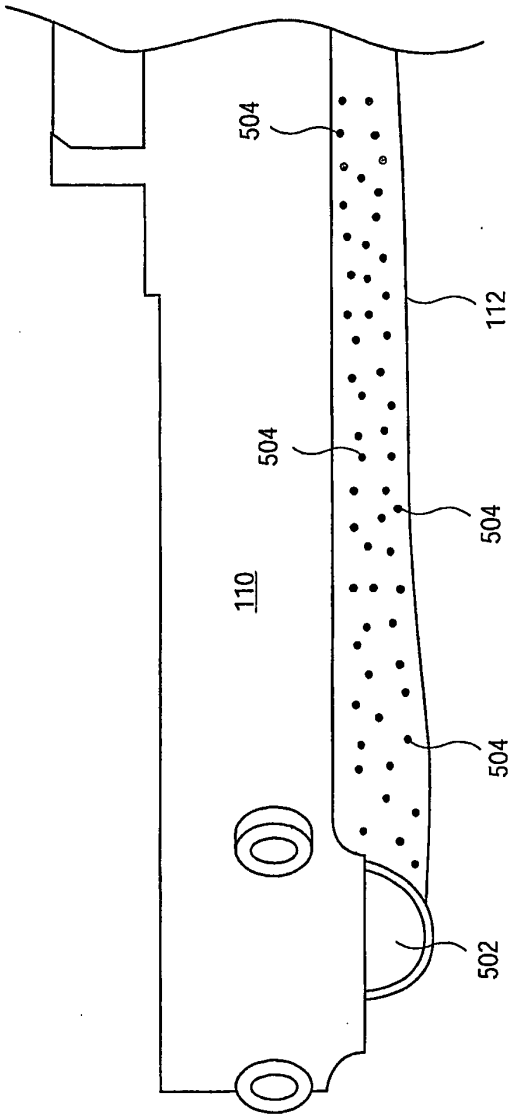


FIG. 5

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 03/39969

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B24B37/04 B24B53/007

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B24B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2001/029155 A1 (LI JUI-LUNG ET AL) 11 October 2001 (2001-10-11) paragraphs '0034!,'0035!,'0043!; claim 1; figure 3	1-17
A	US 2002/137436 A1 (GOTKIS YEHIEL ET AL) 26 September 2002 (2002-09-26) paragraph '0024!; figure 5C	16,17

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13 May 2004	25/05/2004

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 03/39969

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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Inventor Information for 11/223786

Inventor Name	City	State/Country
SUNG, CHIEN-MIN	TAIPEI COUNTY	TAIWAN

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US 20040107648 A1	US-PGPUB	20040610		Superabrasive wire saw and associated methods of manufacture	51/295	51/293; 51/298; 51/307	Sung, Chien-Min
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A1				forming			
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US 20060068691 A1	US-PGPUB	20060330		Abrading tools with individually controllable grit and method of making the same	451/540		Sung; Chien-Min et al.
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US 20060113546 A1	US-PGPUB	20060601		Diamond composite heat spreaders having low thermal mismatch stress and associated methods	257/77		Sung; Chien-Min
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US 20060143991 A1	US-PGPUB	20060706		Chemical mechanical polishing pad dresser	51/307	51/308; 51/309	Sung; Chien-Min
US 20060174823 A1	US-PGPUB	20060810		Surface acoustic wave devices and associated casting methods	117/84	117/88	Sung; Chien-Min
US 20060186556 A1	US-PGPUB	20060824	15	Semiconductor-on-diamond devices and methods of forming	257/798		Sung; Chien-Min
US 4943488 A	USPAT	19900724		Low pressure bonding of PCD bodies and method for drill bits and the like	428/552	125/30.01; 175/430; 175/434; 408/27; 428/408; 428/627; 51/295; 75/239; 75/240	Sung; Chien-Min et al.
US 5011514 A	USPAT	19910430		Cemented and cemented/sintered superabrasive polycrystalline bodies and methods of manufacture thereof	51/295	51/293; 51/308; 51/309	Cho; Hyun S. et al.
US 5024680 A	USPAT	19910618		Multiple metal coated superabrasive grit and methods for their manufacture	51/295	51/293; 51/298; 51/309	Chen; Sy-Hwa et al.
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US 6193770 B1	USPAT	20010227		Brazed diamond tools by infiltration	51/295	451/540; 451/542; 51/293; 51/307	Sung; Chien-Min
US 6286498 B1	USPAT	20010911		Metal bond diamond tools that contain uniform or patterned distribution of diamond grits and method of manufacture thereof	125/12	451/527; 451/529; 451/533; 451/544; 51/295; 51/297	Sung; Chien-Min
US 6368198 B1	USPAT	20020409		Diamond grid CMP pad dresser	451/443	451/285; 451/41	Sung; Chien-Min et al.
US 6632477 B2	USPAT	20031014		SiCN compositions and methods	427/249.15	427/255.27; 427/255.28; 427/255.393; 427/255.394; 427/255.4; 427/301	Sung; Chien-Min
US 6659161 B1	USPAT	20031209		Molding process for making diamond tools	164/74	264/29.1; 427/135; 427/249.8	Sung; Chien-Min
US 6679243 B2	USPAT	20040120		Brazed diamond tools and methods for	125/12	451/527; 451/529;	Sung; Chien-Min

				making		451/533; 451/544; 51/297	
US 6806629 B2	USPAT	20041019		Amorphous diamond materials and associated methods for the use and manufacture thereof	313/310	313/309; 313/326; 313/336; 313/346R; 313/351; 313/495; 427/249.7	Sung; Chien-Min
US 6814130 B2	USPAT	20041109		Methods of making diamond tools using reverse casting of chemical vapor deposition	164/74	264/29.1; 427/135; 427/249.8	Sung; Chien-Min
US 6830598 B1	USPAT	20041214		Molten braze coated superabrasive particles and associated methods	51/307	51/295; 51/298; 51/308; 51/309	Sung; Chien-Min
US 6840424 B2	USPAT	20050111		Compression bonding tools and associated bonding methods	228/4.5	228/1.1; 228/180.5; 228/44.7	Sung; Chien-Min
US 6874795 B2	USPAT	20050405		Wheeled skate device	280/11.223	280/11.26; 280/11.28; 280/843	Sung; Chien-Min
US 6884155 B2	USPAT	20050426		Diamond grid CMP pad dresser	451/443	451/285; 451/56	Sung; Chien-Min et al.
US 6915796 B2	USPAT	20050712		Superabrasive wire saw and associated methods of manufacture	125/21	125/12; 125/30.02; 125/36; 125/39; 451/296; 451/526; 451/532; 451/534	Sung; Chien-Min
US 6949873 B2	USPAT	20050927		Amorphous diamond materials and associated methods for the use and manufacture thereof	313/311	313/309; 313/310; 313/336; 313/346R; 313/351	Sung; Chien-Min
US 6969313 B2	USPAT	20051129		Cast diamond tools and formation thereof by chemical vapor deposition	451/540	51/307	Sung; Chien-Min
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B2				composite heat spreader and associated methods		257/E23.11; 257/E23.112	Chien-Min
US 6987318 B2	USPAT	20060117		Diamond composite heat spreader having thermal conductivity gradients and associated methods	257/720	257/E23.11; 257/E23.112	Sung; Chien-Min
US 7011134 B2	USPAT	20060314		Casting method for producing surface acoustic wave devices	164/74	264/29.1; 427/133; 427/135; 427/249.8	Sung; Chien-Min
US 7085125 B2	USPAT	20060801		Carbon nanotube devices and uses therefor	361/502	361/504; 361/508; 361/512; 361/516; 361/523	Sung; Chien-Min
US 7089925 B1	USPAT	20060815		Reciprocating wire saw for cutting hard materials	125/21	125/12; 125/16.01; 125/19; 125/20; 451/296; 451/311	Lin; Frank S. et al.
US 7095157 B2	USPAT	20060822		Cast diamond tools and formation thereof by chemical vapor deposition	310/313R	310/313B	Sung; Chien-Min

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Application Number	11/223,786
Filing Date	Sept. 9, 2005
First Named Inventor	Chien-Min Sung
Title	Improved Retention of Superabrasive Particles...
Atty Docket Number	00802-25023
Art Unit	3723
Examiner	

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Application Number	11/223,786
Filing Date	Sept. 9, 2005
First Named Inventor	Chien-Min Sung
Art Unit	3723
Examiner Name	
Attorney Docket Number	00802-25023

ENCLOSURES *(Check all that apply)*

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ART UNIT:	3723
EXAMINER:	
APPLICANT:	SUNG, CHIEN-MIN
SERIAL NO.:	11/223,786
FILED:	September 9, 2005
CONFRM. NO.:	8266
FOR:	"METHODS OF BONDING SUPERABRASIVE PARTICLES IN A ORGANIC MATRIX"
DOCKET NO.:	00802-25023

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Respectfully submitted,

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THORPE NORTH & WESTERN, LLP.
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SANDY, UT 84070

Date Mailed: 09/19/2006

Communication Regarding Rescission Of Nonpublication Request and/or Notice of Foreign Filing

Applicant's rescission of the previously-filed nonpublication request and/or notice of foreign filing is acknowledged. The paper has been reflected in the Patent and Trademark Office's (USPTO's) computer records so that the earliest possible projected publication date can be assigned.

The projected publication date is 03/15/2007.

If applicant rescinded the nonpublication request before or on the date of "foreign filing,"[1] then no notice of foreign filing is required.

If applicant foreign filed the application after filing the above application and before filing the rescission, and the rescission did not also include a notice of foreign filing, then a notice of foreign filing (not merely a rescission) is required to be filed within 45 days of the date of foreign filing. See 35 U.S.C. § 122(b)(2)(B)(iii), and Clarification of the United States Patent and Trademark Office's Interpretation of the Provisions of 35 U.S.C. § 122(b)(2)(B)(ii)-(iv), 1272 Off. Gaz. Pat. Office 22 (July 1, 2003).

If a notice of foreign filing is required and is not filed within 45 days of the date of foreign filing, then the application becomes abandoned pursuant to 35 U.S.C. § 122(b)(2)(B)(iii). In this situation, applicant should either file a petition to revive or notify the Office that the application is abandoned. See 37 CFR 1.137(f). Any such petition to revive will be forwarded to the Office of Petitions for a decision. Note that the filing of the petition will not operate to stay any period of reply that may be running against the application.

Questions regarding petitions to revive should be directed to the Office of Petitions at (571) 272-3282. Questions regarding publications of patent applications should be directed to the patent application publication hotline at (703) 605-4283 or by e-mail pgpub@uspto.gov.

[1] Note, for purpose of this notice, that "foreign filing" means "filing an application directed to the same invention in another country, or under a multilateral international agreement, that requires publication of applications 18 months after filing".

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/223,786	09/09/2005	Chien-Min Sung	00802-25023	8266

20551 7590 02/12/2007
THORPE NORTH & WESTERN, LLP.
8180 SOUTH 700 EAST, SUITE 200
SANDY, UT 84070

EXAMINER	
ACKUN, JACOB K	
ART UNIT	PAPER NUMBER
3723	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
31 DAYS	02/12/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	11/223,786	SUNG, CHIEN-MIN	
	Examiner	Art Unit	
	Jacob K. Ackun Jr.	3723	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 1 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-66 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) _____ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) 1-66 are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

I. Claims 1-29, drawn to a method, classified in class 29, subclass unknown.

II. Claims 30-66, drawn to a tool, classified in class 451, subclass 540.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product as claimed can be made by another and materially different process, such as one in which the particles do not protrude out of the material layer, or one in which the retention of superabrasive particles is not improved (compare claim 1 with claim 30, for example only). Additionally, the process as claimed can be used to make another and materially different product, such as one that was not a tool.

3. Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

4. Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

5. Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions have acquired a separate status in the art due to their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

6. Subsequent to the election of either of Groups I or II above, applicant is required to elect one species as indicated below.

7. This application contains claims directed to the following patentably distinct species:

Group 1, the protrusion of the superabrasive particles to a predetermined height;

Group 2, the protrusion of the superabrasive particles to a predetermined height that is along a designated profile;

Group 3, the protrusion of the particles to a height that deviates from a designated profile;

Group 4, variations in particle size;

Group 5, variations in particle size between different locations on the tool;

Group 6, variations in the attitude of the superabrasive particles;

Group 7, the arrangement or distribution of particles in the organic material layer;

Group 8, the use of reinforcing material.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, no claim is generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable

thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which depend from or otherwise require all the limitations of an allowable generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

8. Applicant is advised that the reply to this requirement to be complete must include (i) an election of an invention and species thereof to be examined even though the requirement be traversed (37 CFR 1.143) and (ii) identification of the claims encompassing the elected invention.

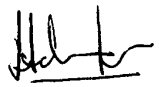
The election of an invention or species may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse.

Should applicant traverse on the ground that the inventions or species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions or species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C.103(a) of the other invention.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacob K. Ackun Jr. whose telephone number is (571)272-4418. The examiner can normally be reached on Monday through Friday 8.30AM-5.00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Hail can be reached on (571)272-4485. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Jacob K. Ackun Jr.
Primary Examiner
Art Unit 3723

J.A.

PTO
MAR 14 2007
PATENT & TRADEMARK OFFICE

1HW

PTO/SB/21 (09-06)
Approved for use through 03/31/2007. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission	5

Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	Chien-Min Sung
Art Unit	3723
Examiner Name	Jacob K. Ackun
Attorney Docket Number	00802-25023

ENCLOSURES *(Check all that apply)*

- ☐ Fee Transmittal Form
  - ☐ Fee Attached
- ☑ Amendment/Reply
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Reply to Missing Parts/ Incomplete Application
  - ☐ Reply to Missing Parts under 37 CFR 1.52 or 1.53
- ☐ Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Power of Attorney, Revocation Change of Correspondence Address
- ☐ Terminal Disclaimer
- ☐ Request for Refund
- ☐ CD, Number of CD(s) _____
  - ☐ Landscape Table on CD
- ☐ After Allowance Communication to TC
- ☐ Appeal Communication to Board of Appeals and Interferences
- ☐ Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- ☐ Proprietary Information
- ☐ Status Letter
- ☑ Other Enclosure(s) (please Identify below):
  Return postcard

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	Thorpe North & Western, LLP		
Signature			
Printed name	David W. Osborne		
Date	March 12, 2007	Reg. No.	44,989

CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below:

Signature	Nicole Solomon		
Typed or printed name	Nicole Solomon	Date	March 12, 2007

This collection of information is required by 37 CFR 1.5. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and1.14. This collection is estimated to 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

MAR 14 2007
PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ART UNIT: 3723 EXAMINER: Jacob Ackun APPLICANT: Chien-Min Sung SERIAL NO.: 11/223,786 FILED: 09/09/2005 CONFRM. NO.: 8266 FOR: METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX	**AMENDMENT/RESPONSE** **CERTIFICATE OF TRANSMISSION UNDER 37 C.F.R. § 1.8** DATE OF DEPOSIT: March 12, 2007 I hereby certify that this paper or fee (along with any paper or fee referred to as being attached or enclosed) is being facsimile transmitted, or deposited with the United States Postal Service as first class mail with sufficient postage on the date indicated above and is addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450. Nicole Solomon **Nicole Solomon**

THORPE NORTH & WESTERN, LLP
8180 South 700 East, Suite 200
Sandy, Utah 84070

RESTRICTION AND ELECTION OF SPECIES

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the communication mailed February 12, 2007, please enter the following Restriction and Election of Species.

RESTRICTION AND ELECTION OF SPECIES

Examiner has issued a restriction requirement under 35 U.S.C. § 121 as follows:

Group I: Claims 1-29, drawn to a method, classified in class 29, subclass unknown.

Group II: Claims 30-66, drawn to a tool, classified in class 451, subclass 540.

Furthermore, Examiner has also issued a species election requirement to one of the following species:

1) the protrusion of the superabrasive particles to a predetermined height;
2) the protrusion of the superabrasive particles to a predetermined height that is along a designated profile;
3) the protrusion of the particles to a height that deviates from a designated profile;
4) variations in particle size;
5) variations in particle size between different locations on the tool;
6) variations in the attitude of the superabrasive particles;
7) the arrangement or distribution of particles in the organic material layer; or
8) the use of reinforcing material.

REMARKS

Pursuant to the restriction requirement detailed above, Applicant hereby elects, without traverse: Group I, claims 1-29, drawn to a method, classified in class 29, subclass unknown. Applicant also elects species 1, the protrusion of the superabrasive particles to a predetermined height. Claims containing limitations that read on species 1 include claims 3-15.

Examiner has alleged that no claim is generic. Applicant respectfully disagrees with this assertion. As is stated in MPEP 806.04(d), a generic claim should require no material element additional to those required by the species claims, and each of the species claims must require all the limitations of the generic claim. Such is the case for the generic claim 1. Each of the species outlined by Examiner further limits one of the novel aspects of claim 1, namely minimizing stress impinging on the protruding portions of any individual superabrasive particle. Thus limitations to predetermined height, designated profiles, variations in particle size, location variations, variations in attitude, and distribution of particles are all limitations that facilitate the minimization of mechanical stress impinging on protruding portions of any individual superabrasive particle. As such, all of the elements of the outlined species are within the scope of claim 1, and all of the outlined species require all of the elements of claim 1, particularly given the dependencies of these claims. Applicant thus respectfully requests reconsideration regarding the generic status of claim 1.

CONCLUSION

In view of the foregoing, Applicant respectfully requests examination of claims 1-29. If any impediment to the prompt examination of these claims is found and could be removed during a telephone interview, the Examiner is invited to telephone the undersigned attorney, so that such issues may be resolved as expeditiously as possible.

Please charge any additional fees except for Issue Fee or credit any overpayment to Deposit Account No. 20-0100.

Dated this 12th day of March, 2007.

Respectfully submitted,

THORPE, NORTH & WESTERN, LLP

David W. Osborne
Reg. No. 44,989
8180 South 700 East, Suite 200
Sandy, UT 84070
Telephone: (801) 566-6633
Facsimile: (801) 566-0750

DWO/TBA/ns

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NUMBER	FILING OR 371(c) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/223,786	09/09/2005	Chien-Min Sung	00802-25023

CONFIRMATION NO. 8266

20551
THORPE NORTH & WESTERN, LLP.
8180 SOUTH 700 EAST, SUITE 200
SANDY, UT84070

Title: Methods of bonding superabrasive particles in an organic matrix

Publication No. US-2007-0060026-A1
Publication Date: 03/15/2007

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently http://www.uspto.gov/patft/.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently http://pair.uspto.gov/. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 703-305-3028.

Pre-Grant Publication Division, 703-605-4283

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/223,786	09/09/2005	Chien-Min Sung	00802-25023	8266

20551 7590 06/19/2007

THORPE NORTH & WESTERN, LLP.
8180 SOUTH 700 EAST, SUITE 350
SANDY, UT 84070

EXAMINER	
ACKUN, JACOB K	
ART UNIT	**PAPER NUMBER**
3723	
MAIL DATE	**DELIVERY MODE**
06/19/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	11/223,786	SUNG, CHIEN-MIN	
	Examiner	Art Unit	
	Jacob K. Ackun Jr.	3723	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 March 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-66* is/are pending in the application.

4a) Of the above claim(s) *2,7-12 and 16-66* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-6 and 13-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. Applicants election of the invention of Group 1 and species of Group 1, without traverse, is acknowledged. While the applicant indicates that claims 1 and 3-15 are readable on the elected invention and species, the examiner finds that this is not the case. For example, the applicant specifically did not elect the species wherein the particles protrude to a predetermined height that is along a designated profile. Accordingly, the claims readable on the elected invention and species are considered to be 1, 3, 4, 5, 6 and 13-15. The remaining claims are accordingly withdrawn from consideration.

Additionally the applicant's argument that claim 1 is generic is acknowledged. However, this argument does not appear to have a bearing on the Restriction and subsequent Election, at least insofar as the claims to be examined or withdrawn are concerned. An examination on the merits of the claims noted above follows.

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 3-6 and 13-15 are rejected under 35 U.S.C. 102(b or e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ishizaki et al (6,755,720) OR Andrews et al (2005/0260939). Either reference appears to teach securing superabrasive particles in an arrangement that minimizes mechanical stress as claimed. The specific terminology "minimizes mechanical stress...." may not specifically be used in the applied references, however, it is not believed that this is required for maintaining the rejection. Relevant disclosure in Ishizaki include column 1 line 9, column 2 line 21, column 2 lines 41-47 and 55-56, column 3 lines 9-13, 20-23, 37-47 and 58-61. See also column 9 lines 54-58 and column 10 lines 55-57, for example only. With regard to Andrews see paragraphs 30, 31 and 33 on page 3, for example only. As may also be noted some of the disclosure in the references corresponds to the methods taught in the instant application for minimizing the mechanical stress, including arranging the particles in a grid or spacing them a specified distance apart or to a specific height.

It would also have been obvious in view of the teaching in either reference to provide either with any elements of the claims deemed to be missing, for the purpose of improving the performance of the abrasive article.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacob K. Ackun Jr. whose telephone number is (571)272-4418. The examiner can normally be reached on Monday through Friday 8.30AM-5.00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Hail can be reached on (571)272-4485. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jacob K. Ackun Jr.
Primary Examiner
Art Unit 3723

J.A.

OIPE IAP43 DEC 06 2005 PATENT & TRADEMARK OFFICE

PTO/SB/08A (08-03)
Approved for use through 07/31/2006. OMB 0651-0031
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	Chien-Min Sung
Art Unit	3723
Examiner Name	JACOB K. ACKUN JR.
Attorney Docket Number	25023

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
J.A.		US- 4,925,457	05-15-1990	deKok et al.	—
		US- 5,049,165	09-17-1991	Tselesin	—
		US- 5,380,390	01-10-1995	Tselesin	—
		US- 6,346,202	02-12-2002	Molnar	—
		US- 2002-0042200	04-11-2002	Fawcett	—
		US- 2005-0118939	06-02-2005	Duescher	—
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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]- Number[4] – Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
J.A.		WO 2004/094106	11-04-2004	INTEL CORPORATION	—	

Examiner Signature	Jacob Ackun JA.	Date Considered	6/4/07

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1]Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentially is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

Notice of References Cited	Application/Control No. 11/223,786	Applicant(s)/Patent Under Reexamination SUNG, CHIEN-MIN	
	Examiner Jacob K. Ackun Jr.	Art Unit 3723	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,755,720	06-2004	Ishizaki et al.	451/28
*	B	US-2005/0260939	11-2005	Andrews et al.	451/443
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

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Bib Data Sheet

CONFIRMATION NO. 8266

SERIAL NUMBER	FILING OR 371(c) DATE / RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
11/223,786	09/09/2005	451	3723	00802-25023

APPLICANTS

Chien-Min Sung, Taipei County, TAIWAN;

** CONTINUING DATA ********** None J.A.

** FOREIGN APPLICATIONS ********** None J.A.

IF REQUIRED, FOREIGN FILING LICENSE GRANTED
** 09/27/2005

		STATE OR COUNTRY	SHEETS DRAWING	TOTAL CLAIMS	INDEPENDENT CLAIMS
Foreign Priority claimed	☐ yes ☑ no	TAIWAN	4	66	1
35 USC 119 (a-d) conditions met	☐ yes ☑ no ☐ Met after Allowance				
Verified and Acknowledged	Examiner's Signature J.A. Initials				

ADDRESS
20551

TITLE

Methods of bonding superabrasive particles in an organic matrix

FILING FEE RECEIVED	FEES: Authority has been given in Paper	
3430	No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

Search Notes

Application/Control No.	Applicant(s)/Patent under Reexamination	
11/223,786	SUNG, CHIEN-MIN	
Examiner	**Art Unit**	
Jacob K. Ackun Jr.	3723	

SEARCHED

Class	Subclass	Date	Examiner
451	28	6/4/07	J.A.
	21		
	443		
	444		
	540		
	548		

INTERFERENCE SEARCHED

Class	Subclass	Date	Examiner

SEARCH NOTES (INCLUDING SEARCH STRATEGY)

	DATE	EXMR

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	Chien-Min Sung
SERIAL NO.:	11/223,786
FILING DATE:	09/09/2005
FOR:	METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX
ART UNIT:	3723
EXAMINER:	Jacob K. Ackun
DOCKET NO.:	00802-25023

THORPE NORTH & WESTERN, LLP
8180 South 700 East, Suite 200
Sandy, Utah 84070

AMENDMENT AND RESPONSE UNDER 37 C.F.R. § 1.111

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the office action mailed June 19, 2007, please reconsider this application in view of the remarks provided below.

REMARKS

In the Office Action mailed June 19, 2007, claims 1, 3-6, and 13-15 were pending for consideration, all of which were rejected on various statutory grounds. Particularly, claims 1, 3-6, and 13-15 were rejected under 35 U.S.C. 102(b or e) as being allegedly anticipated by, or in the alternative, under 35 U.S.C. 103(a) as being allegedly obvious over U.S. Patent No. 6,755,720 (hereinafter "Ishizaki") or U.S. Patent Application No. 2005/0260939 (hereinafter "Andrews").

35 U.S.C. § 102 Rejections:

The Patent Office has rejected claims 1, 3-6, and 13-15 under 35 U.S.C. 102(b or e) as being allegedly anticipated by Ishizaki. Ishizaki teaches a vitrified bond tool comprising a support body, a vitrified bond layer, and a plurality of abrasive grains held by the vitrified bond layer (col. 2, lines 27-32). The vitrified bond layer is made from a ceramic or glassy material such as silicon nitride or an alumina. The vitrified bond material includes borosilicate glass, crystallized glass, quartz glass, alumina, alumina nitride, silicon nitride, mullite, zirconia, and other ceramic materials (col. 3, lines 21-23; col. 11, lines 57-60).

Claim 1 of the present invention contains limitations to a method of improving retention of superabrasive particles held in a solidified organic material layer of an abrading tool, where a portion of each of said superabrasive particles protrudes out of the solidified organic material layer. The method may further include securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece.

Ishizaki does not teach or suggest an organic material layer, as is specified in claim 1, but rather a vitrified bond layer. Vitrified bond materials taught by Ishizaki include borosilicate glass, crystallized glass, quartz glass, alumina, alumina nitride, silicon nitride, mullite, and zirconia. These materials are primarily ceramics that would not be considered to be organic by one of ordinary skill in the art. As is defined in the specification on page 7, lines 2-4, an organic material layer refers to a layer or mass of a semisolid or solid complex amorphous mix of organic compounds. None of the materials exemplified by Ishizaki can be considered to be organic compounds. As such, Ishizaki does not teach or suggest each and every element of claim 1.

Additionally, Ishizaki also does not teach or suggest the claim 1 limitation of securing a plurality of superabrasive particles in a solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece. As can be seen in FIGs. 7(a-d) of Ishizaki, the particles are not evenly distributed across the vitrified bond layer. Such a non-uniform distribution of particles will likely result in a non-uniform distribution of mechanical forces across the particles. Particles that are further apart from neighboring particles will experience greater mechanical stress from the work piece during abrading, while particles that are closer to neighboring particles will experience less mechanical stress. As such, Ishizaki does not teach or suggest each and every element of claim 1.

Accordingly, Applicant respectfully requests that the rejections of claim 1 be withdrawn. Additionally, as claims 3-6 and 13-15 depend from claim 1 and are considered to be narrower in scope, it is also requested that these rejections be withdrawn as well.

35 U.S.C. § 103 Rejections:

While the Applicant is confident that the Examiner is well acquainted with the requirements necessary to establish a *prima facie* case of obviousness, it is thought prudent to briefly review the required elements. Specifically, in order to meet the burden of establishing a *prima facie* case of obvious, the Patent Office must show that: 1) each and every element of the invention as set forth in the claims is taught or suggested by the reference as modified or the combination of references; 2) that there is sufficient motivation or articulated reasoning for one of ordinary skill in the art to modify or combine the reference; and 3) that one of ordinary skill in the art would find a sufficient likelihood of successfully making the modification or combination asserted. Applicants respectfully submit that the Patent Office has failed to satisfy these requirements with any of the asserted rejections, and thus has not established a *prima facie* case of obviousness with respect to either of the Ishizaki or Andrews references alone or in combination.

The Ishizaki Reference:

The Patent Office has rejected claims 1, 3-6, and 13-15 under 35 U.S.C. 103(a) as being allegedly obvious over Ishizaki. As has been described, Ishizaki teaches a vitrified bond tool comprising a support body, a vitrified bond layer, and a plurality of abrasive grains held by the vitrified bond layer (col. 2, lines 27-32). The vitrified bond layer is made from a ceramic or glassy material, examples of which include borosilicate glass, crystallized glass, quartz glass, alumina, alumina nitride, silicon nitride, mullite, zirconia, and other ceramic materials (col. 3, lines 21-23; col. 11, lines 57-60).

As has also been described, claim 1 of the present invention contains limitations to a method of improving retention of superabrasive particles held in a solidified organic material

layer of an abrading tool, where a portion of each of said superabrasive particles protrudes out of the solidified organic material layer. The method may further include securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece. As is described in the present specification, it was previously thought that polymeric resins were not able to retain superabrasive particles to a degree that is sufficient for CMP pad dressing (page 2, lines 28-30). The Applicant of present application has discovered, however, that by minimizing mechanical stress impinging on the protruding portion of any one superabrasive particle during an abrading operation, superabrasive particles are retained in the organic or polymeric matrix that would otherwise not be suitable for such uses (see page 10, lines 20-27).

As has also been described, Ishizaki does not teach or suggest an organic material layer, as is specified in claim 1, but rather a vitrified bond layer. Vitrified bond materials taught by Ishizaki include borosilicate glass, crystallized glass, quartz glass, alumina, alumina nitride, silicon nitride, mullite, and zirconia. These materials are primarily ceramics that would not be considered to be organic by one of ordinary skill in the art. As is defined in the specification on page 7, lines 2-4, an organic material layer refers to a layer or mass of a semisolid or solid complex amorphous mix of organic compounds. None of the materials exemplified by Ishizaki can be considered to be organic compounds. For this reason the Patent Office has failed to establish a *prima facie* case of obviousness because Ishizaki does not teach or suggest each and every element of claim 1.

Ishizaki also does not teach or suggest the claim 1 limitation of securing a plurality of superabrasive particles in a solidified organic material layer in an arrangement that minimizes

mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece. As can be seen in FIGs. 7(a-d), the particles are not evenly distributed across the vitrified bond layer. Such a non-uniform distribution of particles will likely result in a non-uniform distribution of mechanical forces across the particles. Particles that are further apart from neighboring particles will experience greater mechanical stress from the work piece during abrading, while particles that are closer to neighboring particles will experience less mechanical stress. For this reason the Patent Office has failed to establish a *prima facie* case of obviousness because neither Ishizaki nor a modification of Ishizaki teaches or suggests each and every element of claim 1.

Additionally, it would not have been obvious to modify Ishizaki to include organic material layers. Vitrified bond materials are defined as materials that have been converted into glass or a glassy substance by heat and fusion (Merriam-Webster Dictionary, 10th ed.), where the vitreous materials are hard, amorphous, brittle, as in porcelain enamel (Hawley's Condensed Chemical Dictionary, Fourteenth ed.). Such vitrification of a material generally occurs at as a result of firing at fairly high temperatures. As a result, vitrified bond materials tend to preclude organic materials due to their general inability to withstand high temperatures. For example, Ishizaki teaches that the softening point of the vitreous bond materials should be below 750° C, and that the material should be fired at between 900° C and 1600° C. (see col. 11, lines 62-65; Examples 1-5). Such high temperatures will likely result in covalent bonding between the vitreous bond material and the superabrasive particles. Such bonding allows the superabrasive particles to be held more firmly in the vitreous material. Many superabrasive materials such as diamond would not form such covalent bonds with an organic matrix due to the low temperatures at which most organic materials are cured. Because of the lack of covalent bonding

between these materials, a superabrasive particle embedded in an organic matrix is held by mechanical bonding. Thus according to the state of the art at the time the application was filed, superabrasive particles could not be retained in an organic or polymeric matrix during a polishing procedure such as CMP processing (see page 2, lines 28-30 of the present specification). As such, it would not have been obvious to one of ordinary skill in the art to modify Ishizaki to include an organic matrix because there would have been insufficient likelihood of success in producing a polishing device capable of retaining the superabrasive particles. For these reasons, the Patent Office has failed to establish a prima facie case of obviousness.

The Patent Office has also not shown that one of ordinary skill in the art would have had sufficient motivation to modify Ishizaki in such a way as to arrive at all of the elements of claim 1. The Supreme Court has recently articulated that "it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." *KSR v. Teleflex,* 127 S. Ct. 1727 (2007). The Patent Office has not provided sufficient reason as to why it would have been obvious to substitute an organic matrix for a vitrified bond layer, particularly given the much lower retention of superabrasive particles in an organic matrix. It is more likely that one of ordinary skill in the art would be motivated to pursue experimentation with other ceramic materials in order to improve retention of superabrasive particles, rather than organic matrixes in which such particles are weakly held. For these reasons, the Patent Office has failed to establish a prima facie case of obviousness with respect to this reference.

Accordingly, it is respectfully requested that the rejections of claim 1 be withdrawn. Additionally, as claims 3-6 and 13-15 depend from claim 1 and are considered to be narrower in scope, it is also requested that these rejections be withdrawn as well.

The Andrews Reference:

The Patent Office has also rejected claims 1, 3-6, and 13-15 under 35 U.S.C. 103(a) as being allegedly obvious over Andrews. Andrews teaches a dressing blade for grinding and cutting tools having superabrasive particles held thereto by a brazed metal composition (abstract). Metal braze materials require high temperatures in order to bond superabrasive particles to a support substrate. For example, paragraph [0053] teaches that brazing is carried out at a temperature of from 800° C to 1200° C.

Similar to the discussion of Ishizaki, Andrews does not teach or suggest all of the elements of claim 1. For example, Andrews does not teach or suggest an organic matrix to retain the superabrasive particles. Possible metal braze materials taught by Andrews include copper, nickel, silver, tin, zirconium, silicon and iron [paragr. 0045] and an active metal component including titanium, zirconium, chromium, and hafnium [0043] to increase the strength of the bonds between the particle and the metal braze. Furthermore, there is no teaching or suggestion in Andrews that mechanical stress be minimized for any individual superabrasive particle. For example, FIGs. 1B and 2B of Andrews show superabrasive particles having an irregular spacing, indicating that mechanical stress will not be minimized for each individual particle during an abrading operation. For these reasons the Patent Office has failed to establish a *prima facie* case of obviousness because neither Andrews nor a modification of Andrews teaches or suggests each and every element of claim 1.

Additionally, it would not have been obvious to modify Andrews to replace the braze metal matrix with an organic matrix. Many metal materials form strong carbide bonds with superabrasive particles, particularly at high temperatures. For example, paragraph [0053] teaches that brazing conditions permanently attach particles to the support. Further down in the same paragraph it is taught that titanium hydride is used as an active metal component to form strong titanium carbide bonds between the diamond particles and the metal braze. As such, one of ordinary skill in the art would not have had sufficient likelihood of success in permanently bonding diamond particles to a support with an organic matrix. One of ordinary skill in the art would have likely been motivated to experiment with other metal brazes or braze alloys in order improve the characteristics of the tool and the retention of the superabrasive particles embedded therein, rather than organic matrixes having weak retention characteristics. Additionally, the Patent Office has also not shown that one of ordinary skill in the art would have had sufficient motivation to modify Andrews in such a way as to arrive at all of the elements of claim 1. Specifically, no reason has been given as to why it would have been obvious to one of ordinary skill in the art to replace the braze metal layer with an organic matrix, particularly in light of the importance of permanent particle retention concept as taught in paragraph [0053]. For these reasons, the Patent Office has failed to establish a prima facie case of obviousness with respect to claim 1.

CONCLUSION

In view of the foregoing, the Applicant believes that claims 1, 3-6, and 13-15 present allowable subject matter and the prompt allowance thereof is requested. If any impediment to the allowance of these claims remains after consideration of the present amendment and above remarks, and such impediment could be removed during a telephone interview, the Examiner is invited to telephone the undersigned attorney, so that such issues may be resolved as expeditiously as possible.

Please charge any additional fees except for Issue Fee or credit any overpayment to Deposit Account No. 20-0100.

Dated this 19th day of September, 2007.

Respectfully submitted,

THORPE, NORTH & WESTERN, LLP

/David W. Osborne/

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DWO/TBA/ns

Electronic Acknowledgement Receipt	
EFS ID:	2217162
Application Number:	11223786
International Application Number:	
Confirmation Number:	8266
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Customer Number:	20551
Filer:	David William Osborne/Nicole Solomon
Filer Authorized By:	David William Osborne
Attorney Docket Number:	00802-25023
Receipt Date:	19-SEP-2007
Filing Date:	09-SEP-2005
Time Stamp:	17:49:47
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)
1		25023.PDF	269483 2851af974df5233a92e981ac5285b95a72ae702b	yes	10

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (12-04)
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PATENT APPLICATION FEE DETERMINATION RECORD
Substitute for Form PTO-875

Application or Docket Number: 11223786

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))							300
SEARCH FEE (37 CFR 1.16(k), (l), or (m))							500
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))							200
TOTAL CLAIMS (37 CFR 1.16(i))	66 minus 20 =	* 46	X$ 25		OR	X$50	2300
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1 minus 3 =	* 0	X$100			X$200	
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR						
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))			N/A			N/A	
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	3300

APPLICATION AS AMENDED – PART II

Amt

AMENDMENT A	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 66	Minus	** 66	= 0	X =		OR	X =	
Independent (37 CFR 1.16(h))	* 2	Minus	*** 2	= 0	X =		OR	X =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					N/A		OR	N/A	
					TOTAL ADD'T FEE		OR	TOTAL ADD'T FEE	

AMENDMENT B	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)	OR	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	*	Minus	**	=	X =		OR	X =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X =		OR	X =	
Application Size Fee (37 CFR 1.16(s))									
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					N/A		OR	N/A	
					TOTAL ADD'T FEE		OR	TOTAL ADD'T FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/223,786	09/09/2005	Chien-Min Sung	00802-25023	8266

20551 7590 11/26/2007
THORPE NORTH & WESTERN, LLP.
8180 SOUTH 700 EAST, SUITE 350
SANDY, UT 84070

EXAMINER	
ACKUN, JACOB K	
ART UNIT	**PAPER NUMBER**
3728	
MAIL DATE	**DELIVERY MODE**
11/26/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	11/223,786	SUNG, CHIEN-MIN	
	Examiner	Art Unit	
	Jacob K. Ackun Jr.	3728	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 September 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-66* is/are pending in the application.

4a) Of the above claim(s) *2,7-12 and 16-66* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-6 and 13-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. Claims 1, 3-6 and 13-15 are rejected under 35 U.S.C. 102(b or e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ishizaki et al (6,755,720) OR Andrews et al (2005/0260939). Either reference appears to teach securing superabrasive particles in an arrangement that minimizes mechanical stress as claimed. The specific terminology "minimizes mechanical stress...." may not specifically be used in the applied references, however, it is not believed that this is required for maintaining the rejection. Relevant disclosure in Ishizaki include column 1 line 9, column 2 line 21, column 2 lines 41-47 and 55-56, column 3 lines 9-13, 20-23, 37-47 and 58-61. See also column 9 lines 54-58 and column 10 lines 55-57, for example only. With regard to Andrews see paragraphs 30, 31 and 33 on page 3, for example only. As may also be noted some of the disclosure in the references corresponds to the methods taught in the instant application for minimizing the mechanical stress, including arranging the particles in a grid or spacing them a specified distance apart or to a specific height.

It would also have been obvious in view of the teaching in either reference to provide either with any elements of the claims deemed to be missing, for the purpose of improving the performance of the abrasive article.

2. Applicant's response filed 9/19/2007 has been fully considered but they are not persuasive. The applicant responds to the last office action only by arguing that the rejection is error. No amendments were submitted.

The applicant first argues that the applied references do not show a solidified organic material layer and it would not have been obvious to provide the devices in the prior art references with a solidified organic material layer. The examiner disagrees. Based on the teachings in either reference, and the knowledge in the relevant art, it would have been at least

obvious to provide each with a solidified organic material layer. More importantly, however, at least in terms of the patentability of the claimed invention, claim 1 is drafted so that it appears that the feature or features argued by applicant is (are) in fact conventional. The preamble of claim 1 is directed to "a method of improving retention of superabrasive particles held in a solidified organic material layer". The body of the claim continues by enumerating the steps for carrying out the improvement. Thus, in similar fashion to a Jepson type claim, claim 1 by its terms indicates that the applicants do not believe that it is novel or unobvious to retain superabrasive particles in a solidified organic material layer. For these reasons the applicant's arguments are not well taken, and are unconvincing.

The applicant also argues that none of the applied references teaches an arrangement that minimizes mechanical stress. This feature, that appears from the claims to be what the applicant believes is his contribution to the art, has already been discussed by the examiner. The examiner adds the following comments to those already made. The limitation "an arrangement that minimizes mechanical stress" is overly broad. It reads on many arrangements, including some not even contemplated by applicant, as well as those disclosed in the references. Moreover with particular regard to at least some of the arrangements contemplated by applicant as minimizing mechanical stress impinging on the protruding portion of any individual superabrasive particle, as set out in some of the dependent claims, it appears even more certain that the claims are in fact drafted so as to recite what is conventional or what at least would have been obvious to a routineer in the art. For example only, applicant is not the first to contemplate an arrangement of superabrasive particles such that they protrude to a predetermined height, as recited in dependent

claim 3. So if this feature is what minimizes mechanical stress then the minimizing is clearly within the prior art.

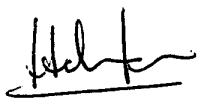
3. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacob K. Ackun Jr. whose telephone number is (571)272-4418. The examiner can normally be reached on Monday through Friday 8.30AM-5.00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mickey Yu can be reached on (571)272-4562. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Jacob K. Ackun Jr.
Primary Examiner
Art Unit 3728

J.A.

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Bib Data Sheet

CONFIRMATION NO. 8266

SERIAL NUMBER	FILING OR 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
11/223,786	09/09/2005 RULE	451	3723	00802-25023

APPLICANTS

Chien-Min Sung, Taipei County, TAIWAN;

** CONTINUING DATA ********** None J.A.

** FOREIGN APPLICATIONS ********** None J.A.

IF REQUIRED, FOREIGN FILING LICENSE GRANTED
** 09/27/2005

		STATE OR COUNTRY	SHEETS DRAWING	TOTAL CLAIMS	INDEPENDENT CLAIMS
Foreign Priority claimed	☐ yes ☑ no	TAIWAN	4	66	1
35 USC 119 (a-d) conditions met	☐ yes ☑ no ☐ Met after Allowance				
Verified and Acknowledged	Examiner's Signature J.A. Initials				

ADDRESS
20551

TITLE

Methods of bonding superabrasive particles in an organic matrix

FILING FEE RECEIVED	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit
3430		

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	Chien-Min Sung
SERIAL NO.:	11/223,786
FILING DATE:	09/09/2005
FOR:	METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX
ART UNIT:	3728
EXAMINER:	Jacob K. Ackun
DOCKET NO.:	00802-25023

AMENDMENT AND RESPONSE UNDER 37 C.F.R. § 1.116

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Office Action mailed November 26, 2007, please enter the following amendment and reconsider this application in view of the remarks provided below.

AMENDMENTS TO THE CLAIMS

1. (original) A method of improving retention of superabrasive particles held in a solidified organic material layer of an abrading tool, a portion of each of said superabrasive particles protruding out of the solidified organic material layer, comprising:

securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece.

2. (withdrawn) The method of claim 1, wherein the arrangement of the plurality of superabrasive particles is configured to uniformly distribute drag forces across substantially each superabrasive particle.

3. (original) The method of claim 1, wherein a majority of the plurality of superabrasive particles protrudes to a predetermined height above the solidified organic material layer.

4. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of less than about 20 microns when used to abrade a work piece.

5. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of from about 1 micron to about 20 microns when used to abrade a work piece.

6. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of from about 10 micron to about 20 microns when used to abrade a work piece.

7. (withdrawn) The method of claim 3, wherein the superabrasive particles protrude to a predetermined height that is along a designated profile.

8. (withdrawn) The method of claim 7, wherein the designated profile is a plane.

9. (withdrawn) The method of claim 7, wherein the designated profile has a slope.

10. (withdrawn) The method of claim 7, wherein the designated profile has a curved shape.

11. (withdrawn) The method of claim 10, wherein the designated profile has a dome shape.

12. (withdrawn) The method of claim 7, wherein a majority of the plurality of superabrasive particles are arranged such that their tips vary from the designated profile to less than about 10% of the average size of the superabrasive particles.

13. (canceled)

14. (original) The method of claim 3, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 30 microns.

15. (original) The method of claim 3, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to about 20 microns.

16. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are of substantially the same size.

17. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particle are from about 30 microns to about 500 microns in size.

18. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are from about 100 microns to about 200 microns in size.

19. (withdrawn) The method of claim 1, wherein superabrasive particles in a central location of the abrading tool are smaller in size than superabrasive particles in a peripheral location on the abrading tool.

20. (withdrawn) The method of claim 1, wherein securing the plurality of superabrasive particles includes arranging the plurality of superabrasive particles according to a predetermined attitude.

21. (withdrawn) The method of claim 20, wherein the predetermined attitude is a uniform attitude across substantially all of the plurality of superabrasive particles.

22. (withdrawn) The method of claim 20, wherein the plurality of superabrasive particles are substantially configured with an apex portion oriented towards a work piece.

23. (withdrawn) The method of claim 20, wherein superabrasive particles in a central location on the abrading tool are configured with an apex or an edge portion oriented towards a work piece, and superabrasive particles in a peripheral location on the abrading tool are configured with a face portion oriented towards the work piece.

24. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are arranged as a grid.

25. (withdrawn) The method of claim 24, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 3 times to about 5 times the average size of the superabrasive particles.

26. (withdrawn) The method of claim 24, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 100 microns to about 800 microns.

27. (withdrawn) The method of claim 20, wherein arranging the superabrasive particles according to a predetermined attitude further comprises:

applying an adhesive to a substrate;

applying a flexible sieve to the adhesive;

disposing superabrasive particles across a template positioned on the flexible sieve such that a portion of the superabrasive particles adhere to the adhesive by either an edge or an apex portion; and

removing the template and the un-adhered superabrasive particles from the flexible sieve.

28. (withdrawn) The method of claim 27, wherein the flexible sieve is a nylon sieve.

29. (withdrawn) The method of claim 1, wherein superabrasive particles in a central location on the abrading tool are spaced farther apart than superabrasive particles in a peripheral location on the abrading tool.

30. (withdrawn) A superabrasive tool having improved superabrasive particle retention, comprising:

a solidified organic material layer; and

a plurality of superabrasive particles secured in the solidified organic material layer in an arrangement as recited in claim 1.

31. (withdrawn) The tool of claim 30, wherein each of the plurality of superabrasive particles protrudes to a predetermined height above the solidified organic material layer.

32. (withdrawn) The tool of claim 31, wherein the predetermined height is greater than about 20 microns.

33. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 1 micron to about 20 microns.

34. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 5 microns to about 20 microns.

35. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 10 microns to about 20 microns.

36. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles protrude to a predetermined height is along a designated profile.

37. (withdrawn) The tool of claim 36, wherein the designated profile is a plane.

38. (withdrawn) The tool of claim 36, wherein the designated profile has an average slope from a high point near a center location of the tool to a low point near a peripheral edge of the tool.

39. (withdrawn) The tool of claim 38, wherein the average slope is about 1/1000.

40. (withdrawn) The tool of claim 36, wherein the designated profile has a curved shape.

41. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles are arranged such that their tips protrude to about 10% of the average size of the superabrasive particles.

42. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles are arranged such that their tips protrude from about 20 to about 30 microns.

43. (withdrawn) The tool of claim 30, wherein the arrangement is a grid.

44. (withdrawn) The tool of claim 43, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 3 times to about 5 times the average size of the superabrasive particles.

45. (withdrawn) The tool of claim 43, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 100 microns to 800 microns.

46. (withdrawn) The tool of claim 30, wherein superabrasive particles in a central location on the tool are spaced farther apart than superabrasive particles in a peripheral location on the tool.

47. (withdrawn) The tool of claim 30, wherein superabrasive particles in a central location on the tool are larger in size than superabrasive particles in a peripheral location on the tool.

48. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles are arranged according to a predetermined attitude.

49. (withdrawn) The tool of claim 48, wherein the plurality of superabrasive particles are substantially configured with an apex portion oriented towards a work piece.

50. (withdrawn) The tool of claim 48, wherein superabrasive particles in a central location on the tool are configured with an apex or an edge portion oriented towards a work piece, and superabrasive particles in a peripheral location on the tool are configured with a face portion oriented towards the work piece.

51. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles include a member selected from the group consisting of diamond, polycrystalline diamond, cubic boron nitride, polycrystalline cubic boron nitride, and combinations thereof.

52. (withdrawn) The tool of claim 51, wherein the plurality of superabrasive particles includes diamond.

53. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles are from about 30 microns to about 500 microns in size.

54. (withdrawn) The tool of claim 53, wherein the plurality of superabrasive particles are from about 100 microns to about 200 microns in size.

55. (withdrawn) The tool of claim 30, wherein the solidified organic material layer comprises a member selected from the group consisting of amino resins, acrylate resins, alkyd resins, polyester resins, polyamide resins, polyimide resins, polyurethane resins, phenolic resins, phenolic/latex resins, epoxy resins, isocyanate resins, isocyanurate resins, polysiloxane resins, reactive vinyl resins, polyethylene resins, polypropylene resins, polystyrene resins, phenoxy resins, perylene resins, polysulfone resins, acrylonitrile-butadiene-styrene resins, acrylic resins, polycarbonate resins, polyimide resins, and mixtures thereof.

56. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is an epoxy resin.

57. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is a polyurethane resin.

58. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is a polyimide resin.

59. (withdrawn) The tool of claim 30, further comprising a reinforcing material disposed within at least a portion of the solidified organic material layer.

60. (withdrawn) The tool of claim 59, wherein the reinforcing material is a material selected from the group consisting of ceramics, metals, or combinations thereof.

61. (withdrawn) The tool of claim 60, wherein the reinforcing material is a ceramic.

62. (withdrawn) The tool of claim 61, wherein the ceramic comprises a member selected from the group consisting of alumina, aluminum carbide, tungsten carbide, silica, silicon carbide, silicon nitride, zirconia, zirconium carbide, and mixtures thereof.

63. (withdrawn) The tool of claim 59, wherein the reinforcing material is an organometallic coupling agent.

64. (withdrawn) The tool of claim 30, wherein the tool is a polishing or grinding pad.

65. (withdrawn) The tool of claim 30, wherein the tool is a CMP pad dresser.

66. (withdrawn) The tool of claim 30, wherein the tool is for shaping dental materials.

67. (new) A method of improving retention of superabrasive particles held in a solidified organic material layer of an abrading tool, a portion of each of said superabrasive particles protruding out of the solidified organic material layer, comprising:

securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer.

REMARKS

In the Office Action mailed November 26, 2007, Claims 1, 3-6, and 13-15 were pending for consideration, all of which were rejected on various statutory grounds. Particularly, Claims 1, 3-6, and 13-15 were rejected under 35 U.S.C. 102(b or e) as being allegedly anticipated by, or in the alternative, under 35 U.S.C. 103(a) as being allegedly obvious over U.S. Patent No. 6,755,720 (hereinafter "Ishizaki") or U.S. Patent Application No. 2005/0260939 (hereinafter "Andrews").

By the present amendment, Claim 67 has been added, which includes the subject matter of Claims 1, 3, and 13. Claim 13 has been canceled. As such, no new matter is added by the amendment; the amendment is fully supported by originally-filed Claims 1, 3, and 13; and such amendment does not require an additional search.

35 U.S.C. § 102 Rejections:

The Patent Office has rejected Claims 1, 3-6, and 13-15 under 35 U.S.C. 102(b or e) as allegedly anticipated by Ishizaki. Before discussing the rejections, it is thought proper to briefly state what is required to sustain such a rejection. It is well settled that "[a] claim is anticipated only if each and every element as set forth in the claims is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil of California*, 814 F.2d 628, 2 U.S.P.Q. 2d 1051, 1053 (Fed. Cir. 1987). In order to establish anticipation under 35 U.S.C. § 102, all elements of the claim must be found in a single reference. *Hybritech, Inc. v. Monoclonal Antibodies, Inc.,* 231 U.S.P.Q. 81, 90 (Fed. Cir. 1986), *cert. denied* 107 S.Ct. 1606 (1987). In particular, as pointed out by the court in *W.L. Gore & Assoc., Inc. v. Garlock, Inc.,* 220 U.S.P.Q. 303, 313 (Fed. Cir. 1981), *cert denied,* 469 U.S. 851 (1984), "anticipation requires that each and every element of the claimed invention be disclosed in a prior art reference." "The identical invention must be shown in as complete detail as is contained in the...claim." *Richardson v. Suzuki Motor Co.* 9 U.S.P.Q. 2d 1913, 1920 (Fed. Cir. 1989).

Claim 1 of the present invention contains limitations to a method of improving retention of superabrasive particles held in a solidified organic material layer of an abrading tool, where a portion of each of said superabrasive particles protrudes out of the solidified organic material layer. The method may further include securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging

on the protruding portion of any individual superabrasive particle when used to abrade a work piece. Newly submitted Claim 67 is similarly directed to a method of improving retention of superabrasive particles held in a solidified organic material layer of an abrading tool where a portion of each of the superabrasive particles protrude out of the solidified organic material layer. The method includes securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece. Claim 67 specifically requires a majority of the plurality of superabrasive particles to be arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer.

The Ishizaki Reference

Ishizaki teaches a vitrified bond tool comprising a support body, a vitrified bond layer, and a plurality of abrasive grains held by the vitrified bond layer (col. 2, lines 27-32). The vitrified bond layer is made from a ceramic or glassy material such as silicon nitride or an alumina. The vitrified bond material includes borosilicate glass, crystallized glass, quartz glass, alumina, alumina nitride, silicon nitride, mullite, zirconia, and other ceramic materials (col. 3, lines 21-23; col. 11, lines 57-60).

Ishizaki does not teach or suggest (a) an organic material layer, (b) securing a plurality of superabrasive particles in a solidified organic material layer, (c) securing the plurality of superabrasive particles in a solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle, or (d) superabrasive particles in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle. Rather, Ishizaki teaches a vitrified bond layer. Vitrified bond materials taught by Ishizaki include borosilicate glass, crystallized glass, quartz glass, alumina, alumina nitride, silicon nitride, mullite, and zirconia. These materials are primarily ceramics that would not be considered to be organic by one of ordinary skill in the art. As is defined in the specification on page 7, lines 2-4, an organic material layer refers to a layer or mass of a semisolid or solid complex amorphous mix of organic compounds. None of the materials exemplified by Ishizaki can be considered to be organic compounds. As such, Ishizaki does not teach an organic material layer. By the fact that

Ishizaki does not teach an organic material layer, it can not be interpreted as teaching securing a plurality of superabrasive particles in a solidified organic material layer, nor can it teach securing the plurality of superabrasive particles in a solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle.

Further, Ishizaki also does not teach or suggest the claim limitation of securing a plurality of superabrasive particles in a solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece. As can be seen in FIGs. 7(a-d) of Ishizaki, the particles are not evenly distributed across the vitrified bond layer. Such non-uniform distribution of particles will likely result in a non-uniform distribution of mechanical forces across the particles. Particles that are further apart from neighboring particles will experience greater mechanical stress from the work piece during abrading, while particles that are closer to neighboring particles will experience less mechanical stress. As such, Ishizaki does not teach or suggest each and every element of the claims.

In response to the Applicant's previous arguments, the Examiner has argued that the lack of teaching of a solidified organic material layer is allegedly "at least obvious." Such response does not address the alleged anticipation by Ishizaki, or the lack of teaching in Ishizaki of a solidified organic material layer, or the additional claim elements of securing a plurality of superabrasive particles in a solidified organic material layer, and securing the plurality of superabrasive particles in a solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle. As Ishizaki fails to teach any one of the listed claim elements, such rejection is thought improper and the Applicant respectfully requests that it be withdrawn.

In the Office Action, the Examiner further likens Claim 1 to a Jepson type claim and erroneously alleges "applicants do not believe that it is novel or unobvious to retain superabrasive particles in a solidified organic material layer." Such statement by the Examiner is unfounded. First, the Examiner does not assert that the claim is a Jepson type claim; only that it may be similarly fashioned. The logical conclusion from such assertion, then, is that the claim should be evaluated on the merits, without consideration of Jepson type claim classification. As the claim is directed to a method, the preamble of the claim is thought to be an integral part of

the claim language. Neither in the body of the application nor in prosecution has the Applicant referenced or identified the material of the claim preamble to be prior art or work of another. Logically, then, the phrasing of the claim, nor the accompanying description and prosecution would lead a reasonable person to misinterpret the preamble as an admission of prior art. Second, Applicant emphatically **does not** believe that it is not novel or unobvious to retain superabrasive particles in a solidified organic material layer. Third, although Applicant believes further discussion is not merited regarding the Examiner's erroneous comparison, Applicant respectfully submits that even if, *arguendo*, Claim 1 were a Jepson type claim, the subject matter of the preamble is not *de facto* admission of prior art work of another. M.P.E.P. 2129 states "where the preamble of a *Jepson* claim describes applicant's own work, such may not be used against the claims." Applicant respectfully submits that the preamble of Claim 1, specifically "A method of improving retention of superabrasive particles held in a solidified organic material layer of an abrading tool, a portion of each of said superabrasive particles protruding out of the solidified organic material layer" is the Applicant's own work. For any and all of the above reasons, the Examiner's argument is not supported and removal of the rejections is respectfully requested.

Regarding Claim 67, such elements present in Claim 1 are present in Claim 67, in addition to requirements of the majority of the plurality of superabrasive particles arranged so that their tips protrude to less than about 40 microns above the solidified organic material layer. As Ishizaki fails to teach a solidified organic layer, it inherently cannot teach arranging superabrasive particles so that their tips protrude to less than 40 microns above a solidified organic material layer. Additionally, Ishizaki fails to teach arranging superabrasive particles so that their tips protrude to less than 40 microns. As such, Ishizaki fails to teach each and every element of the claims. Furthermore, Applicant respectfully submits that Ishizaki fails to teach securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer.

Accordingly, Applicant respectfully requests that the rejections of Claim 1 be withdrawn. Additionally, as Claims 3-6 and 13-15 depend from Claim 1 and are considered to be narrower in scope, it is also requested that these rejections be withdrawn as well.

The Andrews Reference

Although it is not clear, the Examiner may also have rejected Claims 1, 3-6, and 13-15 under 35 U.S.C. 102(b or e) as being allegedly anticipated by Andrews, and such rejection will be addressed herein, in the event that such rejection was the Examiner's intent. Andrews teaches a dressing blade for grinding and cutting tools having superabrasive particles held thereto by a brazed metal composition (abstract). Metal braze materials require high temperatures in order to bond superabrasive particles to a support substrate. For example, paragraph [0053] teaches that brazing is carried out at a temperature of from 800° C to 1200° C.

Similar to the discussion of Ishizaki, Andrews does not teach or suggest all of the elements of Claim 1. For example, Andrews does not teach or suggest an organic matrix to retain the superabrasive particles. Andrews teaches possible metal braze materials to include copper, nickel, silver, tin, zirconium, silicon and iron [paragr. 0045] and an active metal component including titanium, zirconium, chromium, and hafnium [0043] to increase the strength of the bonds between the particle and the metal braze. As before, without a teaching of an organic matrix, Andrews naturally fails to teach securing a plurality of superabrasive particles in a solidified organic material layer, or securing the plurality of superabrasive particles in a solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle.

Furthermore, there is no teaching or suggestion in Andrews that mechanical stress be minimized for any individual superabrasive particle. For example, FIGs. 1B and 2B of Andrews show superabrasive particles having an irregular spacing, indicating that mechanical stress will not be minimized for each individual particle during an abrading operation. As such, Andrews fails to teach each and every element of Claim 1, and likewise dependent Claims 3-6 and 13-15. Therefore, Applicant respectfully requests removal of the rejections.

Regarding Claim 67, Applicant respectfully submits that, in addition to the noted limitations of Claim 1 not taught in Andrews, the reference fails to teach securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes

mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer.

35 U.S.C. § 103 Rejections:

It is thought prudent to once again briefly review the required elements necessary to establish a *prima facie* case of obviousness. Specifically, in order to meet the burden of establishing a *prima facie* case of obvious, the Patent Office must show that: 1) each and every element of the invention as set forth in the claims is taught or suggested by the reference as modified or the combination of references; 2) that there is sufficient motivation or articulated reasoning for one of ordinary skill in the art to modify or combine the reference; and 3) that one of ordinary skill in the art would find a sufficient likelihood of successfully making the modification or combination asserted. Applicants respectfully submit that the Patent Office has failed to satisfy these requirements with any of the asserted rejections, and thus has not established a *prima facie* case of obviousness with respect to either of the Ishizaki or Andrews references.

The Ishizaki Reference

The Patent Office has rejected Claims 1, 3-6, and 13-15 under 35 U.S.C. 103(a) as being allegedly obvious over Ishizaki. As has been described, Ishizaki teaches a vitrified bond tool comprising a support body, a vitrified bond layer, and a plurality of abrasive grains held by the vitrified bond layer (col. 2, lines 27-32). The vitrified bond layer is made from a ceramic or glassy material, examples of which include borosilicate glass, crystallized glass, quartz glass, alumina, alumina nitride, silicon nitride, mullite, zirconia, and other ceramic materials (col. 3, lines 21-23; col. 11, lines 57-60).

As has also been described, Claim 1 of the present invention contains limitations to a method of improving retention of superabrasive particles held in a solidified organic material layer of an abrading tool, where a portion of each of said superabrasive particles protrudes out of the solidified organic material layer. The method may further include securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes

mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece. As is described in the present specification, it was previously thought that polymeric resins were not able to retain superabrasive particles to a degree that is sufficient for CMP pad dressing (page 2, lines 28-30). The Applicant of present application has discovered, however, that by minimizing mechanical stress impinging on the protruding portion of any one superabrasive particle during an abrading operation, superabrasive particles are retained in the organic or polymeric matrix that would otherwise not be suitable for such uses (see page 10, lines 20-27).

As has also been described, Ishizaki does not teach or suggest an organic material layer, as is specified in Claim 1, but rather a vitrified bond layer. Vitrified bond materials taught by Ishizaki include borosilicate glass, crystallized glass, quartz glass, alumina, alumina nitride, silicon nitride, mullite, and zirconia. These materials are primarily ceramics that would not be considered to be organic by one of ordinary skill in the art. As is defined in the specification on page 7, lines 2-4, an organic material layer refers to a layer or mass of a semisolid or solid complex amorphous mix of organic compounds. None of the materials exemplified by Ishizaki can be considered to be organic compounds. For this reason the Patent Office has failed to establish a *prima facie* case of obviousness because Ishizaki does not teach or suggest each and every element of Claim 1.

Ishizaki also does not teach or suggest the Claim 1 limitation of securing a plurality of superabrasive particles in a solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece. As can be seen in FIGs. 7(a-d), the particles are not evenly distributed across the vitrified bond layer. Such a non-uniform distribution of particles will likely result in a non-uniform distribution of mechanical forces across the particles. Particles that are further apart from neighboring particles will experience greater mechanical stress from the work piece during abrading, while particles that are closer to neighboring particles will experience less mechanical stress. For this reason the Patent Office has failed to establish a *prima facie* case of obviousness because neither Ishizaki nor a modification of Ishizaki teaches or suggests each and every element of Claim 1.

Additionally, it would not have been obvious to modify Ishizaki to include organic material layers. Vitrified bond materials are defined as materials that have been converted into

glass or a glassy substance by heat and fusion (Merriam-Webster Dictionary, 10th ed.), where the vitreous materials are hard, amorphous, brittle, as in porcelain enamel (Hawley's Condensed Chemical Dictionary, Fourteenth ed.). Such vitrification of a material generally occurs at as a result of firing at fairly high temperatures. As a result, vitrified bond materials tend to preclude organic materials due to their general inability to withstand high temperatures. For example, Ishizaki teaches that the softening point of the vitreous bond materials should be below 750° C, and that the material should be fired at between 900° C and 1600° C. (see col. 11, lines 62-65; Examples 1-5). Such high temperatures will likely result in covalent bonding between the vitreous bond material and the superabrasive particles. Such bonding allows the superabrasive particles to be held more firmly in the vitreous material. Many superabrasive materials such as diamond would not form such covalent bonds with an organic matrix due to the low temperatures at which most organic materials are cured. Because of the lack of covalent bonding between these materials, a superabrasive particle embedded in an organic matrix is held by mechanical bonding. Thus according to the state of the art at the time the application was filed, superabrasive particles could not be retained in an organic or polymeric matrix during a polishing procedure such as CMP processing (see page 2, lines 28-30 of the present specification). As such, it would not have been obvious to one of ordinary skill in the art to modify Ishizaki to include an organic matrix because there would have been insufficient likelihood of success in producing a polishing device capable of retaining the superabrasive particles.

Furthermore, a many organic materials have vaporizing temperatures below the recommended processing temperatures of Ishizaki. As such, if organic materials were subjected to the methods of Ishizaki, they would not form a tool as the reference teaches. Rather, organic materials would vaporize during processing and prevent formation a desired tool, let alone one that could effectively hold and secure superabrasive particles. For these reasons, the Patent Office has failed to establish a *prima facie* case of obviousness.

The Patent Office has also not shown that one of ordinary skill in the art would have had sufficient motivation to modify Ishizaki in such a way as to arrive at all of the elements of Claim 1. The Supreme Court has recently articulated that "it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." *KSR v. Teleflex,* 127 S. Ct. 1727 (2007). The Patent

Office has not provided sufficient reason as to why it would have been obvious to substitute an organic matrix for a vitrified bond layer, particularly given the much lower retention of superabrasive particles in an organic matrix. It is more likely that one of ordinary skill in the art would be motivated to pursue experimentation with other ceramic materials in order to improve retention of superabrasive particles, rather than organic matrixes in which such particles are weakly held. For these reasons, the Patent Office has failed to establish a prima facie case of obviousness with respect to this reference.

The Examiner has argued that "it would also have been obvious in view of the teaching in either reference to provide either with any elements of the claims deemed to be missing, for the purpose of improving the performance of the abrasive article." Respectfully, the Applicant must disagree. According to the state of the art at the time of filing, organic materials were understood to be less effective at holding and securing superabrasive particles, over such materials as brazed metals and ceramics. Therefore, the Applicant is unsure why replacing a ceramic material or a brazed metal with an organic material would have been interpreted as "improving the performance of the abrasive article" (Office Action, p.2, ln. 14-15) as such substitution would likely result in less secure superabrasive particles, which would result in greater numbers of scratches and higher failure rates from dislodged particles. In the Office Action, the Examiner recognizes Applicant's arguments of the references failing to teach a solidified organic material, but states "[b]ased on the teachings in either reference, and the knowledge in the relevant art, it would have been at least obvious to provide each with a solidified organic material layer" (Office Action, p. 2, ln. 21- p. 3, ln. 1). Respectfully, Applicant disagrees and points to the "teachings in either reference" of processing at high temperatures, that are typically higher than the vaporizing temperature of many organic materials, and of the cited references clearly using ceramics and metals. As such, the Examiner has failed to provide sufficient motivation or articulated reasoning for one of ordinary skill in the art to modify or combine the reference.

Accordingly, it is respectfully requested that the rejections of Claim 1 be withdrawn. Additionally, as Claims 3-6 and 13-15 depend from Claim 1 and are considered to be narrower in scope, it is also requested that these rejections be withdrawn as well.

The Andrews Reference

The Patent Office has also rejected Claims 1, 3-6, and 13-15 under 35 U.S.C. 103(a) as being allegedly obvious over Andrews. As previously noted, Andrews teaches a dressing blade for grinding and cutting tools having superabrasive particles held thereto by a brazed metal composition (abstract). Metal braze materials require high temperatures in order to bond superabrasive particles to a support substrate. For example, paragraph [0053] teaches that brazing is carried out at a temperature of from 800° C to 1200° C.

Similar to the discussion of Ishizaki, Andrews does not teach or suggest all of the elements of Claim 1. For example, Andrews does not teach or suggest an organic matrix to retain the superabrasive particles. Possible metal braze materials taught by Andrews include copper, nickel, silver, tin, zirconium, silicon and iron [para. 0045] and an active metal component including titanium, zirconium, chromium, and hafnium [para. 0043] to increase the strength of the bonds between the particle and the metal braze. Furthermore, there is no teaching or suggestion in Andrews that mechanical stress be minimized for any individual superabrasive particle. For example, FIGs. 1B and 2B of Andrews show superabrasive particles having an irregular spacing, indicating that mechanical stress will not be minimized for each individual particle during an abrading operation. For these reasons the Patent Office has failed to establish a *prima facie* case of obviousness because neither Andrews nor a modification of Andrews teaches or suggests each and every element of Claim 1. Specifically, Andrews fails to support a *prima facie* case of obviousness for failing to teach: 1) each and every element of the invention; 2) that there is sufficient motivation or articulated reasoning for one of ordinary skill in the art to modify the reference; and 3) that one of ordinary skill in the art would find a sufficient likelihood of successfully making the modification or combination asserted. The reasoning is the same as articulated above in discussing Ishizaki, and is incorporated by reference herein.

Further, it would not have been obvious to modify Andrews to replace the braze metal matrix with an organic matrix. Many metal materials form strong carbide bonds with superabrasive particles, particularly at high temperatures. For example, paragraph [0053] teaches that brazing conditions permanently attach particles to the support. Further down in the same paragraph it is taught that titanium hydride is used as an active metal component to form strong titanium carbide bonds between the diamond particles and the metal braze. As such, one of ordinary skill in the art would not have had sufficient likelihood of success in permanently

bonding diamond particles to a support with an organic matrix. One of ordinary skill in the art would have likely been motivated to experiment with other metal brazes or braze alloys in order improve the characteristics of the tool and the retention of the superabrasive particles embedded therein, rather than organic matrixes having weak retention characteristics. Additionally, the Patent Office has also not shown that one of ordinary skill in the art would have had sufficient motivation to modify Andrews in such a way as to arrive at all of the elements of Claim 1. Specifically, no reason has been given as to why it would have been obvious to one of ordinary skill in the art to replace the braze metal layer with an organic matrix, particularly in light of the importance of permanent particle retention concept as taught in paragraph [0053]. For these reasons, the Patent Office has failed to establish a prima facie case of obviousness with respect to Claim 1.

CONCLUSION

In view of the foregoing, the Applicant believes that Claims 1, 3-6, 14-15 and 67 present allowable subject matter and the prompt allowance thereof is requested. If any impediment to the allowance of these claims remains after consideration of the present amendment and above remarks, and such impediment could be removed during a telephone interview, the Examiner is invited to telephone the undersigned attorney, so that such issues may be resolved as expeditiously as possible.

Please charge any additional fees except for Issue Fee or credit any overpayment to Deposit Account No. 20-0100.

Dated this 25th day of January, 2008.

Respectfully submitted,

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DWO/SAS/ns

Electronic Acknowledgement Receipt

EFS ID:	2771432
Application Number:	11223786
International Application Number:	
Confirmation Number:	8266
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Customer Number:	20551
Filer:	David William Osborne/Nicole Solomon
Filer Authorized By:	David William Osborne
Attorney Docket Number:	00802-25023
Receipt Date:	25-JAN-2008
Filing Date:	09-SEP-2005
Time Stamp:	19:23:46
Application Type:	Utility under 35 USC 111(a)

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Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)
1		25023response.pdf	141173 13b0a234eddebf7f0c1cdf6270f082cedf5561eb	yes	21

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment After Final	1	1
	Claims	2	9
	Applicant Arguments/Remarks Made in an Amendment	10	21
Warnings:			
Information:			
	Total Files Size (in bytes):	141173	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
11/223,786	09/09/2005	

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	01/25/2008	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 66	Minus	** 66	= 0	X $ =		OR	X $50=	0
	Independent (37 CFR 1.16(h))	* 2	Minus	***3	= 0	X $ =		OR	X $210=	0
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/JAMES F. ELLIOTT/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/223,786	09/09/2005	Chien-Min Sung	00802-25023	8266

20551 7590 03/14/2008
THORPE NORTH & WESTERN, LLP.
P.O. Box 1219
SANDY, UT 84091-1219

EXAMINER	
ACKUN, JACOB K	
ART UNIT	**PAPER NUMBER**
3728	
MAIL DATE	**DELIVERY MODE**
03/14/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Advisory Action Before the Filing of an Appeal Brief	Application No. 11/223,786	Applicant(s) SUNG, CHIEN-MIN	
	Examiner Jacob K. Ackun Jr.	Art Unit 3728	

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED on 1/25/2008 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

1. ☒ The reply was filed after a final rejection, but prior to or on the same day as filing a Notice of Appeal. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. The reply must be filed within one of the following time periods:
   a) ☐ The period for reply expires _____months from the mailing date of the final rejection.
   b) ☒ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.

   Examiner Note: If box 1 is checked, check either box (a) or (b). ONLY CHECK BOX (b) WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. ☒ The proposed amendment(s) filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   (a) ☒ They raise new issues that would require further consideration and/or search (see NOTE below);
   (b) ☐ They raise the issue of new matter (see NOTE below);
   (c) ☒ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   (d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.

   NOTE: _____. (See 37 CFR 1.116 and 41.33(a)).
4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicant's reply has overcome the following rejection(s): _____.
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☒ For purposes of appeal, the proposed amendment(s): a) ☒ will not be entered, or b) ☐ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.
   The status of the claim(s) is (or will be) as follows:
   Claim(s) allowed: _____.
   Claim(s) objected to: _____.
   Claim(s) rejected: *As already noted*.
   Claim(s) withdrawn from consideration: _____.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
9. ☐ The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing a good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. ☒ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: See Continuation Sheet.
12. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____
13. ☐ Other: _____.

/Jacob K. Ackun Jr./
Primary Examiner, Art Unit 3728

Continuation of 11. does NOT place the application in condition for allowance because: The applicant has not amended the independent claim during the entire prosecution of this case. Accordingly the examiners reasons for maintaining the rejections as set forth in the two prior office actions are believed to be evident from the record in this case. Accordingly these reasons will not be reiterated herein. However, the applicants response raises a few issues that the examiner believes need to be addressed. First, the applicants have argued that the examiner has made statements that are "erroneous" and "unfounded" with regard to the preamble of independent claim 1. The examiner considers this argument to be an example of an approach to this case by applicant that is unreasonable. The scope of claim 1 and the lack of any amendments thereto have already been referred to in this reagrd. Secondly, the examiner has observed quite reasonably and appropriately that the claim is drafted as a method of improving something, and then recites steps directed to the improvement. Thus claim1 itself indicates by its plain meaning that it is directed to the improvement of something. Applicant is reminded that it is the examiners duty to carefully review all of the facts in any case, including this one, and to allow claims only after being convinced and satisfied that the claims as drafted avoid the prior art. The applicant can be a big help in the process (and should be) by, for example, being candid and forthright as to any issues that might be raised regarding what is or is not prior art. Clearly, the dismissal of the examiners concerns as being "erroneous" and "unfounded", without more, is not helpful. It would also appear to be counterproductive to distort the examiners posiion.relative to the noted limitation, as applicant has done. The examiner never concluded that the retention of superabrasive particles held in a solidified organic material layer was the prior art of another, as alleged by applicant. Clearly, the prior art of applicant is also "prior art" in a given application. Claim 1 continues to plainly recite on the very first line thereof "A method of improving retention of superabrasive particles held in a solidified organic material layer of an abrading tool", while applicant argues that the examiner should allow the claim because the "prior art" does not teach or disclose retention of superabrasive particles in a solidified organic material layer.

As to the only other issue in the case relative to claim 1, the only step recited in the claim requires that the improvement is accomplished by securing the particles in an arrangement "that minimizes mechanical stress". This is very clearly overly broad. Almost any arrangement can be said to minimize mechanical stress. Note some of the dependent claims in the case. So unless securing the superabrasive particles in the organic material layer were itself inventive (there is no evidence of record such as a simple statement or claim to that effect in the case) it would not appear to be reasonable to conclude that claim 1 was allowable.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	Chien-Min Sung
SERIAL NO.:	11/223,786
FILING DATE:	09/09/2005
FOR:	METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX
ART UNIT:	3728
EXAMINER:	Jacob K. Ackun
DOCKET NO.:	00802-25023

AMENDMENT AND RESPONSE UNDER 37 C.F.R. § 1.116

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Office Action mailed November 26, 2007, please enter the following amendment and reconsider this application in view of the remarks provided below.

DO NOT ENTER: /J.A./

PTO/SB/30 (04-07)
Approved for use through 09/30/2007. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Request for Continued Examination (RCE) Transmittal

Address to:
Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	SUNG, CHIEN-MIN
Art Unit	3728
Examiner Name	Ackun, Jacob K.
Attorney Docket Number	00802-25023

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. Submission required under 37 CFR 1.114 Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

   a. ☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

      i. ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

      Ii. ☐ Other _____

   b. ☑ Enclosed

      I. ☑ Amendment/Reply

      ii. ☐ Affidavit(s)/ Declaration(s)

      iii. ☐ Information Disclosure Statement (IDS)

      iv. ☐ Other _____

2. Miscellaneous

   a. ☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of _____ months. (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

   b. ☐ Other _____

3. Fees The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

   a. ☑ The Director is hereby authorized to charge the following fees, any underpayment of fees, or credit any overpayments, to Deposit Account No. 02-0100. I have enclosed a duplicate copy of this sheet.

      i. ☐ RCE fee required under 37 CFR 1.17(e)

      ii. ☐ Extension of time fee (37 CFR 1.136 and 1.17)

      iii. ☑ Other DEFICIENCIES ONLY

   b. ☑ Check in the amount of $ 810 enclosed

   c. ☐ Payment by credit card (Form PTO-2038 enclosed)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Signature	/David W. Osborne/	Date	May 23, 2008
Name (Print/Type)	David W. Osborne	Registration No.	44989

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450 or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.

Signature	/David W. Osborne/		
Name (Print/Type)	David W. Osborne	Date	May 23, 2008

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	Chien-Min Sung
SERIAL NO.:	11/223,786
FILING DATE:	09/09/2005
FOR:	METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX
ART UNIT:	3728
EXAMINER:	Jacob K. Ackun
DOCKET NO.:	00802-25023

REQUEST FOR RCE AND
AMENDMENT AND RESPONSE UNDER 37 C.F.R. § 1.116

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Office Action mailed November 26, 2007, and the Advisory Action mailed March 14, 2008, please enter the following amendment and reconsider the application in light of the accompanying remarks. Enclosed is a Request for Continued Examination under 37 CFR §1.114, along with the fee of $810.00 under 37 CFR §1.17(e) for the Request for Continued Examination.

AMENDMENTS TO THE CLAIMS

1. (currently amended) A method of increasing ~~improving~~ retention of superabrasive particles held in a solidified organic material layer of an abrading tool, a portion of each of said superabrasive particles protruding out of the solidified organic material layer, comprising:

securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer.

2. (withdrawn) The method of claim 1, wherein the arrangement of the plurality of superabrasive particles is configured to uniformly distribute drag forces across substantially each superabrasive particle.

3. (original) The method of claim 1, wherein a majority of the plurality of superabrasive particles protrudes to a predetermined height above the solidified organic material layer.

4. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of less than about 20 microns when used to abrade a work piece.

5. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of from about 1 micron to about 20 microns when used to abrade a work piece.

6. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of from about 10 micron to about 20 microns when used to abrade a work piece.

7. (withdrawn) The method of claim 3, wherein the superabrasive particles protrude to a predetermined height that is along a designated profile.

8. (withdrawn) The method of claim 7, wherein the designated profile is a plane.

9. (withdrawn) The method of claim 7, wherein the designated profile has a slope.

10. (withdrawn) The method of claim 7, wherein the designated profile has a curved shape.

11. (withdrawn) The method of claim 10, wherein the designated profile has a dome shape.

12. (withdrawn) The method of claim 7, wherein a majority of the plurality of superabrasive particles are arranged such that their tips vary from the designated profile to less than about 10% of the average size of the superabrasive particles.

13. (canceled)

14. (original) The method of claim 3, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 30 microns.

15. (original) The method of claim 3, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to about 20 microns.

16. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are of substantially the same size.

17. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particle are from about 30 microns to about 500 microns in size.

18. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are from about 100 microns to about 200 microns in size.

19. (withdrawn) The method of claim 1, wherein superabrasive particles in a central location of the abrading tool are smaller in size than superabrasive particles in a peripheral location on the abrading tool.

20. (withdrawn) The method of claim 1, wherein securing the plurality of superabrasive particles includes arranging the plurality of superabrasive particles according to a predetermined attitude.

21. (withdrawn) The method of claim 20, wherein the predetermined attitude is a uniform attitude across substantially all of the plurality of superabrasive particles.

22. (withdrawn) The method of claim 20, wherein the plurality of superabrasive particles are substantially configured with an apex portion oriented towards a work piece.

23. (withdrawn) The method of claim 20, wherein superabrasive particles in a central location on the abrading tool are configured with an apex or an edge portion oriented towards a work piece, and superabrasive particles in a peripheral location on the abrading tool are configured with a face portion oriented towards the work piece.

24. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are arranged as a grid.

25. (withdrawn) The method of claim 24, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 3 times to about 5 times the average size of the superabrasive particles.

26. (withdrawn) The method of claim 24, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 100 microns to about 800 microns.

27. (withdrawn) The method of claim 20, wherein arranging the superabrasive particles according to a predetermined attitude further comprises:

applying an adhesive to a substrate;

applying a flexible sieve to the adhesive;

disposing superabrasive particles across a template positioned on the flexible sieve such that a portion of the superabrasive particles adhere to the adhesive by either an edge or an apex portion; and

removing the template and the un-adhered superabrasive particles from the flexible sieve.

28. (withdrawn) The method of claim 27, wherein the flexible sieve is a nylon sieve.

29. (withdrawn) The method of claim 1, wherein superabrasive particles in a central location on the abrading tool are spaced farther apart than superabrasive particles in a peripheral location on the abrading tool.

30. (withdrawn) A superabrasive tool having improved superabrasive particle retention, comprising:

a solidified organic material layer; and

a plurality of superabrasive particles secured in the solidified organic material layer in an arrangement as recited in claim 1.

31. (withdrawn) The tool of claim 30, wherein each of the plurality of superabrasive particles protrudes to a predetermined height above the solidified organic material layer.

32. (withdrawn) The tool of claim 31, wherein the predetermined height is greater than about 20 microns.

33. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 1 micron to about 20 microns.

34. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 5 microns to about 20 microns.

35. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 10 microns to about 20 microns.

36. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles protrude to a predetermined height is along a designated profile.

37. (withdrawn) The tool of claim 36, wherein the designated profile is a plane.

38. (withdrawn) The tool of claim 36, wherein the designated profile has an average slope from a high point near a center location of the tool to a low point near a peripheral edge of the tool.

39. (withdrawn) The tool of claim 38, wherein the average slope is about 1/1000.

40. (withdrawn) The tool of claim 36, wherein the designated profile has a curved shape.

41. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles are arranged such that their tips protrude to about 10% of the average size of the superabrasive particles.

42. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles are arranged such that their tips protrude from about 20 to about 30 microns.

43. (withdrawn) The tool of claim 30, wherein the arrangement is a grid.

44. (withdrawn) The tool of claim 43, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 3 times to about 5 times the average size of the superabrasive particles.

45. (withdrawn) The tool of claim 43, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 100 microns to 800 microns.

46. (withdrawn) The tool of claim 30, wherein superabrasive particles in a central location on the tool are spaced farther apart than superabrasive particles in a peripheral location on the tool.

47. (withdrawn) The tool of claim 30, wherein superabrasive particles in a central location on the tool are larger in size than superabrasive particles in a peripheral location on the tool.

48. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles are arranged according to a predetermined attitude.

49. (withdrawn) The tool of claim 48, wherein the plurality of superabrasive particles are substantially configured with an apex portion oriented towards a work piece.

50. (withdrawn) The tool of claim 48, wherein superabrasive particles in a central location on the tool are configured with an apex or an edge portion oriented towards a work piece, and superabrasive particles in a peripheral location on the tool are configured with a face portion oriented towards the work piece.

51. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles include a member selected from the group consisting of diamond, polycrystalline diamond, cubic boron nitride, polycrystalline cubic boron nitride, and combinations thereof.

52. (withdrawn) The tool of claim 51, wherein the plurality of superabrasive particles includes diamond.

53. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles are from about 30 microns to about 500 microns in size.

54. (withdrawn) The tool of claim 53, wherein the plurality of superabrasive particles are from about 100 microns to about 200 microns in size.

55. (withdrawn) The tool of claim 30, wherein the solidified organic material layer comprises a member selected from the group consisting of amino resins, acrylate resins, alkyd resins, polyester resins, polyamide resins, polyimide resins, polyurethane resins, phenolic resins, phenolic/latex resins, epoxy resins, isocyanate resins, isocyanurate resins, polysiloxane resins, reactive vinyl resins, polyethylene resins, polypropylene resins, polystyrene resins, phenoxy resins, perylene resins, polysulfone resins, acrylonitrile-butadiene-styrene resins, acrylic resins, polycarbonate resins, polyimide resins, and mixtures thereof.

56. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is an epoxy resin.

57. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is a polyurethane resin.

58. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is a polyimide resin.

59. (withdrawn) The tool of claim 30, further comprising a reinforcing material disposed within at least a portion of the solidified organic material layer.

60. (withdrawn) The tool of claim 59, wherein the reinforcing material is a material selected from the group consisting of ceramics, metals, or combinations thereof.

61. (withdrawn) The tool of claim 60, wherein the reinforcing material is a ceramic.

62. (withdrawn) The tool of claim 61, wherein the ceramic comprises a member selected from the group consisting of alumina, aluminum carbide, tungsten carbide, silica, silicon carbide, silicon nitride, zirconia, zirconium carbide, and mixtures thereof.

63. (withdrawn) The tool of claim 59, wherein the reinforcing material is an organometallic coupling agent.

64. (withdrawn) The tool of claim 30, wherein the tool is a polishing or grinding pad.

65. (withdrawn) The tool of claim 30, wherein the tool is a CMP pad dresser.

66. (withdrawn) The tool of claim 30, wherein the tool is for shaping dental materials.

REMARKS

In the Final Office Action mailed November 26, 2007, Claims 1, 3-6, and 13-15 were pending for consideration, all of which were rejected on various statutory grounds. Particularly, Claims 1, 3-6, and 13-15 were rejected under 35 U.S.C. 102(b or e) as being allegedly anticipated by, or in the alternative, under 35 U.S.C. 103(a) as being allegedly obvious over U.S. Patent No. 6,755,720 (hereinafter "Ishizaki") or U.S. Patent Application No. 2005/0260939 (hereinafter "Andrews"). In the following Advisory Action mailed March 14, 2008, the Examiner refused to enter the proposed amendments and maintained the rejections.

By the present amendment, Claim 1 has been amended to include the subject matter of Claim 13. Claim 13 has been canceled. Additionally, the preamble of the claim has been amended for clarity to replace the term "improving" with "increasing." Support for the amendment can be found at page 17, lines 24-25; page 20, line 3; and Claims 3 and 13 of the originally-filed application. Accordingly, Applicant respectfully submits that no new matter is added by this amendment. Such amendment is made without conceding the correctness of the present rejections and without prejudice to Applicant's right to pursue canceled or removed subject matter in a future application. Applicant believes that pending claims 1, 3-6, and 13-15 present allowable subject matter, and reconsideration and allowance thereof is respectfully requested.

35 U.S.C. § 102 Rejections:

The Patent Office has rejected Claims 1, 3-6, and 13-15 under 35 U.S.C. 102(b or e) as allegedly anticipated by Ishizaki. Before discussing the rejections, it is thought proper to once again briefly state what is required to sustain such a rejection. It is well settled that "[a] claim is anticipated only if each and every element as set forth in the claims is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil of California*, 814 F.2d 628, 2 U.S.P.Q. 2d 1051, 1053 (Fed. Cir. 1987). In order to establish anticipation under 35 U.S.C. § 102, all elements of the claim must be found in a single reference. *Hybritech, Inc. v. Monoclonal Antibodies, Inc.,* 231 U.S.P.Q. 81, 90 (Fed. Cir. 1986), *cert. denied* 107 S.Ct. 1606 (1987). In particular, as pointed out by the court in *W.L. Gore & Assoc., Inc. v. Garlock, Inc.,* 220 U.S.P.Q. 303, 313 (Fed. Cir. 1981), *cert denied,* 469 U.S. 851 (1984), "anticipation requires that each and every element of the claimed invention be disclosed in a prior art

reference." "The identical invention must be shown in as complete detail as is contained in the...claim." *Richardson v. Suzuki Motor Co.* 9 U.S.P.Q. 2d 1913, 1920 (Fed. Cir. 1989).

Claim 1 of the present invention contains limitations to a method of increasing retention of superabrasive particles held in a solidified organic material layer of an abrading tool, where a portion of each of said superabrasive particles protrudes out of the solidified organic material layer. The method may further include securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece. The claim also requires a majority of the plurality of superabrasive particles to be arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer.

The Ishizaki Reference

Ishizaki teaches a vitrified bond tool comprising a support body, a vitrified bond layer, and a plurality of abrasive grains held by the vitrified bond layer (col. 2, lines 27-32). The vitrified bond layer is made from a ceramic or glassy material such as silicon nitride or an alumina. The vitrified bond material includes borosilicate glass, crystallized glass, quartz glass, alumina, alumina nitride, silicon nitride, mullite, zirconia, and other ceramic materials (col. 3, lines 21-23; col. 11, lines 57-60).

Ishizaki does not teach or suggest (a) an **organic** material layer, (b) securing a plurality of superabrasive particles in a solidified organic material layer, (c) securing the plurality of superabrasive particles in a solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle, (d) superabrasive particles in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle (e) arranging superabrasive particles so that their tips protrude to less than 40 microns above a solidified organic material layer, or even (f) arranging superabrasive particles so that their tips protrude to less than 40 microns.

Rather, Ishizaki teaches a vitrified bond layer. Vitrified bond materials taught by Ishizaki include borosilicate glass, crystallized glass, quartz glass, alumina, alumina nitride, silicon nitride, mullite, and zirconia. These materials are primarily ceramics that would not be considered to be organic by one of ordinary skill in the art. As is defined in the specification on

page 7, lines 2-4, an organic material layer refers to a layer or mass of a semisolid or solid complex amorphous mix of organic compounds. None of the materials exemplified by Ishizaki can be considered to be organic compounds. As such, Ishizaki does not teach an organic material layer. By the fact that Ishizaki does not teach an organic material layer, it can not be interpreted as teaching securing a plurality of superabrasive particles in a solidified organic material layer, nor can it teach securing the plurality of superabrasive particles in a solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle.

Further, Ishizaki also does not teach or suggest the claim limitation of securing a plurality of superabrasive particles in a solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece. As can be seen in FIGs. 7(a-d) of Ishizaki, the particles are not evenly distributed across the vitrified bond layer. Such non-uniform distribution of particles will likely result in a non-uniform distribution of mechanical forces across the particles. Particles that are further apart from neighboring particles will experience greater mechanical stress from the work piece during abrading, while particles that are closer to neighboring particles will experience less mechanical stress. As such, Ishizaki does not teach or suggest each and every element of the claims.

In the Advisory Action, the Examiner states that the use of the term "improving" in the preamble of Claim 1 "indicates by its plain meaning that it is directed to the improvement of something." In response, and in clarification, the claim has been amended to recite a method of increasing retention of superabrasive particles. Candidly, utilizing organic material in the make-up of an abrading tool, such as a CMP pad dresser has a number of benefits over the conventional use of metal and metallic-based securing agents. However, the use of an organic securing agent would have been quickly discounted for applications requiring superabrasive particles, as the forces applied to the particles is sufficient to rip the superabrasive particles from an organic material. Furthermore, once one particle is removed from an abrasive surface, the effects of the missing particle can be detrimental to the remaining surface as the remaining surface lacks the lateral support once provided by the missing particle. The surface then is subject to cracking, loss of other particles, loss of other surface materials, etc. Furthermore, abrading tools utilizing superabrasive particles are generally used in extreme conditions that

greatly accelerate the demise of the abrasive surface. Regardless, abrading tools utilizing superabrasive particles are also generally utilized in areas wherein unintentional debris (such as a free particle or surface material) can not only reduce or terminate the life of the abrasive tool, but can also cause damage to the work piece being abraded. Therefore, the term used in the preamble of Claim 1 of increasing retention of superabrasive particles would be clear to one of ordinary skill in the art as providing a tool sufficient to function in abrasive areas utilizing superabrasive particles.

Also in the Advisory Action the Examiner points out that the use of "minimizing mechanical stress" is allegedly over broad. Respectfully, Applicant recognizes the role of the Examiner in thoroughly examining the application, and Applicant further appreciates the Examiner's diligence in this respect. However, the field of superabrasive-based abrading tools, and particularly CMP pad dressers, is one with very few quantified functional properties of finished abrading tools. As such, minimizing mechanical stress would be sufficient explanations of better and more equally distributing pressure and stress of abrading processes upon individual superabrasive particles sufficient to form a superabrasive particle-based abrading tool. As such, the allegedly over broad term is not, in fact, overly broad, but rather reflects the state of the art and likewise the knowledge available in the field of art. Such use of minimizing mechanical stress is particularly not over broad when considering the additional claim limitation of a majority of the plurality of superabrasive particles arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer, which point, along with the other enumerated elements, is not taught by Ishizaki.

Accordingly, Applicant respectfully requests that the rejections of Claim 1 be withdrawn. Additionally, as Claims 3-6 and 13-15 depend from Claim 1 and are considered to be narrower in scope, it is also requested that these rejections be withdrawn as well.

The Andrews Reference

Although it is not clear, the Examiner may also have rejected Claims 1, 3-6, and 13-15 under 35 U.S.C. 102(b or e) as being allegedly anticipated by Andrews, and such rejection will be addressed herein, in the event that such rejection was the Examiner's intent. Andrews teaches a dressing blade for grinding and cutting tools having superabrasive particles held thereto by a brazed metal composition (abstract). Metal braze materials require high temperatures in order to

bond superabrasive particles to a support substrate. For example, paragraph [0053] teaches that brazing is carried out at a temperature of from 800° C to 1200° C.

Similar to the discussion of Ishizaki, Andrews does not teach or suggest all of the elements of Claim 1. For example, Andrews does not teach or suggest an organic matrix to retain the superabrasive particles. Andrews teaches possible metal braze materials to include copper, nickel, silver, tin, zirconium, silicon and iron [0045] and an active metal component including titanium, zirconium, chromium, and hafnium [0043] to increase the strength of the bonds between the particle and the metal braze. As before, without a teaching of an organic matrix, Andrews naturally fails to teach securing a plurality of superabrasive particles in a solidified organic material layer, or securing the plurality of superabrasive particles in a solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle. Furthermore, Andrews fails to teach securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer.

There is no teaching or suggestion in Andrews that mechanical stress be minimized for any individual superabrasive particle. For example, FIGs. 1B and 2B of Andrews show superabrasive particles having an irregular spacing, indicating that mechanical stress will not be minimized for each individual particle during an abrading operation. As such, Andrews fails to teach each and every element of Claim 1, and likewise dependent Claims 3-6 and 13-15. Therefore, Applicant respectfully requests removal of the rejections.

35 U.S.C. § 103 Rejections:

It is thought prudent to once again briefly review the required elements necessary to establish a *prima facie* case of obviousness. Specifically, in order to meet the burden of establishing a *prima facie* case of obvious, the Patent Office must show that: 1) each and every element of the invention as set forth in the claims is taught or suggested by the reference as modified or the combination of references; 2) that there is sufficient motivation or articulated reasoning for one of ordinary skill in the art to modify or combine the reference; and 3) that one

of ordinary skill in the art would find a sufficient likelihood of successfully making the modification or combination asserted. Applicants respectfully submit that the Patent Office has failed to satisfy these requirements with any of the asserted rejections, and thus has not established a *prima facie* case of obviousness with respect to either of the Ishizaki or Andrews references.

The Ishizaki Reference

The Patent Office has rejected Claims 1, 3-6, and 13-15 under 35 U.S.C. 103(a) as being allegedly obvious over Ishizaki. As has been described, Ishizaki teaches a vitrified bond tool comprising a support body, a vitrified bond layer, and a plurality of abrasive grains held by the vitrified bond layer (col. 2, lines 27-32). The vitrified bond layer is made from a ceramic or glassy material, examples of which include borosilicate glass, crystallized glass, quartz glass, alumina, alumina nitride, silicon nitride, mullite, zirconia, and other ceramic materials (col. 3, lines 21-23; col. 11, lines 57-60).

As is described in the present specification, it was previously thought that polymeric resins were not able to retain superabrasive particles to a degree that is sufficient for CMP pad dressing (page 2, lines 28-30). The Applicant of present application has discovered, however, that by minimizing mechanical stress impinging on the protruding portion of any one superabrasive particle during an abrading operation, superabrasive particles are retained in the organic or polymeric matrix that would otherwise not be suitable for such uses (see page 10, lines 20-27). Such is particularly the case with superabrasive particle-based abrasive tools.

As has also been described, Ishizaki does not teach or suggest an organic material layer, as is specified in Claim 1, but rather a vitrified bond layer. Vitrified bond materials taught by Ishizaki include borosilicate glass, crystallized glass, quartz glass, alumina, alumina nitride, silicon nitride, mullite, and zirconia. These materials are primarily ceramics that would not be considered to be organic by one of ordinary skill in the art. As is defined in the specification on page 7, lines 2-4, an organic material layer refers to a layer or mass of a semisolid or solid complex amorphous mix of organic compounds. None of the materials exemplified by Ishizaki can be considered to be organic compounds. For this reason the Patent Office has failed to establish a *prima facie* case of obviousness because Ishizaki does not teach or suggest each and every element of Claim 1.

Ishizaki also does not teach or suggest the Claim 1 limitation of securing a plurality of superabrasive particles in a solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece. As can be seen in FIGs. 7(a-d), the particles are not evenly distributed across the vitrified bond layer. Such a non-uniform distribution of particles will likely result in a non-uniform distribution of mechanical forces across the particles. Particles that are further apart from neighboring particles will experience greater mechanical stress from the work piece during abrading, while particles that are closer to neighboring particles will experience less mechanical stress. For this reason the Patent Office has failed to establish a *prima facie* case of obviousness because neither Ishizaki nor a modification of Ishizaki teaches or suggests each and every element of Claim 1.

Additionally, it would not have been obvious to modify Ishizaki to include organic material layers. Vitrified bond materials are defined as materials that have been converted into glass or a glassy substance by heat and fusion (Merriam-Webster Dictionary, 10th ed.), where the vitreous materials are hard, amorphous, brittle, as in porcelain enamel (Hawley's Condensed Chemical Dictionary, Fourteenth ed.). Such vitrification of a material generally occurs at as a result of firing at fairly high temperatures. As a result, vitrified bond materials tend to preclude organic materials due to their general inability to withstand high temperatures. For example, Ishizaki teaches that the softening point of the vitreous bond materials should be below 750° C, and that the material should be fired at between 900° C and 1600° C. (see col. 11, lines 62-65; Examples 1-5). Such high temperatures will likely result in covalent bonding between the vitreous bond material and the superabrasive particles. Such bonding allows the superabrasive particles to be held more firmly in the vitreous material. Many superabrasive materials such as diamond would not form such covalent bonds with an organic matrix due to the low temperatures at which most organic materials are cured. Because of the lack of covalent bonding between these materials, a superabrasive particle embedded in an organic matrix is held by mechanical bonding.

Thus according to the state of the art at the time the application was filed, superabrasive particles could not be retained in an organic or polymeric matrix during a polishing procedure such as CMP processing (see page 2, lines 28-30 of the present specification). As such, it would not have been obvious to one of ordinary skill in the art to modify Ishizaki to include an organic

matrix because there would have been insufficient likelihood of success in producing a polishing device capable of retaining the superabrasive particles.

Furthermore, a many organic materials have vaporizing temperatures below the recommended processing temperatures of Ishizaki. As such, if organic materials were subjected to the methods of Ishizaki, they would not form a tool as the reference teaches. Rather, organic materials would vaporize during processing and prevent formation a desired tool, let alone one that could effectively hold and secure superabrasive particles. For these reasons, the Patent Office has failed to establish a *prima facie* case of obviousness.

The Patent Office has also failed to establish a *prima facie* case of obviousness for failure of Ishizaki to teach a majority of the plurality of superabrasive particles arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer. Such is an element in Claim 1, and as such, is a limitation on all dependent claims. The failure of Ishizaki to teach this particular element, as with each of the discussed missing elements, is grounds alone for failing to establish a *prima facie* case of obviousness.

The Patent Office has also not shown that one of ordinary skill in the art would have had sufficient motivation to modify Ishizaki in such a way as to arrive at all of the elements of Claim 1. The Supreme Court has recently articulated that "it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." *KSR v. Teleflex,* 127 S. Ct. 1727 (2007). The Patent Office has not provided sufficient reason as to why it would have been obvious to substitute an organic matrix for a vitrified bond layer, particularly given the much lower retention of superabrasive particles in an organic matrix. It is more likely that one of ordinary skill in the art would be motivated to pursue experimentation with other ceramic materials in order to improve retention of superabrasive particles, rather than organic matrixes in which such particles are weakly held. For these reasons, the Patent Office has failed to establish a prima facie case of obviousness with respect to this reference.

Accordingly, it is respectfully requested that the rejections of Claim 1 be withdrawn. Additionally, as Claims 3-6 and 13-15 depend from Claim 1 and are considered to be narrower in scope, it is also requested that these rejections be withdrawn as well.

The Andrews Reference

The Patent Office has also rejected Claims 1, 3-6, and 13-15 under 35 U.S.C. 103(a) as being allegedly obvious over Andrews. As previously noted, Andrews teaches a dressing blade for grinding and cutting tools having superabrasive particles held thereto by a brazed metal composition (abstract). Metal braze materials require high temperatures in order to bond superabrasive particles to a support substrate. For example, paragraph [0053] teaches that brazing is carried out at a temperature of from 800° C to 1200° C.

Similar to the discussion of Ishizaki, Andrews does not teach or suggest all of the elements of Claim 1. For example, Andrews does not teach or suggest an organic matrix to retain the superabrasive particles, nor does it teach a majority of the plurality of superabrasive particles arranged such that their tips protrude to less htan about 40 microns above the solidified organic material layer. Possible metal braze materials taught by Andrews include copper, nickel, silver, tin, zirconium, silicon and iron [para. 0045] and an active metal component including titanium, zirconium, chromium, and hafnium [para. 0043] to increase the strength of the bonds between the particle and the metal braze. Furthermore, there is no teaching or suggestion in Andrews that mechanical stress be minimized for any individual superabrasive particle. For example, FIGs. 1B and 2B of Andrews show superabrasive particles having an irregular spacing, indicating that mechanical stress will not be minimized for each individual particle during an abrading operation. For these reasons the Patent Office has failed to establish a *prima facie* case of obviousness because neither Andrews nor a modification of Andrews teaches or suggests each and every element of Claim 1. Specifically, Andrews fails to support a *prima facie* case of obviousness for failing to teach: 1) each and every element of the invention; 2) that there is sufficient motivation or articulated reasoning for one of ordinary skill in the art to modify the reference; and 3) that one of ordinary skill in the art would find a sufficient likelihood of successfully making the modification or combination asserted. The reasoning is the same as articulated above in discussing Ishizaki, and is incorporated by reference herein.

Further, it would not have been obvious to modify Andrews to replace the braze metal matrix with an organic matrix. Many metal materials form strong carbide bonds with superabrasive particles, particularly at high temperatures. For example, paragraph [0053] teaches that brazing conditions permanently attach particles to the support. Further down in the same paragraph it is taught that titanium hydride is used as an active metal component to form

strong titanium carbide bonds between the diamond particles and the metal braze. As such, one of ordinary skill in the art would not have had sufficient likelihood of success in permanently bonding diamond particles to a support with an organic matrix. One of ordinary skill in the art would have likely been motivated to experiment with other metal brazes or braze alloys in order improve the characteristics of the tool and the retention of the superabrasive particles embedded therein, rather than organic matrixes having weak retention characteristics. Additionally, the Patent Office has also not shown that one of ordinary skill in the art would have had sufficient motivation to modify Andrews in such a way as to arrive at all of the elements of Claim 1. Specifically, no reason has been given as to why it would have been obvious to one of ordinary skill in the art to replace the braze metal layer with an organic matrix, particularly in light of the importance of permanent particle retention concept as taught in paragraph [0053]. For these reasons, the Patent Office has failed to establish a prima facie case of obviousness with respect to Claim 1.

CONCLUSION

In view of the foregoing, the Applicant believes that Claims 1, 3-6, and 14-15 present allowable subject matter and the prompt allowance thereof is requested. If any impediment to the allowance of these claims remains after consideration of the present amendment and above remarks, and such impediment could be removed during a telephone interview, the Examiner is invited to telephone the undersigned attorney, so that such issues may be resolved as expeditiously as possible.

Please charge any additional fees except for Issue Fee or credit any overpayment to Deposit Account No. 20-0100.

Dated this 23rd day of May, 2008.

Respectfully submitted,

THORPE, NORTH & WESTERN, LLP

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DWO/SAS/ns

PTO/SB/22 (01-08)
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Under the paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless if displays a valid OMB control number.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a) **FY 2006** *(Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).)*	Docket Number (Optional) 00802-25023
Application Number 11/223,786	Filed 9/9/2005
For Methods of Bonding Superabrasive Particles In An Organic Matrix	
Art Unit 3728	Examiner Ackun, Jacob K.

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

	Fee	Small Entity Fee	
☐ One month (37 CFR 1.17(a)(1))	$120	$60	$
☐ Two months (37 CFR 1.17(a)(2))	$460	$230	$
☑ Three months (37 CFR 1.17(a)(3))	$1050	$525	$ 1050
☐ Four months (37 CFR 1.17(a)(4))	$1640	$820	$
☐ Five months (37 CFR 1.17(a)(5))	$2230	$1115	$

☐ Applicant claims small entity status. See 37 CFR 1.27.

☑ A check in the amount of the fee is enclosed.

☐ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☐ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 20-0100. I have enclosed a duplicate copy of this sheet.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest. See 37 CFR 3.71.
Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).

☑ attorney or agent of record. Registration Number 44,989

☐ attorney or agent under 37 CFR 1.34.
Registration number if acting under 37 CFR 1.34 _____

/David W. Osborne/ — Signature
May 23, 2008 — Date

David W. Osborne — Typed or printed name
801-566-6633 — Telephone Number

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

☐ Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Patent Application Fee Transmittal

Application Number:	11223786
Filing Date:	09-Sep-2005
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Filer:	David William Osborne/Nicole Solomon
Attorney Docket Number:	00802-25023
Filed as Large Entity	

Utility Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 3 months with $0 paid	1253	1	1050	1050

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Request for continued examination	1801	1	810	810
		Total in USD ($)		**1860**

Electronic Acknowledgement Receipt

EFS ID:	3350721
Application Number:	11223786
International Application Number:	
Confirmation Number:	8266
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Customer Number:	20551
Filer:	David William Osborne/Nicole Solomon
Filer Authorized By:	David William Osborne
Attorney Docket Number:	00802-25023
Receipt Date:	23-MAY-2008
Filing Date:	09-SEP-2005
Time Stamp:	13:51:05
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Electronic Funds Transfer
Payment was successfully received in RAM	$1860
RAM confirmation Number	7800
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)

1	Request for Continued Examination (RCE)	25023RCE.pdf	233123 2b86aa58ac92a487d776ad95a481f5541e8bdc6d	no	1
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
2		25023response.PDF	481927 c7c7f6ce55f7553a22e08fdec17811e6a28605e9	yes	20
	Multipart Description/PDF files in .zip description				
	Document Description		**Start**	**End**	
	Amendment After Final		1	1	
	Claims		2	9	
	Applicant Arguments/Remarks Made in an Amendment		10	20	
Warnings:					
Information:					
3	Extension of Time	25023extension.PDF	40327 773ca9db641241978c1e60b7595f89c70b4083b0	no	1
Warnings:					
Information:					
4	Fee Worksheet (PTO-06)	fee-info.pdf	8327 a4664bfd4330906d973aae3364c6bf04e1a3589d	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	763704		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
11/223,786	09/09/2005	

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	05/23/2008	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 65	Minus	** 66	= 0	X $ =		OR	X $50=	0
	Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X $ =		OR	X $210=	0
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/Dorretta Brooks/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/223,786	09/09/2005	Chien-Min Sung	00802-25023	8266

20551 7590 06/09/2008

THORPE NORTH & WESTERN, LLP.
P.O. Box 1219
SANDY, UT 84091-1219

EXAMINER	
ACKUN, JACOB K	
ART UNIT	**PAPER NUMBER**
3728	
MAIL DATE	**DELIVERY MODE**
06/09/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	11/223,786	SUNG, CHIEN-MIN	
	Examiner	Art Unit	
	Jacob K. Ackun Jr.	3728	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 May 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12 and 14-66* is/are pending in the application.

4a) Of the above claim(s) *2,7-12 and 16-66* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 3-6 and 14-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. Claims 1, 3-6 and 14-15 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims of record of U.S. Patent No. 7,258,708. Although the conflicting claims are not identical, they are not patentably distinct from each other because it would have been obvious in view of the claims of the patent to practice the method recited in this application for the purpose of facilitating the construction of a more useful article.

3. Claims 1, 3-6 and 14-15 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims

of record of copending Application No. 11/804,221. Although the conflicting claims are not identical, they are not patentably distinct from each other because it would have been obvious in view of the claims of the copending application to practice the method recited in the subject application for the purpose of providing a more durable article.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 3-6 and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicants own disclosure of the prior art or Benedict et al. (5,924,917) alone, or especially in view of Sung et al. (2002/0173234), Doan et al (6,945,857), Ishizaki et al. (6,755,720) or Andrews et al. (2005/0260939). Applicant's own disclosure of the prior art, including line 1 of claim 1 as originally filed, and as now amended, indicates that the retention of superabrasive particles in a solidified organic material layer of an abrading tool is prior art. Note all of the examiners comments on this issue in the last office communications. See also page

2 of the specification of the instant application at, for example, lines 25-30. Now, Benedict also indicates the same.

What the prior art does not teach, however, is the securement of a majority of the superabrasive particles such that their tips protrude to less than about 40 microns, as claimed. However, the securing of abrasive particles within a matrix of a tool such that the abrasive particles protrude to a uniform height is known in the art to, for example, provide more desirable tool performance. Additionally, abrasive particles having very small sizes are known and the environment in which the tools employing such particles are used is also known to be increasingly miniaturized. See, for example only, applicants own disclosure. Therefore, this examiner finds that it would have been obvious to retain the superabrasive particles of the prior art such that they protruded to the heights claimed, for the purpose of providing better performance for the tools in question.

Moreover, in general it is well known that the more particles protrude from a surface the more stress they encounter. The converse is also known. Add to this, the desirability to reduce such stress and prolong the useful life of tools of the type under consideration is a known goal in the art. Therefore the examiner finds for these additional reasons, that it would have been obvious to retain the superabrasive particles of the prior art such that they protruded to the heights

claimed, for the purpose of providing better performance and/or durability for the tools in question.

Finally, each of the secondary references is cited to show a desirability to provide particles extending to a uniform height or to a uniform height very close to the claimed height. For example, Sung teaches a uniform height within 50 micrometers. The relevant teachings of the latter two references were discussed by the examiner previously in connection with their application in one or more prior rejections. Accordingly, it would have been especially obvious in view of either secondary reference to retain the superabrasive particles of the prior art such that they protruded to the heights claimed, for the purpose of providing better performance and/or durability for the tools in question.

6. Applicant's arguments with respect to claims 1, 3-6 and 14-15 have been considered but are moot in view of the new ground(s) of rejection. However, it is noted that applicant has previously argued that applied prior art has not expressly taught the securing of abrasive particles in an arrangement that minimizes mechanical stress on any individual particle, as recited in lines 3-6 of claim 1. It is also noted that the claims at bar are method claims. On the other hand, these particular arguments were unconvincing because the recitation is very clearly so broad that many arrangements of abrasive particles will inherently meet the

limitation even if minimization of mechanical stress is not specifically mentioned in connection with the particular arrangement. A reference is not required to specifically recite "minimizing mechanical stress", or use similar language, in order for it to be found to meet claim 1. Accordingly, these arguments are also unconvincing should they be made in connection with the new rejections.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacob K. Ackun Jr. whose telephone number is (571)272-4418. The examiner can normally be reached on Monday through Friday 8.30AM-5.00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mickey Yu can be reached on (571)272-4562. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jacob K. Ackun Jr./
Primary Examiner, Art Unit 3728

Notice of References Cited	Application/Control No. 11/223,786	Applicant(s)/Patent Under Reexamination SUNG, CHIEN-MIN	
	Examiner Jacob K. Ackun Jr.	Art Unit 3728	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-5,924,917 A	07-1999	Benedict et al.	451/526
*	B	US-2002/0173234 A1	11-2002	Sung et al.	451/21
*	C	US-6,945,857 B1	09-2005	Doan et al.	451/56
*	D	US-7,044,990 B2	05-2006	Ishizaki et al.	51/295
*	E	US-2006/0143991 A1	07-2006	Sung, Chien-Min	051/307
*	F	US-2007/0264918 A1	11-2007	Sung, Chien-Min	451/533
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11223786	SUNG, CHIEN-MIN
	Examiner	Art Unit
	Jacob K Ackun Jr.	3728

SEARCHED			
Class	Subclass	Date	Examiner
451	28	6/3/08	J.A.

SEARCH NOTES		
Search Notes	Date	Examiner

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner
East text search.		6/3/08	J.A.

OIPE IAP20 JUN 23 2008 PATENT & TRADEMARK OFFICE

PTO/SB/08A (10-07)
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Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	SUNG, CHIEN-MIN
Art Unit	3728
Examiner Name	
Attorney Docket Number	00802-25023

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1	US- 5,453,106	09-1995	Roberts	
	2	US- 6,093,280	07-2000	Kirchner	
	3	US- 6,213,856	04-2001	Cho et al.	
	4	US- 2001/0009844	07-2001	Cho et al.	
	5	US- 2002/0127962	09-2002	Cho et al.	
	6	US- 6,884,155	04-2005	Sung et al.	
	7	US- 7,021,995	04-2006	Toge et al.	
	8	US- 7,201,645	04-2007	Sung	
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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] *(if known)*	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

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IFW

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June 19, 2008

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

TRANSMITTAL OF INFORMATION DISCLOSURE STATEMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Re: U.S. Patent Application No. 11/223,786 filed September 9, 2005
First Named Inventor: SUNG, CHIEN-MIN
Title: **Methods of Bonding Superabrasive Particles In An Organic Matrix**
Group Art Unit: 3728
Attorney Docket No.: 00802-25023

Sir/Madam:

Transmitted herewith for filing and pursuant to 37 C.F.R. § 1.56 and 1.97 is an Information Disclosure Statement. Enclosed also are the following designated documents, as required under 37 C.F.R. § 1.97 and 1.98:

☒ Form **PTO/SB/08A** list of 8 references submitted for consideration.

☐ Legible copies of the listed non-patent documents, unpublished U.S. applications and foreign documents or their relevant portions are included.

☐ All English translations of each non-English reference, if any, within the possession, custody, control or availability of anyone designated in 37 C.F.R. § 1.56(c) (see 37 C.F.R. § 1.98(c)).

The following are included within the Information Disclosure Statement if applicable and as required under 37 C.F.R. § 1.98:

☐ Concise explanation of relevance of each reference not in English and unaccompanied by an English translation.

☐ Statement that certain listed references not enclosed are substantially cumulative of an enclosed reference.

☐ Statement that certain listed references not enclosed were previously cited by or submitted to the Office in prior application no. , filed on _____, which is relied upon for an earlier filing date under 35 U.S.C. § 120.

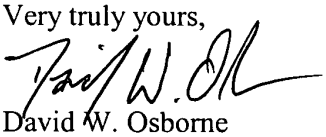
In order to secure consideration of the items designated above, one or more of the following, if required, is also enclosed:

☐ Statement under 37 C.F.R. § 1.97(e)(1) or (2).

☐ Check No. _____, which includes the amount of $____ (amount in § 1.17(p)) constituting the submission fee set forth in 37 C.F.R. § 1.17(p).

In the event that 37 C.F.R. § 1.97(c) applies and the Examiner is not satisfied that the Statement meets the requirements of 37 C.F.R. § 1.97(e), or in any other event remediable by a fee, please credit any over payment or charge any additional fees to Deposit Account No. 20-0100 of the undersigned.

Very truly yours,



David W. Osborne
Attorney for Applicant
Registration No. 44,898

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DO/rs

OIPE IAP23
JUN 23 2008
PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

ART UNIT:	3728
EXAMINER:	Jacob K. Ackun Jr.
FIRST NAMED INVENTOR:	SUNG, CHIEN-MIN
SERIAL NO.:	11/223,786
FILED:	September 9, 2005
CONFRM. NO.:	8266
FOR:	METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX
DOCKET NO.:	00802-25023

CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8

DATE OF DEPOSIT: June 20, 2008

I hereby certify that this paper or fee (along with any paper or fee referred to as being attached or enclosed) is being deposited with the United States Postal Service with sufficient postage as first class mail on the date indicated above and is addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

REBECCA SPENCER

INFORMATION DISCLOSURE STATEMENT UNDER 37 C.F.R. § 1.97

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

Please find, pursuant to 37 C.F.R. § 1.98(a)(1), the enclosed Form **PTO/SB/08A** which contains a list of all patents, publications, or other items that have come to the attention of one or more of the individuals designated in 37 C.F.R. § 1.56(c). Applicant respectfully submits that this Information Disclosure statement is filed pursuant to:

☒ 37 C.F.R. § 1.97(b)(1) or (3), within three months of the filing date of the application, or before a first office action on the merits, whichever occurs last;

☐ 37 C.F.R. § 1.97(c), after a first office action on the merits, but before a Final Office Action or a Notice of Allowance, whichever occurs first, and is accompanied by either 1) a statement in accordance with 37 C.F.R. § 1.97(e), or 2) the fee set forth in 37 C.F.R. § 1.17(p); or

☐ 37 C.F.R. § 1.97(d), after a Final Office Action or Notice of Allowance, whichever occurs first, but on or before payment of the issue fee, and is accompanied by both 1) a statement in accordance with 37 C.F.R. § 1.97(e), and 2) the fee set forth in 37 C.F.R. § 1.17(p).

While no representation is made that any of these references may be "prior art" within the meaning of that term in accordance with 37 C.F.R. §§ 102 or 103, the enclosed list of references is disclosed so as to comply with the duty of disclosure set forth in 37 C.F.R. § 1.56.

Moreover, while no representation is made that a specific search of office files or patent office records has been conducted or that no better art exists, the undersigned attorney of record believes that the references listed, together with any other references which may have been previously submitted or listed, are the closest to the claimed invention (taken in its entirety) of which the undersigned is presently aware, and no art which is closer to the claimed invention (taken in its entirety) has been knowingly withheld.

☐ A legible copy of each of the listed non-patent literature, unpublished U.S. applications, and foreign documents or their relevant portions is enclosed.

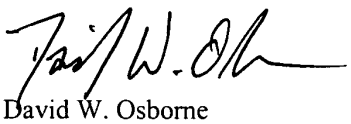
☐ Copies of the references listed in the accompanying Form PTO/SB/08A and PTO/SB/08B are NOT enclosed because, under 37 C.F.R. § 1.98.(d), they were previously cited by or submitted to the Office in application number , which is relied upon for an earlier filing date under 37 C.F.R. § 1.20.

☐ For all listed references that are not either in the English language, or accompanied by a translation into English, a concise explanation of relevance as required under 37 C.F.R. § 1.98(a)(3) is enclosed attached to each.

The Commissioner is hereby authorized to charge any additional fees associated with this communication or to credit any overpayment to Deposit Account No. 20-0100.

Dated June 20, 2008.

Respectfully submitted,



David W. Osborne
Attorney for Applicant
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DO/rs
Enclosures

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	Chien-Min Sung
SERIAL NO.:	11/223,786
FILING DATE:	09/09/2005
FOR:	METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX
ART UNIT:	3728
EXAMINER:	Jacob K. Ackun
DOCKET NO.:	00802-25023

RESPONSE UNDER 37 C.F.R. § 1.111

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Office Action mailed June 9, 2008, please reconsider the application in light of the accompanying remarks.

LISTING OF CLAIMS

1. (previously presented) A method of increasing retention of superabrasive particles held in a solidified organic material layer of an abrading tool, a portion of each of said superabrasive particles protruding out of the solidified organic material layer, comprising:

securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer.

2. (withdrawn) The method of claim 1, wherein the arrangement of the plurality of superabrasive particles is configured to uniformly distribute drag forces across substantially each superabrasive particle.

3. (original) The method of claim 1, wherein a majority of the plurality of superabrasive particles protrudes to a predetermined height above the solidified organic material layer.

4. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of less than about 20 microns when used to abrade a work piece.

5. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of from about 1 micron to about 20 microns when used to abrade a work piece.

6. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of from about 10 micron to about 20 microns when used to abrade a work piece.

7. (withdrawn) The method of claim 3, wherein the superabrasive particles protrude to a predetermined height that is along a designated profile.

8. (withdrawn) The method of claim 7, wherein the designated profile is a plane.

9. (withdrawn) The method of claim 7, wherein the designated profile has a slope.

10. (withdrawn) The method of claim 7, wherein the designated profile has a curved shape.

11. (withdrawn) The method of claim 10, wherein the designated profile has a dome shape.

12. (withdrawn) The method of claim 7, wherein a majority of the plurality of superabrasive particles are arranged such that their tips vary from the designated profile to less than about 10% of the average size of the superabrasive particles.

13. (canceled)

14. (original) The method of claim 3, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 30 microns.

15. (original) The method of claim 3, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to about 20 microns.

16. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are of substantially the same size.

17. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particle are from about 30 microns to about 500 microns in size.

18. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are from about 100 microns to about 200 microns in size.

19. (withdrawn) The method of claim 1, wherein superabrasive particles in a central location of the abrading tool are smaller in size than superabrasive particles in a peripheral location on the abrading tool.

20. (withdrawn) The method of claim 1, wherein securing the plurality of superabrasive particles includes arranging the plurality of superabrasive particles according to a predetermined attitude.

21. (withdrawn) The method of claim 20, wherein the predetermined attitude is a uniform attitude across substantially all of the plurality of superabrasive particles.

22. (withdrawn) The method of claim 20, wherein the plurality of superabrasive particles are substantially configured with an apex portion oriented towards a work piece.

23. (withdrawn) The method of claim 20, wherein superabrasive particles in a central location on the abrading tool are configured with an apex or an edge portion oriented towards a work piece, and superabrasive particles in a peripheral location on the abrading tool are configured with a face portion oriented towards the work piece.

24. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are arranged as a grid.

25. (withdrawn) The method of claim 24, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 3 times to about 5 times the average size of the superabrasive particles.

26. (withdrawn) The method of claim 24, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 100 microns to about 800 microns.

27. (withdrawn) The method of claim 20, wherein arranging the superabrasive particles according to a predetermined attitude further comprises:

applying an adhesive to a substrate;

applying a flexible sieve to the adhesive;

disposing superabrasive particles across a template positioned on the flexible sieve such that a portion of the superabrasive particles adhere to the adhesive by either an edge or an apex portion; and

removing the template and the un-adhered superabrasive particles from the flexible sieve.

28. (withdrawn) The method of claim 27, wherein the flexible sieve is a nylon sieve.

29. (withdrawn) The method of claim 1, wherein superabrasive particles in a central location on the abrading tool are spaced farther apart than superabrasive particles in a peripheral location on the abrading tool.

30. (withdrawn) A superabrasive tool having improved superabrasive particle retention, comprising:

a solidified organic material layer; and

a plurality of superabrasive particles secured in the solidified organic material layer in an arrangement as recited in claim 1.

31. (withdrawn) The tool of claim 30, wherein each of the plurality of superabrasive particles protrudes to a predetermined height above the solidified organic material layer.

32. (withdrawn) The tool of claim 31, wherein the predetermined height is greater than about 20 microns.

33. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 1 micron to about 20 microns.

34. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 5 microns to about 20 microns.

35. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 10 microns to about 20 microns.

36. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles protrude to a predetermined height is along a designated profile.

37. (withdrawn) The tool of claim 36, wherein the designated profile is a plane.

38. (withdrawn) The tool of claim 36, wherein the designated profile has an average slope from a high point near a center location of the tool to a low point near a peripheral edge of the tool.

39. (withdrawn) The tool of claim 38, wherein the average slope is about 1/1000.

40. (withdrawn) The tool of claim 36, wherein the designated profile has a curved shape.

41. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles are arranged such that their tips protrude to about 10% of the average size of the superabrasive particles.

42. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles are arranged such that their tips protrude from about 20 to about 30 microns.

43. (withdrawn) The tool of claim 30, wherein the arrangement is a grid.

44. (withdrawn) The tool of claim 43, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 3 times to about 5 times the average size of the superabrasive particles.

45. (withdrawn) The tool of claim 43, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 100 microns to 800 microns.

46. (withdrawn) The tool of claim 30, wherein superabrasive particles in a central location on the tool are spaced farther apart than superabrasive particles in a peripheral location on the tool.

47. (withdrawn) The tool of claim 30, wherein superabrasive particles in a central location on the tool are larger in size than superabrasive particles in a peripheral location on the tool.

48. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles are arranged according to a predetermined attitude.

49. (withdrawn) The tool of claim 48, wherein the plurality of superabrasive particles are substantially configured with an apex portion oriented towards a work piece.

50. (withdrawn) The tool of claim 48, wherein superabrasive particles in a central location on the tool are configured with an apex or an edge portion oriented towards a work piece, and superabrasive particles in a peripheral location on the tool are configured with a face portion oriented towards the work piece.

51. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles include a member selected from the group consisting of diamond, polycrystalline diamond, cubic boron nitride, polycrystalline cubic boron nitride, and combinations thereof.

52. (withdrawn) The tool of claim 51, wherein the plurality of superabrasive particles includes diamond.

53. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles are from about 30 microns to about 500 microns in size.

54. (withdrawn) The tool of claim 53, wherein the plurality of superabrasive particles are from about 100 microns to about 200 microns in size.

55. (withdrawn) The tool of claim 30, wherein the solidified organic material layer comprises a member selected from the group consisting of amino resins, acrylate resins, alkyd resins, polyester resins, polyamide resins, polyimide resins, polyurethane resins, phenolic resins, phenolic/latex resins, epoxy resins, isocyanate resins, isocyanurate resins, polysiloxane resins, reactive vinyl resins, polyethylene resins, polypropylene resins, polystyrene resins, phenoxy resins, perylene resins, polysulfone resins, acrylonitrile-butadiene-styrene resins, acrylic resins, polycarbonate resins, polyimide resins, and mixtures thereof.

56. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is an epoxy resin.

57. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is a polyurethane resin.

58. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is a polyimide resin.

59. (withdrawn) The tool of claim 30, further comprising a reinforcing material disposed within at least a portion of the solidified organic material layer.

60. (withdrawn) The tool of claim 59, wherein the reinforcing material is a material selected from the group consisting of ceramics, metals, or combinations thereof.

61. (withdrawn) The tool of claim 60, wherein the reinforcing material is a ceramic.

62. (withdrawn) The tool of claim 61, wherein the ceramic comprises a member selected from the group consisting of alumina, aluminum carbide, tungsten carbide, silica, silicon carbide, silicon nitride, zirconia, zirconium carbide, and mixtures thereof.

63. (withdrawn) The tool of claim 59, wherein the reinforcing material is an organometallic coupling agent.

64. (withdrawn) The tool of claim 30, wherein the tool is a polishing or grinding pad.

65. (withdrawn) The tool of claim 30, wherein the tool is a CMP pad dresser.

66. (withdrawn) The tool of claim 30, wherein the tool is for shaping dental materials.

REMARKS

In the Office Action mailed June 9, 2008, Claims 1, 3-6, and 14-15 were pending for consideration, all of which were rejected on various statutory grounds. Particularly, Claims 1, 3-6, and 14-15 were rejected under a nonstatutory double patenting rejection over U.S. Patent No. 7,258,708 (hereinafter "'708 patent") and were provisionally rejected under a nonstatutory double patenting rejection over Applicant's copending Application Serial No. 11/804,221 (hereinafter "'221 application"). Additionally, Claims 1, 3-6, and 14-15 were rejected under 35 U.S.C 103(a) as being allegedly obvious over U.S. Patent No. 5,924,917 (hereinafter "Benedict") alone, or especially in view of U.S. Publication No. 2002/0173234 (hereinafter "Sung"), U.S. Patent No. 6,945,857 (hereinafter ("Doan"); U.S. Patent No. 6,755,720 (hereinafter "Ishizaki"), or U.S. Patent Application No. 2005/0260939 (hereinafter "Andrews").

Applicant believes that pending claims 1, 3-6, and 14-15 present allowable subject matter, and reconsideration and allowance thereof is respectfully requested.

Nonstatutory Double Patenting

Claims 1, 3-6, and 14-15 were rejected on the grounds of nonstatutory obviousness-type double patenting over the claims of '708 patent. As such, the Applicant wishes to review the standard for establishing a proper nonstatutory obviousness-type double patenting rejection. According to MPEP 804(II)(B)(1):

> A double patenting rejection of the obviousness type is "analogous to [a failure to meet] the nonobviousness requirement of 35 U.S.C. 103" except that the patent principally underlying the double patenting rejection is not considered prior art. *In re Braithwaite*, 379 F.2d 594, 154 USPQ 29 (CCPA 1967). Therefore, any analysis employed in an obviousness-type double patenting rejection parallels the guidelines for analysis of a 35 U.S.C. 103 obviousness determination. *In re Braat*, 937 F.2d 589, 19 USPQ2d 1289 (Fed. Cir. 1991); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985).

As such, in order to establish a proper obviousness-type double patenting rejection, the Examiner must establish obviousness through the 103 standard without using the '708 patent or the '221 application as prior art.

The Applicant submits that the claims of the '708 patent do not teach each and every element of the pending claims. Specifically, the Applicant submits that the '708 patent does not teach or disclose at least the elements of minimizing mechanical stress impinging on the

protruding portion of any individual superabrasive particle when used to abrade a work piece and where a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer. Rather, the '708 patent discloses a method for improving retention in a solidified resin layer by using a metal layer, or coating, between the grit and the resin. See Independent Claims 1, 15, and 33. Additionally, the Applicant submits that the elements of minimizing mechanical stresses on individual particles or the tips protruding less than about 40 microns are not present in any of the claims. Furthermore, the Applicant submits that the aforementioned elements are not present in the entire reference, even though the Applicant notes that such is not required to overcome the present double patenting rejection. Regardless, the Applicant submits that as the present claims of the '708 patent do not teach each and every element of the pending claims, the present claims are patentably distinct from the '708 patent, and therefore, respectfully requests that the Examiner withdraw the present rejection.

The Applicant submits that the claims of the '221 application do not teach each and every element of the pending claims. Specifically, the Applicant submits that the claims of the '221 application do not teach the element of minimizing mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece. As such, the Applicant respectfully requests that the Examiner withdraw the present rejection, or in the alternative, as the present rejection is a provisional rejection, hold the present rejection in abeyance until such time as the claims of the '221 application issue such that an appropriate obvious analysis can be made.

35 U.S.C. § 103 Rejections

The Patent Office has rejected 1, 3-6, and 14-15 under 35 U.S.C 103(a) as being allegedly obvious over Benedict alone, or especially in view of Sung, Doan, Ishizaki, or Andrews. Before discussing the rejections, it is thought proper to once again briefly state what is required to sustain such a rejection. The Applicant does not deem it necessary to recite the entire case law standard required in order to establish a *prima facie* case of obviousness. However, the Applicant would like to briefly remind the Examiner of the required three criteria for a *prima facie* case of obviousness, namely: 1) that the asserted references as modified or combined must teach or suggest each and every element of the claimed invention, 2) that the asserted references

as modified or combined must provide a sufficient likelihood of successfully making the modification or combination, and 3) that the Examiner must identify a reason for the modification or combination asserted.

Claim 1 of the present invention contains limitations to a method of increasing retention of superabrasive particles held in a solidified organic material layer of an abrading tool, where a portion of each of said superabrasive particles protrudes out of the solidified organic material layer. The method may further include securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a work piece. The claim also requires a majority of the plurality of superabrasive particles to be arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer.

Claims 1, 3-6, and 14-15

Benedict teaches methods of preparing superabrasive particles in fibrous material and organic binders. See Abstract. However, Benedict lacks any teaching regarding minimizing the mechanical stress on a single superabrasive particle. Additionally, Benedict does not teach arranging the superabrasive particles such that their tips protrude less than about 40 microns above the organic layer. As such, taken alone, the Applicant submits that Benedict does not teach each and every element of the pending claims.

The Examiner notes that the prior art does not teach "securement of a majority of the superabrasive particles such that their tips protrude to less than about 40 microns, as claimed." Office Action, dated June 9, 2008, page 4. The Examiner then alleges that generally "it is well known that the more particles protrude from a surface the more stress they encounter." Id. The Examiner then cites various secondary references that allegedly teach particles extending to a uniform height; "close to the claimed height." Id. at page 5. However, the Applicant submits that Benedict, alone, or in combination with Sung, Doan, Ishizaki, or Andrews does not teach each and every element of the pending claims.

First, contrary to the Examiner's assertion, the Applicant submits that Sung does not teach superabrasive particles such that their tips protrude to less than about 40 microns from the organic material or the desirability of uniformity of height as alleged by the Examiner. Sung

refers to grits having a size variance no greater than 50 micrometers. See [0069]. As such, Sung does not address the distance of the tips from the surface of the substrate. To be clear, Sung does not teach or disclose height uniformity; rather Sung refers to variance in the grit sizes of the superabrasive particles. Furthermore, Sung is directed at a metal substrate rather than an organic substrate. As such, Sung provides no teaching or disclosure regarding securing superabrasive particles in an organic layer or that reducing mechanical stresses on individual particles is necessary to provide retention in an organic layer, as presently claimed.

Second, contrary to the Examiner's assertion, the Applicant submits that Doan does not teach superabrasive particles such that their tips protrude to less than about 40 microns from the organic material or the desirability of uniformity of height as alleged by the Examiner. Doan is directed at a pad having an abrasive face with at least 60% of the abrasive particles having a crystalline structure with substantially the same crystal symmetry. See Abstract. Specifically, Doan refers to an improved abrasive disk when the symmetric particles are positioned in the matrix with uniform and periodic spacing between them. See col. 6, line 63 – col. 7, line 4. As such, Doan does not teach or disclose height uniformity; rather Doan refers to spacing between the particles in the matrix. Furthermore, Doan is directed at a metal substrate rather than an organic substrate. As such, Doan provides no teaching or disclosure regarding securing superabrasive particles in an organic layer or that reducing mechanical stresses on individual particles is necessary to provide retention in an organic layer, as presently claimed.

Third, contrary to the Examiner's assertion, the Applicant submits that Ishizaki does not teach superabrasive particles such that their tips protrude to less than about 40 microns from the organic material or the desirability of uniformity of height as alleged by the Examiner. Ishizaki teaches a vitrified bond tool comprising a support body, a vitrified bond layer, and a plurality of abrasive grains held by the vitrified bond layer. See col. 2, lines 27-32. The vitrified bond layer is made from a ceramic or glassy material such as silicon nitride or an alumina. The vitrified bond material includes borosilicate glass, crystallized glass, quartz glass, alumina, alumina nitride, silicon nitride, mullite, zirconia, and other ceramic materials. See col. 3, lines 21-23; col. 11, lines 57-60. Ishizaki addresses the height of the superabrasive particles from the substrate. Specifically, Ishizaki teaches that "the abrasive grains protrude from a surface of the vitrified bond layer …correspond[ing] to 20-70% of a diameter of the abrasive grain. As such, Ishizaki

does not teach height uniformity but teaches that the height can substantially vary. Therefore, the Applicant submits that Ishizaki actually teaches away from the present claims.

As the Applicant has raised the issue of teaching away, the Applicant would like to review the current case law regarding teaching away for the Examiner's convenience. The Court of Appeals for the Federal Circuit has clearly stated that "an applicant may rebut a prima facie case of obviousness by showing that the prior art teaches away from the claimed invention in any material respect." In re Petersen, 315 F.3d 1325, 1331 (Fed. Cir. 2003). The Court has also stated that "[w]e have noted elsewhere, as a 'useful general rule,' that references that teach away cannot serve to create a prima facie case of obviousness." (emphasis added) McGinley v. Franklin Sports, Inc., 262 F.3d 1339, 1354 (Fed. Cir. 2001). In identifying the appropriate standard for teaching away, the Court has further stated:

> "A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be **discouraged from following the path set out in the reference**, or would be led in a direction divergent from the path that was taken by the applicant. The degree of teaching away will of course depend on the particular facts; in general, **a reference will teach away if it suggests** that the **line of development** flowing from the reference's disclosure **is unlikely to be productive** of the result sought by the applicant." (emphasis added) In re Gurley, 27 F.3d 551, 553 (Fed. Cir. 1994).

Clearly in the present case, a person of ordinary skill in the art would be discouraged from maintaining a specific height uniformity since Ishizaki teaches that the height of its abrasive particles can substantially vary. Furthermore, Ishizaki is not directed at an organic substrate. As such, Ishizaki provides no teaching or disclosure regarding securing superabrasive particles in an organic layer or that reducing mechanical stresses on individual particles is necessary to provide retention in an organic layer, as presently claimed.

Fourth, contrary to the Examiner's assertion, the Applicant submits that Andrews does not teach superabrasive particles such that their tips protrude to less than about 40 microns from the organic material or the desirability of uniformity of height as alleged by the Examiner. Andrews teaches a dressing blade for grinding and cutting tools having superabrasive particles held thereto by a brazed metal composition. See abstract. Metal braze materials require high temperatures in order to bond superabrasive particles to a support substrate. For example, paragraph [0053] teaches that brazing is carried out at a temperature of from 800° C to 1200° C.

Andrews teaches possible metal braze materials to include copper, nickel, silver, tin, zirconium, silicon and iron [0045] and an active metal component including titanium, zirconium, chromium, and hafnium [0043] to increase the strength of the bonds between the particle and the metal braze. At most, Andrews only refers to the thickness of a single layer abrasive portion being less than two diameters of the superabrasive particles used. As such, Andrews does not teach or disclose superabrasive particles' tips protruding to less than about 40 microns or having height uniformity. Furthermore, Andrews is directed at a metal substrate rather than an organic substrate. As such, Andrews provides no teaching or disclosure regarding securing superabrasive particles in an organic layer or that reducing mechanical stresses on individual particles is necessary to provide retention in an organic layer, as presently claimed.

The Applicant wishes to emphasize that the present invention provides methods and compositions not appreciated prior to Applicant's disclosure. As previously discussed during the present prosecution, utilizing organic material in the make-up of an abrading tool, such as a CMP pad dresser has a number of benefits over the conventional use of metal and metallic-based securing agents. However, the use of an organic securing agent would have been quickly discounted for applications requiring superabrasive particles, as the forces applied to the particles is sufficient to rip the superabrasive particles from an organic material. In fact, the Examiner has cited a reference that explicitly supports this statement. Specifically, the '708 patent states that "while other substrate materials such as polymeric resins have been known, such materials typically are not able to retain superabrasive particles to a degree that is sufficient for CMP pad dressing. See col. 2, lines 19-23. The '708 patent then discloses utilization of a metal layer between the superabrasive particle and the resin to overcome this problem. However, the Applicant has provided a method of increasing retention of superabrasive particles held in a solidified organic material layer of an abrading tool without the use of any metal. As such, the Applicant submits that the present invention provides unexpected results over the prior art.

In light of the above, the Applicant respectfully requests that the rejections of Claim 1 be withdrawn. Additionally, as Claims 3-6 and 14-15 depend from Claim 1 and are considered to be narrower in scope, it is also requested that these rejections be withdrawn as well.

CONCLUSION

In view of the foregoing, the Applicant believes that Claims 1, 3-6, and 14-15 present allowable subject matter and the prompt allowance thereof is requested. If any impediment to the allowance of these claims remains after consideration of the present amendment and above remarks, and such impediment could be removed during a telephone interview, the Examiner is invited to telephone the undersigned attorney, so that such issues may be resolved as expeditiously as possible.

Please charge any additional fees except for Issue Fee or credit any overpayment to Deposit Account No. 20-0100.

Dated this 9th day of September, 2008.

Respectfully submitted,

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DWO/RAB

Electronic Acknowledgement Receipt

EFS ID:	3913780
Application Number:	11223786
International Application Number:	
Confirmation Number:	8266
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Customer Number:	20551
Filer:	David William Osborne/Nicole Solomon
Filer Authorized By:	David William Osborne
Attorney Docket Number:	00802-25023
Receipt Date:	09-SEP-2008
Filing Date:	09-SEP-2005
Time Stamp:	17:30:10
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		25023response.pdf	122412 173d1c5f4b1d3d3232a34fff45463e81837f82ab	yes	16

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Miscellaneous Incoming Letter	1	1
	Claims	2	9
	Applicant Arguments/Remarks Made in an Amendment	10	16
Warnings:			
Information:			
	Total Files Size (in bytes):	122412	

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (07-06)
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
11/223,786	09/09/2005	

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	09/09/2008	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 65	Minus	** 66	= 0	X $ =		OR	X $50=	0
	Independent (37 CFR 1.16(h))	* 1	Minus	***6	= 0	X $ =		OR	X $210=	0
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/Dorretta Brooks/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

ART UNIT:	3728
EXAMINER:	Jacob K. Ackun Jr.
FIRST NAMED INVENTOR:	SUNG, CHIEN-MIN
SERIAL NO.:	11/223,786
FILED:	9/9/2005
CONFRM. NO.:	8266
FOR:	METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX
DOCKET NO.:	00802-25023

CERTIFICATE OF DEPOSIT UNDER 37 C.F.R. § 1.8

DATE OF DEPOSIT: November 14 2008

I hereby certify that this paper or fee (along with any paper or fee referred to as being attached or enclosed) is being e-filed with the United States Patent and Trademark Office.

Rebecca Spencer

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT UNDER 37 C.F.R. § 1.97

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

Please find, pursuant to 37 C.F.R. § 1.98(a)(1), the enclosed Form **PTO/SB/08B** which contains a list of all patents, publications, or other items that have come to the attention of one or more of the individuals designated in 37 C.F.R. § 1.56(c). Applicant respectfully submits that this Information Disclosure statement is filed pursuant to:

☐ 37 C.F.R. § 1.97(b)(1), (3) or (4), within three months of the filing date of the application or request for RCE, or before a first office action on the merits, whichever occurs last;

☒ 37 C.F.R. § 1.97(c), after a first office action on the merits, but before a Final Office Action or a Notice of Allowance, whichever occurs first, and is accompanied by either 1)

a statement in accordance with 37 C.F.R. § 1.97(e), or 2) the fee set forth in 37 C.F.R. § 1.17(p); or

☐ 37 C.F.R. § 1.97(d), after a Final Office Action or Notice of Allowance, whichever occurs first, but on or before payment of the issue fee, and is accompanied by both 1) a statement in accordance with 37 C.F.R. § 1.97(e), and 2) the fee set forth in 37 C.F.R. § 1.17(p).

While no representation is made that any of these references may be "prior art" within the meaning of that term in accordance with 37 C.F.R. §§ 102 or 103, the enclosed list of references is disclosed so as to comply with the duty of disclosure set forth in 37 C.F.R. § 1.56.

Moreover, while no representation is made that a specific search of office files or patent office records has been conducted or that no better art exists, the undersigned attorney of record believes that the references listed, together with any other references which may have been previously submitted or listed, are the closest to the claimed invention (taken in its entirety) of which the undersigned is presently aware, and no art which is closer to the claimed invention (taken in its entirety) has been knowingly withheld.

☐ A legible copy of each of the listed non-patent literature, unpublished U.S. applications and foreign documents or their relevant portions is enclosed.

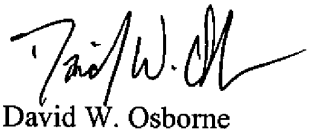
☐ Copies of the references listed in the accompanying Form PTO/SB/08A and PTO/SB/08B are NOT enclosed because, under 37 C.F.R. § 1.98.(d), they were previously cited by or submitted to the Office in application number , which is relied upon for an earlier filing date under 37 C.F.R. § 1.20.

For all listed references that are not either in the English language, or accompanied by a translation into English, a concise explanation of relevance as required under 37 C.F.R. § 1.98(a)(3) is enclosed attached to each.

The Commissioner is hereby authorized to charge any additional fees associated with this communication or to credit any overpayment to Deposit Account No. 20-0100.

Dated November 14, 2008.

Very truly yours,



David W. Osborne
Attorney for Applicant
Registration No. 44989

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Enclosures

DOCKET NO. 00802-25023

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

FIRST NAMED INVENTOR:	SUNG, CHIEN-MIN
SERIAL NO.:	11/223,786
FILED:	9/9/2005
CONFIRM. NO.:	8266
FOR:	METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX
ART UNIT:	3728
EXAMINER:	Jacob K. Ackun Jr.

CERTIFICATE OF DEPOSIT UNDER 37 C.F.R. §1.8

I hereby certify that this correspondence is being deposited with the United States Patent and Trademark Office via EFS web filing.

RSpencer

Rebecca Spencer

Nov 14 2008

Date of Deposit

PROMPTNESS CERTIFICATE UNDER 37 C.F.R. §1.97(e)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

___ I hereby certify that each item contained in the information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement; or

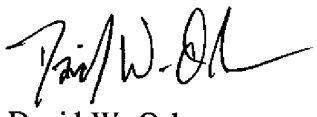
_x_ I hereby certify that no item contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual

designated in §1.56(c) more than three months prior to the filing of the information disclosure statement.

Please charge any additional fees or credit any overpayment to Deposit Account No. 20-0100.

DATED this 14th day of November, 2008.

Respectfully submitted,



David W. Osborne
Attorney for Applicant
Registration No. 44989

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Enclosures

PTO/SB/08B (09-08)
Approved for use through 10/31/2008. OMB 0651-0031
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Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of

Complete if Known	
Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	SUNG, CHIEN-MIN
Art Unit	3728
Examiner Name	
Attorney Docket Number	00802-25023

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	1	U.S. Application 11/724,585, Filed 03/14/2007, Chien-Min Sung. Office action issued 08/14/2008.	

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

Electronic Acknowledgement Receipt

EFS ID:	4295351
Application Number:	11223786
International Application Number:	
Confirmation Number:	8266
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Customer Number:	20551
Filer:	David William Osborne/Rebecca Spencer
Filer Authorized By:	David William Osborne
Attorney Docket Number:	00802-25023
Receipt Date:	14-NOV-2008
Filing Date:	09-SEP-2005
Time Stamp:	19:04:07
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		ids25023.PDF	169422 020eea01d93df3212ce5c614cad5b789b1f8869e	yes	8

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Miscellaneous Incoming Letter	1	2
	Information Disclosure Statement Letter	3	5
	Miscellaneous Incoming Letter	6	7
	Information Disclosure Statement (IDS) Filed (SB/08)	8	8
Warnings:			
Information:			
	Total Files Size (in bytes):	169422	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

THORPE NORTH AND WESTERN
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The Team Approach to Premier Performance

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November 13, 2008

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

TRANSMITTAL OF SUPPLEMENTAL
INFORMATION DISCLOSURE STATEMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Re: U.S. Patent Application No. 11/223,786 filed September 9, 2005
First Named Inventor: SUNG, CHIEN-MIN
Title: **METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX**
Group Art Unit: 3728
Attorney Docket No.: 00802-25023

Sir/Madam:

Transmitted herewith for filing and pursuant to 37 C.F.R. § 1.56 and 1.97 is a Supplemental Information Disclosure Statement. Enclosed also are the following designated documents, as required under 37 C.F.R. § 1.97 and 1.98:

☒ Form **PTO/SB/08B** list of 1 references submitted for consideration.

☐ Legible copies of the listed non-patent documents, unpublished U.S. applications and foreign documents or their relevant portions are included.

☐ All English translations of each non-English reference, if any, within the possession, custody, control or availability of anyone designated in 37 C.F.R. § 1.56(c) (see 37 C.F.R. § 1.98(c)).

The following are included within the Information Disclosure Statement if applicable and as required under 37 C.F.R. § 1.98:

☐ Concise explanation of relevance of each reference not in English and unaccompanied by an English translation.

☐ Statement that certain listed references not enclosed are substantially cumulative of an enclosed reference.

☐ Statement that certain listed references not enclosed were previously cited by or submitted to the Office in prior application no. , filed on _____, which is relied upon for an earlier filing date under 35 U.S.C. § 120.

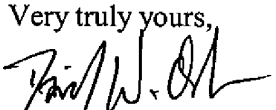
In order to secure consideration of the items designated above, one or more of the following, if required, is also enclosed:

☒ Statement under 37 C.F.R. § 1.97(e)(1) or (2).

☐ Check No. _____, which includes the amount of $____ (amount in §1.17(p)) constituting the submission fee set forth in 37 C.F.R. § 1.17(p).

In the event that 37 C.F.R. § 1.97(c) applies and the Examiner is not satisfied that the Statement meets the requirements of 37 C.F.R. § 1.97(e), or in any other event remediable by a fee, please credit any over payment or charge any additional fees to Deposit Account No. 20-0100 of the undersigned.

Very truly yours,



David W. Osborne
Attorney for Applicant
Registration No. 44989

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/223,786	09/09/2005	Chien-Min Sung	00802-25023	8266

20551 7590 01/08/2009

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EXAMINER	
ACKUN, JACOB K	
ART UNIT	**PAPER NUMBER**
3728	

MAIL DATE	DELIVERY MODE
01/08/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	11/223,786	SUNG, CHIEN-MIN	
	Examiner	Art Unit	
	Jacob K. Ackun Jr.	3728	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 September 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12 and 14-66* is/are pending in the application.

4a) Of the above claim(s) *2,7-12 and 16-66* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-6,14 and 15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/14/08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. Claims 1, 3-6 and 14-15 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims of record of U.S. Patent No. 7,258,708. Although the conflicting claims are not identical, they are not patentably distinct from each other because it would have been obvious in view of the claims of the patent to practice the method recited in this application for the purpose of facilitating the construction of a more useful article.

3. Claims 1, 3-6 and 14-15 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims

of record of copending Application No. 11/804,221. Although the conflicting claims are not identical, they are not patentably distinct from each other because it would have been obvious in view of the claims of the copending application to practice the method recited in the subject application for the purpose of providing a more durable article.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 3-6 and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicants own disclosure of the prior art or Benedict et al. (5,924,917) alone, or especially in view of Sung et al. (2002/0173234), Doan et al (6,945,857), Ishizaki et al. (6,755,720) or Andrews et al. (2005/0260939). Applicant's own disclosure of the prior art, including line 1 of claim 1 as originally filed, and as now amended, indicates that the retention of superabrasive particles in

a solidified organic material layer of an abrading tool is prior art. Note all of the examiners comments on this issue in the last office communications. See also page 2 of the specification of the instant application at, for example, lines 25-30. Now, Benedict also indicates the same.

What the prior art does not specifically teach, however, is the securement of a majority of the superabrasive particles such that their tips protrude to less than about 40 microns, as claimed. However, the securing of abrasive particles within a matrix of a tool such that the abrasive particles protrude to a uniform height is known in the art to, for example, provide more desirable tool performance. Additionally, abrasive particles having very small sizes are known and the environment in which the tools employing such particles are used is also known to be increasingly miniaturized. See, for example only, applicants own disclosure. Therefore, this examiner finds that it would have been obvious to retain the superabrasive particles of the prior art or Benedict such that they protruded to the heights claimed, for the purpose of providing better performance for the tools in question.

Moreover, in general it is well known that the more particles protrude from a surface the more stress they encounter. The converse is also known. Add to this, the desirability to reduce such stress and prolong the useful life of tools of the type

under consideration is a known goal in the art. Therefore the examiner finds for these additional reasons, that it would have been obvious to retain the superabrasive particles of the prior art or Benedict such that they protruded to the heights claimed, for the purpose of providing better performance and/or durability for the tools in question.

Finally, each of the secondary references is cited to show a desirability to provide particles extending to a uniform height or to a uniform height very close to the claimed height. For example, Sung teaches a uniform height within 50 micrometers. The relevant teachings of the latter two references were discussed by the examiner previously in connection with their application in one or more prior rejections. Accordingly, it would have been especially obvious in view of either secondary reference to retain the superabrasive particles of the prior art or Benedict such that they protruded to the heights claimed, for the purpose of providing better performance and/or durability for the tools in question.

6. Applicant's arguments filed 9/9/08 have been fully considered but they are not persuasive. Applicant argues that the double patenting rejections should be withdrawn because the documents on which the rejections are based do not recite in the claims thereof that the arrangement of the particles minimizes mechanical stress on individual ones of the particles. On the other hand as noted in previous

office actions and again herein, documents that may provide a basis for the rejection of the claims of the subject application do not have to expressly teach or recite the noted expresion. Where as in the above two noted references the limitation is inherently present the claims of the subject application are met even though the references may not expressly recite "minimizes mechanical stress". In this case the examiner finds that the limitation with regard to the minimization of mechanical stress is inherent in the claims of the '708 patent and the '221 application. Therefore the claims of the subject application are properly rejected as obvious over the claims of the noted documents.

Applicant also argues with regard to the double patenting rejection that the claims of the noted references do not recite projection to less than about 40 microns. Again, this is not required. What is required is that the feature be found to have been known prior to applicants invention as set out in the claims at bar. It was known in the specific art to which the claims are directed to project superabrasive particles to a height of less than 40 microns prior to the invention of applicant. Thus as already noted, it would have been obvious to provide this feature together with the elements of the claims of the noted references.

With regard to the prior art rejections applicant's attention is directed to the comments above and to those made in prior office actions. In particular it is again

noted that no reference is required to specifically state that the arrangement of particles on a superabrasive tool, as disclosed in the reference, minimizes mechanical stress on any one particle, in order for the reference to form a proper basis for a rejection of the claims of the instant application. Where as in the applied references the feature would be inherent, that is sufficient.

Applicant has argued, and appears to continue to argue, that the claims are allowable over the prior art because the prior art does not teach the securement of superabrasive particles in **organic material** to form an abrading tool. On the other hand this argument is unconvincing based on applicants own disclosure of the prior art, as the examiner has held previously. See also the outstanding prior art rejection. The argument is also unconvincing based on the teaching of Benedict et al., as also applied in the outstanding rejection. Applicant's latest argument does not refute this specific noted teaching of Benedict. The reference applied by another examiner in the patent application now cited by applicant in the newly submitted Information Disclosure Statement is also noted. **Accordingly, it is presumed that the applicant may now agree, without specifically so stating, that the securement of superabrasive particles in an organic layer of a tool of the type under consideration, is not the invention of applicant.** If this analysis

is in error then the applicant is requested to specifically argue the point in view of the noted references in the next response.

Applicant has also argued strongly that the prior art applied by the examiner does not teach particles that are secured in such a way that they extend to the same height. Again this argument appears to be clearly contrary to what the prior art teaches. Paragraphs [0030] and [0031] of Andrews et al have already been cited in prior office actions. In another example only, the applied reference to Sung (2002/0173234) clearly shows that **the extension of abrasive particles to the same height was known in the prior art before the invention of applicant**. See paragraphs [0023] and [0076] for example only. As noted above this same reference, Sung, also expressly teaches an extension of the abrasive particles to a predetermined uniform height …to within 50 micrometers. See for example paragraph [0071]. Coincidentally, while only supportive of the non-prior art double patenting rejection, claim 35 of the '708 patent also recites extension of abrasive particles to a uniform height.

Applicant also argues that since Ishizaki teaches that the abrasive grains protrude from a surface of the bond layer corresponding to 20-70 percent of the grain diameter, Ishizaki does not teach height uniformity of the grains. According to applicant the above teaching in Ishizaki must mean that the reference teaches

away from the claimed invention. This argument is also unconvincing in view of the relevant teachings in Ishizaki. Moreover, the argument is unconvincing because the portion of Ishizaki cited by applicant can clearly be read by one of ordinary skill as suggesting that the grains can project to the same height, but that when they do, the projection can be 20% or 70 % or a value in between these extremes.

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacob K. Ackun Jr. whose telephone number is

(571)272-4418. The examiner can normally be reached on Monday through Friday 8.30AM-5.00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mickey Yu can be reached on (571)272-4562. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jacob K. Ackun Jr./

Primary Examiner, Art Unit 3728

Receipt date: 11/14/2008

PTO/SB/08B (09-08)
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of

	Complete if Known
Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	SUNG, CHIEN-MIN
Art Unit	3728
Examiner Name	JACOB ACKUN
Attorney Docket Number	00802-25023

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
J.A.	1	U.S. Application 11/724,585, Filed 03/14/2007, Chien-Min Sung. Office action issued 08/14/2008.	

Examiner Signature	/Jacob Ackun/	Date Considered	01/04/2009

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

ART UNIT:	3728
EXAMINER:	Jacob K. Ackun Jr.
FIRST NAMED INVENTOR:	Chien-Min Sung
SERIAL NO.:	11/223,786
FILED:	9/9/2005
CONFRM. NO.:	8266
FOR:	METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX
DOCKET NO.:	00802-25023

CERTIFICATE OF DEPOSIT UNDER 37 C.F.R. § 1.8

DATE OF DEPOSIT: **March 3, 2009**

I hereby certify that this paper or fee (along with any paper or fee referred to as being attached or enclosed) is being E-FILED with the United States Patent and Trademark Office.

Rebecca Spencer

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT UNDER 37 C.F.R. § 1.97

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

Please find, pursuant to 37 C.F.R. § 1.98(a)(1), the enclosed Form **PTO/SB/08A and PTO/SB/08B** which contains a list of all patents, publications, or other items that have come to the attention of one or more of the individuals designated in 37 C.F.R. § 1.56(c). Applicant respectfully submits that this Information Disclosure statement is filed pursuant to:

☐ 37 C.F.R. § 1.97(b)(1), (3) or (4), within three months of the filing date of the application or request for RCE, or before a first office action on the merits, whichever occurs last;

☐ 37 C.F.R. § 1.97(c), after a first office action on the merits, but before a Final Office Action or a Notice of Allowance, whichever occurs first, and is accompanied by either 1)

a statement in accordance with 37 C.F.R. § 1.97(e), or 2) the fee set forth in 37 C.F.R. § 1.17(p); or

☒ 37 C.F.R. § 1.97(d), after a Final Office Action or Notice of Allowance, whichever occurs first, but on or before payment of the issue fee, and is accompanied by both 1) a statement in accordance with 37 C.F.R. § 1.97(e), and 2) the fee set forth in 37 C.F.R. § 1.17(p).

While no representation is made that any of these references may be "prior art" within the meaning of that term in accordance with 37 C.F.R. §§ 102 or 103, the enclosed list of references is disclosed so as to comply with the duty of disclosure set forth in 37 C.F.R. § 1.56.

Moreover, while no representation is made that a specific search of office files or patent office records has been conducted or that no better art exists, the undersigned attorney of record believes that the references listed, together with any other references which may have been previously submitted or listed, are the closest to the claimed invention (taken in its entirety) of which the undersigned is presently aware, and no art which is closer to the claimed invention (taken in its entirety) has been knowingly withheld.

☐ A legible copy of each of the listed non-patent literature, unpublished U.S. applications and foreign documents or their relevant portions is enclosed.

☐ Copies of the references listed in the accompanying Form PTO/SB/08A and PTO/SB/08B are NOT enclosed because, under 37 C.F.R. § 1.98.(d), they were previously cited by or submitted to the Office in application number , which is relied upon for an earlier filing date under 37 C.F.R. § 1.20.

For all listed references that are not either in the English language, or accompanied by a translation into English, a concise explanation of relevance as required under 37 C.F.R. § 1.98(a)(3) is enclosed attached to each.

The Commissioner is hereby authorized to charge any additional fees associated with this communication or to credit any overpayment to Deposit Account No. 20-0100.

Dated March 3, 2009.

Very truly yours,

/David W. Osborne/

David W. Osborne
Attorney for Applicant
Registration No. 44989

THORPE NORTH & WESTERN, LLP
Customer No. 20,551
P.O. Box 1219
Sandy, Utah 84091-1219
(801) 566-6633

DO/rs
Enclosures

PTO/SB/08A (09-08)
Approved for use through 10/31/2008. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of

Complete if Known	
Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	Chien-Min Sung
Art Unit	3728
Examiner Name	
Attorney Docket Number	00802-25023

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1	US- 4481016	11-1984	Campbell et al.	
	2	US- 4849602	07-1989	Gardner	
	3	US- 5195403	03-1993	Sani et al.	
	4	US- 5195404	03-1993	Notter et al.	
	5	US- 5232320	08-1993	Tank et al.	
	6	US- 5247765	09-1993	Quintana	
	7	US- 5505272	04-1996	Clark	
	8	US- 5924917	07-1999	Benedict et al.	
	9	US- 2003/0114094	06-2003	Myoung et al.	
	10	US- 6694847	02-2004	Hiroyasu et al.	
	11	US- 6027659	02-22-2000	Billett	
	12	US- 3852078	12-03-1974	Wakatsuki et al.	
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

PTO/SB/08B (09-08)
Approved for use through 10/31/2008. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of

Complete if Known	
Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	Chien-Min Sung
Art Unit	3728
Examiner Name	
Attorney Docket Number	00802-25023

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	1	US Application 11/786,426 filed 4-10-2007, Chien-Min Sung. Office action issued 12-3-2008.	
	2	US Application 11/724,585 filed 3-14-2007, Chien-Min Sung. Office action issued 1-28-2009.	
	3	US Application 11/357,713 filed 2-17-2003, Chien-Min Sung. Office action issued 1-30-2009.	

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

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If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

Electronic Patent Application Fee Transmittal	
Application Number:	11223786
Filing Date:	09-Sep-2005
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Filer:	David William Osborne/Rebecca Spencer
Attorney Docket Number:	00802-25023
Filed as Large Entity	

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

Electronic Acknowledgement Receipt	
EFS ID:	4897884
Application Number:	11223786
International Application Number:	
Confirmation Number:	8266
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Customer Number:	20551
Filer:	David William Osborne/Rebecca Spencer
Filer Authorized By:	David William Osborne
Attorney Docket Number:	00802-25023
Receipt Date:	03-MAR-2009
Filing Date:	09-SEP-2005
Time Stamp:	19:19:49
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Electronic Funds Transfer
Payment was successfully received in RAM	$180
RAM confirmation Number	3996
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1		ids25023.PDF	211066 688d277e19a9b520d0bb326c2b090c58307d3357	yes	9

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Miscellaneous Incoming Letter	1	2
Miscellaneous Incoming Letter	3	4
Information Disclosure Statement Letter	5	7
Information Disclosure Statement (IDS) Filed (SB/08)	8	9

Warnings:

Information:

2	Fee Worksheet (PTO-06)	fee-info.pdf	30082 02e5b5bbc53f8ea039f24cc771cf99fe33961c3b	no	2

Warnings:

Information:

Total Files Size (in bytes):	241148

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

THORPE NORTH AND WESTERN
INTELLECTUAL PROPERTY LAW

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Law Firm Approach to
Patent Performance™

David W. Osborne
Registered Patent Attorney
osborne@tnw.com

March 3, 2009

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

TRANSMITTAL OF SUPPLEMENTAL
INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Re: U.S. Patent Application No. 11/223,786 filed September 9, 2005
First Named Inventor: Chien-Min Sung
Title: **METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX**
Group Art Unit: 3728
Attorney Docket No.: 00802-25023

Sir/Madam:

Transmitted herewith for filing and pursuant to 37 C.F.R. § 1.56 and 1.97 is a Supplemental Information Disclosure Statement. Enclosed also are the following designated documents, as required under 37 C.F.R. § 1.97 and 1.98:

☒ Form **PTO/SB/08A AND PTO/SB/08B** list of 15 references submitted for consideration.

☐ Legible copies of the listed non-patent documents, unpublished U.S. applications and foreign documents or their relevant portions are included.

☐ All English translations of each non-English reference, if any, within the possession, custody, control or availability of anyone designated in 37 C.F.R. § 1.56(c) (see 37 C.F.R. § 1.98(c)).

The following are included within the Information Disclosure Statement if applicable and as required under 37 C.F.R. § 1.98:

☐ Concise explanation of relevance of each reference not in English and unaccompanied by an English translation.

☐ Statement that certain listed references not enclosed are substantially cumulative of an enclosed reference.

☐ Statement that certain listed references not enclosed were previously cited by or submitted to the Office in prior application no. , filed on _____, which is relied upon for an earlier filing date under 35 U.S.C. § 120.

In order to secure consideration of the items designated above, one or more of the following, if required, is also enclosed:

☒ Statement under 37 C.F.R. § 1.97(e)(1) or (2).

☒ EFT, which includes the amount of $180.00 (amount in §1.17(p)) constituting the submission fee set forth in 37 C.F.R. § 1.17(p).

In the event that 37 C.F.R. § 1.97(c) applies and the Examiner is not satisfied that the Statement meets the requirements of 37 C.F.R. § 1.97(e), or in any other event remediable by a fee, please credit any over payment or charge any additional fees to Deposit Account No. 20-0100 of the undersigned.

Very truly yours,

/David W. Osborne/

David W. Osborne
Attorney for Applicant
Registration No. 44989

THORPE NORTH & WESTERN, LLP
Customer No. 20,551
P.O. Box 1219
Sandy, Utah 84091-1219
Telephone: (801) 566-6633

DO/rs

DOCKET NO. 00802-25023

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

FIRST NAMED INVENTOR:	Chien-Min Sung
SERIAL NO.:	11/223,786
FILED:	9/9/2005
CONFIRM. NO.:	8266
FOR:	METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX
ART UNIT:	3728
EXAMINER:	Jacob K. Ackun Jr.

CERTIFICATE OF DEPOSIT UNDER 37 C.F.R. §1.8

I hereby certify that this correspondence is being deposited with the United States Patent and Trademark Office.

RSpencer

Rebecca Spencer

March 3 2009

Date of Deposit

PROMPTNESS CERTIFICATE UNDER 37 C.F.R. §1.97(e)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

___ I hereby certify that each item contained in the information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement; or

_X_ I hereby certify that no item contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual

designated in §1.56(c) more than three months prior to the filing of the information disclosure statement.

Please charge any additional fees or credit any overpayment to Deposit Account No. 20-0100.

DATED this 3rd day of March, 2009.

Respectfully submitted,

/David W. Osborne/

David W. Osborne
Attorney for Applicant
Registration No. 44989

THORPE NORTH & WESTERN, LLP
Customer No. 20,551
P.O. Box 1219
Sandy, Utah 84091-1219
Telephone (801) 566-6633

DO/rs
Enclosures

PTO/SB/30 (02-09)
Approved for use through 03/31/2009. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Request for Continued Examination (RCE) Transmittal

Address to:
Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	Chien-Min Sung
Art Unit	3728
Examiner Name	Jacob K. Ackun
Attorney Docket Number	00802-25023

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. Submission required under 37 CFR 1.114 Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

   a. ☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

      i. ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

      ii. ☐ Other _____

   b. ☑ Enclosed

      i. ☑ Amendment/Reply

      ii. ☐ Affidavit(s)/ Declaration(s)

      iii. ☐ Information Disclosure Statement (IDS)

      iv. ☐ Other _____

2. Miscellaneous

   a. ☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of _____ months. (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

   b. ☐ Other _____

3. Fees The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

   a. ☑ The Director is hereby authorized to charge the following fees, any underpayment of fees, or credit any overpayments, to Deposit Account No. 02-0100.

      i. ☐ RCE fee required under 37 CFR 1.17(e)

      ii. ☐ Extension of time fee (37 CFR 1.136 and 1.17)

      iii. ☑ Other DEFICIENCIES ONLY

   b. ☑ Check in the amount of $ 810 enclosed

   c. ☐ Payment by credit card (Form PTO-2038 enclosed)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Signature	/David W. Osborne/	Date	April 8, 2009
Name (Print/Type)	David W. Osborne	Registration No.	44989

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450 or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.

Signature	Nicole Solomon		
Name (Print/Type)	Nicole Solomon	Date	April 8, 2009

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Patent Application Fee Transmittal

Application Number:	11223786
Filing Date:	09-Sep-2005
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Filer:	David William Osborne/Nicole Solomon
Attorney Docket Number:	00802-25023

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Request for continued examination	1801	1	810	810
		Total in USD ($)		**810**

Electronic Acknowledgement Receipt	
EFS ID:	5121928
Application Number:	11223786
International Application Number:	
Confirmation Number:	8266
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Customer Number:	20551
Filer:	David William Osborne/Nicole Solomon
Filer Authorized By:	David William Osborne
Attorney Docket Number:	00802-25023
Receipt Date:	08-APR-2009
Filing Date:	09-SEP-2005
Time Stamp:	17:27:42
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Electronic Funds Transfer
Payment was successfully received in RAM	$810
RAM confirmation Number	3683
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1		25023response.PDF	1261621 02caf9caa80c969db6889275463e0d4a40113545	yes	15

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Amendment Submitted/Entered with Filing of CPA/RCE	1	1
Claims	2	9
Applicant Arguments/Remarks Made in an Amendment	10	15

Warnings:

Information:

2	Request for Continued Examination (RCE)	25023rce.PDF	80470 296c784301f58cc7e5857d26d90778567d1b54b6	no	1

Warnings:

This is not a USPTO supplied RCE SB30 form.

Information:

3	Fee Worksheet (PTO-06)	fee-info.pdf	30228 0a2355372a0610e513511d34235477c53daa721e	no	2

Warnings:

Information:

Total Files Size (in bytes):	1372319

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<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ART UNIT:	3728
EXAMINER:	Jacob K. Ackun
FIRST NAMED INVENTOR:	Chien-Min Sung
SERIAL NO.:	11/223,786
FILED:	09/09/2005
CONFRM. NO.:	8266
FOR:	METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX
DOCKET NO.:	00802-25023

CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8

DATE OF DEPOSIT: **April 8, 2009**

I hereby certify that this paper or fee (along with any paper or fee referred to as being attached or enclosed) is being submitted on the date indicated above via:

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Nicole Solomon

Nicole Solomon

RESPONSE UNDER 37 C.F.R. § 1.113

Mailstop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Final Office Action mailed January 8, 2009, please enter the following amendment and reconsider the application in light of the accompanying remarks. Additionally, a Request for Continued Examination is enclosed herewith.

LISTING OF CLAIMS

1. (currently amended) A method of increasing retention of superabrasive particles held in a solidified organic material layer of ~~an abrading tool~~ CMP pad dresser, a portion of each of said superabrasive particles protruding out of the solidified organic material layer, comprising:

securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a ~~work piece~~CMP pad, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer, and wherein the solidified organic material layer is in direct contact with the superabrasive particles.

2. (withdrawn) The method of claim 1, wherein the arrangement of the plurality of superabrasive particles is configured to uniformly distribute drag forces across substantially each superabrasive particle.

3. (original) The method of claim 1, wherein a majority of the plurality of superabrasive particles protrudes to a predetermined height above the solidified organic material layer.

4. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of less than about 20 microns when used to abrade a work piece.

5. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of from about 1 micron to about 20 microns when used to abrade a work piece.

6. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of from about 10 micron to about 20 microns when used to abrade a work piece.

7. (withdrawn) The method of claim 3, wherein the superabrasive particles protrude to a predetermined height that is along a designated profile.

8. (withdrawn) The method of claim 7, wherein the designated profile is a plane.

9. (withdrawn) The method of claim 7, wherein the designated profile has a slope.

10. (withdrawn) The method of claim 7, wherein the designated profile has a curved shape.

11. (withdrawn) The method of claim 10, wherein the designated profile has a dome shape.

12. (withdrawn) The method of claim 7, wherein a majority of the plurality of superabrasive particles are arranged such that their tips vary from the designated profile to less than about 10% of the average size of the superabrasive particles.

13. (canceled)

14. (original) The method of claim 3, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 30 microns.

15. (original) The method of claim 3, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to about 20 microns.

16. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are of substantially the same size.

17. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particle are from about 30 microns to about 500 microns in size.

18. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are from about 100 microns to about 200 microns in size.

19. (withdrawn) The method of claim 1, wherein superabrasive particles in a central location of the abrading tool are smaller in size than superabrasive particles in a peripheral location on the abrading tool.

20. (withdrawn) The method of claim 1, wherein securing the plurality of superabrasive particles includes arranging the plurality of superabrasive particles according to a predetermined attitude.

21. (withdrawn) The method of claim 20, wherein the predetermined attitude is a uniform attitude across substantially all of the plurality of superabrasive particles.

22. (withdrawn) The method of claim 20, wherein the plurality of superabrasive particles are substantially configured with an apex portion oriented towards a work piece.

23. (withdrawn) The method of claim 20, wherein superabrasive particles in a central location on the abrading tool are configured with an apex or an edge portion oriented towards a work piece, and superabrasive particles in a peripheral location on the abrading tool are configured with a face portion oriented towards the work piece.

24. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are arranged as a grid.

25. (withdrawn) The method of claim 24, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 3 times to about 5 times the average size of the superabrasive particles.

26. (withdrawn) The method of claim 24, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 100 microns to about 800 microns.

27. (withdrawn) The method of claim 20, wherein arranging the superabrasive particles according to a predetermined attitude further comprises:

applying an adhesive to a substrate;

applying a flexible sieve to the adhesive;

disposing superabrasive particles across a template positioned on the flexible sieve such that a portion of the superabrasive particles adhere to the adhesive by either an edge or an apex portion; and

removing the template and the un-adhered superabrasive particles from the flexible sieve.

28. (withdrawn) The method of claim 27, wherein the flexible sieve is a nylon sieve.

29. (withdrawn) The method of claim 1, wherein superabrasive particles in a central location on the abrading tool are spaced farther apart than superabrasive particles in a peripheral location on the abrading tool.

30. (withdrawn) A superabrasive tool having improved superabrasive particle retention, comprising:

a solidified organic material layer; and

a plurality of superabrasive particles secured in the solidified organic material layer in an arrangement as recited in claim 1.

31. (withdrawn) The tool of claim 30, wherein each of the plurality of superabrasive particles protrudes to a predetermined height above the solidified organic material layer.

32. (withdrawn) The tool of claim 31, wherein the predetermined height is greater than about 20 microns.

33. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 1 micron to about 20 microns.

34. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 5 microns to about 20 microns.

35. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 10 microns to about 20 microns.

36. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles protrude to a predetermined height is along a designated profile.

37. (withdrawn) The tool of claim 36, wherein the designated profile is a plane.

38. (withdrawn) The tool of claim 36, wherein the designated profile has an average slope from a high point near a center location of the tool to a low point near a peripheral edge of the tool.

39. (withdrawn) The tool of claim 38, wherein the average slope is about 1/1000.

40. (withdrawn) The tool of claim 36, wherein the designated profile has a curved shape.

41. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles are arranged such that their tips protrude to about 10% of the average size of the superabrasive particles.

42. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles are arranged such that their tips protrude from about 20 to about 30 microns.

43. (withdrawn) The tool of claim 30, wherein the arrangement is a grid.

44. (withdrawn) The tool of claim 43, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 3 times to about 5 times the average size of the superabrasive particles.

45. (withdrawn) The tool of claim 43, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 100 microns to 800 microns.

46. (withdrawn) The tool of claim 30, wherein superabrasive particles in a central location on the tool are spaced farther apart than superabrasive particles in a peripheral location on the tool.

47. (withdrawn) The tool of claim 30, wherein superabrasive particles in a central location on the tool are larger in size than superabrasive particles in a peripheral location on the tool.

48. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles are arranged according to a predetermined attitude.

49. (withdrawn) The tool of claim 48, wherein the plurality of superabrasive particles are substantially configured with an apex portion oriented towards a work piece.

50. (withdrawn) The tool of claim 48, wherein superabrasive particles in a central location on the tool are configured with an apex or an edge portion oriented towards a work piece, and superabrasive particles in a peripheral location on the tool are configured with a face portion oriented towards the work piece.

51. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles include a member selected from the group consisting of diamond, polycrystalline diamond, cubic boron nitride, polycrystalline cubic boron nitride, and combinations thereof.

52. (withdrawn) The tool of claim 51, wherein the plurality of superabrasive particles includes diamond.

53. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles are from about 30 microns to about 500 microns in size.

54. (withdrawn) The tool of claim 53, wherein the plurality of superabrasive particles are from about 100 microns to about 200 microns in size.

55. (withdrawn) The tool of claim 30, wherein the solidified organic material layer comprises a member selected from the group consisting of amino resins, acrylate resins, alkyd resins, polyester resins, polyamide resins, polyimide resins, polyurethane resins, phenolic resins, phenolic/latex resins, epoxy resins, isocyanate resins, isocyanurate resins, polysiloxane resins, reactive vinyl resins, polyethylene resins, polypropylene resins, polystyrene resins, phenoxy resins, perylene resins, polysulfone resins, acrylonitrile-butadiene-styrene resins, acrylic resins, polycarbonate resins, polyimide resins, and mixtures thereof.

56. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is an epoxy resin.

57. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is a polyurethane resin.

58. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is a polyimide resin.

59. (withdrawn) The tool of claim 30, further comprising a reinforcing material disposed within at least a portion of the solidified organic material layer.

60. (withdrawn) The tool of claim 59, wherein the reinforcing material is a material selected from the group consisting of ceramics, metals, or combinations thereof.

61. (withdrawn) The tool of claim 60, wherein the reinforcing material is a ceramic.

62. (withdrawn) The tool of claim 61, wherein the ceramic comprises a member selected from the group consisting of alumina, aluminum carbide, tungsten carbide, silica, silicon carbide, silicon nitride, zirconia, zirconium carbide, and mixtures thereof.

63. (withdrawn) The tool of claim 59, wherein the reinforcing material is an organometallic coupling agent.

64. (withdrawn) The tool of claim 30, wherein the tool is a polishing or grinding pad.

65. (withdrawn) The tool of claim 30, wherein the tool is a CMP pad dresser.

66. (withdrawn) The tool of claim 30, wherein the tool is for shaping dental materials.

REMARKS

In the Office Action mailed January 8, 2009, claims 1, 3-6, 14, and 15 were pending for consideration, all of which were rejected on various statutory grounds. First, claims 1, 3-6, and 14-15 were rejected under a nonstatutory obviousness-type double patenting rejection over U.S. Patent No. 7,258,708 (hereinafter "'708 patent") and were provisionally rejected under a nonstatutory double patenting rejection over Applicant's copending Application Serial No. 11/804,221 (hereinafter "'221 application"). Additionally, claims 1, 3-6, and 14-15 were rejected under 35 U.S.C 103(a) as being allegedly obvious over Applicant's own disclosure, or U.S. Patent No. 5,924,917 (hereinafter "Benedict") alone, or in view of U.S. Publication No. 2002/0173234 (hereinafter "Sung"), U.S. Patent No. 6,945,857 (hereinafter ("Doan"), U.S. Patent No. 6,755,720 (hereinafter "Ishizaki"), or U.S. Patent Application No. 2005/0260939 (hereinafter "Andrews").

Claim 1 has been amended. Support for this amendment can be found on page 3, lines 3-5 and FIG. 1 of the specification as filed. As such, no new matter has been added thereby. Applicant believes that pending claims 1, 3-6, and 14-15 present allowable subject matter, and reconsideration and allowance thereof is respectfully requested.

Nonstatutory Double Patenting

Claims 1, 3-6, and 14-15 were rejected on the grounds of nonstatutory obviousness-type double patenting over the claims of the '708 patent. The Applicants strongly disagree with this assertion. The Examiner has stated that the present claims are not patentably distinct from the '708 patent because "it would have been obvious in view of the claims of the patent to practice the method recited in this application for the purpose of facilitating the construction of a more useful article."

The MPEP describes a proper standard for such an obviousness-type double patenting rejection as being a claim that defines an invention that is merely an obvious variation of an invention claimed in the patent (MPEP 804(II)(B)(1)). No argument has been put forward by the Examiner as to how any of the present claims are "obvious variations" of the '708 patent. The '708 patent teaches that a metal layer is disposed between the resin layer and the superabrasive particle in order to improve retention of the superabrasive particle in the resin layer (col. 2, lines 34-40). Claim 1 has been amended to clarify the absence of a metal coating or any other coating

or barrier between the particles and organic layer in order to further illustrate the essence of the invention where the arrangement and placement of particles acts to minimize mechanical stress. This is an entirely different approach to maximizing retention and is opposite in nature and concept to that of using a metal coating as recited in the '708 ref. As such, it would not be obvious to remove such a metal layer if that metal layer was taught as the reason for the improved retention. The Applicant therefore asserts that a nonstatutory obviousness-type double patenting rejection has not been established by the Examiner.

Claims 1, 3-6, and 14-15 were provisionally rejected on the grounds of nonstatutory obviousness-type double patenting over the claims of the '221 application. The Applicants strongly disagree with this assertion. The Examiner has stated that the present claims are not patentably distinct from the '221 application because "it would have been obvious in view of the claims of the copending application to practice the method recited in the subject application for the purpose of providing a more durable article."

Again, as was outlined above, the MPEP standard for such an obviousness-type double patenting rejection requires that the claims be merely obvious variations of an invention claimed in the '221 application. No argument has been put forward by the Examiner as to how any of the present claims are "obvious variations" of the '221 application other than a mere assertion of such. The claims of the '221 application are to methods of making superabrasive tools, while the present claims are directed to methods for improving retention of superabrasive particles in an organic material layer of a CMP pad dresser. As such, the Applicant asserts that a nonstatutory obviousness-type double patenting rejection has not been established by the Examiner. Additionally, it should be noted that the '221 application is a continuation of, and thus claims priority to, the present application, and as such, both applications have the same priority date.

35 U.S.C. § 103 Rejections

The Examiner has rejected claims 1, 3-6, and 14-15 under 35 U.S.C 103(a) as allegedly obvious over Applicant's disclosure or Benedict alone, or especially in view of Sung, Doan, Ishizaki, or Andrews. Claim 1 of the present invention contains limitations to a method of increasing retention of superabrasive particles held in a solidified organic material layer of a CMP pad dresser, where a portion of each of said superabrasive particles protrudes out of the solidified organic material layer. The method may further include securing a plurality of

superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a CMP pad. The claim also requires a majority of the plurality of superabrasive particles to be arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer, and that the organic material layer directly contacts the superabrasive particles.

The Examiner has argued that the Applicant has admitted in claim 1 and the specification that superabrasive particles in a solidified organic material layer of an abrading tool is prior art. It is unclear why the Examiner has spent time on this point as this point was clearly admitted in the background section of the present application at the time of filing. The Applicant has never argued that the concept of disposing superabrasive particles in an organic layer was the Applicant's invention, but rather, that the retention of such particles in an organic layer can be increased by how the particles are disposed therein, a concept that was not obvious to one of ordinary skill in the art at the time the application was filed, and that the Examiner has shown no evidence for. The Examiner additionally points to a reference that was submitted by the Applicant in an Information Disclosure Statement as further evidence that superabrasive particles in an organic layer of a tool is not the invention of the Applicant. First, a submittal of a reference in an IDS is never to be taken as an admission of anything by an applicant, but rather is merely a submission of a reference that may have some relevance in an ongoing prosecution in order to fulfill an applicant's duty to the PTO (MPEP Sec. 2001). Second, as discussed above, abrasive particles in an organic matrix are in the prior art. Simple sandpaper is an example. This is not, and has never been, the issue at hand.

The Examiner has repeatedly argued that minimizing mechanical stress on individual particles is inherent, and that this has bearing on the present claims. The Applicant disagrees. The Examiner refers to prior art references that utilize metal brazes or other metal matrixes to make this point. Such a matrix is not applicable to organic materials, particularly for CMP pad dressers. While such references may recite dressers having leveled tips and show drawings of particles with leveled tips, the reality of a finished product is altogether different. When a braze material is applied to a metal support matrix and a plurality of abrasive particles, the braze heat warps the metal support matrix. A dresser that started out having aligned tips would not be in

alignment after the brazing process. It is clearly outlined in the present specification that such metal tools warp and buckle during heating (page 2, lines 25-27).

This same paragraph also outlines the problems encountered using polymeric resins to secure particles in a CMP pad dresser, namely, that these resins are not able to maintain superabrasive particles therein to a degree sufficient for CMP pad dressing. It should be understood that in CMP processing the CMP pad dresser is not polishing the wafer, but rather is cleaning the CMP pad that performing the polishing procedure. The superabrasive particles are much larger than any abrasive particle in the slurry used for polishing. Because of this, a single superabrasive particle pulling out of the dresser can cause significant and irreparable damage to the wafer. For this reason, the art has always held to the notion that particles needed to be very strongly held in the matrix to avoid damaging or ruining the wafer, and as such, polymeric materials have not been considered for this use. For this reason, the state of the art for metal CMP pad dressers continually moved in the direction of stronger bonds between the particles and the metal matrix. Seeking higher bond strengths, practitioners began brazing particles to a metal substrate in order to form chemical bonding between the two materials that was stronger than the mechanical bonding of electroplating techniques that were previously used. Thus the high heat required to create these chemical bonds created further problems due to the warping that occurred, particularly as the polishing of the wafer materials became more delicate.

Even in non-CMP related polishing, the state of the art has always focused on the strength of the bond between the particles and the matrix. Moreover, the art recognizes that pullouts of particles from organic layers are common. As an example of this, Benedict teaches that shelling of the tool occurs (col. 8, lines 42-47). Shelling is a term that is synonymous with particle pullout. In most tools such as those taught by Benedict, however, pullouts are not particularly catastrophic, and merely relate to tool wear. Benedict teaches a sanding belt that is used to polish a work piece using the abrasives in the belt. In other words, the abrasive particles are abrading the work piece in proportion to their size and protrusion. If a particle pulls out, it may be driven across the work piece but will not cause significant damage because the degree of polishing is roughly proportional to the size of the abrasive particles, which is not the case with CMP procedures.

Tools utilizing polymeric materials that have been attempted where pullout can be catastrophic have focused on increasing the bond strength between the particles and the

polymeric matrix. Such attempts have been made by disposing a material between the particle and the matrix, such as by the metal coating layers of the '708 patent. However, to the Applicant's knowledge, the prior art has never taught or suggested a bare superabrasive particle disposed in an organic matrix where pullout can be catastrophic. The Applicant has recognized that by distributing the forces across all particles so as to minimize mechanical stress on any individual particles, a satisfactory degree of particle retention can be achieved for CMP pad dressing. This concept is not obvious in light of the combination of references cited by the Examiner. Concern over catastrophic pullout would not have allowed one of ordinary skill in the art to have had a sufficient likelihood of success in creating a tool through the modification or combination of these references that would not be prone to particle pullout. As such, the minimization of mechanical stress impinging on individual superabrasive particles for improving retention in an organic material layer is not obvious in light of the cited combination.

In light of the above, the Applicant requests that the rejections of claim 1 be withdrawn. Additionally, as claims 3-6 and 14-15 depend from claim 1, it is also requested that these rejections be withdrawn as well. It should be noted that the arguments presented in the previous response are deemed to be incorporated herein by reference. Also, the absence of those arguments from this response should not be seen as being in agreement with the Examiner.

CONCLUSION

In view of the foregoing, the Applicant believes that claims 1, 3-6, and 14-15 present allowable subject matter and the prompt allowance thereof is requested. If any impediment to the allowance of these claims remains after consideration of the present amendment and above remarks, and such impediment could be removed during a telephone interview, the Examiner is invited to telephone the undersigned attorney, so that such issues may be resolved as expeditiously as possible.

Please charge any additional fees except for Issue Fee or credit any overpayment to Deposit Account No. 20-0100.

Dated this 8th day of April, 2009.

Respectfully submitted,

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DWO/TBA

PTO/SB/06 (07-06)
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
11/223,786	09/09/2005	

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	04/08/2009	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 65	Minus	** 66	= 0	X $ =		OR	X $52=	0
	Independent (37 CFR 1.16(h))	* 1	Minus	***6	= 0	X $ =		OR	X $220=	0
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/JAMES ELLIOTT/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of

Complete if Known	
Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	Chien-Min Sung
Art Unit	3728
Examiner Name	
Attorney Docket Number	00802-25023

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1	US- 3743489	07-1973	Wentorf Jr. et al.	
	2	US- 3767371	10-1973	Wentorf et al.	
	3	US- 4662896	05-1987	Dennis	
	4	US- 5190568	03-1993	Tselesin	
	5	US- 5851138	12-1998	Hempel	
	6	US- 6319108	11-2001	Adefris et al.	
	7	US- 2006/0079160	04-2006	Balagani et al.	
	8	US- 7261621	08-2007	Moon et al.	
	9	US- 6054183	04-2000	Zimmer et al.	
	10	US- 6368198	04-2002	Sung et al.	
	11	US- 2003/0084894	05-2003	Sung	
	12	US- 7066795	06-2006	Balagani et al.	
	13	US- 2007/0051355	03-2007	Sung	
	14	US- 7465217	12-2008	Kinoshita et al.	
	15	US- 7258708	08-2007	Sung	
	16	US- 6478831	11-2002	Tselesin	
	17	US- 2003/0084894	05-2003	Sung	
	18	US- 2003/0207659	11-2003	Annen et al.	
	19	US- 2005/0060941	03/2005	Provow et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

PTO/SB/08a (02-09)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2 of

Complete if Known	
Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	Chien-Min Sung
Art Unit	3728
Examiner Name	
Attorney Docket Number	00802-25023

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	20	US- 2007/0066194	03-2007	Wielonski et al.	
	21	US- 4923490	05-1990	Johnson et al.	
	22	US- 4954139	09-1990	Cerutti	
	23	US- 5137543	08-1992	Heath et al.	
	24	US- 5374293	12-1994	Takashita et al.	
	25	US- 5486131	01-1996	Cesna et al.	
	26	US- 7033408	04-2006	Fries et al.	
	27	US- 5527424	06-1996	Mullins	
	28	US- 5536202	07-1996	Appel et al.	
	29	US- 5547417	08-1996	Breivogel et al.	
	30	US- 5560745	10-1996	Roberts	
	31	US- 5560754	10-1996	Johnson et al.	
	32	US- 5921856	07-1999	Zimmer	
	33	US- 5975988	11-1999	Christianson	
	34	US- 6001008	12-1999	Fujimori et al.	
	35	US- 6190240	02-2001	Kinoshita et al.	
	36	US- 6217413	04-2001	Christianson	
	37	US- 6224469	05-2001	Ohmori et al.	
	38	US- 6281129	08-2001	Easter et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

Examiner Signature		Date Considered	

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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 3 of

Complete if Known	
Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	Chien-Min Sung
Art Unit	3728
Examiner Name	
Attorney Docket Number	00802-25023

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	39	US- 6293854	09-2001	Kimura et al.	
	40	US- 6299508	10-2001	Gagliardi et al.	
	41	US- 6354918	03-2002	Togawa et al.	
	42	US- 6371838	04-2002	Holzapfel	
	43	US- 6371842	04-2002	Romero	
	44	US- 6439986	08-2002	Myoung et al.	
	45	US- 6446740	09-2002	Eyre	
	46	US- 6626167	09-2003	Kim et al.	
	47	US- 6672943	01-2004	Vogtmann et al.	
	48	US- 6818029	11-2004	Myoung et al.	
	49	US- 6824455	11-2004	Osterheld et al.	
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		US-			

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

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If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

PTO/SB/08b (02-09)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of

Complete if Known	
Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	Chien-Min Sung
Art Unit	3728
Examiner Name	
Attorney Docket Number	00802-25023

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	1	U.S. Application 11/804,221 filed 5/16/2007 Chien-Min Sung, Office Action issued 1/16/2009.	
	2	U.S. Application 11/786,426 filed 4/10/2007 Chien-Min Sung, Office Action issued 3/13/2009.	
	3	U.S. Application 11/560,817 filed 11/16/2006 Chien-Min Sung	
	4	U.S. Application 11/804,221 filed 03/14/2007 Chien-Min Sung	
	5	Syndite, elementsix advancing diamond, 2 pages. www.e6.com.	

Examiner Signature		Date Considered	

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1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

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If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

Electronic Acknowledgement Receipt

EFS ID:	5170255
Application Number:	11223786
International Application Number:	
Confirmation Number:	8266
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Customer Number:	20551
Filer:	David William Osborne/Rebecca Spencer
Filer Authorized By:	David William Osborne
Attorney Docket Number:	00802-25023
Receipt Date:	16-APR-2009
Filing Date:	09-SEP-2005
Time Stamp:	20:20:26
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		ids25023.PDF	266569 edc89fa58bdc3fd35506e6b292573d7ee922a017	yes	9

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Transmittal Letter	1	2
	Transmittal Letter	3	5
	Information Disclosure Statement (IDS) Filed (SB/08)	6	9

Warnings:					
Information:					
2	NPL Documents	syndite.PDF	631224 1eba2054f769f6ce6abce770c8fd58ea8143a383	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	897793		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

THORPE NORTH AND WESTERN
INTELLECTUAL PROPERTY LAW

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The Team Approach to Premier Performance

David W. Osborne
Registered Patent Attorney
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April 15, 2009

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

TRANSMITTAL OF SUPPLEMENTAL
INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Re: U.S. Patent Application No. 11/223,786 filed September 9, 2005
First Named Inventor: Chien-Min Sung
Title: **METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX**
Group Art Unit: 3728
Attorney Docket No.: 00802-25023

Sir/Madam:

Transmitted herewith for filing and pursuant to 37 C.F.R. § 1.56 and 1.97 is a Supplemental Information Disclosure Statement. Enclosed also are the following designated documents, as required under 37 C.F.R. § 1.97 and 1.98:

☒ Form **PTO/SB/08A AND PTO/SB/08B** list of 54_ references submitted for consideration.

☒ Legible copies of the listed non-patent documents, unpublished U.S. applications and foreign documents or their relevant portions are included.

☐ All English translations of each non-English reference, if any, within the possession, custody, control or availability of anyone designated in 37 C.F.R. § 1.56(c) (see 37 C.F.R. § 1.98(c)).

The following are included within the Information Disclosure Statement if applicable and as required under 37 C.F.R. § 1.98:

☐ Concise explanation of relevance of each reference not in English and unaccompanied by an English translation.

☐ Statement that certain listed references not enclosed are substantially cumulative of an enclosed reference.

☐ Statement that certain listed references not enclosed were previously cited by or submitted to the Office in prior application no. , filed on _____, which is relied upon for an earlier filing date under 35 U.S.C. § 120.

In order to secure consideration of the items designated above, one or more of the following, if required, is also enclosed:

☐ Statement under 37 C.F.R. § 1.97(e)(1) or (2).

☐ Check No. _____, which includes the amount of $____ (amount in §1.17(p)) constituting the submission fee set forth in 37 C.F.R. § 1.17(p).

In the event that 37 C.F.R. § 1.97(c) applies and the Examiner is not satisfied that the Statement meets the requirements of 37 C.F.R. § 1.97(e), or in any other event remediable by a fee, please credit any over payment or charge any additional fees to Deposit Account No. 20-0100 of the undersigned.

Very truly yours,

/David W. Osborne/

David W. Osborne
Attorney for Applicant
Registration No. 44989

THORPE NORTH & WESTERN, LLP
Customer No. 20,551
P.O. Box 1219
Sandy, Utah 84091-1219
Telephone: (801) 566-6633

DO/rs

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

ART UNIT:	3728
EXAMINER:	Jacob K. Ackun Jr.
FIRST NAMED INVENTOR:	Chien-Min Sung
SERIAL NO.:	11/223,786
FILED:	9/9/2005
CONFRM. NO.:	8266
FOR:	METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX
DOCKET NO.:	00802-25023

CERTIFICATE OF DEPOSIT UNDER 37 C.F.R. § 1.8

DATE OF DEPOSIT: **April 16, 2009**

I hereby certify that this paper or fee (along with any paper or fee referred to as being attached or enclosed) is being E-FILED with the United States Patent and Trademark Office.

RSpencer

Rebecca Spencer

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT UNDER 37 C.F.R. § 1.97

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

Please find, pursuant to 37 C.F.R. § 1.98(a)(1), the enclosed Form **PTO/SB/08A and PTO/SB/08B** which contains a list of all patents, publications, or other items that have come to the attention of one or more of the individuals designated in 37 C.F.R. § 1.56(c). Applicant respectfully submits that this Information Disclosure statement is filed pursuant to:

☒ 37 C.F.R. § 1.97(b)(1), (3) or (4), within three months of the filing date of the application or request for RCE, or before a first office action on the merits, whichever occurs last;

☐ 37 C.F.R. § 1.97(c), after a first office action on the merits, but before a Final Office Action or a Notice of Allowance, whichever occurs first, and is accompanied by either 1)

a statement in accordance with 37 C.F.R. § 1.97(e), or 2) the fee set forth in 37 C.F.R. § 1.17(p); or

☐ 37 C.F.R. § 1.97(d), after a Final Office Action or Notice of Allowance, whichever occurs first, but on or before payment of the issue fee, and is accompanied by both 1) a statement in accordance with 37 C.F.R. § 1.97(e), and 2) the fee set forth in 37 C.F.R. § 1.17(p).

While no representation is made that any of these references may be "prior art" within the meaning of that term in accordance with 37 C.F.R. §§ 102 or 103, the enclosed list of references is disclosed so as to comply with the duty of disclosure set forth in 37 C.F.R. § 1.56.

Moreover, while no representation is made that a specific search of office files or patent office records has been conducted or that no better art exists, the undersigned attorney of record believes that the references listed, together with any other references which may have been previously submitted or listed, are the closest to the claimed invention (taken in its entirety) of which the undersigned is presently aware, and no art which is closer to the claimed invention (taken in its entirety) has been knowingly withheld.

☒ A legible copy of each of the listed non-patent literature, unpublished U.S. applications and foreign documents or their relevant portions is enclosed.

☐ Copies of the references listed in the accompanying Form PTO/SB/08A and PTO/SB/08B are NOT enclosed because, under 37 C.F.R. § 1.98.(d), they were previously cited by or submitted to the Office in application number , which is relied upon for an earlier filing date under 37 C.F.R. § 1.20.

For all listed references that are not either in the English language, or accompanied by a translation into English, a concise explanation of relevance as required under 37 C.F.R. § 1.98(a)(3) is enclosed attached to each.

The Commissioner is hereby authorized to charge any additional fees associated with this communication or to credit any overpayment to Deposit Account No. 20-0100.

Dated April 16, 2009.

Very Truly Yours,

/David W. Osborne/

David W. Osborne
Attorney for Applicant
Registration No. 44989

THORPE NORTH & WESTERN, LLP
Customer No. 20,551
P.O. Box 1219
Sandy, Utah 84091-1219
(801) 566-6633

DO/rs
Enclosures

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/223,786	09/09/2005	Chien-Min Sung	00802-25023	8266

20551 7590 06/17/2009
THORPE NORTH & WESTERN, LLP.
P.O. Box 1219
SANDY, UT 84091-1219

EXAMINER	
ACKUN, JACOB K	
ART UNIT	**PAPER NUMBER**
3728	
MAIL DATE	**DELIVERY MODE**
06/17/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	11/223,786	SUNG, CHIEN-MIN	
	Examiner	Art Unit	
	Jacob K. Ackun Jr.	3728	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 April 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-6,14 and 15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-6,14 and 15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/3/09, 4/16/09*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1, 3-6 and 4-15 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims of record of U.S. Patent No. 7,258,708. The rejection is set out in the last office action and is incorporated herein by reference. Applicant's traverse of the rejection appears to be based on the claims as currently amended in this application. That is, without specifically so stating, applicant appears to be arguing that it is the amendment to claim 1 on the last line thereof that overcomes the rejection. For example, applicant refers to a teaching in the specification of the '708 patent with regard to the teaching therein of a metal coating for the abrasive particles, while applicant also argues more generally that "no argument has been put forward by the examiner as to how any of the present claims are obvious variations of the '708 patent".

The examiner disagrees with the applicant's argument. First of all, as applicant is no doubt aware, the double patenting rejection can not be based on the specification in the "reference". Thus as noted below it is the metal coating layer **claimed** in the '708 patent that is particularly relevant in view of the amendments to claim 1. The specification of the instant application, like the '708 patent, expressly teaches that the superabrasive particles can be coated. See page 17.

Claim 1 is presumed to encompass this embodiment in the absence of any express indication on the record to the contrary, and since a coated superabrasive particle can still be described as a superabrasive particle. Thus, the claims at bar do not avoid the claims in the 708 patent merely because of the metallic coating recited in those claims. That is claim 1 can be interpreted as encompassing a solidified organic material layer in direct contact with a coated superabrasive particle. As to the more general argument that the examiner has put forward no argument showing that the claims in question are obvious variations of one another, it is respectfully submitted that all one has to do is compare the claims at issue. What more is needed. For example, look at emended claim 1 in the subject application and then look at claim 1 of the patent.

3. The Double Patenting rejection over US Application No. 11/804,221 has been withdrawn. While applicant does not specifically mention it in his argument traversing the rejection, the claims in the co-pending application have been amended since the last Double Patenting rejection. The examiner finds that the claims of the subject application no longer conflict with those of the co-pending application based on the amendment in that application.

4. Claims 1, 3-6 and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's own disclosure of the prior art or Benedict et al.

(5,924,917) alone, or especially in view of Sung et al. (2002/0173234), Doan et al (6,945,857), Ishizaki et al. (6,775,720) or Andrews et al. (2005/0260939). The rejection is set out in full in the last office action and is incorporated herein by reference.

5. Applicant's arguments filed 4/8/09 have been fully considered but they are not persuasive. The Double Patenting rejection has been addressed above. As to the rejection over the prior art the applicant first questions why the examiner has spent so much time showing that the retention of superabrasive particles in a solidified organic material layer of an abrading tool is prior art, as this point was clearly admitted in the background section of the present application at the time of filing. The answer quite clearly is because **the applicant** spent so much time arguing that the retention of superabrasive particles in a solidified organic material layer was **not** within the prior art. Moreover, contrary to what the applicant now asserts, the point was not expressly admitted in the background section of the application, a fact that made it all the more difficult for the examiner to show. In fact it was only the careful examination of the entire record in the subject application that led the examiner to the belief that the retention of superabrasive particles in a solidified organic material layer was not the invention of the applicant, contrary to what applicant apparently was vociferously arguing.

Applicants attention is now specifically directed to the Argument submitted on 5/23/08 at page 12 paragraph 3 as well as the Argument of 1/25/08 at page 3 last paragraph through the first paragraph of page 4 thereof, as examples only. Perhaps the examiner is missing something, but to quote one of applicant's relevant comments in the noted page 4, "Applicant emphatically **does not** believe that it is not novel or unobvious to retain superabrasive particles in a solidified organic material layer".

In light of the above the applicant is the last person who should be questioning why the examiner spent so much time trying to show that the feature in question was in fact prior art. It is not clear to the examiner what seems to have changed applicant's mind as to the knowledge in the prior art, however, the applicant can hardly complain about the time spent by the examiner when it was applicant that forced the examiner to spend the time.

As to the applicant's remaining arguments the examiner refers to his comments in prior office actions and adds the following. The comments provided by applicant with regard to the knowledge in the field of pad dressers is noted. However, the comments do not answer a number of questions as outlined below. With reference to line 1 of claim 1, the examiner has pointed out from the very beginning that a prior patent or other prior art applied in a rejection of the claims of

the subject application does not have to mention a desire to increase the retention of the particles or have to have this as a goal. Moreover, such a reference does not have to expressly teach minimizing mechanical stress as recited on line 4 of claim1. Why? Because the instant application specification teaches that the aforementioned goals are achieved only because of how the particles are arranged in the matrix, (In this regard all of the claims as originally filed may also be noted). Thus, if it is known in the prior art or obvious from the prior art to arrange the abrasive particles in any one of the methods described by applicant in the instant application specification, for any reason, the noted goals would be met regardless of whether the prior art even mentions them. This is a point the applicant has never acknowledged, or convincingly addressed, but one that remains very relevant in this case.

As amended, claim 1 encompasses the embodiment wherein the goal of increasing retention of the particles is achieved by securing the particles in an arrangement that minimizes mechanical stress, this goal in turn being achieved by securing the particles in the matrix such that for a majority of the particles their tips protrude to less than about 40 microns above the solidified organic material layer. That's it!? The amendment to claim 1 to now further limit its scope to a CMP pad dresser is also noted. Claim 3 adds that a majority of the particles protrudes to a

predetermined height, a limitation that has also been argued at length by applicant. The reason the claims are rejected over the prior art is not only because the prior art teaches or intends to increase the retention of superabrasive particles in a pad dresser matrix (applicant appears to only admit that this may be with regard to braze, but clearly the prior art is concerned with the retention of the particles no matter the dresser pad matrix), but because more fundamentally, the arrangements recited in claims 1 and 3 have been found to be obvious regardless of any considerations having to do with the retention of the particles on the pad.

Thus with regard to claim 1 the examiner has found that **first** it is known to secure superabrasive particles in an organic matrix. Note the outstanding rejection Applicant now admits that such a statement is true and appears to admit that it is true with regard to CMP pad dressers, although the applicant also appears to argue that such prior art pad dressers did not work properly. See the Remarks at page 4. In any event Benedict is directed generally to a type of apparatus that would include pad dressers. Also, one having ordinary skill in the art would recognize the applicability of the Benedict teaching to pad dressers from reading the Benedict specification. **Secondly**, it is known to secure the particles in an arrangement wherein a majority of the tips of the particles protruded to less than 40 microns. The examiner has also found that each of these two elements would have also been

obvious to one having ordinary skill in the relevant art. Given just these 2 findings claim 1 is not patentable over the prior art, regardless of whether the prior art mentions increasing retention of the particles or the minimization of mechanical stress. With regard to claim 3 the examiner has also found that it is known as well as obvious to protrude a majority of superabrasive particles to a particular height. This **third** finding added to the other two prevents the allowance of claim 3.

Should applicant wish to continue to try to convince the examiner that the claims are allowable applicant is requested to argue why the logic or overall approach by the examiner outlined above is in error. For example applicant can provide specific arguments as to why a piece of prior art must mention the minimization of mechanical stress or a desire to increase the retention of superabrasive particles in order for it to be applied against the claims. Alternatively, the applicant can simply admit on the record that the examiners analysis regarding what the prior art has to show is correct and move on to other arguments. Secondly, the applicant should candidly argue which of the three elements above are in fact not within the prior art (or not obvious to a routineer) and why.

For example, applicant appears to have argued on the record that CMP pad dressers have been known wherein the abrasive particles have been secured in a

solidified organic material layer. If this is a fact then for claim 1 to be allowable in light of the comments above, applicant has to also be arguing that the second element the examiner considers to be necessary to meet the claim is not within the prior art. That is applicant has to be arguing that it is not known (and it would not have been obvious) to arrange the particles in the matrix of the pad dresser such that for a majority of the particles, their tips protruded to less than 40 microns for any reason (not just considering increasing the retention of superabrasive particles in the pad). This appears contrary to the knowledge in the prior art. Note the specification of the subject application, for example. Why would one having ordinary skill in the relevant art not know or be led to retain particles in some CMP pad solidified organic material layer (a structure that admittedly is prior art) in an arrangement wherein a majority of the particles protruded to various heights, all within say 39 microns (which is less than 40 microns) based on the specific work the dresser was to operate on (not a reason having necessarily to do with increasing the retention of the particles on the pad). Moreover, if this is not unobvious why is claim 1 allowable? These issues need to be specifically and convincingly addressed for this examiner to agree that claim 1 as currently drafted merits allowance over the prior art.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacob K. Ackun Jr. whose telephone number is (571)272-4418. The examiner can normally be reached on Monday through Friday 8.30AM-5.00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mickey Yu can be reached on (571)272-4562. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or

571-272-1000.

/Jacob K. Ackun Jr./
Primary Examiner, Art Unit 3728

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 1 of

Complete if Known	
Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	Chien-Min Sung
Art Unit	3728
Examiner Name	
Attorney Docket Number	00802-25023

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1	US- 4481016	11-1984	Campbell et al.	
	2	US- 4849602	07-1989	Gardner	
	3	US- 5195403	03-1993	Sani et al.	
	4	US- 5195404	03-1993	Notter et al.	
	5	US- 5232320	08-1993	Tank et al.	
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	8	US- 5924917	07-1999	Benedict et al.	
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Examiner Signature	/Jacob Ackun/	Date Considered	06/15/2009

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NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	1	US Application 11/786,426 filed 4-10-2007, Chien-Min Sung. Office action issued 12-3-2008.	
	2	US Application 11/724,585 filed 3-14-2007, Chien-Min Sung. Office action issued 1-28-2009.	
	3	US Application 11/357,713 filed 2-17-2003, Chien-Min Sung. Office action issued 1-30-2009.	

Examiner Signature	/Jacob Ackun/	Date Considered	06/15/2009

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	2	US- 3767371	10-1973	Wentorf et al.	
	3	US- 4662896	05-1987	Dennis	
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Sheet 3 of

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Filing Date	9/9/2005
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	41	US- 6354918	03-2002	Togawa et al.	
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Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]-Number[4]-Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

Examiner Signature	/Jacob Ackun/	Date Considered	06/15/2009

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.A./

PTO/SB/08b (02-09)
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of

Complete if Known	
Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	Chien-Min Sung
Art Unit	3728
Examiner Name	
Attorney Docket Number	00802-25023

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	1	U.S. Application 11/804,221 filed 5/16/2007 Chien-Min Sung, Office Action issued 1/16/2009.	
	2	U.S. Application 11/786,426 filed 4/10/2007 Chien-Min Sung, Office Action issued 3/13/2009.	
	3	U.S. Application 11/560,817 filed 11/16/2006 Chien-Min Sung	
	4	U.S. Application 11/804,221 filed 03/14/2007 Chien-Min Sung	
	5	Syndite, elementsix advancing diamond, 2 pages. www.e6.com.	

Examiner Signature	/Jacob Ackun/	Date Considered	06/15/2009

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1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

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Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	1	US Application 11/560,817 filed 11/16/2006, Chien-Min Sung. Office action issued 6/4/2009.	
	2	US Application 11/724,585 filed 3/14/2007, Chien-Min Sung. Office action issued 7/27/2009.	
	3	US Application 11/357,713 filed 02/17/2006, Chien-Min Sung. Office action issued 8/3/2009.	

Examiner Signature		Date Considered	

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1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

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Electronic Acknowledgement Receipt

EFS ID:	6022844
Application Number:	11223786
International Application Number:	
Confirmation Number:	8266
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Customer Number:	20551
Filer:	David William Osborne/Rebecca Spencer
Filer Authorized By:	David William Osborne
Attorney Docket Number:	00802-25023
Receipt Date:	04-SEP-2009
Filing Date:	09-SEP-2005
Time Stamp:	19:52:30
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		ids.pdf	344873 70956f0a3c82224508fdfd4a3eb3b0630e580000	yes	8

	Multipart Description/PDF files in .zip description		
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	Information Disclosure Statement (IDS) Filed (SB/08)	8	8
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National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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September 4, 2009

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

TRANSMITTAL OF SUPPLEMENTAL
INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Re: U.S. Patent Application No. 11/223,786 filed September 9, 2005
First Named Inventor: Chien-Min Sung
Title: **METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX**
Group Art Unit: 3728
Attorney Docket No.: 00802-25023

Sir/Madam:

Transmitted herewith for filing and pursuant to 37 C.F.R. § 1.56 and 1.97 is a Supplemental Information Disclosure Statement. Enclosed also are the following designated documents, as required under 37 C.F.R. § 1.97 and 1.98:

☒ Form **PTO/SB/08B** list of 3 references submitted for consideration.

☐ Legible copies of the listed non-patent documents, unpublished U.S. applications and foreign documents or their relevant portions are included.

☐ All English translations of each non-English reference, if any, within the possession, custody, control or availability of anyone designated in 37 C.F.R. § 1.56(c) (see 37 C.F.R. § 1.98(c)).

The following are included within the Information Disclosure Statement if applicable and as required under 37 C.F.R. § 1.98:

☐ Concise explanation of relevance of each reference not in English and unaccompanied by an English translation.

☐ Statement that certain listed references not enclosed are substantially cumulative of an enclosed reference.

☐ Statement that certain listed references not enclosed were previously cited by or submitted to the Office in prior application no. , filed on _____, which is relied upon for an earlier filing date under 35 U.S.C. § 120.

In order to secure consideration of the items designated above, one or more of the following, if required, is also enclosed:

☒ Statement under 37 C.F.R. § 1.97(e)(1) or (2).

☐ Check No. _____, which includes the amount of $____ (amount in §1.17(p)) constituting the submission fee set forth in 37 C.F.R. § 1.17(p).

In the event that 37 C.F.R. § 1.97(c) applies and the Examiner is not satisfied that the Statement meets the requirements of 37 C.F.R. § 1.97(e), or in any other event remediable by a fee, please credit any over payment or charge any additional fees to Deposit Account No. 20-0100 of the undersigned.

Very truly yours,

/David W. Osborne/

David W. Osborne
Attorney for Applicant
Registration No. 44989

THORPE NORTH & WESTERN, LLP
Customer No. 20,551
P.O. Box 1219
Sandy, Utah 84091-1219
Telephone: (801) 566-6633

DO/rs

DOCKET NO. 00802-25023

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

FIRST NAMED INVENTOR:	Chien-Min Sung
SERIAL NO.:	11/223,786
FILED:	9/9/2005
CONFIRM. NO.:	8266
FOR:	METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX
ART UNIT:	3728
EXAMINER:	Jacob K. Ackun Jr.

CERTIFICATE OF DEPOSIT UNDER 37 C.F.R. §1.8

I hereby certify that this correspondence is being deposited with the United States Patent and Trademark Office via EFS Web Filing.

RSpencer
Rebecca Spencer
Sept 4 2009
Date of Deposit

PROMPTNESS CERTIFICATE UNDER 37 C.F.R. §1.97(e)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

___ I hereby certify that each item contained in the information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement; or

__x__ I hereby certify that no item contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual

designated in §1.56(c) more than three months prior to the filing of the information disclosure statement.

Please charge any additional fees or credit any overpayment to Deposit Account No. 20-0100.

DATED this 4th day of September, 2009.

Respectfully submitted,

/David W. Osborne/

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DO/rs
Enclosures

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

ART UNIT:	3728
EXAMINER:	Jacob K. Ackun Jr.
FIRST NAMED INVENTOR:	Chien-Min Sung
SERIAL NO.:	11/223,786
FILED:	9/9/2005
CONFRM. NO.:	8266
FOR:	METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX
DOCKET NO.:	00802-25023

CERTIFICATE OF DEPOSIT UNDER 37 C.F.R. § 1.8

DATE OF DEPOSIT: **September 4, 2009**

I hereby certify that this paper or fee (along with any paper or fee referred to as being attached or enclosed) is being E-FILED with the United States Patent and Trademark Office.

RSpencer

Rebecca Spencer

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT UNDER 37 C.F.R. § 1.97

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

Please find, pursuant to 37 C.F.R. § 1.98(a)(1), the enclosed Form **PTO/SB/08B** which contains a list of all patents, publications, or other items that have come to the attention of one or more of the individuals designated in 37 C.F.R. § 1.56(c). Applicant respectfully submits that this Information Disclosure statement is filed pursuant to:

☐ 37 C.F.R. § 1.97(b)(1), (3) or (4), within three months of the filing date of the application or request for RCE, or before a first office action on the merits, whichever occurs last;

☒ 37 C.F.R. § 1.97(c), after a first office action on the merits, but before a Final Office Action or a Notice of Allowance, whichever occurs first, and is accompanied by either 1)

a statement in accordance with 37 C.F.R. § 1.97(e), or 2) the fee set forth in 37 C.F.R. § 1.17(p); or

☐ 37 C.F.R. § 1.97(d), after a Final Office Action or Notice of Allowance, whichever occurs first, but on or before payment of the issue fee, and is accompanied by both 1) a statement in accordance with 37 C.F.R. § 1.97(e), and 2) the fee set forth in 37 C.F.R. § 1.17(p).

While no representation is made that any of these references may be "prior art" within the meaning of that term in accordance with 37 C.F.R. §§ 102 or 103, the enclosed list of references is disclosed so as to comply with the duty of disclosure set forth in 37 C.F.R. § 1.56.

Moreover, while no representation is made that a specific search of office files or patent office records has been conducted or that no better art exists, the undersigned attorney of record believes that the references listed, together with any other references which may have been previously submitted or listed, are the closest to the claimed invention (taken in its entirety) of which the undersigned is presently aware, and no art which is closer to the claimed invention (taken in its entirety) has been knowingly withheld.

☐ A legible copy of each of the listed non-patent literature, unpublished U.S. applications and foreign documents or their relevant portions is enclosed.

☐ Copies of the references listed in the accompanying Form PTO/SB/08A and PTO/SB/08B are NOT enclosed because, under 37 C.F.R. § 1.98.(d), they were previously cited by or submitted to the Office in application number , which is relied upon for an earlier filing date under 37 C.F.R. § 1.20.

For all listed references that are not either in the English language, or accompanied by a translation into English, a concise explanation of relevance as required under 37 C.F.R. § 1.98(a)(3) is enclosed attached to each.

The Commissioner is hereby authorized to charge any additional fees associated with this communication or to credit any overpayment to Deposit Account No. 20-0100.

Dated September 4, 2009.

Very truly yours,

/David W. Osborne/

David W. Osborne
Attorney for Applicant
Registration No. 44989

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DO/rs
Enclosures

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ART UNIT:	3728
EXAMINER:	Jacob K. Ackun
FIRST NAMED INVENTOR:	Chien-Min Sung
SERIAL NO.:	11/223,786
FILED:	09/09/2005
CONFRM. NO.:	8266
FOR:	METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX
DOCKET NO.:	00802-25023

CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8

DATE OF DEPOSIT: **September 17, 2009**

I hereby certify that this paper or fee (along with any paper or fee referred to as being attached or enclosed) is being submitted on the date indicated above via:

☒ EFS Web
☐ facsimile to _____
☐ the United States Postal Service with sufficient postage as first class mail addressed to: Mail Stop _____, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

/Nicole Solomon/
Nicole Solomon

RESPONSE UNDER 37 C.F.R. § 1.111

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Office Action mailed June 17, 2009, please reconsider the application in light of the accompanying remarks.

LISTING OF CLAIMS

1. (previously presented) A method of increasing retention of superabrasive particles held in a solidified organic material layer of a CMP pad dresser, a portion of each of said superabrasive particles protruding out of the solidified organic material layer, comprising:

securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a CMP pad, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer, and wherein the solidified organic material layer is in direct contact with the superabrasive particles.

2. (withdrawn) The method of claim 1, wherein the arrangement of the plurality of superabrasive particles is configured to uniformly distribute drag forces across substantially each superabrasive particle.

3. (original) The method of claim 1, wherein a majority of the plurality of superabrasive particles protrudes to a predetermined height above the solidified organic material layer.

4. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of less than about 20 microns when used to abrade a work piece.

5. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of from about 1 micron to about 20 microns when used to abrade a work piece.

6. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of from about 10 micron to about 20 microns when used to abrade a work piece.

7. (withdrawn) The method of claim 3, wherein the superabrasive particles protrude to a predetermined height that is along a designated profile.

8. (withdrawn) The method of claim 7, wherein the designated profile is a plane.

9. (withdrawn) The method of claim 7, wherein the designated profile has a slope.

10. (withdrawn) The method of claim 7, wherein the designated profile has a curved shape.

11. (withdrawn) The method of claim 10, wherein the designated profile has a dome shape.

12. (withdrawn) The method of claim 7, wherein a majority of the plurality of superabrasive particles are arranged such that their tips vary from the designated profile to less than about 10% of the average size of the superabrasive particles.

13. (canceled)

14. (original) The method of claim 3, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 30 microns.

15. (original) The method of claim 3, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to about 20 microns.

16. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are of substantially the same size.

17. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particle are from about 30 microns to about 500 microns in size.

18. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are from about 100 microns to about 200 microns in size.

19. (withdrawn) The method of claim 1, wherein superabrasive particles in a central location of the abrading tool are smaller in size than superabrasive particles in a peripheral location on the abrading tool.

20. (withdrawn) The method of claim 1, wherein securing the plurality of superabrasive particles includes arranging the plurality of superabrasive particles according to a predetermined attitude.

21. (withdrawn) The method of claim 20, wherein the predetermined attitude is a uniform attitude across substantially all of the plurality of superabrasive particles.

22. (withdrawn) The method of claim 20, wherein the plurality of superabrasive particles are substantially configured with an apex portion oriented towards a work piece.

23. (withdrawn) The method of claim 20, wherein superabrasive particles in a central location on the abrading tool are configured with an apex or an edge portion oriented towards a work piece, and superabrasive particles in a peripheral location on the abrading tool are configured with a face portion oriented towards the work piece.

24. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are arranged as a grid.

25. (withdrawn) The method of claim 24, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 3 times to about 5 times the average size of the superabrasive particles.

26. (withdrawn) The method of claim 24, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 100 microns to about 800 microns.

27. (withdrawn) The method of claim 20, wherein arranging the superabrasive particles according to a predetermined attitude further comprises:

applying an adhesive to a substrate;

applying a flexible sieve to the adhesive;

disposing superabrasive particles across a template positioned on the flexible sieve such that a portion of the superabrasive particles adhere to the adhesive by either an edge or an apex portion; and

removing the template and the un-adhered superabrasive particles from the flexible sieve.

28. (withdrawn) The method of claim 27, wherein the flexible sieve is a nylon sieve.

29. (withdrawn) The method of claim 1, wherein superabrasive particles in a central location on the abrading tool are spaced farther apart than superabrasive particles in a peripheral location on the abrading tool.

30. (withdrawn) A superabrasive tool having improved superabrasive particle retention, comprising:

a solidified organic material layer; and

a plurality of superabrasive particles secured in the solidified organic material layer in an arrangement as recited in claim 1.

31. (withdrawn) The tool of claim 30, wherein each of the plurality of superabrasive particles protrudes to a predetermined height above the solidified organic material layer.

32. (withdrawn) The tool of claim 31, wherein the predetermined height is greater than about 20 microns.

33. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 1 micron to about 20 microns.

34. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 5 microns to about 20 microns.

35. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 10 microns to about 20 microns.

36. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles protrude to a predetermined height is along a designated profile.

37. (withdrawn) The tool of claim 36, wherein the designated profile is a plane.

38. (withdrawn) The tool of claim 36, wherein the designated profile has an average slope from a high point near a center location of the tool to a low point near a peripheral edge of the tool.

39. (withdrawn) The tool of claim 38, wherein the average slope is about 1/1000.

40. (withdrawn) The tool of claim 36, wherein the designated profile has a curved shape.

41. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles are arranged such that their tips protrude to about 10% of the average size of the superabrasive particles.

42. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles are arranged such that their tips protrude from about 20 to about 30 microns.

43. (withdrawn) The tool of claim 30, wherein the arrangement is a grid.

44. (withdrawn) The tool of claim 43, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 3 times to about 5 times the average size of the superabrasive particles.

45. (withdrawn) The tool of claim 43, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 100 microns to 800 microns.

46. (withdrawn) The tool of claim 30, wherein superabrasive particles in a central location on the tool are spaced farther apart than superabrasive particles in a peripheral location on the tool.

47. (withdrawn) The tool of claim 30, wherein superabrasive particles in a central location on the tool are larger in size than superabrasive particles in a peripheral location on the tool.

48. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles are arranged according to a predetermined attitude.

49. (withdrawn) The tool of claim 48, wherein the plurality of superabrasive particles are substantially configured with an apex portion oriented towards a work piece.

50. (withdrawn) The tool of claim 48, wherein superabrasive particles in a central location on the tool are configured with an apex or an edge portion oriented towards a work piece, and superabrasive particles in a peripheral location on the tool are configured with a face portion oriented towards the work piece.

51. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles include a member selected from the group consisting of diamond, polycrystalline diamond, cubic boron nitride, polycrystalline cubic boron nitride, and combinations thereof.

52. (withdrawn) The tool of claim 51, wherein the plurality of superabrasive particles includes diamond.

53. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles are from about 30 microns to about 500 microns in size.

54. (withdrawn) The tool of claim 53, wherein the plurality of superabrasive particles are from about 100 microns to about 200 microns in size.

55. (withdrawn) The tool of claim 30, wherein the solidified organic material layer comprises a member selected from the group consisting of amino resins, acrylate resins, alkyd resins, polyester resins, polyamide resins, polyimide resins, polyurethane resins, phenolic resins, phenolic/latex resins, epoxy resins, isocyanate resins, isocyanurate resins, polysiloxane resins, reactive vinyl resins, polyethylene resins, polypropylene resins, polystyrene resins, phenoxy resins, perylene resins, polysulfone resins, acrylonitrile-butadiene-styrene resins, acrylic resins, polycarbonate resins, polyimide resins, and mixtures thereof.

56. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is an epoxy resin.

57. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is a polyurethane resin.

58. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is a polyimide resin.

59. (withdrawn) The tool of claim 30, further comprising a reinforcing material disposed within at least a portion of the solidified organic material layer.

60. (withdrawn) The tool of claim 59, wherein the reinforcing material is a material selected from the group consisting of ceramics, metals, or combinations thereof.

61. (withdrawn) The tool of claim 60, wherein the reinforcing material is a ceramic.

62. (withdrawn) The tool of claim 61, wherein the ceramic comprises a member selected from the group consisting of alumina, aluminum carbide, tungsten carbide, silica, silicon carbide, silicon nitride, zirconia, zirconium carbide, and mixtures thereof.

63. (withdrawn) The tool of claim 59, wherein the reinforcing material is an organometallic coupling agent.

64. (withdrawn) The tool of claim 30, wherein the tool is a polishing or grinding pad.

65. (withdrawn) The tool of claim 30, wherein the tool is a CMP pad dresser.

66. (withdrawn) The tool of claim 30, wherein the tool is for shaping dental materials.

REMARKS

In the Office Action mailed June 17, 2009, claims 1, 3-6, 14, and 15 were pending for consideration, all of which were rejected on various statutory grounds. First, claims 1, 3-6, 14, and 15 were rejected under a nonstatutory obviousness-type double patenting rejection over U.S. Patent No. 7,258,708 (hereinafter "'708 patent"). Additionally, claims 1, 3-6, and 14-15 were rejected under 35 U.S.C 103(a) as being allegedly obvious over Applicant's own disclosure, or U.S. Patent No. 5,924,917 (hereinafter "Benedict") alone, or in view of U.S. Publication No. 2002/0173234 (hereinafter "Sung"), U.S. Patent No. 6,945,857 (hereinafter ("Doan"), U.S. Patent No. 6,755,720 (hereinafter "Ishizaki"), or U.S. Patent Application No. 2005/0260939 (hereinafter "Andrews").

Nonstatutory Double Patenting

Claims 1, 3-6, and 14-15 were rejected on the grounds of nonstatutory obviousness-type double patenting over the claims of the '708 patent. Applicant respectfully requests that the Examiner hold this rejection in abeyance until such time as allowable claims have been confirmed in the present matter, so that such claims can be the basis of any obviousness-type double patenting issues.

35 U.S.C. § 103 Rejections

The Examiner has rejected claims 1, 3-6, and 14-15 under 35 U.S.C 103(a) as allegedly obvious over Applicant's disclosure or Benedict alone, or especially in view of Sung, Doan, Ishizaki, or Andrews. Claim 1 of the present invention contains limitations to a method of increasing retention of superabrasive particles held in a solidified organic material layer of a CMP pad dresser, where a portion of each of said superabrasive particles protrudes out of the solidified organic material layer. The method may further include securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a CMP pad. The claim also requires a majority of the plurality of superabrasive particles to be arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer, and that the organic material layer directly contacts the superabrasive particles.

Much has been said by the Patent Office about what the Applicant has previously argued, and a significant amount of interpretation of what was meant by those statements has been introduced into the record. The Applicant feels that much of this interpretation has been a misunderstanding from the Examiner's perspective of what has been stated. Therefore, the Applicant wishes to state expressly what the Applicant sees as the relevant points regarding the prior art and the present rejection, to the exclusion of the previous response discussions.

1. As is stated in the background section of the present application (page 2, lines 25-30), polymeric resins are known for use as substrate materials of abrasive articles. A common example of a tool incorporating such a resin would be sandpaper.

2. It is known that abrasive particles are poorly held in a polymeric resin during use of the tool. This fact is admitted by Benedict, as is discussed below. Anyone who has ever used sandpaper knows that sandpaper wears out during use, and that such wearing is the dislodging of abrasive particles from the support matrix. This dislodgement is generally not a problem with most uses of such tools because the abrasive particles are being used to abrade the workpiece even after dislodged from the matrix. The scale of the abrading/polishing is approximately the same scale as the size of the abrasive particles because of the fact that the abrasive particles are actually digging into the workpiece. So as abrasive particles are dislodged they continue to abrade the workpiece until they are ejected from beneath the tool.

3. To the Applicants knowledge, superabrasive particles retained in an organic matrix have never been utilized to dress a CMP pad. In CMP processes, a CMP pad made from a material such as polyurethane is used to polish a workpiece such as a silicon wafer. The CMP pad contains asperities in the pad surface that are used to trap a chemical/abrasive slurry against the wafer surface to facilitate polishing. Unlike abrading tools such as sanding devices, a CMP pad dresser does not contact the workpiece, but rather is used to unclog/cut asperities in the CMP pad that is in turn, used to polish the workpiece. It is important to note that the abrasives used in the slurry on the pad are typically orders of magnitude smaller than the superabrasive particles in the dresser used to cut the asperities of the pad. When abrasive particles are dislodged from sandpaper or some other abrading tool, the abrasive particles continue to abrade the workpiece in the same manner they did while attached to the substrate until the particles are dislodged from under the tool. One of ordinary skill in the art understands that this will occur, as is described by Benedict. Abrasive particles are attached to such a tool using a resin matrix because it is an easy

manufacturing method, and in such cases the eventual failure of the resin and the subsequent dislodgement of abrasive particles is not detrimental to the workpiece.

4. One of ordinary skill in the art understands that a single superabrasive particle dislodged from a CMP pad dresser has the potential of contacting and destroying the wafer due to the particle's large size compared to the scale of the polishing. The CMP arts have moved in a direction of increasing bond strength because of this fact. Those references teaching tip-leveled superabrasive particles embedded in a metal matrix are teaching such because of how the superabrasive particles cut the CMP pad, and have not recognized that leveled tips affect retention; in fact, leveled tips in a metal matrix probably do not affect retention due to the strength of the bonding between the metal and the superabrasive particle. It is also important to note in actual practice that these metal CMP pad dressers do not actually have leveled tips as a result of the warpage that occurs during the brazing or other metal heating process required to join the abrasives to the metal.

5. The non-obviousness of the present claims comes not from the fact that resin matrices are unknown or that references have never taught leveled tips, but rather that: 1) it is catastrophic for a CMP pad dresser to lose a single superabrasive particle during polishing procedure and that 2) the art has not taught or suggested how superabrasive particles can be retained in an organic matrix without experiencing such catastrophic failures. References teaching the bonding of abrasive particles in a resin matrix on a tool that is abrading a workpiece are irrelevant with respect to the present claims because it is understood that particles will be dislodged from such a tool; one of ordinary skill in the art would understand that these references would not be applicable to CMP pad dressing because of this. References teaching leveled tips in a metal matrix are likewise irrelevant to the patentability of the present claims because the superabrasive particles are so strongly bonded to the matrix that the leveled tips would not be seen by one of ordinary skill in the art as the reason for the strong retention.

6. The Benedict Reference – Benedict teaches belt, drum, and other configurations for sandpaper type abrading devices. As has been described above, sandpaper-type devices are not relevant to the present claims because it is understood that the dislodging of particles will occur. For example, Benedict teaches that, while undesirable as it shortens the life of the tool, shelling of the tool occurs (col. 8, lines 42-47). Shelling is a term that is synonymous with particle pullout. In the case of such tools, shelling is not catastrophic, and but merely relates to tool

wear. If a particle pulls out, it may be driven across the work piece but will not cause significant damage because the degree of polishing is roughly proportional to the size of the abrasive particles, which is not the case with CMP procedures.

Additionally, the Examiner has stated that Benedict is directed generally to a type of apparatus that would include pad dressers, and that one of ordinary skill in the art would recognize the applicability of the Benedict teaching to pad dressers from reading the Benedict specification. The Applicant disagrees with this statement. To the contrary, one of ordinary skill in the art would immediately recognize that Benedict is not applicable to CMP processes. Benedict teaches tools for the abrading of a workpiece, and nowhere therein is it taught or suggested that such a tool could be used for dressing a CMP pad (i.e. the CMP pad is NOT a workpiece, but rather is itself a tool for removal of the actual workpiece, a silicon wafer). The mere contact of a CMP pad dresser against a wafer being polished would destroy the wafer. Additionally, the teaching of Benedict that shelling occurs would preclude one of ordinary skill in the art from using such teachings in CMP processes due to the catastrophic effects of dislodged superabrasive particles.

7. The Examiner has argued that two points, 1) that it is known that superabrasive particles can be embedded in an organic matrix and 2) that it is known that particles can be secured in an arrangement whereby particle tips protrude to less than 40 microns, renders claim 1 unpatentable. The Applicant disagrees with this assertion. These two points alone do not establish a prima facie case of obviousness against claim 1. First, there is no apparent motivation for one of ordinary skill in the art to combine these elements. The leveling teachings are derived from the metal matrix references, and as such, it is unclear why one of ordinary skill in the art would provide such leveled tips with an organic matrix that has such poor retention characteristics. Second, one of ordinary skill in the art would not have had a reasonable likelihood of success in creating a CMP pad dresser through such a combination. In moving from a metal matrix to an organic matrix, one of ordinary skill would understand that retention of superabrasive particles would be significantly decreased, as is evident from the shelling statement of Benedict.

8. The Sung, Doan, Ishizaki, and Andrews References – These references, alone, in combination with each other or with Benedict, do not render the present claims obvious, nor do

they provide the necessary motivation or likelihood of success that is missing from the Benedict reference.

In light of the above, the Applicant requests that the rejections of claim 1 be withdrawn. Additionally, as claims 3-6 and 14-15 depend from claim 1, it is also requested that these rejections be withdrawn as well. It should be noted that the arguments presented in the previous response are deemed to be incorporated herein by reference, with the statements and interpretations presented herein taking precedence. Also, the absence of any argument from this response should not be seen as being in agreement with the Examiner.

CONCLUSION

In view of the foregoing, the Applicant believes that claims 1, 3-6, and 14-15 present allowable subject matter and the prompt allowance thereof is requested. If any impediment to the allowance of these claims remains after consideration of the present amendment and above remarks, and such impediment could be removed during a telephone interview, the Examiner is invited to telephone the undersigned attorney, so that such issues may be resolved as expeditiously as possible.

Please charge any additional fees except for Issue Fee or credit any overpayment to Deposit Account No. 20-0100.

Dated this 17th day of September, 2009.

Respectfully submitted,

THORPE, NORTH & WESTERN, LLP

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DWO/TBA

Electronic Acknowledgement Receipt	
EFS ID:	6093998
Application Number:	11223786
International Application Number:	
Confirmation Number:	8266
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Customer Number:	20551
Filer:	David William Osborne/Nicole Solomon
Filer Authorized By:	David William Osborne
Attorney Docket Number:	00802-25023
Receipt Date:	17-SEP-2009
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Application Type:	Utility under 35 USC 111(a)

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Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		25023response.pdf	96210 b4a3f9414fb44a1e0ba78820c51d7f18b383d24f	yes	15

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	9
	Applicant Arguments/Remarks Made in an Amendment	10	15
Warnings:			
Information:			
	Total Files Size (in bytes):	96210	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
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Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
11/223,786	09/09/2005	

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☒ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	300
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	300

APPLICATION AS AMENDED – PART II

AMENDMENT	09/17/2009	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 65	Minus	** 66	= 0	X $ =		OR	X $52=	0
	Independent (37 CFR 1.16(h))	* 1	Minus	***6	= 0	X $ =		OR	X $220=	0
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/KIMBERLY JONES/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/223,786	09/09/2005	Chien-Min Sung	00802-25023	8266

20551 7590 01/07/2010

THORPE NORTH & WESTERN, LLP.
P.O. Box 1219
SANDY, UT 84091-1219

EXAMINER	
ACKUN, JACOB K	
ART UNIT	**PAPER NUMBER**
3728	

NOTIFICATION DATE	DELIVERY MODE
01/07/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

rich@tnw.com
causse@tnw.com
patentdocket@tnw.com

Office Action Summary	Application No.	Applicant(s)	
	11/223,786	SUNG, CHIEN-MIN	
	Examiner	Art Unit	
	Jacob K. Ackun Jr.	3728	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 September 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-66* is/are pending in the application.

4a) Of the above claim(s) *2,7-13 and 16-66* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-6,14 and 15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/4/09*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. Claims 1, 3-6 and 4-15 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims of record of U.S. Patent No. 7,258,708. Although the conflicting claims are not identical, they are not patentably distinct from each other because it would have been obvious in view of the claims of the patent to perform the method claimed in the subject application in order to provide a more effective pad dresser.

3. Claims 1, 3-6 and 4-15 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims

of record of copending Application No. 11/724,585. Although the conflicting claims are not identical, they are not patentably distinct from each other because it would have been obvious in view of the claims of the copending application to perform the method claimed in the subject application in order to provide a more effective pad dresser. This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1, 3-6 and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al (2006/0254154) alone, or in view of Sung et al. (2002/0173234), Doan et al. (6,945,857), Ishizaki et al. (6,775,720) or Andrews et al. (2005/0260939). In Huang see especially paragraphs [0006], [0007], [0008] [0009] line4, [0023] lines 10-11, [0024] lines 1-4, Figs 2A-2E and their description including paragraph [0030] lines 1-3 and [0031] lines 1-4. Accordingly, Huang appears to suggest all of the elements of the claims. The secondary references are applied for emphasis only, to show that the uniform height requirements of the claims are conventional (note also Huang). Thus it would have been obvious in view of Huang et al alone, to perform the claimed method in order to provide a more effective pad dresser. It would have been especially obvious over Huang in

view of either one of the noted secondary references to perform the claimed method for the same reason.

6. Applicant's arguments with respect to claims 1, 3-6 and 14-15 have been considered but are moot in view of the new ground(s) of rejection. However, the examiner notes that applicant has argued that there is no apparent motivation to combine the relevant teaching in either one of the secondary references (this teaching is to construct a pad dresser so that the abrasive particles thereon protrude to a uniform height as recited in the claims at bar) with the base reference teaching, specifically with the knowledge within the prior art (now shown by Huang) to retain abrasive particles in a solidified organic material layer. According to applicant, leveled tips in a metal matrix, as disclosed in the secondary references, are not relevant to the patentability of the subject application claims, since the particles are so strongly bonded to the metal matrix that the leveled tips would not be seen by one having ordinary skill in the art as the reason for the strong retention.

The problem with this argument is that it appears to suggest that leveled tips can only be relevant when bond strength is an issue, an argument that is at odds with the knowledge in the art and with applicants own comments in paragraph 4 line 6 of the last response. Said differently, applicant appears to be arguing that since the base reference teaching is to retain the abrasive in an organic material

matrix, the routineer would not look to teachings of leveled tips since in those references with such teachings, the bond strength is already sufficient by virtue of the matrix being metal. Thus the applicant is arguing that the references have to be combined for the same reason the invention was made (making the tips level in an organic material matrix increases the bond strength in such a matrix allowing for use as a cmp pad dresser, according to applicant).

Such an argument is clearly contrary to by now well established authority. All of the references applied in the rejection are directed to cmp pad dressers. Leveled tips in such devices are provided for a variety of known reasons, as taught in the references themselves, including perhaps for reasons having to do with how the particles cut the cmp pad, as applicant states in the noted portion of the Response. Thus one having ordinary skill in the relevant art would be motivated to provide leveled tips to the base reference teaching for any one of the reasons that appear to be well recognized in the prior art. The desire to increase bond strength does not have to be a consideration.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacob K. Ackun Jr. whose telephone number is (571)272-4418. The examiner can normally be reached on Monday through Friday 8.30AM-5.00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mickey Yu can be reached on (571)272-4562. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jacob K. Ackun Jr./
Primary Examiner, Art Unit 3728

Notice of References Cited	Application/Control No. 11/223,786	Applicant(s)/Patent Under Reexamination SUNG, CHIEN-MIN	
	Examiner Jacob K. Ackun Jr.	Art Unit 3728	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2006/0254154 A1	11-2006	Huang et al.	051/293
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

PTO/SB/08b (02-09)
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of

Complete if Known	
Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	Chien-Min Sung
Art Unit	3728
Examiner Name	
Attorney Docket Number	00802-25023

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	1	US Application 11/560,817 filed 11/16/2006, Chien-Min Sung. Office action issued 6/4/2009.	
	2	US Application 11/724,585 filed 3/14/2007, Chien-Min Sung. Office action issued 7/27/2009.	
	3	US Application 11/357,713 filed 02/17/2006, Chien-Min Sung. Office action issued 8/3/2009.	

Examiner Signature	/Jacob Ackun/	Date Considered	01/03/2010

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.A./

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ART UNIT:	3728
EXAMINER:	Jacob K. Ackun
FIRST NAMED INVENTOR:	Chien-Min Sung
SERIAL NO.:	11/223,786
FILED:	09/09/2005
CONFRM. NO.:	8266
FOR:	METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX
DOCKET NO.:	00802-25023

CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8

DATE OF DEPOSIT: **April 7, 2010**

I hereby certify that this paper or fee (along with any paper or fee referred to as being attached or enclosed) is being submitted on the date indicated above via:

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/Nicole Solomon/
Nicole Solomon

RESPONSE UNDER 37 C.F.R. § 1.111

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Office Action mailed January 7, 2010, please reconsider the application in light of the accompanying remarks.

LISTING OF CLAIMS

1. (previously presented) A method of increasing retention of superabrasive particles held in a solidified organic material layer of a CMP pad dresser, a portion of each of said superabrasive particles protruding out of the solidified organic material layer, comprising:

securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a CMP pad, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer, and wherein the solidified organic material layer is in direct contact with the superabrasive particles.

2. (withdrawn) The method of claim 1, wherein the arrangement of the plurality of superabrasive particles is configured to uniformly distribute drag forces across substantially each superabrasive particle.

3. (original) The method of claim 1, wherein a majority of the plurality of superabrasive particles protrudes to a predetermined height above the solidified organic material layer.

4. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of less than about 20 microns when used to abrade a work piece.

5. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of from about 1 micron to about 20 microns when used to abrade a work piece.

6. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of from about 10 micron to about 20 microns when used to abrade a work piece.

7. (withdrawn) The method of claim 3, wherein the superabrasive particles protrude to a predetermined height that is along a designated profile.

8. (withdrawn) The method of claim 7, wherein the designated profile is a plane.

9. (withdrawn) The method of claim 7, wherein the designated profile has a slope.

10. (withdrawn) The method of claim 7, wherein the designated profile has a curved shape.

11. (withdrawn) The method of claim 10, wherein the designated profile has a dome shape.

12. (withdrawn) The method of claim 7, wherein a majority of the plurality of superabrasive particles are arranged such that their tips vary from the designated profile to less than about 10% of the average size of the superabrasive particles.

13. (canceled)

14. (original) The method of claim 3, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 30 microns.

15. (original) The method of claim 3, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to about 20 microns.

16. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are of substantially the same size.

17. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particle are from about 30 microns to about 500 microns in size.

18. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are from about 100 microns to about 200 microns in size.

19. (withdrawn) The method of claim 1, wherein superabrasive particles in a central location of the abrading tool are smaller in size than superabrasive particles in a peripheral location on the abrading tool.

20. (withdrawn) The method of claim 1, wherein securing the plurality of superabrasive particles includes arranging the plurality of superabrasive particles according to a predetermined attitude.

21. (withdrawn) The method of claim 20, wherein the predetermined attitude is a uniform attitude across substantially all of the plurality of superabrasive particles.

22. (withdrawn) The method of claim 20, wherein the plurality of superabrasive particles are substantially configured with an apex portion oriented towards a work piece.

23. (withdrawn) The method of claim 20, wherein superabrasive particles in a central location on the abrading tool are configured with an apex or an edge portion oriented towards a work piece, and superabrasive particles in a peripheral location on the abrading tool are configured with a face portion oriented towards the work piece.

24. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are arranged as a grid.

25. (withdrawn) The method of claim 24, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 3 times to about 5 times the average size of the superabrasive particles.

26. (withdrawn) The method of claim 24, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 100 microns to about 800 microns.

27. (withdrawn) The method of claim 20, wherein arranging the superabrasive particles according to a predetermined attitude further comprises:

applying an adhesive to a substrate;

applying a flexible sieve to the adhesive;

disposing superabrasive particles across a template positioned on the flexible sieve such that a portion of the superabrasive particles adhere to the adhesive by either an edge or an apex portion; and

removing the template and the un-adhered superabrasive particles from the flexible sieve.

28. (withdrawn) The method of claim 27, wherein the flexible sieve is a nylon sieve.

29. (withdrawn) The method of claim 1, wherein superabrasive particles in a central location on the abrading tool are spaced farther apart than superabrasive particles in a peripheral location on the abrading tool.

30. (withdrawn) A superabrasive tool having improved superabrasive particle retention, comprising:

a solidified organic material layer; and

a plurality of superabrasive particles secured in the solidified organic material layer in an arrangement as recited in claim 1.

31. (withdrawn) The tool of claim 30, wherein each of the plurality of superabrasive particles protrudes to a predetermined height above the solidified organic material layer.

32. (withdrawn) The tool of claim 31, wherein the predetermined height is greater than about 20 microns.

33. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 1 micron to about 20 microns.

34. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 5 microns to about 20 microns.

35. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 10 microns to about 20 microns.

36. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles protrude to a predetermined height is along a designated profile.

37. (withdrawn) The tool of claim 36, wherein the designated profile is a plane.

38. (withdrawn) The tool of claim 36, wherein the designated profile has an average slope from a high point near a center location of the tool to a low point near a peripheral edge of the tool.

39. (withdrawn) The tool of claim 38, wherein the average slope is about 1/1000.

40. (withdrawn) The tool of claim 36, wherein the designated profile has a curved shape.

41. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles are arranged such that their tips protrude to about 10% of the average size of the superabrasive particles.

42. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles are arranged such that their tips protrude from about 20 to about 30 microns.

43. (withdrawn) The tool of claim 30, wherein the arrangement is a grid.

44. (withdrawn) The tool of claim 43, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 3 times to about 5 times the average size of the superabrasive particles.

45. (withdrawn) The tool of claim 43, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 100 microns to 800 microns.

46. (withdrawn) The tool of claim 30, wherein superabrasive particles in a central location on the tool are spaced farther apart than superabrasive particles in a peripheral location on the tool.

47. (withdrawn) The tool of claim 30, wherein superabrasive particles in a central location on the tool are larger in size than superabrasive particles in a peripheral location on the tool.

48. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles are arranged according to a predetermined attitude.

49. (withdrawn) The tool of claim 48, wherein the plurality of superabrasive particles are substantially configured with an apex portion oriented towards a work piece.

50. (withdrawn) The tool of claim 48, wherein superabrasive particles in a central location on the tool are configured with an apex or an edge portion oriented towards a work piece, and superabrasive particles in a peripheral location on the tool are configured with a face portion oriented towards the work piece.

51. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles include a member selected from the group consisting of diamond, polycrystalline diamond, cubic boron nitride, polycrystalline cubic boron nitride, and combinations thereof.

52. (withdrawn) The tool of claim 51, wherein the plurality of superabrasive particles includes diamond.

53. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles are from about 30 microns to about 500 microns in size.

54. (withdrawn) The tool of claim 53, wherein the plurality of superabrasive particles are from about 100 microns to about 200 microns in size.

55. (withdrawn) The tool of claim 30, wherein the solidified organic material layer comprises a member selected from the group consisting of amino resins, acrylate resins, alkyd resins, polyester resins, polyamide resins, polyimide resins, polyurethane resins, phenolic resins, phenolic/latex resins, epoxy resins, isocyanate resins, isocyanurate resins, polysiloxane resins, reactive vinyl resins, polyethylene resins, polypropylene resins, polystyrene resins, phenoxy resins, perylene resins, polysulfone resins, acrylonitrile-butadiene-styrene resins, acrylic resins, polycarbonate resins, polyimide resins, and mixtures thereof.

56. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is an epoxy resin.

57. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is a polyurethane resin.

58. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is a polyimide resin.

59. (withdrawn) The tool of claim 30, further comprising a reinforcing material disposed within at least a portion of the solidified organic material layer.

60. (withdrawn) The tool of claim 59, wherein the reinforcing material is a material selected from the group consisting of ceramics, metals, or combinations thereof.

61. (withdrawn) The tool of claim 60, wherein the reinforcing material is a ceramic.

62. (withdrawn) The tool of claim 61, wherein the ceramic comprises a member selected from the group consisting of alumina, aluminum carbide, tungsten carbide, silica, silicon carbide, silicon nitride, zirconia, zirconium carbide, and mixtures thereof.

63. (withdrawn) The tool of claim 59, wherein the reinforcing material is an organometallic coupling agent.

64. (withdrawn) The tool of claim 30, wherein the tool is a polishing or grinding pad.

65. (withdrawn) The tool of claim 30, wherein the tool is a CMP pad dresser.

66. (withdrawn) The tool of claim 30, wherein the tool is for shaping dental materials.

REMARKS

In the Office Action mailed January 7, 2010, claims 1, 3-6, 14, and 15 were pending for consideration, all of which were rejected on various statutory grounds. First, claims 1, 3-6, 14, and 15 were rejected on the grounds of nonstatutory obviousness-type double patenting over U.S. Patent No. 7,258,708 (hereinafter " '708 patent"). Claims 1, 3-6, 14, and 15 were provisionally rejected on the grounds of nonstatutory obviousness-type double patenting over U.S. Patent Application No. 11/724,585 (hereinafter " '585 application"). Additionally, claims 1, 3-6, 14, and 15 were rejected under 35 U.S.C 103(a) as being allegedly unpatentable over U.S. Patent Publication No. 2006/0254154 (hereinafter "Huang") alone, or in view of U.S. Publication No. 2002/0173234 (hereinafter "Sung"), U.S. Patent No. 6,945,857 (hereinafter ("Doan"), U.S. Patent No. 6,755,720 (hereinafter "Ishizaki"), or U.S. Patent Application No. 2005/0260939 (hereinafter "Andrews").

Nonstatutory Double Patenting

Claims 1, 3-6, 14, and 15 were rejected on the grounds of nonstatutory obviousness-type double patenting over the claims of the '708 patent. Applicant respectfully requests that the Examiner hold this rejection in abeyance until such time as allowable claims have been confirmed in the present matter, so that such claims can be the basis of any obviousness-type double patenting issues.

Claims 1, 3-6, 14, and 15 were provisionally rejected on the grounds of nonstatutory obviousness-type double patenting over the claims of the '585 application. As this is a provisional rejection, the Applicant will address the rejection upon allowance of claims from the present application.

35 U.S.C. § 103 Rejections

The Examiner has rejected claims 1, 3-6, 14, and 15 under 35 U.S.C 103(a) as allegedly unpatentable over Huang alone, or in view of Sung, Doan, Ishizaki, or Andrews. While the Applicant is confident that the Examiner is well acquainted with the requirements necessary to establish a *prima facie* case of obviousness, it is thought prudent to briefly review the required elements. Specifically, in order to meet the burden of establishing a *prima facie* case of obvious, the Patent Office must show that: 1) each and every element of the invention as set forth in the claims is taught or suggested by the reference as modified or the combination of references; 2) that there is sufficient motivation or articulated reasoning for one of ordinary skill in the art to modify or combine the reference; and 3) that one of ordinary skill in the art would find a sufficient likelihood of successfully making the modification or combination asserted. Applicants respectfully submit that the Patent Office has failed to satisfy these requirements with any of the asserted rejections, and thus has not established a *prima facie* case of obviousness.

Claim 1 of the present invention contains limitations to a method of increasing retention of superabrasive particles held in a solidified organic material layer of a CMP pad dresser, where a portion of each of said superabrasive particles protrudes out of the solidified organic material layer. The method may further include securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a CMP pad. The claim also requires a majority of the plurality of superabrasive particles to be arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer, and that the organic material layer directly contacts the superabrasive particles.

Huang teaches an abrasive tool having a plurality of abrasive particle groups in a bonding layer. Abrasive particle groups consist of a plurality of abrasive particles grouped together. The abrasive groups are grouped together in a regular pattern and fixed with the bonding layer. (see abstract). The bonding layer can be a metal solder and/or a polymeric bonding layer [0012]. Groups of abrasive particles are used in order to increase the abrasive particle density [0010], and such groups are distributed in a regular pattern so that the cutting load can be evenly distributed to all the diamond particle groups [0023].

The Applicant submits that the Patent Office has not established a prima facie case of obviousness with respect to independent claim 1. More specifically, Huang alone, or in combination with the secondary references does not teach or suggest each and every element of claim 1. Claim 1 requires that the plurality of superabrasive particles be secured in the solidified organic material in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle to increase retention of the superabrasive particles. Huang does not teach or suggest this concept. Huang groups multiple abrasive particles into regular groupings to allow a high abrasive particle density and allow the cutting load to be evenly distributed to all particle groups. This is not a teaching of minimizing mechanical stress impinging on the protruding portion of any individual particle. The particle groupings of Huang are made by dropping abrasive particles into the holes of a positioning template [0027]. Placing multiple particles in a template hole invariably causes some abrasive particles to ride higher in the template holes than others. When the bonding layer is applied to the abrasive particle groupings, the particles with the highest attitude may also be bonded with the least amount of bonding material, whether it be metal or polymer. This situation can be visualized in the drawings of FIG. 2. As can clearly be seen in FIG. 2e, certain abrasive particles

ride higher in the abrasive grouping than others, and these particles will experience a greater impingement of mechanical stress that the others. While this situation may be ok for metal bonding layers (depending on the amount of bonding material and the degree of protrusion), in a polymeric layer the greater mechanical stress will cause these particles to pull out of the abrasive group, thus potentially causing damage to the wafer.

Thus Huang does not teach or suggest minimizing mechanical stress impinging on individual abrasive particles. Regular cutting load distribution is not necessarily the same as minimizing mechanical stress on individual particles. Huang does not recognize that minimizing mechanical stress to individual abrasive particles can increase retention of abrasive particles in an organic matrix. Accordingly, Huang alone does not teach or suggest each and every element of claim 1. Also of note, the Examiner points to paragraph [0009] as a teaching in Huang as to protrusion height. This paragraph is describing various optimization values that are used to affect the cutting performance of the tool. Nothing is said regarding protrusion height other than it is optimized. No link between protrusion height and particle retention is made, and protrusion height is not mentioned further.

As has been discussed in previous responses, the secondary references do not provide the missing element that particles retention can be increased by minimizing mechanical stress to individual particles. Claim 1 contains limitations to a method for improving retention in an organic matrix by limiting mechanical stress impinging on individual superabrasive particles. A knowledge in the art that superabrasive particles can be leveled or regularly spaced does not necessarily imply that one of ordinary skill in the art understands that those concepts can be used increase retention in a completely disparate material. Regardless, any combination of Huang with the teachings of the secondary references would be imposed on the "cutting units" of

Huang. In other words, the teachings of the secondary references as to regular spacing would apply to the groups of particles, not to the individual particles themselves.

The Patent Office has also imported meaning into the Applicant's statements that is incorrect and unintended. On page 4 of the Office Action, the Examiner has stated that the Applicant's argument suggests that leveled tips can only be relevant when bond strength is an issue, and that this argument is at odds with the Applicant's own comments in paragraph 4 of the response. The Applicant has never stated that leveled tips are only relevant when bond strength is an issue. As has been the case in the past, an argument has been presented by the Patent Office in a manner that appears to contradict the statements of the Applicant. Paragraph 4 is stating that the catastrophic effects of particle pullout from a dresser in CMP pad conditioning precludes those of skill in the art from utilizing metal braze methods in organic matrix tools for CMP pad dressing. Leveling of particle tips in metal dressers is used to cause evenly cut asperities in the CMP pad, thus effecting polishing of the wafer. This is an admission by the Applicant. So where has the Applicant ever suggested that leveled tips are only relevant when bond strength is an issue? The point is not that tips of particles have never been leveled, but that one of ordinary skill in the art, knowing that they have been leveled in metal braze tools, would not obviously know that minimizing mechanical stress impinging on a single particle would allow an organic material to retain such particles. This knowledge in metal braze tools would not lead one of ordinary skill in the art to practice the method of claim 1 in an organic matrix tool.

As such, the Patent Office has not established a *prima facie* case of obviousness, and it is respectfully requested that the rejection of claim 1 be withdrawn. Additionally, as claims 3-6, 14, and 15 depend from claim 1, it is also requested that these rejections be withdrawn as well. It

should be noted that the arguments presented in the previous response are deemed to be incorporated herein by reference, with the statements and interpretations presented herein taking precedence. Also, the absence of any argument from this response should not be seen as being in agreement with the Examiner.

CONCLUSION

In view of the foregoing, the Applicant believes that claims 1, 3-6, 14, and 15 present allowable subject matter and the prompt allowance thereof is requested. If any impediment to the allowance of these claims remains after consideration of the present amendment and above remarks, and such impediment could be removed during a telephone interview, the Examiner is invited to telephone the undersigned attorney, so that such issues may be resolved as expeditiously as possible.

Please charge any additional fees except for Issue Fee or credit any overpayment to Deposit Account No. 20-0100.

Dated this 7th day of April, 2010.

Respectfully submitted,

THORPE, NORTH & WESTERN, LLP

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DWO/TBA

Electronic Acknowledgement Receipt

EFS ID:	7371867
Application Number:	11223786
International Application Number:	
Confirmation Number:	8266
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Customer Number:	20551
Filer:	David William Osborne/Nicole Solomon
Filer Authorized By:	David William Osborne
Attorney Docket Number:	00802-25023
Receipt Date:	07-APR-2010
Filing Date:	09-SEP-2005
Time Stamp:	18:07:08
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		25023response.pdf	104799 8e2d0045243dbb4bd70d90cf8eebf7787e2fae8c	yes	16

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1
	Claims	2	9
	Applicant Arguments/Remarks Made in an Amendment	10	16
Warnings:			
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National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (07-06)
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
11/223,786	09/09/2005	

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	04/07/2010	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 65	Minus	** 66	= 0	X $ =		OR	X $52=	0
	Independent (37 CFR 1.16(h))	* 1	Minus	***6	= 0	X $ =		OR	X $220=	0
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/WANDA D. MITCHELL/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
11/223,786	09/09/2005	

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	04/07/2010	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 65	Minus	** 66	= 0	X $ =		OR	X $52=	0
	Independent (37 CFR 1.16(h))	* 1	Minus	***6	= 0	X $ =		OR	X $220=	0
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/WANDA D. MITCHELL/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/SB/08b (02-09)
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of

Complete if Known	
Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	Chien-Min Sung
Art Unit	3728
Examiner Name	
Attorney Docket Number	00802-25023

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	1	U.S. Application 11/357,713 filed 2/17/2006, Chien-Min Sung. Office action issued 1-14-2010.	

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

Electronic Acknowledgement Receipt

EFS ID:	7416121
Application Number:	11223786
International Application Number:	
Confirmation Number:	8266
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Customer Number:	20551
Filer:	David William Osborne/Rebecca Spencer
Filer Authorized By:	David William Osborne
Attorney Docket Number:	00802-25023
Receipt Date:	14-APR-2010
Filing Date:	09-SEP-2005
Time Stamp:	17:42:52
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		ids.pdf	322918 d22157cd47235f9445adfc3bc24641885b8c0af8	yes	8

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Transmittal Letter	1	7
	Information Disclosure Statement (IDS) Filed (SB/08)	8	8
Warnings:			
Information:			
	Total Files Size (in bytes):	322918	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

THORPE NORTH AND WESTERN
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Premier Performance®

David W. Osborne
Registered Patent Attorney
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April 12, 2010

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

TRANSMITTAL OF SUPPLEMENTAL
INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Re: U.S. Patent Application No. 11/223,786 filed September 9, 2005
First Named Inventor: Chien-Min Sung
Title: **METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX**
Group Art Unit: 3728
Attorney Docket No.: 00802-25023

Sir/Madam:

Transmitted herewith for filing and pursuant to 37 C.F.R. § 1.56 and 1.97 is a Supplemental Information Disclosure Statement. Enclosed also are the following designated documents, as required under 37 C.F.R. § 1.97 and 1.98:

☒ Form **PTO/SB/08B** list of 1 references submitted for consideration.

☐ Legible copies of the listed non-patent documents, unpublished U.S. applications and foreign documents or their relevant portions are included.

☐ All English translations of each non-English reference, if any, within the possession, custody, control or availability of anyone designated in 37 C.F.R. § 1.56(c) (see 37 C.F.R. § 1.98(c)).

The following are included within the Information Disclosure Statement if applicable and as required under 37 C.F.R. § 1.98:

☐ Concise explanation of relevance of each reference not in English and unaccompanied by an English translation.

☐ Statement that certain listed references not enclosed are substantially cumulative of an enclosed reference.

☐ Statement that certain listed references not enclosed were previously cited by or submitted to the Office in prior application no. , filed on _____, which is relied upon for an earlier filing date under 35 U.S.C. § 120.

In order to secure consideration of the items designated above, one or more of the following, if required, is also enclosed:

☒ Statement under 37 C.F.R. § 1.97(e)(1) or (2).

☐ Check No. _____, which includes the amount of $____ (amount in §1.17(p)) constituting the submission fee set forth in 37 C.F.R. § 1.17(p).

In the event that 37 C.F.R. § 1.97(c) applies and the Examiner is not satisfied that the Statement meets the requirements of 37 C.F.R. § 1.97(e), or in any other event remediable by a fee, please credit any over payment or charge any additional fees to Deposit Account No. 20-0100 of the undersigned.

Very truly yours,

David W. Osborne
Attorney for Applicant
Registration No. 44989

THORPE NORTH & WESTERN, LLP
Customer No. 20,551
P.O. Box 1219
Sandy, Utah 84091-1219
Telephone: (801) 566-6633

DO/rs

DOCKET NO. 00802-25023

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

FIRST NAMED INVENTOR:	Chien-Min Sung
SERIAL NO.:	11/223,786
FILED:	9/9/2005
CONFIRM. NO.:	8266
FOR:	METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX
ART UNIT:	3728
EXAMINER:	Jacob K. Ackun Jr.

CERTIFICATE OF DEPOSIT UNDER 37 C.F.R. §1.8

I hereby certify that this correspondence is being e-filed with the United States Patent and Trademark Office.

RSpencer

Rebecca Spencer

April 14 2010

Date of Deposit

PROMPTNESS CERTIFICATE UNDER 37 C.F.R. ' 1.97(e)

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

___ I hereby certify that each item contained in the information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement; or

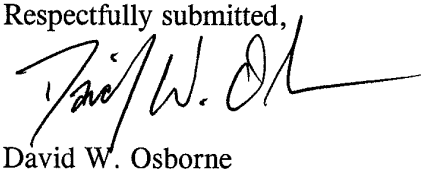
_x_ I hereby certify that no item contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual

designated in §1.56(c) more than three months prior to the filing of the information disclosure statement.

Please charge any additional fees or credit any overpayment to Deposit Account No. 20-0100.

DATED this 14th day of April, 2010.

Respectfully submitted,



David W. Osborne
Attorney for Applicant
Registration No. 44989

THORPE NORTH & WESTERN, LLP
Customer No. 20,551
P.O. Box 1219
Sandy, Utah 84091-1219
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DO/rs
Enclosures

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

ART UNIT:	3728
EXAMINER:	Jacob K. Ackun Jr.
FIRST NAMED INVENTOR:	Chien-Min Sung
SERIAL NO.:	11/223,786
FILED:	9/9/2005
CONFRM. NO.:	8266
FOR:	METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX
DOCKET NO.:	00802-25023

CERTIFICATE OF DEPOSIT UNDER 37 C.F.R. § 1.8

DATE OF DEPOSIT: April 14, 2010

I hereby certify that this paper or fee (along with any paper or fee referred to as being attached or enclosed) is being E-FILED with the United States Patent and Trademark Office.

RSpencer

Rebecca Spencer

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT UNDER 37 C.F.R. § 1.97

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

Please find, pursuant to 37 C.F.R. § 1.98(a)(1), the enclosed Form **PTO/SB/08B** which contains a list of all patents, publications, or other items that have come to the attention of one or more of the individuals designated in 37 C.F.R. § 1.56(c). Applicant respectfully submits that this Information Disclosure statement is filed pursuant to:

☐ 37 C.F.R. § 1.97(b)(1), (3) or (4), within three months of the filing date of the application or request for RCE, or before a first office action on the merits, whichever occurs last;

☒ 37 C.F.R. § 1.97(c), after a first office action on the merits, but before a Final Office Action or a Notice of Allowance, whichever occurs first, and is accompanied by either 1)

a statement in accordance with 37 C.F.R. § 1.97(e), or 2) the fee set forth in 37 C.F.R. § 1.17(p); or

☐ 37 C.F.R. § 1.97(d), after a Final Office Action or Notice of Allowance, whichever occurs first, but on or before payment of the issue fee, and is accompanied by both 1) a statement in accordance with 37 C.F.R. § 1.97(e), and 2) the fee set forth in 37 C.F.R. § 1.17(p).

While no representation is made that any of these references may be "prior art" within the meaning of that term in accordance with 37 C.F.R. §§ 102 or 103, the enclosed list of references is disclosed so as to comply with the duty of disclosure set forth in 37 C.F.R. § 1.56.

Moreover, while no representation is made that a specific search of office files or patent office records has been conducted or that no better art exists, the undersigned attorney of record believes that the references listed, together with any other references which may have been previously submitted or listed, are the closest to the claimed invention (taken in its entirety) of which the undersigned is presently aware, and no art which is closer to the claimed invention (taken in its entirety) has been knowingly withheld.

☐ A legible copy of each of the listed non-patent literature, unpublished U.S. applications and foreign documents or their relevant portions is enclosed.

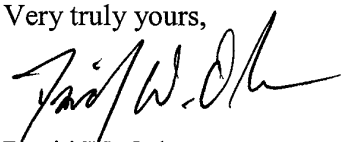
☐ Copies of the references listed in the accompanying Form PTO/SB/08A and PTO/SB/08B are NOT enclosed because, under 37 C.F.R. § 1.98.(d), they were previously cited by or submitted to the Office in application number , which is relied upon for an earlier filing date under 37 C.F.R. § 1.20.

For all listed references that are not either in the English language, or accompanied by a translation into English, a concise explanation of relevance as required under 37 C.F.R. § 1.98(a)(3) is enclosed attached to each.

The Commissioner is hereby authorized to charge any additional fees associated with this communication or to credit any overpayment to Deposit Account No. 20-0100.

Dated April 14, 2010.

Very truly yours,



David W. Osborne
Attorney for Applicant
Registration No. 44989

THORPE NORTH & WESTERN, LLP
Customer No. 20,551
P.O. Box 1219
Sandy, Utah 84091-1219
(801) 566-6633

DO/rs
Enclosures

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/223,786	09/09/2005	Chien-Min Sung	00802-25023	8266

20551 7590 05/12/2010

THORPE NORTH & WESTERN, LLP.
P.O. Box 1219
SANDY, UT 84091-1219

EXAMINER	
ACKUN, JACOB K	
ART UNIT	**PAPER NUMBER**
3728	

NOTIFICATION DATE	DELIVERY MODE
05/12/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

rich@tnw.com
causse@tnw.com
patentdocket@tnw.com

Office Action Summary	Application No.	Applicant(s)	
	11/223,786	SUNG, CHIEN-MIN	
	Examiner	Art Unit	
	Jacob K. Ackun Jr.	3728	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 April 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-6,14 and 15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-6,14 and 15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *4/14/10*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. Claims 1, 3-6 and 14-15 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims of record of U.S. Patent No. 7,258,708. Although the conflicting claims are not identical, they are not patentably distinct from each other because it would have been obvious in view of the claims of the patent to perform the method claimed in the subject application in order to provide a more effective pad dresser.

3. Claims 1, 3-6 and 14-15 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims

of record of copending Application No. 11/724,585. Although the conflicting claims are not identical, they are not patentably distinct from each other because it would have been obvious in view of the claims of the copending application to perform the method claimed in the subject application in order to provide a more effective pad dresser. This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 1, 3-6 and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al (2006/0254154) alone, or in view of Sung et al. (2002/0173234), Doan et al. (6,945,857), Ishizaki et al. (6,775,720) or Andrews et al. (2005/0260939). In Huang see especially paragraphs [0006], [0007], [0008] [0009] line4, [0023] lines 10-11, [0024] lines 1-4, Figs 2A-2E and their description including paragraph [0030] lines 1-3 and [0031] lines 1-4. Accordingly, Huang appears to suggest all of the elements of the claims. The secondary references are applied for emphasis only, to show that the uniform height requirements of the claims are conventional (note also Huang). Thus it would have been obvious in view of Huang et al alone, to perform the claimed method in order to provide a more effective pad dresser. It would have been especially obvious over Huang in

view of either one of the noted secondary references to perform the claimed method for the same reason.

6. Applicant's arguments filed on 4/7/10 have been fully considered but they are not persuasive. Applicant argues that Huang does not teach or suggest minimizing mechanical stress impinging on individual abrasive particles. In support of this argument, applicant argues that Huang groups multiple abrasive particles into regular groupings to allow a high abrasive particle density, which in turn allows the cutting load to be evenly distributed to all particle groups. Thus, as the examiner understands the applicant's argument, the cutting load **is evenly distributed to all particle groups in Huang but not to individual particles**. This is because according to applicant, some groups may have particles that as a whole ride up higher (or lower) than particles in other groups.

The applicant also appears to make a second argument. The applicant states that regular cutting load distribution is not necessarily the same as minimizing mechanical stress on individual particles. See page 4 of the remarks at lines 7-8, for example. Thus the applicant appears to be arguing that even if some abrasive particles do not ride higher than others as suggested by applicant, so that the particles are all level, the fact that the cutting load would then be evenly distributed

to all particles would still not necessarily mean that the mechanical stress on each particle would be minimized.

The examiner responds as follows to applicants first argument. The applicant states that "placing multiple particles in a template hole invariably causes some abrasive particles to ride up higher in the template holes than others". The examiner disagrees. The applicant makes this statement as if it is factual and then bases much of the argument on it. However, clearly, the accuracy of the statement has not been established in the subject application. Moreover, there is little, if any basis to conclude that the statement is true. Three, even if the noted statement is shown by applicant to be true, the use of a template as taught in Huang is not the only way in which to form devices of the kind under consideration herein. It is clear that the teaching in Huang to evenly distribute pressure to abrasive particles by positioning them "in a uniform and regular way on the abrasive tool" is not only possible in the specific method Huang uses to form his abrasive tool. This is because, for example only, this is described in Huang in paragraph [0009] (among other parts of the reference), which is part of the prior art discussion in the reference itself. Thus the focus by applicant on the method specifically practiced in Huang wherein the particles are grouped, with the resulting conclusion that any

even distribution of pressure is only with respect to groups of particles, not individual particles themselves, is misplaced.

The fact is that it is conventional to distribute particles in a uniform and regular way on an abrasive tool for the purpose of evenly distributing the pressure to the abrasive particles (Note paragraph [0009] line 16 in Huang). Where as in Huang's method some particles, according to applicant, may be affixed in a higher position than others, and therefore would be subjected to a greater pressure than others lower down, the idea is still to minimize the pressure on any one particle. The fact that some particles would have a higher pressure by virtue of their elevated position does not indicate that overall the pressure is not less than it would otherwise have been. Note the specific language of the independent claim in the instant application. Perhaps more importantly, where the effort to evenly distribute the pressure is undertaken according to the knowledge in the art, and absent the specific method in Huang, then the argument regarding the Huang groupings simply does not apply.

If the examiner correctly understands applicant's second argument, then the response is as follows. If distributing the cutting load evenly among abrasive particles in an abrasive tool is not the same as minimizing mechanical stress on individual particles, what is? The examiner is not suggesting that there is only one

factor that contributes to mechanical stress on abrasive particles. One look at the subject application specification, if nothing else, clearly indicates that mechanical stress is a broad term that is caused by a number of factors. The whole point, however, is that one way to reduce such stress is to distribute the cutting load evenly among the abrasive particles. This is prior art to the invention in the subject application.

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacob K. Ackun Jr. whose telephone number is

(571)272-4418. The examiner can normally be reached on Monday through Friday 8.30AM-5.00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mickey Yu can be reached on (571)272-4562. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jacob K. Ackun Jr./
Primary Examiner, Art Unit 3728

PTO/SB/08b (02-09)
Approved for use through 03/31/2009. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of

Complete if Known	
Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	Chien-Min Sung
Art Unit	3728
Examiner Name	
Attorney Docket Number	00802-25023

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
J.A.	1	U.S. Application 11/357,713 filed 2/17/2006, Chien-Min Sung. Office action issued 1-14-2010.	

Examiner Signature	/Jacob Ackun/	Date Considered	05/07/2010

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

1 Applicant's unique citation designation number (optional). 2 Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

PTO/SB/30 (02-09)
Approved for use through 03/31/2009. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Request for Continued Examination (RCE) Transmittal

Address to:
Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	Chien-Min Sung
Art Unit	3728
Examiner Name	Jacob K. Ackun
Attorney Docket Number	00802-25023

This is a Request for Continued Examination (RCE) under 37 CFR 1.114 of the above-identified application.
Request for Continued Examination (RCE) practice under 37 CFR 1.114 does not apply to any utility or plant application filed prior to June 8, 1995, or to any design application. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. Submission required under 37 CFR 1.114 Note: If the RCE is proper, any previously filed unentered amendments and amendments enclosed with the RCE will be entered in the order in which they were filed unless applicant instructs otherwise. If applicant does not wish to have any previously filed unentered amendment(s) entered, applicant must request non-entry of such amendment(s).

   a. ☐ Previously submitted. If a final Office action is outstanding, any amendments filed after the final Office action may be considered as a submission even if this box is not checked.

      i. ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____

      ii. ☐ Other _____

   b. ☑ Enclosed

      i. ☑ Amendment/Reply

      ii. ☐ Affidavit(s)/ Declaration(s)

      iii. ☐ Information Disclosure Statement (IDS)

      iv. ☐ Other _____

2. Miscellaneous

   a. ☐ Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a period of _____ months. (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

   b. ☐ Other _____

3. Fees The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.

   a. ☑ The Director is hereby authorized to charge the following fees, any underpayment of fees, or credit any overpayments, to Deposit Account No. 20-0100.

      i. ☐ RCE fee required under 37 CFR 1.17(e)

      ii. ☐ Extension of time fee (37 CFR 1.136 and 1.17)

      iii. ☑ Other DEFICIENCIES ONLY

   b. ☑ Check in the amount of $ 810 enclosed

   c. ☐ Payment by credit card (Form PTO-2038 enclosed)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Signature	/David W. Osborne/	Date	August 12, 2010
Name (Print/Type)	David W. Osborne	Registration No.	44989

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450 or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.

Signature	/Nicole Solomon/		
Name (Print/Type)	Nicole Solomon	Date	August 12, 2010

This collection of information is required by 37 CFR 1.114. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Electronic Patent Application Fee Transmittal

Application Number:	11223786
Filing Date:	09-Sep-2005
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Filer:	David William Osborne/Nicole Solomon
Attorney Docket Number:	00802-25023
Filed as Large Entity	

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Request for continued examination	1801	1	810	810
		Total in USD ($)		**810**

Electronic Acknowledgement Receipt	
EFS ID:	8210811
Application Number:	11223786
International Application Number:	
Confirmation Number:	8266
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Customer Number:	20551
Filer:	David William Osborne/Nicole Solomon
Filer Authorized By:	David William Osborne
Attorney Docket Number:	00802-25023
Receipt Date:	12-AUG-2010
Filing Date:	09-SEP-2005
Time Stamp:	18:23:00
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Electronic Funds Transfer
Payment was successfully received in RAM	$810
RAM confirmation Number	4383
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1		25023response.pdf	105106 bdeb6a26a1fba866d644baa69823ecbff32e42f9	yes	16

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Amendment After Final	1	1
Claims	2	9
Applicant Arguments/Remarks Made in an Amendment	10	16

Warnings:

Information:

2	Request for Continued Examination (RCE)	25023rce.pdf	52448 178b40bd39cd77a3bed01aee2bfb1e4c4764a631	no	1

Warnings:

This is not a USPTO supplied RCE SB30 form.

Information:

3	Fee Worksheet (PTO-875)	fee-info.pdf	30228 545938151ef8451989e368dd89e127f764f9e1a9	no	2

Warnings:

Information:

Total Files Size (in bytes):	187782

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ART UNIT:	3728
EXAMINER:	Jacob K. Ackun
FIRST NAMED INVENTOR:	Chien-Min Sung
SERIAL NO.:	11/223,786
FILED:	09/09/2005
CONFRM. NO.:	8266
FOR:	METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX
DOCKET NO.:	00802-25023

CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8

DATE OF DEPOSIT: **August 12, 2010**

I hereby certify that this paper or fee (along with any paper or fee referred to as being attached or enclosed) is being submitted on the date indicated above via:

☒ EFS Web
☐ facsimile to _____
☐ the United States Postal Service with sufficient postage as first class mail addressed to: Mail Stop _____, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

/Nicole Solomon/
Nicole Solomon

RESPONSE UNDER 37 C.F.R. § 1.113

Mailstop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Final Office Action mailed May 12, 2010, please enter the following amendment and reconsider the application in light of the accompanying remarks. A Request for Continued Examination is enclosed herewith.

REMARKS

In the Final Office Action mailed May 12, 2010, claims 1, 3-6, 14, and 15 were pending for consideration, all of which were rejected on various statutory grounds. First, claims 1, 3-6, 14, and 15 were rejected on the grounds of nonstatutory obviousness-type double patenting over U.S. Patent No. 7,258,708 (hereinafter " '708 patent"). Claims 1, 3-6, 14, and 15 were provisionally rejected on the grounds of nonstatutory obviousness-type double patenting over U.S. Patent Application No. 11/724,585 (hereinafter " '585 application"). Additionally, claims 1, 3-6, 14, and 15 were rejected under 35 U.S.C 103(a) as being allegedly unpatentable over U.S. Patent Publication No. 2006/0254154 (hereinafter "Huang") alone, or in view of U.S. Publication No. 2002/0173234 (hereinafter "Sung"), U.S. Patent No. 6,945,857 (hereinafter ("Doan"), U.S. Patent No. 6,755,720 (hereinafter "Ishizaki"), or U.S. Patent Application No. 2005/0260939 (hereinafter "Andrews").

By the present amendment, claim 1has been amended. Support for this amendment can be found in FIGs. 1-8 of the specification as filed. As such, Applicant submits that no new matter is added thereby. Accordingly, claims 1, 3-6, 14, and 15 remain pending in the present application. The Applicant respectfully submits that the present claims are allowable over the cited references.

Nonstatutory Double Patenting

Claims 1, 3-6, 14, and 15 were rejected on the grounds of nonstatutory obviousness-type double patenting over the claims of the '708 patent. Applicant traverses such rejection and respectfully requests that the Examiner hold this rejection in abeyance until such time as

allowable claims have been confirmed in the present matter, so that such claims can be the basis of any obviousness-type double patenting issues.

Claims 1, 3-6, 14, and 15 were provisionally rejected on the grounds of nonstatutory obviousness-type double patenting over the claims of the '585 application. As this is a provisional rejection, the Applicant will address the rejection in greater detail upon allowance of claims from the present application.

35 U.S.C. § 103 Rejections

The Examiner has rejected claims 1, 3-6, 14, and 15 under 35 U.S.C 103(a) as allegedly unpatentable over Huang alone, or in view of Sung, Doan, Ishizaki, or Andrews. While the Applicant is confident that the Examiner is well acquainted with the requirements necessary to establish a *prima facie* case of obviousness, it is thought prudent to briefly review the required elements. Specifically, in order to meet the burden of establishing a *prima facie* case of obvious, the Patent Office must show that: 1) each and every element of the invention as set forth in the claims is taught or suggested by the reference as modified or the combination of references; 2) that there is sufficient motivation or articulated reasoning for one of ordinary skill in the art to modify or combine the reference; and 3) that one of ordinary skill in the art would find a sufficient likelihood of successfully making the modification or combination asserted. Applicants respectfully submit that the Patent Office has failed to satisfy these requirements with any of the asserted rejections, and thus has not established a *prima facie* case of obviousness.

Claim 1 of the present invention contains limitations to a method of increasing retention of superabrasive particles held in a solidified organic material layer of a CMP pad dresser, where a portion of each of said superabrasive particles protrudes out of the solidified organic material

layer. The method further includes securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a CMP pad. The claim also requires a majority of the plurality of superabrasive particles to be arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer, and that the organic material layer directly contacts the superabrasive particles. Additionally, the claim has been amended to require that each of the plurality of superabrasive particles is not in contact any other superabrasive particle.

Huang teaches an abrasive tool having a plurality of abrasive particle groups in a bonding layer. Abrasive particle groups consist of a plurality of abrasive particles grouped together. The abrasive groups are grouped together in a regular pattern and fixed with the bonding layer. (see abstract). The bonding layer can be a metal solder and/or a polymeric bonding layer [0012]. Groups of abrasive particles are used in order to increase the abrasive particle density [0010], and such groups are distributed in a regular pattern so that the cutting load can be evenly distributed to all the diamond particle groups [0023].

The Applicant submits that the Patent Office has not established a prima facie case of obviousness with respect to independent claim 1. Huang alone, or in combination with the secondary references, does not teach or suggest each and every element of claim 1. Claim 1 requires that the plurality of superabrasive particles be secured in the solidified organic material in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle to increase retention of the superabrasive particles, and that each superabrasive particle in the organic matrix cannot contact another superabrasive particle. Huang, either alone or in combination, does not teach or suggest this concept. Huang groups

multiple abrasive particles into regular groupings to allow a high abrasive particle density and allow the cutting load to be evenly distributed to all particle groups. Each grouping contains multiple particles that contact one another. Huang does not teach or suggest individual particles in a polymeric matrix that do not contact one another. As such, this limitation is not taught or suggested by Huang, and therefore a *prima facie* case of obviousness has not been established.

Regarding paragraph [0009], Huang is not teaching or suggesting an even distribution of individual particles in an organic matrix. This, as with other teachings of single particles in a matrix, is referring to particles in a metal matrix. From paragraph [0008], Huang refers to two well known metal matrix references, namely 4,925,457 and 5,092,910. Furthermore, Huang explains that these references disclose an abrasive tool that uses a mesh to form a regularly disposed pattern of abrasive particles and the sintering process for making it. These paragraphs do not teach or suggest a polymeric matrix. Nothing in these paragraphs referring to the regular distribution of particles in a metal matrix would teach or suggest to one of ordinary skill in the art that superabrasive particles could be retained in an organic matrix merely by minimizing mechanical stress impinging on individual particles. The Applicant reiterates that metal matrix teachings do not equate to organic matrix tools. One of ordinary skill in the art understands that a metal matrix retains particles much more strongly than an organic matrix would. The fact that Huang refers to general principles that are known in the metal tool arts does not provide relevant teachings to a skilled artisan regarding organic matrix tools, particularly given the potentially catastrophic results of particle pull out in a CMP pad dresser. Similarly, the polymeric matrix teachings of Huang refer to multiple abrasive particles that are in contact with one another, and as such, does not teach or suggest retention of individual particles in such a matrix.

Accordingly, Huang does not teach or suggest minimizing mechanical stress impinging on individual abrasive particles, particularly where abrasive particles do not contact one another. Accordingly, Huang alone does not teach or suggest each and every element of claim 1, and thus a *prima facie* case of obviousness has not been established with respect to Huang, alone or as modified.

As has been discussed in previous responses, the secondary references do not provide the missing element that particle retention can be increased in an organic matrix by minimizing mechanical stress to individual particles. Claim 1 contains limitations to a method for improving retention in an organic matrix by limiting mechanical stress impinging on individual superabrasive particles that do not contact one another. A teaching or knowledge in the art that superabrasive particles can be leveled or regularly spaced does not necessarily imply that one of ordinary skill in the art understands that those concepts can be used increase retention in a completely disparate material such as an organic matrix. Regardless, any combination of Huang with the teachings of the secondary references would be imposed on the groups of particles that contain individual particles in contact with one another. Thus any potential combination would include particles that contact with one another, and thus would not teach or suggest each and every element of claim 1.

In light of the above, the Patent Office has not established a *prima facie* case of obviousness, and it is respectfully requested that the rejection of claim 1 be withdrawn. Additionally, as claims 3-6, 14, and 15 depend from claim 1, it is also requested that these rejections be withdrawn as well. It should be noted that the arguments presented in the previous response are deemed to be incorporated herein by reference, with the statements and

interpretations presented herein taking precedence. Also, the absence of any argument from this response should not be seen as being in agreement with the Examiner.

CONCLUSION

In view of the foregoing, the Applicant believes that claims 1, 3-6, 14, and 15 present allowable subject matter and the prompt allowance thereof is requested. If any impediment to the allowance of these claims remains after consideration of the present amendment and above remarks, and such impediment could be removed during a telephone interview, the Examiner is invited to telephone the undersigned attorney, so that such issues may be resolved as expeditiously as possible.

Please charge any additional fees except for Issue Fee or credit any overpayment to Deposit Account No. 20-0100.

Dated this 12th day of August, 2010.

Respectfully submitted,

THORPE, NORTH & WESTERN, LLP

/David W. Osborne/

David W. Osborne
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DWO/TBA

PTO/SB/06 (07-06)
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
11/223,786	09/09/2005	

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	08/12/2010	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 65	Minus	** 66	= 0	X $ =		OR	X $52=	0
	Independent (37 CFR 1.16(h))	* 1	Minus	***6	= 0	X $ =		OR	X $220=	0
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/NINA RATANAVONG/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

LISTING OF CLAIMS

1. (previously presented) A method of increasing retention of superabrasive particles held in a solidified organic material layer of a CMP pad dresser, a portion of each of said superabrasive particles protruding out of the solidified organic material layer, comprising:

securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a CMP pad, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer, ~~and~~ wherein the solidified organic material layer is in direct contact with the superabrasive particles, and wherein each of the plurality of superabrasive particles is not in contact any other superabrasive particle.

2. (withdrawn) The method of claim 1, wherein the arrangement of the plurality of superabrasive particles is configured to uniformly distribute drag forces across substantially each superabrasive particle.

3. (original) The method of claim 1, wherein a majority of the plurality of superabrasive particles protrudes to a predetermined height above the solidified organic material layer.

4. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of less than about 20 microns when used to abrade a work piece.

5. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of from about 1 micron to about 20 microns when used to abrade a work piece.

6. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of from about 10 micron to about 20 microns when used to abrade a work piece.

7. (withdrawn) The method of claim 3, wherein the superabrasive particles protrude to a predetermined height that is along a designated profile.

8. (withdrawn) The method of claim 7, wherein the designated profile is a plane.

9. (withdrawn) The method of claim 7, wherein the designated profile has a slope.

10. (withdrawn) The method of claim 7, wherein the designated profile has a curved shape.

11. (withdrawn) The method of claim 10, wherein the designated profile has a dome shape.

12. (withdrawn) The method of claim 7, wherein a majority of the plurality of superabrasive particles are arranged such that their tips vary from the designated profile to less than about 10% of the average size of the superabrasive particles.

13. (canceled)

14. (original) The method of claim 3, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 30 microns.

15. (original) The method of claim 3, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to about 20 microns.

16. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are of substantially the same size.

17. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particle are from about 30 microns to about 500 microns in size.

18. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are from about 100 microns to about 200 microns in size.

19. (withdrawn) The method of claim 1, wherein superabrasive particles in a central location of the abrading tool are smaller in size than superabrasive particles in a peripheral location on the abrading tool.

20. (withdrawn) The method of claim 1, wherein securing the plurality of superabrasive particles includes arranging the plurality of superabrasive particles according to a predetermined attitude.

21. (withdrawn) The method of claim 20, wherein the predetermined attitude is a uniform attitude across substantially all of the plurality of superabrasive particles.

22. (withdrawn) The method of claim 20, wherein the plurality of superabrasive particles are substantially configured with an apex portion oriented towards a work piece.

23. (withdrawn) The method of claim 20, wherein superabrasive particles in a central location on the abrading tool are configured with an apex or an edge portion oriented towards a work piece, and superabrasive particles in a peripheral location on the abrading tool are configured with a face portion oriented towards the work piece.

24. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are arranged as a grid.

25. (withdrawn) The method of claim 24, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 3 times to about 5 times the average size of the superabrasive particles.

26. (withdrawn) The method of claim 24, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 100 microns to about 800 microns.

27. (withdrawn) The method of claim 20, wherein arranging the superabrasive particles according to a predetermined attitude further comprises:

applying an adhesive to a substrate;

applying a flexible sieve to the adhesive;

disposing superabrasive particles across a template positioned on the flexible sieve such that a portion of the superabrasive particles adhere to the adhesive by either an edge or an apex portion; and

removing the template and the un-adhered superabrasive particles from the flexible sieve.

28. (withdrawn) The method of claim 27, wherein the flexible sieve is a nylon sieve.

29. (withdrawn) The method of claim 1, wherein superabrasive particles in a central location on the abrading tool are spaced farther apart than superabrasive particles in a peripheral location on the abrading tool.

30. (withdrawn) A superabrasive tool having improved superabrasive particle retention, comprising:

a solidified organic material layer; and

a plurality of superabrasive particles secured in the solidified organic material layer in an arrangement as recited in claim 1.

31. (withdrawn) The tool of claim 30, wherein each of the plurality of superabrasive particles protrudes to a predetermined height above the solidified organic material layer.

32. (withdrawn) The tool of claim 31, wherein the predetermined height is greater than about 20 microns.

33. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 1 micron to about 20 microns.

34. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 5 microns to about 20 microns.

35. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 10 microns to about 20 microns.

36. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles protrude to a predetermined height is along a designated profile.

37. (withdrawn) The tool of claim 36, wherein the designated profile is a plane.

38. (withdrawn) The tool of claim 36, wherein the designated profile has an average slope from a high point near a center location of the tool to a low point near a peripheral edge of the tool.

39. (withdrawn) The tool of claim 38, wherein the average slope is about 1/1000.

40. (withdrawn) The tool of claim 36, wherein the designated profile has a curved shape.

41. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles are arranged such that their tips protrude to about 10% of the average size of the superabrasive particles.

42. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles are arranged such that their tips protrude from about 20 to about 30 microns.

43. (withdrawn) The tool of claim 30, wherein the arrangement is a grid.

44. (withdrawn) The tool of claim 43, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 3 times to about 5 times the average size of the superabrasive particles.

45. (withdrawn) The tool of claim 43, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 100 microns to 800 microns.

46. (withdrawn) The tool of claim 30, wherein superabrasive particles in a central location on the tool are spaced farther apart than superabrasive particles in a peripheral location on the tool.

47. (withdrawn) The tool of claim 30, wherein superabrasive particles in a central location on the tool are larger in size than superabrasive particles in a peripheral location on the tool.

48. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles are arranged according to a predetermined attitude.

49. (withdrawn) The tool of claim 48, wherein the plurality of superabrasive particles are substantially configured with an apex portion oriented towards a work piece.

50. (withdrawn) The tool of claim 48, wherein superabrasive particles in a central location on the tool are configured with an apex or an edge portion oriented towards a work piece, and superabrasive particles in a peripheral location on the tool are configured with a face portion oriented towards the work piece.

51. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles include a member selected from the group consisting of diamond, polycrystalline diamond, cubic boron nitride, polycrystalline cubic boron nitride, and combinations thereof.

52. (withdrawn) The tool of claim 51, wherein the plurality of superabrasive particles includes diamond.

53. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles are from about 30 microns to about 500 microns in size.

54. (withdrawn) The tool of claim 53, wherein the plurality of superabrasive particles are from about 100 microns to about 200 microns in size.

55. (withdrawn) The tool of claim 30, wherein the solidified organic material layer comprises a member selected from the group consisting of amino resins, acrylate resins, alkyd resins, polyester resins, polyamide resins, polyimide resins, polyurethane resins, phenolic resins, phenolic/latex resins, epoxy resins, isocyanate resins, isocyanurate resins, polysiloxane resins, reactive vinyl resins, polyethylene resins, polypropylene resins, polystyrene resins, phenoxy resins, perylene resins, polysulfone resins, acrylonitrile-butadiene-styrene resins, acrylic resins, polycarbonate resins, polyimide resins, and mixtures thereof.

56. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is an epoxy resin.

57. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is a polyurethane resin.

58. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is a polyimide resin.

59. (withdrawn) The tool of claim 30, further comprising a reinforcing material disposed within at least a portion of the solidified organic material layer.

60. (withdrawn) The tool of claim 59, wherein the reinforcing material is a material selected from the group consisting of ceramics, metals, or combinations thereof.

61. (withdrawn) The tool of claim 60, wherein the reinforcing material is a ceramic.

62. (withdrawn) The tool of claim 61, wherein the ceramic comprises a member selected from the group consisting of alumina, aluminum carbide, tungsten carbide, silica, silicon carbide, silicon nitride, zirconia, zirconium carbide, and mixtures thereof.

63. (withdrawn) The tool of claim 59, wherein the reinforcing material is an organometallic coupling agent.

64. (withdrawn) The tool of claim 30, wherein the tool is a polishing or grinding pad.

65. (withdrawn) The tool of claim 30, wherein the tool is a CMP pad dresser.

66. (withdrawn) The tool of claim 30, wherein the tool is for shaping dental materials.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/223,786	09/09/2005	Chien-Min Sung	00802-25023	8266

20551 7590 08/31/2010
THORPE NORTH & WESTERN, LLP.
P.O. Box 1219
SANDY, UT 84091-1219

EXAMINER	
ACKUN, JACOB K	
ART UNIT	**PAPER NUMBER**
3728	

NOTIFICATION DATE	DELIVERY MODE
08/31/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

rich@tnw.com
causse@tnw.com
patentdocket@tnw.com

Office Action Summary	Application No.	Applicant(s)	
	11/223,786	SUNG, CHIEN-MIN	
	Examiner	Art Unit	
	Jacob K. Ackun Jr.	3728	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-6,14 and 15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 3-6 and 14-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. Claims 1, 3-6 and 14-15 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims of record of U.S. Patent No. 7,258,708. The rejection is set out in the last office action and is incorporated herein by reference.

3. Claims 1, 3-6 and 14-15 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims of record of copending Application No. 11/724,585. the rejection is set out in the last office action and is incorporated herein by reference.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 3-6 and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al (2006/0254154) alone, or in view of Sung et al

(2002/0173234), Doan et al (6,945,857), Ishizaki et al (6,775,720) or Andrews et al (2005/0260939). The rejection is set out in the last office action and is incorporated herein by reference. Additionally, to address the amendment to claim 1, it may be noted that nothing in the claim prevents or precludes an interpretation of Huang wherein the plurality of particles as required in the claim reads on one particle only, from each of the Huang particle groups held in the solidified organic material layer. Accordingly, since the groups of particles in Sung are separated from one another, a single particle in each group is separated from at least one other single particle in each group. Accordingly, each one of the plurality of superabrasive particles (the plurality comprising one particle from each group) is not in contact with any other superabrasive particle in the plurality.

Additionally, Huang clearly teaches in paragraph [0008] that it is known in the art to regularly or uniformly distribute single abrasive particles in a material layer to prevent the particles from falling off and increase the life of the tool. See also Fig 5 and the patents referred to in this section. Accordingly, it would have also been obvious to a routineer upon reviewing the background of the Huang patent to construct an abrasive tool of the type under consideration herein, by regularly or uniformly distributing abrasive particles in a solidified organic material layer, for example by using a template, such that the particles were not in

contact with one another, for the purpose of improving pad life. The fact that Huang discloses an improvement on the prior art wherein groups of abrasive particles are regularly or uniformly distributed in a prior art solidified organic material layer in no way detracts from the knowledge of the artisan prior to the Huang invention, as taught in the reference itself, or from what that knowledge would have suggested to such artisan.

In the same vein, the fact that Huang recognizes an even greater advantage by employing groups of superabrasive particles instead of single particles, as Huang teaches is known in the art, would not make it unobvious to employ single particles in the Huang invention. Accordingly, it would have been obvious in view of the above to employ single particles in the Huang invention, for the purpose of providing some improvement in pad life over the construction wherein the particles are randomly distributed, while avoiding the cost and/or complexity of employing only groups of particles.

6. Claims 1, 3-6 and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts (5,453,106). See the embodiment described beginning in column 13. The claimed apparatus would at least have been obvious in view of Roberts, for the purpose of prolonging the life of the tool.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacob K. Ackun Jr. whose telephone number is (571)272-4418. The examiner can normally be reached on Monday through Friday 8.30AM-5.00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mickey Yu can be reached on (571)272-4562. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jacob K. Ackun Jr./
Primary Examiner, Art Unit 3728

Notice of References Cited	Application/Control No. 11/223,786	Applicant(s)/Patent Under Reexamination SUNG, CHIEN-MIN	
	Examiner Jacob K. Ackun Jr.	Art Unit 3728	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-5,380,390 A	01-1995	Tselesin, Naum N.	156/230
*	B	US-5,453,106 A	09-1995	Roberts, Ellis E.	51/307
*	C	US-7,021,995 B2	04-2006	Toge et al.	451/56
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	11223786	SUNG, CHIEN-MIN
	Examiner	Art Unit
	Jacob K Ackun Jr.	3728

SEARCHED			
Class	Subclass	Date	Examiner
451	28	6/3/08	J.A.
East text Search		8/25/10	J.A.

SEARCH NOTES		
Search Notes	Date	Examiner

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner
East text search.		6/3/08	J.A.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ART UNIT:	3728
EXAMINER:	Jacob K. Ackun
FIRST NAMED INVENTOR:	Chien-Min Sung
SERIAL NO.:	11/223,786
FILED:	09/09/2005
CONFRM. NO.:	8266
FOR:	METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX
DOCKET NO.:	00802-25023

CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8

DATE OF DEPOSIT: **November 30, 2010**

I hereby certify that this paper or fee (along with any paper or fee referred to as being attached or enclosed) is being submitted on the date indicated above via:

☒ EFS Web
☐ facsimile to _____
☐ the United States Postal Service with sufficient postage as first class mail addressed to: Mail Stop _____, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

/Nicole Solomon/
Nicole Solomon

RESPONSE UNDER 37 C.F.R. § 1.111

Mailstop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Office Action mailed August 31, 2010, please enter the following amendment and reconsider the application in light of the accompanying remarks.

REMARKS

In the Office Action mailed August 31, 2010, claims 1, 3-6, 14, and 15 were pending for consideration, all of which were rejected on various statutory grounds. First, claims 1, 3-6, 14, and 15 were rejected on the grounds of nonstatutory obviousness-type double patenting over U.S. Patent No. 7,258,708 (hereinafter " '708 patent"). Claims 1, 3-6, 14, and 15 were provisionally rejected on the grounds of nonstatutory obviousness-type double patenting over U.S. Patent Application No. 11/724,585 (hereinafter " '585 application"). Additionally, claims 1, 3-6, 14, and 15 were rejected under 35 U.S.C 103(a) as being allegedly unpatentable over U.S. Patent Publication No. 2006/0254154 (hereinafter "Huang") alone, or in view of U.S. Publication No. 2002/0173234 (hereinafter "Sung"), U.S. Patent No. 6,945,857 (hereinafter ("Doan"), U.S. Patent No. 6,755,720 (hereinafter "Ishizaki"), or U.S. Patent Application No. 2005/0260939 (hereinafter "Andrews").

By the present amendment, claim 1 has been amended. Support for this amendment can be found in FIGs. 1-8 of the specification as filed. As such, Applicant submits that no new matter is added thereby. Accordingly, claims 1, 3-6, 14, and 15 remain pending in the present application. The Applicant respectfully submits that the present claims are allowable over the cited references.

Nonstatutory Double Patenting

Claims 1, 3-6, 14, and 15 were rejected on the grounds of nonstatutory obviousness-type double patenting over the claims of the '708 patent. Applicant traverses such rejection and respectfully requests that the Examiner hold this rejection in abeyance until such time as

allowable claims have been confirmed in the present matter, so that such claims can be the basis of any obviousness-type double patenting issues.

Claims 1, 3-6, 14, and 15 were provisionally rejected on the grounds of nonstatutory obviousness-type double patenting over the claims of the '585 application. As this is a provisional rejection, the Applicant will address the rejection in greater detail upon allowance of claims from the present application.

35 U.S.C. § 103 Rejections

The Examiner has rejected claims 1, 3-6, 14, and 15 under 35 U.S.C 103(a) as allegedly unpatentable over Huang alone, or in view of Sung, Doan, Ishizaki, or Andrews. While the Applicant is confident that the Examiner is well acquainted with the requirements necessary to establish a *prima facie* case of obviousness, it is thought prudent to briefly review the required elements. Specifically, in order to meet the burden of establishing a *prima facie* case of obvious, the Patent Office must show that: 1) each and every element of the invention as set forth in the claims is taught or suggested by the reference as modified or the combination of references; 2) that there is sufficient motivation or articulated reasoning for one of ordinary skill in the art to modify or combine the reference; and 3) that one of ordinary skill in the art would find a sufficient likelihood of successfully making the modification or combination asserted. Applicants respectfully submit that the Patent Office has failed to satisfy these requirements with any of the asserted rejections, and thus has not established a *prima facie* case of obviousness.

Amended claim 1 of the present invention contains limitations to a method of increasing retention of superabrasive particles held in a solidified organic material layer of a CMP pad dresser, where a portion of each of said superabrasive particles protrudes out of the solidified

organic material layer. The method further includes securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a CMP pad. The claim also requires a majority of the plurality of superabrasive particles to be arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer, and that the organic material layer directly contacts the superabrasive particles. Additionally, the claim requires that each superabrasive particle of the plurality of superabrasive particles is not in contact with any other superabrasive particle.

Huang teaches an abrasive tool having a plurality of abrasive particle groups in a bonding layer. Abrasive particle groups consist of a plurality of abrasive particles grouped together. The abrasive groups are grouped together in a regular pattern and fixed with the bonding layer. (see abstract). The bonding layer can be a metal solder and/or a polymeric bonding layer [0012]. Groups of abrasive particles are used in order to increase the abrasive particle density [0010], and such groups are distributed in a regular pattern so that the cutting load can be evenly distributed to all the diamond particle groups [0023].

The Applicant submits that Huang, alone or in combination with the secondary references, does not teach or suggest each and every element of claim 1. Claim 1 requires that the plurality of superabrasive particles be secured in the solidified organic material in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle to increase retention of the superabrasive particles, and that each superabrasive particle of the plurality of superabrasive particles is not in contact with any other superabrasive particle. Huang, either alone or in combination, does not teach or suggest these concepts. Huang groups multiple abrasive particles into regular groupings to allow a high

abrasive particle density and allow the cutting load to be evenly distributed to all particle groups. Each grouping contains multiple particles that contact one another, and therefore does not read on the situation where each superabrasive particle in the plurality of superabrasive particles is not in contact with any other superabrasive particle. In other words, Huang does not teach or suggest individual particles in a polymeric matrix that do not contact one another.

There is also no teaching in Huang that each particle in a group of particles is arranged to minimize mechanical stress impinging on the protruding portion of that particle. The Examiner has argued that Huang teaches that uniform distribution of particles is known, and that it would be obvious to construct a tool having uniformly distributed particles in a solidified organic matrix layer for the purpose of improving pad (tool) life. The Examiner then states that the "fact that Huang discloses an improvement on the prior art wherein groups of abrasive particles are regularly or uniformly distributed in a prior art solidified organic material layer in no way detracts from the knowledge of the artisan prior to the Huan invention…" The Applicant disagrees with this line of reasoning.

In paragraph [0008], Huang teaches that non-uniform distribution of particles may result in particle loss due to insufficient adhesive power. This teaching refers to the problems associated with non-uniform particle placement in metal tools, and how particles can be pulled from a metal matrix due to insufficient adhesion, or in other words, insufficient metal matrix bonding to the particle. As has previously been discussed, CMP pad dressers have moved from electroplated and sintered materials to brazing in order to generate chemical bonding between the particle and the metal. Thus the art has previously been moving in a direction of increasing the adhesive connection between a matrix and an individual particle. It should be noted that this paragraph refers to exclusively metal tools. The references cited in this section refer to particles

embedded in a metal mesh, and held together with a sintered metal powder. Nowhere in Huang is it taught or suggested that single particles can be successfully held in an organic matrix. Even assuming *arguendo* that the teachings of the metal matrix tool reference were relevant to organic matrix tools, those teaching would be applied in combination to the groupings of particles, not to the individual particles within the groupings.

The Examiner additionally argues that it would have been obvious to construct an abrasive tool as in Huang such that the particles were not in contact with one another for the purpose of improving pad life. It is unclear how, in light of the teachings of Huang, tool life would be improved by substituting single particles for Huang's particle groups. Huang appears to accept in paragraph [0008] that uniform spacing of particles in metal tools can be beneficial, but also notes that the cutting rate of a tool is limited by single particles (see [0009]). The whole point to Huang is to increase cutting rate by increasing particle density. Because single particle density is limited [0009], Huang teaches multiple groups of particles to increase cutting rate. Paragraph [0033] and Table 1 show that cutting rate is increased using groups of particles spaced in a uniform manner as compared to a prior art tool. Given this teaching, no reason has been provided by the Examiner to explain why one of ordinary skill in the art would make a tool as in Huang with uniformly spaced single particles when cutting rate would clearly be decreased. The Patent Office has argued that such may be motivated by the teaching of Huang in paragraph [0008] of improved tool life. However, Huang has already accepted this concept the tool design, and has uniformly spaced the groups of particles to improve tool life. Nowhere is it taught or suggested that there is any difference between uniformly spaced single particles and uniformly spaced groups of particles as it applies to tool life, nor is it taught or suggested that uniformly spaced groups of particles in any way negatively affect tool life. As such, Applicant submits that

insufficient motivation or reasoning has been provided to explain why it would be obvious to substitute single particles for the particle groups of Huang. Additionally, because a single particle arrangement would decrease the cutting rate of the tool, such a modification would in fact teach away from Huang's purpose of increasing the tool's cutting rate.

Accordingly, Huang does not teach or suggest minimizing mechanical stress impinging on individual abrasive particles, particularly for single particles that do not contact one another. Accordingly, Huang alone does not teach or suggest each and every element of claim 1, alone or as modified. Additionally, there is insufficient motivation or reasoning to modify Huang in such a way as to render claim 1 obvious, and such a modification would teach away from the purpose of Huang.

As has been discussed in previous responses, the secondary references do not provide these missing elements. Claim 1 contains limitations to a method for improving retention in an organic matrix by limiting mechanical stress impinging on individual superabrasive particles that do not contact one another. A teaching or knowledge in the art that superabrasive particles can be leveled or regularly spaced does not necessarily imply that one of ordinary skill in the art understands that those concepts can be used increase retention in a completely disparate material such as an organic matrix. Regardless, any combination of Huang with the teachings of the secondary references would be imposed on the groups of particles that contain individual particles in contact with one another. Thus any potential combination would include particles that contact with one another, and thus would not teach or suggest each and every element of claim 1.

In light of the above, the Patent Office has not established a *prima facie* case of obviousness, and it is respectfully requested that the rejection of claim 1 be withdrawn.

Additionally, as claims 3-6, 14, and 15 depend from claim 1, it is also requested that these rejections be withdrawn as well. It should be noted that the arguments presented in the previous response are deemed to be incorporated herein by reference, with the statements and interpretations presented herein taking precedence. Also, the absence of any argument from this response should not be seen as being in agreement with the Examiner.

CONCLUSION

In view of the foregoing, the Applicant submits that claims 1, 3-6, 14, and 15 present allowable subject matter and the prompt allowance thereof is requested. If any impediment to the allowance of these claims remains after consideration of the present amendment and above remarks, and such impediment could be removed during a telephone interview, the Examiner is invited to telephone the undersigned attorney, so that such issues may be resolved as expeditiously as possible.

Please charge any additional fees except for Issue Fee or credit any overpayment to Deposit Account No. 20-0100.

Dated this 30th day of November, 2010.

Respectfully submitted,

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DWO/TBA

Electronic Patent Application Fee Transmittal

Application Number:	11223786
Filing Date:	09-Sep-2005
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Filer:	David William Osborne/Nicole Solomon
Attorney Docket Number:	00802-25023

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 1 month with $0 paid	1251	1	130	130

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**130**

Electronic Acknowledgement Receipt	
EFS ID:	8937692
Application Number:	11223786
International Application Number:	
Confirmation Number:	8266
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Customer Number:	20551
Filer:	David William Osborne/Nicole Solomon
Filer Authorized By:	David William Osborne
Attorney Docket Number:	00802-25023
Receipt Date:	30-NOV-2010
Filing Date:	09-SEP-2005
Time Stamp:	18:26:15
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$130
RAM confirmation Number	6249
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1		25023response.pdf	111065 867738887df7d248b3e6c956635b8d00449dc76c	yes	17

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Amendment/Req. Reconsideration-After Non-Final Reject	1	1
Claims	2	9
Applicant Arguments/Remarks Made in an Amendment	10	17

Warnings:

Information:

2	Fee Worksheet (PTO-875)	fee-info.pdf	30111 533818abae523a0afdbb28ebbb21536fcb2dd25f	no	2

Warnings:

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Total Files Size (in bytes):	141176

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/06 (07-06)
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
11/223,786	09/09/2005	

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	11/30/2010	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 65	Minus	** 66	= 0	X $ =		OR	X $52=	0
	Independent (37 CFR 1.16(h))	* 1	Minus	***6	= 0	X $ =		OR	X $220=	0
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/MOLIKI I. MAY/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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11/223,786	09/09/2005	

APPLICATION AS FILED – PART I

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FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	11/30/2010	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 65	Minus	** 66	= 0	X $ =		OR	X $52=	0
	Independent (37 CFR 1.16(h))	* 1	Minus	***6	= 0	X $ =		OR	X $220=	0
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/MOLIKI I. MAY/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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LISTING OF CLAIMS

1. (currently amended) A method of increasing retention of superabrasive particles held in a solidified organic material layer of a CMP pad dresser, a portion of each of said superabrasive particles protruding out of the solidified organic material layer, comprising:

securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a CMP pad, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer, wherein the solidified organic material layer is in direct contact with the superabrasive particles, and wherein each superabrasive particle of the plurality of superabrasive particles is not in contact with any other superabrasive particle.

2. (withdrawn) The method of claim 1, wherein the arrangement of the plurality of superabrasive particles is configured to uniformly distribute drag forces across substantially each superabrasive particle.

3. (original) The method of claim 1, wherein a majority of the plurality of superabrasive particles protrudes to a predetermined height above the solidified organic material layer.

4. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of less than about 20 microns when used to abrade a work piece.

5. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of from about 1 micron to about 20 microns when used to abrade a work piece.

6. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of from about 10 micron to about 20 microns when used to abrade a work piece.

7. (withdrawn) The method of claim 3, wherein the superabrasive particles protrude to a predetermined height that is along a designated profile.

8. (withdrawn) The method of claim 7, wherein the designated profile is a plane.

9. (withdrawn) The method of claim 7, wherein the designated profile has a slope.

10. (withdrawn) The method of claim 7, wherein the designated profile has a curved shape.

11. (withdrawn) The method of claim 10, wherein the designated profile has a dome shape.

12. (withdrawn) The method of claim 7, wherein a majority of the plurality of superabrasive particles are arranged such that their tips vary from the designated profile to less than about 10% of the average size of the superabrasive particles.

13. (canceled)

14. (original) The method of claim 3, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 30 microns.

15. (original) The method of claim 3, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to about 20 microns.

16. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are of substantially the same size.

17. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particle are from about 30 microns to about 500 microns in size.

18. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are from about 100 microns to about 200 microns in size.

19. (withdrawn) The method of claim 1, wherein superabrasive particles in a central location of the abrading tool are smaller in size than superabrasive particles in a peripheral location on the abrading tool.

20. (withdrawn) The method of claim 1, wherein securing the plurality of superabrasive particles includes arranging the plurality of superabrasive particles according to a predetermined attitude.

21. (withdrawn) The method of claim 20, wherein the predetermined attitude is a uniform attitude across substantially all of the plurality of superabrasive particles.

22. (withdrawn) The method of claim 20, wherein the plurality of superabrasive particles are substantially configured with an apex portion oriented towards a work piece.

23. (withdrawn) The method of claim 20, wherein superabrasive particles in a central location on the abrading tool are configured with an apex or an edge portion oriented towards a work piece, and superabrasive particles in a peripheral location on the abrading tool are configured with a face portion oriented towards the work piece.

24. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are arranged as a grid.

25. (withdrawn) The method of claim 24, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 3 times to about 5 times the average size of the superabrasive particles.

26. (withdrawn) The method of claim 24, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 100 microns to about 800 microns.

27. (withdrawn) The method of claim 20, wherein arranging the superabrasive particles according to a predetermined attitude further comprises:

applying an adhesive to a substrate;

applying a flexible sieve to the adhesive;

disposing superabrasive particles across a template positioned on the flexible sieve such that a portion of the superabrasive particles adhere to the adhesive by either an edge or an apex portion; and

removing the template and the un-adhered superabrasive particles from the flexible sieve.

28. (withdrawn) The method of claim 27, wherein the flexible sieve is a nylon sieve.

29. (withdrawn) The method of claim 1, wherein superabrasive particles in a central location on the abrading tool are spaced farther apart than superabrasive particles in a peripheral location on the abrading tool.

30. (withdrawn) A superabrasive tool having improved superabrasive particle retention, comprising:

a solidified organic material layer; and

a plurality of superabrasive particles secured in the solidified organic material layer in an arrangement as recited in claim 1.

31. (withdrawn) The tool of claim 30, wherein each of the plurality of superabrasive particles protrudes to a predetermined height above the solidified organic material layer.

32. (withdrawn) The tool of claim 31, wherein the predetermined height is greater than about 20 microns.

33. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 1 micron to about 20 microns.

34. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 5 microns to about 20 microns.

35. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 10 microns to about 20 microns.

36. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles protrude to a predetermined height is along a designated profile.

37. (withdrawn) The tool of claim 36, wherein the designated profile is a plane.

38. (withdrawn) The tool of claim 36, wherein the designated profile has an average slope from a high point near a center location of the tool to a low point near a peripheral edge of the tool.

39. (withdrawn) The tool of claim 38, wherein the average slope is about 1/1000.

40. (withdrawn) The tool of claim 36, wherein the designated profile has a curved shape.

41. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles are arranged such that their tips protrude to about 10% of the average size of the superabrasive particles.

42. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles are arranged such that their tips protrude from about 20 to about 30 microns.

43. (withdrawn) The tool of claim 30, wherein the arrangement is a grid.

44. (withdrawn) The tool of claim 43, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 3 times to about 5 times the average size of the superabrasive particles.

45. (withdrawn) The tool of claim 43, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 100 microns to 800 microns.

46. (withdrawn) The tool of claim 30, wherein superabrasive particles in a central location on the tool are spaced farther apart than superabrasive particles in a peripheral location on the tool.

47. (withdrawn) The tool of claim 30, wherein superabrasive particles in a central location on the tool are larger in size than superabrasive particles in a peripheral location on the tool.

48. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles are arranged according to a predetermined attitude.

49. (withdrawn) The tool of claim 48, wherein the plurality of superabrasive particles are substantially configured with an apex portion oriented towards a work piece.

50. (withdrawn) The tool of claim 48, wherein superabrasive particles in a central location on the tool are configured with an apex or an edge portion oriented towards a work piece, and superabrasive particles in a peripheral location on the tool are configured with a face portion oriented towards the work piece.

51. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles include a member selected from the group consisting of diamond, polycrystalline diamond, cubic boron nitride, polycrystalline cubic boron nitride, and combinations thereof.

52. (withdrawn) The tool of claim 51, wherein the plurality of superabrasive particles includes diamond.

53. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles are from about 30 microns to about 500 microns in size.

54. (withdrawn) The tool of claim 53, wherein the plurality of superabrasive particles are from about 100 microns to about 200 microns in size.

55. (withdrawn) The tool of claim 30, wherein the solidified organic material layer comprises a member selected from the group consisting of amino resins, acrylate resins, alkyd resins, polyester resins, polyamide resins, polyimide resins, polyurethane resins, phenolic resins, phenolic/latex resins, epoxy resins, isocyanate resins, isocyanurate resins, polysiloxane resins, reactive vinyl resins, polyethylene resins, polypropylene resins, polystyrene resins, phenoxy resins, perylene resins, polysulfone resins, acrylonitrile-butadiene-styrene resins, acrylic resins, polycarbonate resins, polyimide resins, and mixtures thereof.

56. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is an epoxy resin.

57. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is a polyurethane resin.

58. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is a polyimide resin.

59. (withdrawn) The tool of claim 30, further comprising a reinforcing material disposed within at least a portion of the solidified organic material layer.

60. (withdrawn) The tool of claim 59, wherein the reinforcing material is a material selected from the group consisting of ceramics, metals, or combinations thereof.

61. (withdrawn) The tool of claim 60, wherein the reinforcing material is a ceramic.

62. (withdrawn) The tool of claim 61, wherein the ceramic comprises a member selected from the group consisting of alumina, aluminum carbide, tungsten carbide, silica, silicon carbide, silicon nitride, zirconia, zirconium carbide, and mixtures thereof.

63. (withdrawn) The tool of claim 59, wherein the reinforcing material is an organometallic coupling agent.

64. (withdrawn) The tool of claim 30, wherein the tool is a polishing or grinding pad.

65. (withdrawn) The tool of claim 30, wherein the tool is a CMP pad dresser.

66. (withdrawn) The tool of claim 30, wherein the tool is for shaping dental materials.

Document code: WFEE

United States Patent and Trademark Office
Sales Receipt for Accounting Date: 12/28/2010

SZIMMERM ADJ #00000004 Mailroom Dt: 11/30/2010
Seq No: 6249 Sales Acctg Dt: 12/01/2010 11223786
01 FC : 1251 -130.00 OP

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

ART UNIT: 3728 EXAMINER: Jacob K. Ackun Jr. FIRST NAMED INVENTOR: Chien-Min Sung SERIAL NO.: 11/223,786 FILED: 9/9/2005 CONF. NO.: 8266 FOR: METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX DOCKET NO.: 00802-25023	**CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8** DATE OF DEPOSIT: 12/10/10 I hereby certify that this paper or fee (along with any paper or fee referred to as being attached or enclosed) is being submitted on the date indicated above via: ☒ EFS Web ☐ facsimile to _____ ☐ the United States Postal Service with sufficient postage as first class mail addressed to: Mail Stop _____, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450. /Kelley Warner/ Kelley Warner

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT UNDER 37 C.F.R. §§ 1.56, 1.97 and 1.98

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

Pursuant to the duty of disclosure under 37 C.F.R. §§ 1.56, 1.97 and 1.98, the Applicant requests consideration of this Information Disclosure Statement, which is being submitted in accordance with:

☐ 37 C.F.R. § 1.97(b)(1) or (3), within three months of the filing date of the application, or before a first office action on the merits, whichever occurs last;

☒ 37 C.F.R. § 1.97(c), after a first office action on the merits, but before a Final Office Action or a Notice of Allowance, whichever occurs first, and is accompanied by **EITHER** a statement in accordance with 37 C.F.R. § 1.97(e), **OR** the fee set forth in 37 C.F.R. § 1.17(p); or

☐ 37 C.F.R. § 1.97(d), after a Final Office Action or Notice of Allowance, whichever occurs first, but on or before payment of the issue fee, and is accompanied by **BOTH** a statement in

accordance with 37 C.F.R. § 1.97(e), **AND** the fee set forth in 37 C.F.R. § 1.17(p).

SUBMISSIONS

Please find enclosed, pursuant to 37 C.F.R. §§ 1.97 and 1.98:

☒ Form **PTO/SB/08A** and/or **PTO/SB/08B** listing ___3___ references submitted for consideration, which contains a list of all patents, publications and all other items that have come to the attention of one or more of the individuals designated in 37 C.F.R. § 1.56(c).

☐ Legible copies of the listed non-patent documents, unpublished U.S. applications and foreign documents or their relevant portions are included.

☐ All English translations of each non-English reference, if any, within the possession, custody, control or availability of anyone designated in 37 C.F.R. § 1.56(c) (see 37 C.F.R. §1.98 are included.

☐ For all listed references that are not either in the English language, or accompanied by a translation into English, a concise explanation of relevance as required under 37 C.F.R. § 1.98(a)(3) is enclosed attached to each.

Copies of references listed on the enclosed PTO/SB/08A and/or PTO/SB/08B are **not** enclosed:

☐ because, under 37 C.F.R. § 1.98.(d), they were previously cited by or submitted to the Office in application number _____, which is relied upon for an earlier filing date under 37 C.F.R. § 1.20.

☐ because they are substantially cumulative of an enclosed reference.

STATEMENT IN ACCORDANCE WITH 37 C.F.R. § 1.97(e)

☒ I hereby certify that each item contained in the information disclosure statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement.

☐ I hereby certify that no item contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in §1.56(c) more than three months prior to the filing of the information disclosure statement.

REMARKS

While no representation is made that any of these references may be "prior art" within the meaning of that term in accordance with 37 C.F.R. §§ 102 or 103, the enclosed list of references is disclosed so as to comply with the duty of disclosure set forth in 37 C.F.R. § 1.56.

Moreover, while no representation is made that a specific search of office files or patent office records has been conducted or that no better art exists, the undersigned attorney of record believes that the references listed, together with any other references which may have been previously submitted or listed, are the closest to the claimed invention (taken in its entirety) of which the undersigned is presently aware, and no art which is closer to the claimed invention (taken in its entirety) has been knowingly withheld.

☐ Check No. ____ in the amount of $ ____(amount in § 1.17(p)) constituting the submission fee set forth in 37 C.F.R. § 1.17(p) is enclosed.

In the event that 37 C.F.R. § 1.97(c) applies and the Examiner is not satisfied that the Statement meets the requirements of 37 C.F.R. § 1.97(e), or in any other event remediable by a fee, please credit any over payment or charge any additional fees to Deposit Account No. 20-0100 of the undersigned.

Dated this 10 day of December, 2010.

Respectfully submitted,

/David W. Osborne/

David W. Osborne
Attorney for Applicant
Registration No. 44989

THORPE NORTH & WESTERN, LLP
Customer No. 20,551
P.O. Box 1219
Sandy, Utah 84091-1219
Telephone: (801) 566-6633

PTO/SB/08A (08-03)
Approved for use through 07/31/2006. OMB 0651-0031
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	Chien-Min Sung
Art Unit	3728
Examiner Name	Jacob K Ackun Jr.
Attorney Docket Number	00802-25023

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		4,078,906	03/1978	Green	
		6,790,126	09/2004	Wood et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]- Number[4] – Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1]Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentially is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450**.

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

PTO/SB/08B (08-03)
Approved for use through 07/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet		of	

Complete if Known	
Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	Chien-Min Sung
Art Unit	3728
Examiner Name	Jacob K Ackun Jr.
Attorney Docket Number	00802-25023

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		US Application 12/716,734; filed 3/3/2010; Chien-Min Sung; office action mailed 09/10/10	

Examiner Signature		Date Considered	

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English language Translation is attached. This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentially is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **Send to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

Electronic Acknowledgement Receipt	
EFS ID:	9009731
Application Number:	11223786
International Application Number:	
Confirmation Number:	8266
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Customer Number:	20551
Filer:	David William Osborne/kelley warner
Filer Authorized By:	David William Osborne
Attorney Docket Number:	00802-25023
Receipt Date:	10-DEC-2010
Filing Date:	09-SEP-2005
Time Stamp:	13:51:25
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	trans.PDF	79709 b748e25c2d5f34c3b8e6c1f1a898b28ca8621bea	no	4

Warnings:
Information:

2	NPL Documents	a.PDF	96965 3717e592d8ff659bba987f1c931aa11396f53b57	no	1
Warnings:					
Information:					
3	NPL Documents	b.PDF	74026 6a43c6270059d9fa25e2a4a067495bbd48ea0cfb	no	1
Warnings:					
Information:					
			Total Files Size (in bytes):	250700	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

THORPE NORTH AND WESTERN
INTELLECTUAL PROPERTY LAW

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December 8, 2010

Mail Stop 16
Director of the USPTO
P. O. Box 1450
Alexandria, VA 22313-1450

Re: Request for Refund
Application No.: 11/223,786
Title: **METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX**
Our Reference: 00802-25023

Dear Sirs:

We respectfully request a refund of $130.00 for the above mentioned application which was paid in error on November 30, 2010. Copies of the Office Action and EFS documents are enclosed.

A response was filed on November 30, 2010 (EFS ID 8937692) and was submitted with the fee of $130 for a one month extension of time (fee code 1251). This fee was paid in error as the mailing date of the office action was August 31, 2010 and the office action allowd a three month period to file a response. As such, the response was filed in a timely manner and the extension fee should not have been paid.

The fee was paid by credit card (American Express ending in 2008). We ask that the $130 be credited back to the credit card if possible. If not, please credit the amount to our Deposit Account No. 20-0100.

Any questions may be directed to the undersigned.

Sincerely yours,

THORPE NORTH & WESTERN, LLP

/David W. Osborne/

David W. Osborne

DWO/ns
Enclosures
369680

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Sandy, Utah 84091-1219

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Electronic Acknowledgement Receipt	
EFS ID:	8937692
Application Number:	11223786
International Application Number:	
Confirmation Number:	8266
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Customer Number:	20551
Filer:	David William Osborne/Nicole Solomon
Filer Authorized By:	David William Osborne
Attorney Docket Number:	00802-25023
Receipt Date:	30-NOV-2010
Filing Date:	09-SEP-2005
Time Stamp:	18:26:15
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$130
RAM confirmation Number	6249
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1		25023response.pdf	111065 867738887df7d248b3e6c956635b8d00449dc76c	yes	17

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Amendment/Req. Reconsideration-After Non-Final Reject	1	1
Claims	2	9
Applicant Arguments/Remarks Made in an Amendment	10	17

Warnings:

Information:

2	Fee Worksheet (PTO-875)	fee-info.pdf	30111 533818abae523a0afdbb28ebbb21536fcb2dd25f	no	2

Warnings:

Information:

Total Files Size (in bytes):	141176

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/223,786	09/09/2005	Chien-Min Sung	00802-25023	8266

20551 7590 08/31/2010
THORPE NORTH & WESTERN, LLP.
P.O. Box 1219
SANDY, UT 84091-1219

EXAMINER	
ACKUN, JACOB K	
ART UNIT	**PAPER NUMBER**
3728	

NOTIFICATION DATE	DELIVERY MODE
08/31/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

rich@tnw.com
causse@tnw.com
patentdocket@tnw.com

Office Action Summary	Application No.	Applicant(s)	
	11/223,786	SUNG, CHIEN-MIN	
	Examiner	Art Unit	
	Jacob K. Ackun Jr.	3728	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,3-6,14 and 15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 3-6 and 14-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Electronic Acknowledgement Receipt

EFS ID:	9035290
Application Number:	11223786
International Application Number:	
Confirmation Number:	8266
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Customer Number:	20551
Filer:	David William Osborne/Nicole Solomon
Filer Authorized By:	David William Osborne
Attorney Docket Number:	00802-25023
Receipt Date:	14-DEC-2010
Filing Date:	09-SEP-2005
Time Stamp:	18:31:33
Application Type:	Utility under 35 USC 111(a)

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Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Refund Request	25023refund.pdf	173381 833e745abc9bfe3f53963b143d6ee13f87e05331	no	5

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Document code: WFEE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/223,786	09/09/2005	Chien-Min Sung	00802-25023	8266

20551 7590 02/11/2011

THORPE NORTH & WESTERN, LLP.
P.O. Box 1219
SANDY, UT 84091-1219

EXAMINER	
ACKUN, JACOB K	
ART UNIT	**PAPER NUMBER**
3728	

NOTIFICATION DATE	DELIVERY MODE
02/11/2011	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

rich@tnw.com
causse@tnw.com
patentdocket@tnw.com

Office Action Summary	Application No.	Applicant(s)	
	11/223,786	SUNG, CHIEN-MIN	
	Examiner	Art Unit	
	Jacob K. Ackun Jr.	3728	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 November 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-66* is/are pending in the application.

4a) Of the above claim(s) *2,7-12 and 16-66* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,3-6,14 and 15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/10/10*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. The applicant is requested to point out with specificity the portion of the disclosure that provides support for each amendment to the claims in any future Response, in order to help to advance prosecution of the case without undue delay.

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., In re Berg, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); In re Goodman, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); In re Longi, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); In re Van Ornum, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); In re Vogel, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and In re Thorington, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent

either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 1, 3-6 and 14-15 are finally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims of record of U.S. Patent No. 7,258,708. Although the conflicting claims are not identical, they are not patentably distinct from each other because it would have been obvious in view of the claims of the patent to practice the method claimed herein, for the reasons already noted.

4. Claims 1, 3-6 and 14-15 are finally provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims of record of copending Application No. 11/724,585. Although the conflicting claims are not identical, they are not patentably distinct from each other because it would have been obvious in view of the claims of the copending application to practice the method claimed in the subject application, for the reasons already noted..

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claims 1, 3-6 and 14-15 are finally rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al. alone, or in view of Sung et al, Doan et al, Ishizaki et al or Andrews et al. The rejections is set out in previous office actions and is incorporated herein by reference.

7. Claims 1, 3-6 and 14-15 are finally rejected under 35 U.S.C. 103(a) as being unpatentable over Roberts. The rejection is set out in the last office action and is incorporated herein by reference.

8. Applicant's arguments filed on 11/30/10 have been fully considered but they are not persuasive. Applicant argues that Huang does not meet the requirement in claim 1 that each superabrasive particle of the claimed plurality of superabrasive particles not contact any others. It is noted that the limitation in question is a negative limitation that was added by amendment. Assuming for purposes of this office action that the disclosure as filed supports such limitation, it is noted that there is not a single element in any of the claims at bar that requires an interpretation of Huang such that **all** of Huangs particles are the claimed plurality

of superabrasive particles. This is pointed out in the rejection itself. Said differently, the claimed plurality of superabrasive particles reads on **some** of Huangs particles, as noted in the last office action. Specifically, the claimed plurality of superabrasive particles can be a single superabrasive particle from each of Huangs groups, and more particularly, superabrasive particles that are not in contact with any other superabrasive particle **because each belongs to a separate group**. Accordingly, applicants argument is not understood. Huang meets all of the limitations if claim 1.

The applicant also argues with the finding by the examiner that it would also have been obvious to one having ordinary skill in the relevant art to construct an abrasive tool as in Huang such that the particles were **not in contact with one another**, for the purpose of improving tool life. According to applicant, it is not clear how tool life would be improved by **substituting single particles for Huangs particle groups**. In response it is pointed out that the applicant has misunderstood and/or misrepresented the examiners position. As should be evident from the comments immediately above, constructing a tool such that particles are not in contact with one another (the modification set out in the rejection) does not necessarily equate to substituting single particles for particle groups (applicants modification). The particles in contact with each other in Huang are the particles

within a single group. These would be separated from one another, for the reasons noted in the rejection, but the groups of particles would remain. The advantages of particle separation are discussed in Huang and are acknowledged by applicant in applicant's arguments. The noted modification to Huang does not involve dispensing with the particle groups and does not destroy Huangs invention or prevent its intended functioning.

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jacob K. Ackun Jr. whose telephone number is

(571)272-4418. The examiner can normally be reached on Monday through Friday 8.30AM-5.00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mickey Yu can be reached on (571)272-4562. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jacob K. Ackun Jr./
Primary Examiner, Art Unit 3728
11.

PTO/SB/08A (08-03)
Approved for use through 07/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	Chien-Min Sung
Art Unit	3728
Examiner Name	Jacob K Ackun Jr.
Attorney Docket Number	00802-25023

Sheet | | of | |

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
		US Application 12/716,734; filed 3/3/2010; Chien-Min Sung; office action mailed 09/10/10	

Examiner Signature	/Jacob Ackun/	Date Considered	02/07/2011

*Examiner: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

[1]Applicant's unique citation designation number (optional). [2]Applicant is to place a check mark here if English language Translation is attached. This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentially is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **Send to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.A./

PTO/SB/08A (08-03)
Approved for use through 07/31/2006. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	11/223,786
Filing Date	9/9/2005
First Named Inventor	Chien-Min Sung
Art Unit	3728
Examiner Name	Jacob K Ackun Jr.
Attorney Docket Number	00802-25023

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		4,078,906	03/1978	Green	
		6,790,126	09/2004	Wood et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3]- Number[4] – Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

Examiner Signature	/Jacob Ackun/	Date Considered	02/07/2011

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1]Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentially is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450**.

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /J.A./

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ART UNIT:	3728
EXAMINER:	Jacob K. Ackun
FIRST NAMED INVENTOR:	Chien-Min Sung
SERIAL NO.:	11/223,786
FILED:	09/09/2005
CONFRM. NO.:	8266
FOR:	METHODS OF BONDING SUPERABRASIVE PARTICLES IN AN ORGANIC MATRIX
DOCKET NO.:	00802-25023

CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8

DATE OF DEPOSIT: **June 13, 2011**

I hereby certify that this paper or fee (along with any paper or fee referred to as being attached or enclosed) is being submitted on the date indicated above via:

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/Nicole Solomon/
Nicole Solomon

RESPONSE UNDER 37 C.F.R. § 1.113

Mailstop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Final Office Action of February 11, 2011, please reconsider the application in light of the accompanying remarks. A petition for a one-month extension of time and the associated fee are enclosed herewith.

LISTING OF CLAIMS

1. (previously presented) A method of increasing retention of superabrasive particles held in a solidified organic material layer of a CMP pad dresser, a portion of each of said superabrasive particles protruding out of the solidified organic material layer, comprising:

securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a CMP pad, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer, wherein the solidified organic material layer is in direct contact with the superabrasive particles, and wherein each superabrasive particle of the plurality of superabrasive particles is not in contact with any other superabrasive particle.

2. (withdrawn) The method of claim 1, wherein the arrangement of the plurality of superabrasive particles is configured to uniformly distribute drag forces across substantially each superabrasive particle.

3. (original) The method of claim 1, wherein a majority of the plurality of superabrasive particles protrudes to a predetermined height above the solidified organic material layer.

4. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of less than about 20 microns when used to abrade a work piece.

5. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of from about 1 micron to about 20 microns when used to abrade a work piece.

6. (original) The method of claim 3, wherein the predetermined height produces a cutting depth of from about 10 micron to about 20 microns when used to abrade a work piece.

7. (withdrawn) The method of claim 3, wherein the superabrasive particles protrude to a predetermined height that is along a designated profile.

8. (withdrawn) The method of claim 7, wherein the designated profile is a plane.

9. (withdrawn) The method of claim 7, wherein the designated profile has a slope.

10. (withdrawn) The method of claim 7, wherein the designated profile has a curved shape.

11. (withdrawn) The method of claim 10, wherein the designated profile has a dome shape.

12. (withdrawn) The method of claim 7, wherein a majority of the plurality of superabrasive particles are arranged such that their tips vary from the designated profile to less than about 10% of the average size of the superabrasive particles.

13. (canceled)

14. (original) The method of claim 3, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to less than about 30 microns.

15. (original) The method of claim 3, wherein a majority of the plurality of superabrasive particles are arranged such that their tips protrude to about 20 microns.

16. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are of substantially the same size.

17. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particle are from about 30 microns to about 500 microns in size.

18. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are from about 100 microns to about 200 microns in size.

19. (withdrawn) The method of claim 1, wherein superabrasive particles in a central location of the abrading tool are smaller in size than superabrasive particles in a peripheral location on the abrading tool.

20. (withdrawn) The method of claim 1, wherein securing the plurality of superabrasive particles includes arranging the plurality of superabrasive particles according to a predetermined attitude.

21. (withdrawn) The method of claim 20, wherein the predetermined attitude is a uniform attitude across substantially all of the plurality of superabrasive particles.

22. (withdrawn) The method of claim 20, wherein the plurality of superabrasive particles are substantially configured with an apex portion oriented towards a work piece.

23. (withdrawn) The method of claim 20, wherein superabrasive particles in a central location on the abrading tool are configured with an apex or an edge portion oriented towards a work piece, and superabrasive particles in a peripheral location on the abrading tool are configured with a face portion oriented towards the work piece.

24. (withdrawn) The method of claim 1, wherein the plurality of superabrasive particles are arranged as a grid.

25. (withdrawn) The method of claim 24, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 3 times to about 5 times the average size of the superabrasive particles.

26. (withdrawn) The method of claim 24, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 100 microns to about 800 microns.

27. (withdrawn) The method of claim 20, wherein arranging the superabrasive particles according to a predetermined attitude further comprises:

applying an adhesive to a substrate;

applying a flexible sieve to the adhesive;

disposing superabrasive particles across a template positioned on the flexible sieve such that a portion of the superabrasive particles adhere to the adhesive by either an edge or an apex portion; and

removing the template and the un-adhered superabrasive particles from the flexible sieve.

28. (withdrawn) The method of claim 27, wherein the flexible sieve is a nylon sieve.

29. (withdrawn) The method of claim 1, wherein superabrasive particles in a central location on the abrading tool are spaced farther apart than superabrasive particles in a peripheral location on the abrading tool.

30. (withdrawn) A superabrasive tool having improved superabrasive particle retention, comprising:

a solidified organic material layer; and

a plurality of superabrasive particles secured in the solidified organic material layer in an arrangement as recited in claim 1.

31. (withdrawn) The tool of claim 30, wherein each of the plurality of superabrasive particles protrudes to a predetermined height above the solidified organic material layer.

32. (withdrawn) The tool of claim 31, wherein the predetermined height is greater than about 20 microns.

33. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 1 micron to about 20 microns.

34. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 5 microns to about 20 microns.

35. (withdrawn) The tool of claim 31, wherein variation from the predetermined height is from about 10 microns to about 20 microns.

36. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles protrude to a predetermined height is along a designated profile.

37. (withdrawn) The tool of claim 36, wherein the designated profile is a plane.

38. (withdrawn) The tool of claim 36, wherein the designated profile has an average slope from a high point near a center location of the tool to a low point near a peripheral edge of the tool.

39. (withdrawn) The tool of claim 38, wherein the average slope is about 1/1000.

40. (withdrawn) The tool of claim 36, wherein the designated profile has a curved shape.

41. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles are arranged such that their tips protrude to about 10% of the average size of the superabrasive particles.

42. (withdrawn) The tool of claim 31, wherein the plurality of superabrasive particles are arranged such that their tips protrude from about 20 to about 30 microns.

43. (withdrawn) The tool of claim 30, wherein the arrangement is a grid.

44. (withdrawn) The tool of claim 43, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 3 times to about 5 times the average size of the superabrasive particles.

45. (withdrawn) The tool of claim 43, wherein the plurality of superabrasive particles are evenly spaced at a distance of from about 100 microns to 800 microns.

46. (withdrawn) The tool of claim 30, wherein superabrasive particles in a central location on the tool are spaced farther apart than superabrasive particles in a peripheral location on the tool.

47. (withdrawn) The tool of claim 30, wherein superabrasive particles in a central location on the tool are larger in size than superabrasive particles in a peripheral location on the tool.

48. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles are arranged according to a predetermined attitude.

49. (withdrawn) The tool of claim 48, wherein the plurality of superabrasive particles are substantially configured with an apex portion oriented towards a work piece.

50. (withdrawn) The tool of claim 48, wherein superabrasive particles in a central location on the tool are configured with an apex or an edge portion oriented towards a work piece, and superabrasive particles in a peripheral location on the tool are configured with a face portion oriented towards the work piece.

51. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles include a member selected from the group consisting of diamond, polycrystalline diamond, cubic boron nitride, polycrystalline cubic boron nitride, and combinations thereof.

52. (withdrawn) The tool of claim 51, wherein the plurality of superabrasive particles includes diamond.

53. (withdrawn) The tool of claim 30, wherein the plurality of superabrasive particles are from about 30 microns to about 500 microns in size.

54. (withdrawn) The tool of claim 53, wherein the plurality of superabrasive particles are from about 100 microns to about 200 microns in size.

55. (withdrawn) The tool of claim 30, wherein the solidified organic material layer comprises a member selected from the group consisting of amino resins, acrylate resins, alkyd resins, polyester resins, polyamide resins, polyimide resins, polyurethane resins, phenolic resins, phenolic/latex resins, epoxy resins, isocyanate resins, isocyanurate resins, polysiloxane resins, reactive vinyl resins, polyethylene resins, polypropylene resins, polystyrene resins, phenoxy resins, perylene resins, polysulfone resins, acrylonitrile-butadiene-styrene resins, acrylic resins, polycarbonate resins, polyimide resins, and mixtures thereof.

56. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is an epoxy resin.

57. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is a polyurethane resin.

58. (withdrawn) The tool of claim 55, wherein the solidified organic material layer is a polyimide resin.

59. (withdrawn) The tool of claim 30, further comprising a reinforcing material disposed within at least a portion of the solidified organic material layer.

60. (withdrawn) The tool of claim 59, wherein the reinforcing material is a material selected from the group consisting of ceramics, metals, or combinations thereof.

61. (withdrawn) The tool of claim 60, wherein the reinforcing material is a ceramic.

62. (withdrawn) The tool of claim 61, wherein the ceramic comprises a member selected from the group consisting of alumina, aluminum carbide, tungsten carbide, silica, silicon carbide, silicon nitride, zirconia, zirconium carbide, and mixtures thereof.

63. (withdrawn) The tool of claim 59, wherein the reinforcing material is an organometallic coupling agent.

64. (withdrawn) The tool of claim 30, wherein the tool is a polishing or grinding pad.

65. (withdrawn) The tool of claim 30, wherein the tool is a CMP pad dresser.

66. (withdrawn) The tool of claim 30, wherein the tool is for shaping dental materials.

REMARKS

In the Final Office Action of February 11, 2011, claims 1, 3-6, 14, and 15 were pending for consideration, all of which were rejected on various statutory grounds. Claims 1, 3-6, 14, and 15 were rejected on the grounds of nonstatutory obviousness-type double patenting over U.S. Patent No. 7,258,708 (hereinafter " '708 patent"). Claims 1, 3-6, 14, and 15 were provisionally rejected on the grounds of nonstatutory obviousness-type double patenting over U.S. Patent Application No. 11/724,585 (hereinafter " '585 application"). Additionally, claims 1, 3-6, 14, and 15 were rejected under 35 U.S.C 103(a) as being allegedly unpatentable over U.S. Patent Publication No. 2006/0254154 (hereinafter "Huang") alone, or in view of U.S. Publication No. 2002/0173234 (hereinafter "Sung"), U.S. Patent No. 6,945,857 (hereinafter ("Doan"), U.S. Patent No. 6,755,720 (hereinafter "Ishizaki"), or U.S. Patent Application No. 2005/0260939 (hereinafter "Andrews").

Nonstatutory Double Patenting

Claims 1, 3-6, 14, and 15 were rejected on the grounds of nonstatutory obviousness-type double patenting over the claims of the '708 patent. Applicant traverses such rejection and respectfully requests that the Examiner hold this rejection in abeyance until such time as allowable claims have been confirmed in the present matter, so that such claims can be the basis of any obviousness-type double patenting issues.

Claims 1, 3-6, 14, and 15 were provisionally rejected on the grounds of nonstatutory obviousness-type double patenting over the claims of the '585 application. As this is a provisional rejection, the Applicant will address the rejection in greater detail upon allowance of claims from the present application.

35 U.S.C. § 103 Rejections

The Examiner has rejected claims 1, 3-6, 14, and 15 under 35 U.S.C 103(a) as allegedly unpatentable over Huang alone, or in view of Sung, Doan, Ishizaki, or Andrews.

Claim 1 of the present invention contains limitations to a method of increasing retention of superabrasive particles held in a solidified organic material layer of a CMP pad dresser, where a portion of each of said superabrasive particles protrudes out of the solidified organic material layer. The method further includes securing a plurality of superabrasive particles in the solidified organic material layer in an arrangement that minimizes mechanical stress impinging on the protruding portion of any individual superabrasive particle when used to abrade a CMP pad. The claim also requires a majority of the plurality of superabrasive particles to be arranged such that their tips protrude to less than about 40 microns above the solidified organic material layer, and that the organic material layer directly contacts the superabrasive particles. Additionally, the claim requires that each superabrasive particle of the plurality of superabrasive particles is not in contact with any other superabrasive particle.

Huang teaches an abrasive tool having a plurality of abrasive particle groups in a bonding layer. Abrasive particle groups consist of a plurality of abrasive particles grouped together. The abrasive groups are grouped together in a regular pattern and fixed with the bonding layer. (see abstract). The bonding layer can be a metal solder and/or a polymeric bonding layer [0012]. Groups of abrasive particles are used in order to increase the abrasive particle density [0010], and such groups are distributed in a regular pattern so that the cutting load can be evenly distributed to all the diamond particle groups [0023].

The Applicant submits that Huang, alone or in combination with the secondary references, does not teach or suggest each and every element of claim 1. The Examiner has argued that "there is not a single element in any of the claims at bar that requires an interpretation of Huang such that all of Huangs particles are the claimed plurality of superabrasive particles." The Applicant disagrees with this assertion. Claim 1 requires that each superabrasive particle of the plurality of superabrasive particles is not in contact with any other superabrasive particle. This limitation is not compatible with the notion that a selection of superabrasive particles from all of the particles of Huang can represent a plurality, and that this plurality can be selected such that each particle therein is not in contact with another of the preselected plurality, as is suggested by the Examiner. The situation argued by the Examiner would be appropriate if the limitation read that each superabrasive particle of the plurality of superabrasive particles is not in contact with any other superabrasive particle of the plurality of superabrasive particles. Rather, the claim limitation is clear in that each superabrasive particle of the plurality of superabrasive particles is not in contact with any other superabrasive particle, whether the other superabrasive particle is in the plurality or not. In other words, the present claim limitation is to isolated particles, as is shown in FIG. 1 of the present application. Hence, if a plurality of superabrasive particles is defined from Huang to be one superabrasive particle in each of the superabrasive particle groups, that one superabrasive particle is contacting other superabrasive particles that may or may not be in the plurality defined. For this reason, Huang does not read on the present claim 1.

Huang, either alone or in combination, does not teach or suggest this concept. Huang groups multiple abrasive particles into regular groupings to allow a high abrasive particle density and allow the cutting load to be evenly distributed to all particle groups. Each grouping contains

multiple particles that contact one another, and therefore does not read on the situation where each superabrasive particle in the plurality of superabrasive particles is not in contact with any other superabrasive particle. In other words, Huang does not teach or suggest isolated particles in a polymeric matrix that do not contact one another.

There is also no teaching in Huang that each particle in a group of particles is arranged to minimize mechanical stress impinging on the protruding portion of that particle. The Examiner has argued that Huang teaches that uniform distribution of particles is known, and that it would be obvious to construct a tool having uniformly distributed particles in a solidified organic matrix layer for the purpose of improving pad (tool) life. The Examiner then states that the "fact that Huang discloses an improvement on the prior art wherein groups of abrasive particles are regularly or uniformly distributed in a prior art solidified organic material layer in no way detracts from the knowledge of the artisan prior to the Huan invention…" The Applicant disagrees with this line of reasoning.

In paragraph [0008], Huang teaches that non-uniform distribution of particles may result in particle loss due to insufficient adhesive power. This teaching refers to the problems associated with non-uniform particle placement in metal tools, and how particles can be pulled from a metal matrix due to insufficient adhesion, or in other words, insufficient metal matrix bonding to the particle. As has previously been discussed, CMP pad dressers have moved from electroplated and sintered materials to brazing in order to generate chemical bonding between the particle and the metal. Thus the art has previously been moving in a direction of increasing the adhesive connection between a matrix and an individual particle. It should be noted that this paragraph refers to exclusively metal tools. The references cited in this section refer to particles embedded in a metal mesh, and held together with a sintered metal powder. Nowhere in Huang

is it taught or suggested that single particles can be successfully held in an organic matrix. Even assuming *arguendo* that the teachings of the metal matrix tool reference were relevant to organic matrix tools, those teaching would be applied in combination to the groupings of particles, not to the individual particles within the groupings.

Accordingly, Huang does not teach or suggest minimizing mechanical stress impinging on individual abrasive particles, particularly for single particles that do not contact one another. Accordingly, Huang alone does not teach or suggest each and every element of claim 1, alone or as modified. Additionally, there is insufficient motivation or reasoning to modify Huang in such a way as to render claim 1 obvious, and such a modification would teach away from the purpose of Huang.

As has been discussed in previous responses, the secondary references do not provide these missing elements. Claim 1 contains limitations to a method for improving retention in an organic matrix by limiting mechanical stress impinging on individual superabrasive particles that do not contact one another. A teaching or knowledge in the art that superabrasive particles can be leveled or regularly spaced does not necessarily imply that one of ordinary skill in the art understands that those concepts can be used increase retention in a completely disparate material such as an organic matrix. Regardless, any combination of Huang with the teachings of the secondary references would be imposed on the groups of particles that contain individual particles in contact with one another. Thus any potential combination would include particles that contact with one another, and thus would not teach or suggest each and every element of claim 1.

In light of the above, the Patent Office has not established a *prima facie* case of obviousness, and it is respectfully requested that the rejection of claim 1 be withdrawn.

Additionally, as claims 3-6, 14, and 15 depend from claim 1, it is also requested that these rejections be withdrawn as well. It should be noted that the arguments presented in the previous response are deemed to be incorporated herein by reference, with the statements and interpretations presented herein taking precedence. Also, the absence of any argument from this response should not be seen as being in agreement with the Examiner.

CONCLUSION

In view of the foregoing, the Applicant submits that claims 1, 3-6, 14, and 15 present allowable subject matter and the prompt allowance thereof is requested. If any impediment to the allowance of these claims remains after consideration of the present amendment and above remarks, and such impediment could be removed during a telephone interview, the Examiner is invited to telephone the undersigned attorney, so that such issues may be resolved as expeditiously as possible.

Please charge any additional fees except for Issue Fee or credit any overpayment to Deposit Account No. 20-0100.

Dated this 13th day of June, 2011.

Respectfully submitted,

THORPE, NORTH & WESTERN, LLP

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DWO/TBA

Electronic Patent Application Fee Transmittal

Application Number:	11223786
Filing Date:	09-Sep-2005
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Filer:	David William Osborne/Nicole Solomon
Attorney Docket Number:	00802-25023

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 1 month with $0 paid	1251	1	130	130

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**130**

Electronic Acknowledgement Receipt	
EFS ID:	10293561
Application Number:	11223786
International Application Number:	
Confirmation Number:	8266
Title of Invention:	Methods of bonding superabrasive particles in an organic matrix
First Named Inventor/Applicant Name:	Chien-Min Sung
Customer Number:	20551
Filer:	David William Osborne/Nicole Solomon
Filer Authorized By:	David William Osborne
Attorney Docket Number:	00802-25023
Receipt Date:	13-JUN-2011
Filing Date:	09-SEP-2005
Time Stamp:	18:41:39
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$130
RAM confirmation Number	5257
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Extension of Time	25023extension.pdf	257485 a989caf6316425f8ea8d99ed4fa982bf885defbd	no	1
Warnings:					
Information:					
2		25023response.pdf	106437 87eea730d36d65b870707db0c957b004171b7a22	yes	16

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Amendment After Final	1	1
	Claims	2	9
	Applicant Arguments/Remarks Made in an Amendment	10	16

Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30111 fbd86c1ba736f92dce4691e04207f148f522b70b	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	394033		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

<u>New Applications Under 35 U.S.C. 111</u>
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

<u>National Stage of an International Application under 35 U.S.C. 371</u>
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

<u>New International Application Filed with the USPTO as a Receiving Office</u>
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

PTO/SB/22 (02-09)
Approved for use through 03/31/2009. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARMENT OF COMMERCE
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PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a) **FY 2009** (*Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).*)	Docket Number (Optional) 00802-25023
Application Number 11/223,786	Filed 9/9/2005
For Methods of Bonding Superabrasive Particles In An Organic Matrix	
Art Unit 3728	Examiner Jacob K. Ackun

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

		Fee	Small Entity Fee	
☑	One month (37 CFR 1.17(a)(1))	$130	$65	$130
☐	Two months (37 CFR 1.17(a)(2))	$490	$245	$
☐	Three months (37 CFR 1.17(a)(3))	$1110	$555	$
☐	Four months (37 CFR 1.17(a)(4))	$1730	$865	$
☐	Five months (37 CFR 1.17(a)(5))	$2350	$1175	$

☐ Applicant claims small entity status. See 37 CFR 1.27.

☐ A check in the amount of the fee is enclosed.

☑ Payment by credit card. ~~Form PTO-2038 is attached~~.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☑ The Director is hereby authorized to charge ~~any fees which may be required~~ deficiencies only, or credit any overpayment, to Deposit Account Number 20-0100.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest. See 37 CFR 3.71.
Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).

☑ attorney or agent of record. Registration Number 44989

☐ attorney or agent under 37 CFR 1.34.
Registration number if acting under 37 CFR 1.34 _____

/David W. Osborne/ — Signature
June 13, 2011 — Date
David W. Osborne — Typed or printed name
801-566-6633 — Telephone Number

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

☐ Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	☐ To be Mailed
11/223,786	09/09/2005	

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =		OR	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X $ =			X $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	06/13/2011	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 65	Minus	** 66	= 0	X $ =		OR	X $52=	0
	Independent (37 CFR 1.16(h))	* 1	Minus	***3	= 0	X $ =		OR	X $220=	0
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	X $ =		OR	X $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X $ =		OR	X $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/DAWN BREWER/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/223,786	09/09/2005	Chien-Min Sung	00802-25023	8266

20551 7590 06/28/2011

THORPE NORTH & WESTERN, LLP.
P.O. Box 1219
SANDY, UT 84091-1219

EXAMINER	
ACKUN, JACOB K	
ART UNIT	**PAPER NUMBER**
3728	

NOTIFICATION DATE	DELIVERY MODE
06/28/2011	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

rich@tnw.com
causse@tnw.com
patentdocket@tnw.com

Advisory Action Before the Filing of an Appeal Brief	**Application No.** 11/223,786	**Applicant(s)** SUNG, CHIEN-MIN	
	Examiner Jacob K. Ackun Jr.	**Art Unit** 3728	

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 13 June 2011 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

1. ☒ The reply was filed after a final rejection, but prior to or on the same day as filing a Notice of Appeal. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. The reply must be filed within one of the following time periods:
   a) ☒ The period for reply expires *3* months from the mailing date of the final rejection.
   b) ☐ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.

   Examiner Note: If box 1 is checked, check either box (a) or (b). ONLY CHECK BOX (b) WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. ☐ The proposed amendment(s) filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   (a) ☐ They raise new issues that would require further consideration and/or search (see NOTE below);
   (b) ☐ They raise the issue of new matter (see NOTE below);
   (c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   (d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.

   NOTE: _____. (See 37 CFR 1.116 and 41.33(a)).
4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicant's reply has overcome the following rejection(s): _____.
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☐ For purposes of appeal, the proposed amendment(s): a) ☐ will not be entered, or b) ☐ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.
   The status of the claim(s) is (or will be) as follows:
   Claim(s) allowed: _____.
   Claim(s) objected to: _____.
   Claim(s) rejected: _____.
   Claim(s) withdrawn from consideration: _____.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
9. ☐ The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing a good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. ☒ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: Note the reasons already of record.
12. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____
13. ☐ Other: _____.

/Jacob K. Ackun Jr./
Primary Examiner, Art Unit 3728

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/223,786	09/09/2005	Chien-Min Sung	00802-25023	8266

20551 7590 10/27/2011

THORPE NORTH & WESTERN, LLP.
P.O. Box 1219
SANDY, UT 84091-1219

EXAMINER	
ACKUN, JACOB K	
ART UNIT	**PAPER NUMBER**
3728	

NOTIFICATION DATE	DELIVERY MODE
10/27/2011	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

rich@tnw.com
causse@tnw.com
patentdocket@tnw.com

Notice of Abandonment	Application No.	Applicant(s)	
	11/223,786	SUNG, CHIEN-MIN	
	Examiner	Art Unit	
	Jacob K. Ackun Jr.	3728	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

This application is abandoned in view of:

1. ☒ Applicant's failure to timely file a proper reply to the Office letter mailed on *11 February 2011*.
   (a) ☐ A reply was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply (including a total extension of time of _____ month(s)) which expired on _____.
   (b) ☒ A proposed reply was received on *6/13/11*, but it does not constitute a proper reply under 37 CFR 1.113 (a) to the final rejection.

   (A proper reply under 37 CFR 1.113 to a final rejection consists only of: (1) a timely filed amendment which places the application in condition for allowance; (2) a timely filed Notice of Appeal (with appeal fee); or (3) a timely filed Request for Continued Examination (RCE) in compliance with 37 CFR 1.114).
   (c) ☐ A reply was received on _____ but it does not constitute a proper reply, or a bona fide attempt at a proper reply, to the non-final rejection. See 37 CFR 1.85(a) and 1.111. (See explanation in box 7 below).
   (d) ☐ No reply has been received.

2. ☐ Applicant's failure to timely pay the required issue fee and publication fee, if applicable, within the statutory period of three months from the mailing date of the Notice of Allowance (PTOL-85).
   (a) ☐ The issue fee and publication fee, if applicable, was received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the statutory period for payment of the issue fee (and publication fee) set in the Notice of Allowance (PTOL-85).
   (b) ☐ The submitted fee of $_____ is insufficient. A balance of $_____ is due.

   The issue fee required by 37 CFR 1.18 is $_____. The publication fee, if required by 37 CFR 1.18(d), is $_____.
   (c) ☐ The issue fee and publication fee, if applicable, has not been received.

3. ☐ Applicant's failure to timely file corrected drawings as required by, and within the three-month period set in, the Notice of Allowability (PTO-37).
   (a) ☐ Proposed corrected drawings were received on _____ (with a Certificate of Mailing or Transmission dated _____), which is after the expiration of the period for reply.
   (b) ☐ No corrected drawings have been received.

4. ☐ The letter of express abandonment which is signed by the attorney or agent of record, the assignee of the entire interest, or all of the applicants.

5. ☐ The letter of express abandonment which is signed by an attorney or agent (acting in a representative capacity under 37 CFR 1.34(a)) upon the filing of a continuing application.

6. ☐ The decision by the Board of Patent Appeals and Interference rendered on _____ and because the period for seeking court review of the decision has expired and there are no allowed claims.

7. ☐ The reason(s) below:

/Jacob K. Ackun Jr./
Primary Examiner, Art Unit 3728

Petitions to revive under 37 CFR 1.137(a) or (b), or requests to withdraw the holding of abandonment under 37 CFR 1.181, should be promptly filed to minimize any negative effects on patent term.