WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of priority to United States Provisional Patent Application Serial No. 61/427,411, entitled "Solid-State Light Emitting Devices with Remote Phosphor Wavelength Conversion Component", filed December 27, 2010, which is hereby incorporated by reference in its entirety. This application is also a continuation-in-part of United States Application Serial No. 13/253,031, entitled "Solid-State Light Emitting Devices and Signage with Photoluminescence Wavelength Conversion," filed on October 4, 2011, which claims the benefit of United States Provisional Patent Application Serial No. 61/390,091, entitled "Solid-State Light Emitting Devices and Signage with Photoluminescence Wavelength Conversion," filed on October 5, 2010, which is hereby incorporated by reference in its entirety.

FIELD

[0002] This disclosure relates to solid-state light emitting devices that use a remotely positioned phosphor wavelength conversion component to generate a desired color of light.

BACKGROUND

[0003] White light emitting LEDs ("white LEDs") are known and are a relatively recent innovation. It was not until LEDs emitting in the blue/ultraviolet part of the electromagnetic spectrum were developed that it became practical to develop white light sources based on LEDs. As taught, for example in US 5,998,925, white LEDs include one or more one or more

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photoluminescent materials (e.g., phosphor materials), which absorb a portion of the radiation emitted by the LED and re-emit light of a different color (wavelength). Typically, the LED chip or die generates blue light and the phosphor(s) absorbs a percentage of the blue light and re-emits yellow light or a combination of green and red light, green and yellow light, green and orange or yellow and red light. The portion of the blue light generated by the LED that is not absorbed by the phosphor material combined with the light emitted by the phosphor provides light which appears to the eye as being nearly white in color. Alternatively, the LED chip or die may generate ultraviolet (UV) light, in which phosphor(s) to absorb the UV light to re-emit a combination of different colors of photoluminescent light that appear white to the human eye.

[0004] Due to their long operating life expectancy (>50,000 hours) and high luminous efficacy (70 lumens per watt and higher) high brightness white LEDs are increasingly being used to replace conventional fluorescent, compact fluorescent and incandescent light sources.

[0005] Typically the phosphor material is mixed with light transmissive materials, such as silicone or epoxy material, and the mixture applied to the light emitting surface of the LED die. It is also known to provide the phosphor material as a layer on, or incorporate the phosphor material within, an optical component, a phosphor wavelength conversion component, that is located remotely to the LED die ("remote phosphor" LED devices).

[0006] One issue with remote phosphor devices is the non-white color appearance of the device in its OFF state. During the ON state of the LED device, the LED chip or die generates blue light and the phosphor(s) absorbs a percentage of the blue light and re-emits yellow light or a combination of green and red light, green and yellow light, green and orange, or yellow and red light. The portion of the blue light generated by the LED that is not absorbed by the phosphor combined with the light emitted by the phosphor provides light which appears to the human eye

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as being nearly white in color. However, for a remote phosphor device in its OFF state, the absence of the blue light that would otherwise be produced by the LED in the ON state causes the device to have a yellowish, yellow-orange, or orange-color appearance. A potential consumer or purchaser of such devices that is seeking a white-appearing light may be quite confused by the yellowish, yellow-orange, or orange-color appearance of such devices in the marketplace, since the device on a store shelf is in its OFF state. This may be off-putting or undesirable to the potential purchasers and hence cause loss of sales to target customers.

[0007] Another problem with remote phosphor devices can be the variation in color of emitted light with emission angle. In particular, such devices are subject to perceptible non-uniformity in color when viewed from different angles. Such visually distinctive color differences are unacceptable for many commercial uses, particularly for the high-end lighting that often employ LED lighting devices.

[0008] Yet another problem with using phosphor materials is that they are relatively costly, and hence correspond to a significant portion of the costs for producing phosphor-based LED devices. For a non-remote phosphor device, the phosphor material in a LED light is typically mixed with a light transmissive material such as a silicone or epoxy material and the mixture directly applied to the light emitting surface of the LED die. This results in a relatively small layer of phosphor materials placed directly on the LED die, that is nevertheless still costly to produce in part because of the significant costs of the phosphor materials. A remote phosphor device typically uses a much larger layer of phosphor materials as compared to the non-remote phosphor device. Because of its larger size, a much greater amount of phosphor is normally required to manufacture such remote phosphor LED devices. As a result, the costs are correspondingly greater as well to provide the increased amount of phosphor materials needed

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for such remote phosphor LED devices.

[0009] Therefore, there is a need for improved approaches to implement LED lighting apparatuses that maintains the desired color properties of the devices, but without requiring the large quantities of photoluminescent materials (e.g. phosphor materials) that are required in the prior approaches. In addition, there is a need for an improved approach to implement LED lighting apparatuses which addresses perceptible variations in color of emitted light with emission angle, and which also addresses the non-white color appearance of the LED lighting apparatuses while in an OFF state.

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SUMMARY OF THE INVENTION

[0010] Embodiments of the invention concern light emitting devices comprising one or more solid-state light sources, typically LEDs, that are operable to generate excitation radiation (typically blue light) and a remote wavelength conversion component, containing one or more excitable photoluminescence materials (e.g., phosphor materials), that is operable to convert at least a portion of the excitation radiation to light of a different wavelength. When using a blue light radiation source, the emission product of the device comprises the combined light generated by the source and the wavelength conversion component and is typically configured to appear white in color. When using an UV source, the wavelength conversion component(s) may include a blue wavelength conversion component and a yellow wavelength conversion component with the outputs of these components combining to form the emission product. The wavelength conversion component comprises a light transmissive substrate such as a polymer or glass having a wavelength conversion layer comprising particles of the excitable photoluminescence material (such as phosphor) and a light diffusing layer comprising particles of a light diffractive material (such as titanium dioxide). In accordance with some embodiments of the invention, the wavelength conversion and light diffusing layers are in direct contact with each other and are preferably deposited by screen printing or slot die coating. As used herein, "direct contact" means that there are no intervening layers or air gaps.

[0011] One benefit of this approach is that by selecting an appropriate particle size and concentration per unit area of the light diffractive material, an improvement is obtained in the white color appearance of a LED device in its OFF state. Another benefit is an improvement to the color uniformity of emitted light from an LED device for emission angles over a ±60° range from the emission axis. Moreover the use of a light diffusing layer having an appropriate particle

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size and concentration per unit area of the light diffractive material can substantially reduce the quantity of phosphor material required to generate a selected color of emitted light, since the light diffusing layer increases the probability that a photon will result in the generation of photoluminescence light by directing light back into the wavelength conversion layer. Therefore, inclusion of a diffusing layer in direct contact with the wavelength conversion layer can reduce the quantity of phosphor material required to generate a given color emission product, e.g., by up to 40%. In one embodiment the particle size of the light diffractive material is selected such that excitation radiation generated by the source is scattered more than light generated by the one or more phosphor materials.

[0012] According to some embodiments of the invention a wavelength conversion component for a light emitting device comprising at least one light emitting solid-state radiation source, comprises a light transmissive substrate having a wavelength conversion layer comprising particles of at least one photoluminescence material and a light diffusing layer comprising particles of a light diffractive material; and wherein the layers are in direct contact with each other. Preferably the wavelength conversion layer comprises a mixture of at least one phosphor material and a light transmissive binder while the light diffusing layer comprises a mixture of the light diffractive material and a light transmissive binder. To minimize optical losses at the interface of the layers it is preferred that the layers comprise the same transmissive binder. The binder can comprise a curable liquid polymer such as a polymer resin, a monomer resin, an acrylic, an epoxy, a silicone or a fluorinated polymer. The binder is preferably UV or thermally curable.

[0013] To reduce the variation in emitted light color with emission angle the weight loading of light diffractive material to binder is in a range 7% to 35% and more preferably in a range

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10% to 20%. The wavelength conversion and light diffusing layers are preferably deposited by screen printing though they can be deposited using other deposition techniques such as spin coating or doctor blading. The light diffractive material preferably comprises titanium dioxide (TiO_2) though it can comprise other materials such as barium sulfate ($BaSO_4$), magnesium oxide (MgO), silicon dioxide (SiO_2) or aluminum oxide (Al_2O_3).

[0014] In one arrangement the light diffractive material has an average particle size in a range 1μm to 50μm and more preferably in a range 10μm to 20μm. In other arrangements the light diffractive material has a particle size that is selected such that the particles will scatter excitation radiation relatively more than they will scatter light generated by the at least one photoluminescence material. For example, for blue light radiation sources, the light diffractive particle size can be selected such that the particles will scatter blue light relatively at least twice as much as they will scatter light generated by the at least one phosphor material. Such a light diffusing layer ensures that a higher proportion of the blue light emitted from the wavelength conversion layer will be scattered and directed by the light diffractive material back into the wavelength conversion layer increasing the probability of the photon interacting with a phosphor material particle and resulting in the generation of photoluminescent light. At the same time, phosphor generated light can pass through the diffusing layer with a lower probability of being scattered. Since the diffusing layer increases the probability of blue photons interacting with a phosphor material particle, less phosphor material can be used to generate a selected emission color. Such an arrangement can also increase luminous efficacy of the wavelength conversion component/device. Preferably the light diffractive material has an average particle size of less than about 150nm where the excitation radiation comprises blue light. When the excitation radiation comprises UV light, the light diffractive material may have an average particle size of

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less than about 100nm.

[0015] The light transmissive substrate can comprise any material that is substantially transmissive to visible light (380nm to 740nm) and typically comprises a polymer material such as a polycarbonate or an acrylic. Alternatively the substrate can comprise a glass.

[0016] The concept of a wavelength conversion component having a light diffusing layer composed of light diffractive particles that preferentially scatter light corresponding to wavelengths generated by the LEDs compared with light of wavelengths generated by the phosphor material is considered inventive in its own right. According to a further aspect of the invention a wavelength conversion component for a light emitting device comprising at least one blue light emitting solid-state light source, comprises a wavelength layer comprising particles of at least one phosphor material and a light diffusing layer comprising particles of a light diffractive material; wherein the light diffractive particle size is selected such that the particles will scatter excitation radiation relatively more than they will scatter light generated by the at least one phosphor material.

[0017] To increase the CRI (Color Rendering Index) of light generated by the device the device can further comprise at least one solid-state light source operable to generate red light.

[0018] Further details of aspects, objects, and advantages of the invention are described below in the detailed description, drawings, and claims. Both the foregoing general description and the following detailed description are exemplary and explanatory, and are not intended to be limiting as to the scope of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] In order that the present invention is better understood LED-based light emitting devices and phosphor wavelength conversion components in accordance with the invention will now be described, by way of example only, with reference to the accompanying drawings in which like reference numerals are used to denote like parts, and in which:

[0020] FIG. **1** shows schematic partial cutaway plan and sectional views of a solid-state light emitting device in accordance with an embodiment of the invention;

[0021] FIG. **2** is a schematic of a phosphor wavelength conversion component in accordance with an embodiment of the invention;

[0022] FIG. **3** is a schematic of a phosphor wavelength conversion component in accordance with another embodiment of the invention;

[0023] FIG. **4** shows plots of emission color change versus emission angle for the device of FIG. **1** for phosphor wavelength conversion components containing 0%, 7%, 12%, 16%, 23% and 35% weight loadings of light diffractive material;

[0024] FIG. **5** is a plot of luminous efficacy (normalized) versus emission color change at an emission angle $\theta=60°$ for the device of FIG. **1**;

[0025] FIG. **6** shows plots of emission color change versus emission angle for a warm white ($\approx$3000K) solid-state light emitting device in accordance with the invention for wavelength conversion components containing different 0%, 10%, 15% and 20% weight loadings of light diffractive material;

[0026] FIG. **7** is a plot of luminous efficacy (normalized) versus emission color change at an emission angle $\theta=60°$ for the warm white light emitting device for wavelength conversion components containing different 0%, 10%, 15% and 20% weight loadings of light diffractive

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material;

[0027] FIG. **8** is a 1931 C.I.E. (Commission Internationale de l'Eclairage) chromaticity diagram showing emission color at emission angles θ=0°, 15°, 30°, 45° and 60° for the warm white light emitting device for wavelength conversion components containing 0%, 10%, 15% and 20% weight loadings of light diffractive material;

[0028] FIG. **9** shows schematic partial cutaway plan and sectional views of a high CRI solid-state light emitting device in accordance with another embodiment of the invention;

[0029] FIG. **10** shows plots of relative light scattering versus light diffractive particle size (nm) for red, green and blue light.

[0030] FIG. **11** is a schematic illustrating the principle of operation of a known light emitting device;

[0031] FIG. **12** is a schematic illustrating the principle of operation of the light emitting device having scattering particles mixed with phosphor particles in accordance with an embodiment of the invention;

[0032] FIG. **13** is a plot of emission intensity versus chromaticity CIE x for an LED-based light emitting device in accordance with the invention for different weight percent loadings of light reflective material;

[0033] FIG. **14** is a schematic illustrating a light emitting device having scattering particles within both a wavelength conversion layer and a diffusing layer according to an embodiment of the invention;

[0034] FIGs. **15** and **16** illustrate, respectively, a perspective view and a cross-sectional view of an application of a wavelength conversion component in accordance with some embodiments;

[0035] FIG. **17** is a schematic illustrating a light emitting device having a diffusing layer

formed as a dome-shaped shell, in which a wavelength conversion layer forms an inner layer on an interior surface of the dome-shaped diffusing layer, according to an embodiment of the invention;

[0036] FIG. **18** is a schematic illustrating a light emitting device having a diffusing layer formed as a dome-shaped shell, in which a wavelength conversion layer substantially fills an interior volume formed by the interior surface of the dome-shaped diffusing layer, according to an embodiment of the invention;

[0037] FIG. **19** is a schematic illustrating a light emitting device having a diffusing layer formed as a dome-shaped shell, in which a wavelength conversion layer having scattering particles substantially fills an interior volume formed by the interior surface of the dome-shaped diffusing layer, according to an embodiment of the invention;

[0038] FIGs. **20A**, **20B**, and **20C** illustrate an example of an application of a wavelength conversion component in accordance with some embodiments;

[0039] FIGs. **21A**, **21B**, and **21C** illustrate another example of an application of a wavelength conversion component in accordance with some embodiments;

[0040] FIG **22** illustrates another example of an application of a wavelength conversion component in accordance with some embodiments;

[0041] FIGs. **23A** and **23B** illustrate another example of an application of a wavelength conversion component in accordance with some embodiments; and

[0042] FIG. **24** illustrates a perspective of another application of a wavelength conversion component in accordance with some embodiments.

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DETAILED DESCRIPTION OF THE INVENTION

[0043] Some embodiments of the invention are directed to light emitting devices comprising one or more solid-state light emitters, typically LEDs, that is/are operable to generate excitation light (typically blue or UV) which is used to excite a wavelength conversion component containing particles of a photoluminescence materials (e.g. phosphor materials), such as a blue light excitable phosphor material or an UV excitable phosphor material. Additionally the wavelength conversion component comprises a light diffusing layer comprising particles of a light diffractive material (also referred to herein as "light scattering material"). One benefit of this arrangement is that by selecting an appropriate particle size and concentration per unit area of the light diffractive material, it is possible to make a device having an emission product color that is virtually uniform with emission angle over a ±60° range from the emission axis. Moreover the use of a light diffusing layer can substantially reduce the quantity of phosphor material required to generate a selected color of emitted light. In addition, the light diffusing layer can significantly improve the white appearance of the light emitting device in its OFF state.

[0044] For the purposes of illustration only, the following description is made with reference to photoluminescence material embodied specifically as phosphor materials. However, the invention is applicable to any type of any type of photoluminescence material, such as either phosphor materials or quantum dots. A quantum dot is a portion of matter (e.g. semiconductor) whose excitons are confined in all three spatial dimensions that may be excited by radiation energy to emit light of a particular wavelength or range of wavelengths. In addition, the following description is made with reference to radiation sources embodied specifically as blue light sources. However, the invention is applicable any type of radiation source, including blue light sources and UV light sources.

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[0045] A solid-state light emitting device **10** in accordance with an embodiment of the invention will now be described with reference to FIG. **1** which shows schematic partial cutaway plan and sectional views of the device. The device **10** is configured to generate warm white light with a CCT (Correlated Color Temperature) of approximately 3000K and a luminous flux of approximately 1000 lumens.

[0046] The device **10** comprises a hollow cylindrical body **12** composed of a circular disc-shaped base **14**, a hollow cylindrical wall portion **16** and a detachable annular top **18**. To aid in the dissipation of heat the base **14** is preferably fabricated from aluminum, an alloy of aluminum or any material with a high thermal conductivity (preferably $\geq 200 Wm^{-1}K^{-1}$) such as for example copper, a magnesium alloy or a metal loaded plastics material. For low cost production the wall **16** and top **18** are preferably fabricated from a thermoplastics material such as HDPP (High Density Polypropylene), nylon or PMA (polymethyl acrylate). Alternatively they can be fabricated from a thermally conductive material such as aluminum or an aluminum alloy. As indicated in FIG. **1** the base **14** can be attached to the wall portion **16** by screws or bolts **20** or by other fasteners or by means of an adhesive. As further shown in FIG. **1** the top **18** can be detachably mounted to the wall portion **16** using a bayonet-type mount in which radially extending tabs **22** engage in a corresponding annular groove in the top **18**.

[0047] The device **10** further comprises a plurality (four in the example illustrated) of blue light emitting LEDs **24** (blue LEDs) that are mounted in thermal communication with a circular-shaped MCPCB (metal core printed circuit board) **26**. The blue LEDs **24** can comprise 4.8W Cetus™ C1109 chip on ceramic devices from Intematix Corporation of Fremont, California in which each device comprises a ceramic packaged array of twelve 0.4W GaN-based (gallium nitride-based) blue LED chips that are configured as a rectangular array 3 rows by 4 columns.

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Each blue LED **24** is operable to generate blue light **28** having a peak wavelength λ_1 in a wavelength range 400nm to 480nm (typically 450nm to 470nm). As is known an MCPCB comprises a layered structure composed of a metal core base, typically aluminum, a thermally conductive/electrically insulating dielectric layer and a copper circuit layer for electrically connecting electrical components in a desired circuit configuration. The metal core base of the MCPCB **26** is mounted in thermal communication with the base **14** with the aid of a thermally conductive compound such as for example an adhesive containing a standard heat sink compound containing beryllium oxide or aluminum nitride. As shown in FIG. **1** the MCPCB can be attached to the base using screws or bolts **30**.

[0048] To maximize the emission of light, the device **10** can further comprise light reflective surfaces **32**, **34** that respectively cover the face of the MCPCB **26** and the inner curved surface of the top **18**. Typically the light reflective surfaces **32**, **34** can comprise a highly light reflective sheet material such as WhiteOptics™ "White 97" (A high-density polyethylene fiberbased composite film) from A.L.P. lighting Components, Inc of Niles, Illinois, USA. As indicated in FIG. **1** a circular disc **32** of the material can used to cover the face of the MCPCB and a strip of the light reflective material configured as a cylindrical sleeve **34** that is inserted in the housing and is configured to cover the inner surface of the housing wall portion **16**.

[0049] The device **10** further comprises a phosphor wavelength conversion component **36** that is operable to absorb a proportion of the blue light **28** (λ_1) generated by the LEDs **24** and convert it to light **38** of a different wavelength (λ_2) by a process of photoluminescence **36**. The emission product **40** of the device **10** comprises the combined light of wavelengths λ_1, λ_2 generated by the LEDs **24** and the phosphor wavelength conversion component **36**. The wavelength conversion component is positioned remotely to the LEDs **24** and is spatially

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separated from the LEDs a distance **d** that is typically at least 1cm. In this patent specification "remotely" and "remote" means in a spaced or separated relationship. The wavelength conversion component **36** is configured to completely cover the housing **12** opening such that all light emitted by the lamp passes through the component **36**. As shown the wavelength conversion component **36** can be detachably mounted to the top of the wall portion **16** using the top **18** enabling the component and emission color of the lamp to be readily changed.

[0050] As shown in FIG. **2**, the wavelength conversion component **36** comprises, in order, a light transmissive substrate **42**, a light diffusing layer **44** containing light diffractive particles and a wavelength conversion layer **46** containing one or more photoluminescent (e.g., phosphor) materials. As can be seen in FIG. **2** the wavelength conversion component **36** is configured such that in operation the wavelength conversion layer **46** faces the LEDs.

[0051] The light transmissive substrate **42** can be any material that is substantially transmissive to light in a wavelength range 380nm to 740nm and can comprise a light transmissive polymer such as a polycarbonate or acrylic or a glass such as a borosilicate glass. For the lamp **10** of FIG. **1** the substrate **42** comprises a planar circular disc of diameter φ= 62mm and thickness $\mathbf{t_1}$ which is typically 0.5mm to 3mm. In other embodiments the substrate can comprise other geometries such as being convex or concave in form such as for example being dome shaped or cylindrical.

[0052] The diffusing layer **44** comprises a uniform thickness layer of particles of a light diffractive material, preferably titanium dioxide (TiO_2). In alternative arrangements the light diffractive material can comprise barium sulfate ($BaSO_4$), magnesium oxide (MgO), silicon dioxide (SiO_2), aluminum oxide (Al_2O_3) or a powdered material with as high a reflectivity as possible, typically a reflectance of 0.9 or higher. The light diffractive material powder is

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thoroughly mixed in known proportions with a light transmissive liquid binder material to form a suspension and the resulting mixture deposited onto the face of the substrate **42** preferably by screen printing to form a uniform layer of thickness t_2 (typically in a range 10μm to 75μm) that covers the entire face of the substrate. The quantity of light diffracting material per unit area in the light diffusing layer **44** will typically in a range $10\mu g.cm^{-2}$ to $5mg.cm^{-2}$.

[0053] Whilst screen printing is a preferred method for depositing the light diffractive diffusing layer **44**, it can be deposited using other techniques such as for example slot die coating, spin coating, roller coating, drawdown coating or doctor blading. The binder material can comprise a curable liquid polymer such as a polymer resin, a monomer resin, an acrylic, an epoxy (polyepoxide), a silicone or a fluorinated polymer. It is important that the binder material is, in its cured state, substantially transmissive to all wavelengths of light generated by the phosphor material(s) and the LEDs **24** and preferably has a transmittance of at least 0.9 over the visible spectrum (380nm to 800nm). The binder material is preferably U.V. curable though it can be thermally curable, solvent based or a combination thereof. U.V. or thermally curable binders can be preferable because, unlike solvent-based materials, they do not "outgas" during polymerization. In one arrangement the average particle size of the light diffractive material is in a range 5μm to 15μm though as will be described it can be in a nanometer range (nm) and is advantageously in a range 100nm to 150nm. The weight percent loading of light diffractive material to liquid binder is typically in a range 7% to 35%.

[0054] The wavelength conversion layer **46** is deposited in direct contact with the light diffusing layer **44** without any intervening layers or air gaps. The phosphor material, which is in powder form, is thoroughly mixed in known proportions with a liquid light transmissive binder material to form a suspension and the resulting phosphor composition, "phosphor ink", deposited

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directly onto the diffusing layer **44**. The wavelength conversion layer is preferably deposited by screen printing though other deposition techniques such as slot die coating, spin coating or doctor blading can be used. To eliminate an optical interface between the wavelength conversion and diffusing layers **46**, **44** and to maximize the transmission of light between layers, the same liquid binder material is preferably used to fabricate both layers; that is, a polymer resin, a monomer resin, an acrylic, an epoxy, a silicone or a fluorinated polymer.

[0055] The phosphor wavelength conversion layer **46** is preferably deposited by screen printing though other deposition techniques such as for example slot die coating, spin coating, roller coating, drawdown coating or doctor blading can be used. The binder material is preferably U.V. or thermally curable rather than being solvent-based. When a solvent evaporates the volume and viscosity of the composition will change and this can result in a higher concentration of phosphor material which will affect the emission product color of the device. With U.V. curable polymers, the viscosity and solids ratios are more stable during the deposition process with U.V. curing being used to polymerize and solidify the layer after deposition is completed. Moreover since in the case of screen printing of the phosphor ink multiple-pass printing may be required to achieve a required layer thickness, the use of a U.V. curable binder is preferred since each layer can be cured virtually immediately after printing prior to printing of the next layer.

[0056] The color of the emission product produced by the wavelength conversion component depends on the phosphor material composition and the quantity of phosphor material per unit area in the wavelength conversion layer **46**. It will be appreciated that the quantity of phosphor material per unit area is dependent on the thickness t_3 of the wavelength conversion layer **46** and the weight loading of phosphor material to binder in the phosphor ink. In applications in which the emission product is white or in applications in which the emission product has a high

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saturation color (i.e. the emission product comprises substantially all photoluminescence generated light) the quantity of phosphor material per unit area in the wavelength conversion layer **46** will typically be between $10mg.cm^{-2}$ and $40mg.cm^{-2}$. To enable printing of the wavelength conversion layer **46** in a minimum number of print passes the phosphor ink preferably has as high a solids loading of phosphor material to binder material as possible and preferably has a weight loading of phosphor material to binder in a range 40% to 75%. For weight loadings below about 40% it is found that five or more print passes may be necessary to achieve a required phosphor material per unit area. The phosphor material comprises particles with an average particle size of 10μm to 20μm and typically of order 15μm.

[0057] In general lighting applications the emission product **40** will typically be white light and the phosphor material can comprise one or more blue light excitable phosphor materials that emit green (510nm to 550 nm), yellow-green (550nm to 570nm), yellow (570nm to 590nm), orange (590nm to 630nm) or red (630nm to 740nm) light. The thickness t_3 of the wavelength conversion layer, phosphor material composition and the density (weight loading) of phosphor material per unit area will determine the color of light emitted by the lamp.

[0058] The phosphor material can comprise an inorganic or organic phosphor such as for example silicate-based phosphor of a general composition $A_3Si(O,D)_5$ or $A_2Si(O,D)_4$ in which Si is silicon, O is oxygen, A comprises strontium (Sr), barium (Ba), magnesium (Mg) or calcium (Ca) and D comprises chlorine (Cl), fluorine (F), nitrogen (N) or sulfur (S). Examples of silicate-based phosphors are disclosed in United States patents US 7,575,697 B2 *"Silicate-based green phosphors"*, US 7,601,276 B2 *"Two phase silicate-based yellow phosphors"*, US 7,655,156 B2 *"Silicate-based orange phosphors"* and US 7,311,858 B2 *"Silicate-based yellow-green phosphors"*. The phosphor can also comprise an aluminate-based material such as

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is taught in co-pending patent application US2006/0158090 A1 *"Novel aluminate-based green phosphors"* and patent US 7,390,437 B2 *"Aluminate-based blue phosphors"*, an aluminum-silicate phosphor as taught in co-pending application US2008/0111472 A1 *"Aluminum-silicate orange-red phosphor"* or a nitride-based red phosphor material such as is taught in co-pending United States patent application US2009/0283721 A1 *"Nitride-based red phosphors"* and International patent application WO2010/074963 A1 *"Nitride-based red-emitting in RGB (red-green-blue) lighting systems"*. It will be appreciated that the phosphor material is not limited to the examples described and can comprise any phosphor material including nitride and/or sulfate phosphor materials, oxy-nitrides and oxy-sulfate phosphors or garnet materials (YAG).

[0059] A further example of a phosphor wavelength conversion component **36** in accordance with the invention is illustrated in FIG. **3**. In common with the wavelength conversion component of FIG. **2** the component comprises a light transmissive substrate **42**, a light diffusing layer **44** and a wavelength conversion layer **46**. In accordance with the invention the light diffusing and wavelength conversion layers **44, 46** are deposited in direct contact with one another. Again in operation the component is configured such that the wavelength conversion component is configured such that the light diffusing layer **44** faces the LEDs **24**.

[0060] In operation blue light **28** generated by the LEDs **24** travels through the wavelength conversion layer **46** until it strikes a particle of phosphor material. It is believed that on average as little as 1 in 1000 interactions of a photon with a phosphor material particle results in absorption and generation of photo luminescence light **38**. The majority, about 99.9%, of interactions of photons with a phosphor particle result in scattering of the photon. Due to the isotropic nature of the scattering process on average half of the photons will scattered in a direction back towards the LEDs. Tests indicate that typically about 10% of the total incident

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blue light **28** is scattered and emitted from the wavelength conversion component **36** in a direction back towards the LEDs. For a cool white light emitting device the amount of phosphor material is selected to allow approximately 10% of the total incident blue light to be emitted from the wavelength conversion component and contribute to the emission product **40** that is viewed by an observer **21**. The majority, approximately 80%, of the incident light is absorbed by the phosphor material and re-emitted as photo luminescence light **38**. Due to the isotropic nature of photo luminescence light generation, approximately half of the light **38** generated by the phosphor material will be emitted in a direction towards the LED. As a result only up to about 40% of the total incident light will be emitted as light **38** of wavelength λ_2 and contributes to the emission product **38** with the remaining (up to about 40%) of the total incident light being emitted as light **38** of wavelength λ_2 in a direction back towards the LED. Light emitted towards the LEDs from the wavelength conversion component **36** is re-directed by the light diffractive surfaces **32**, **34** to contribute to the emission product and to increase the overall efficiency of the device.

[0061] One problem associated with a conventional LED lighting device that is addressed by embodiments of the invention is the non-white color appearance of the device in an OFF state. As discussed, during an ON state, the LED chip or die generates blue light and some portion of the blue light is thereafter absorbed by the phosphor(s) to re-emit yellow light (or a combination of green and red light, green and yellow light, green and orange or yellow and red light). The portion of the blue light generated by the LED that is not absorbed by the phosphor combined with the light emitted by the phosphor provides light which appears to the human eye as being nearly white in color.

[0062] However, in an OFF state, the LED chip or die does not generate any blue light.

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Instead, light that is produced by the remote phosphor lighting apparatus is based at least in part upon external light (e.g., sunlight or room lights) that excites the phosphor material in the wavelength conversion component, and which therefore generates a yellowish, yellow-orange or orange color in the photoluminescence light. Since the LED chip or die is not generating any blue light, this means that there will not be any residual blue light to combine with the yellow/orange light from the photoluminescence light of the wavelength conversion component to generate white appearing light. As a result, the lighting device will appear to be yellowish, yellow-orange or orange in color. This may be undesirable to the potential purchaser or customer that is seeking a white-appearing light.

[0063] According to some embodiments, the light diffusing layer **44** provides the additional benefit of addressing this problem by improving the visual appearance of the device in an OFF state to an observer **21**. In part, this is because the light diffusing layer **44** includes particles of a light diffractive material that can substantially reduce the passage of external excitation light that would otherwise cause the wavelength conversion component to re-emit light of a wavelength having a yellowish/orange color.

[0064] The particles of a light diffractive material in the light diffusing layer **44** are selected, for example, to have a size range that increases its probability of scattering blue light, which means that less of the external blue light passes through the light diffusing layer **44** to excite the wavelength conversion layer **46**. Therefore, the remote phosphor lighting apparatus will have more of a white appearance in an OFF state since the wavelength conversion component is emitting less yellow/red light.

[0065] The light diffractive particle size can be selected such that the particles will scatter blue light relatively at least twice as much as they will scatter light generated by the phosphor

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material. Such a light diffusing layer **44** ensures that during an OFF state, a higher proportion of the external blue light received by the device will be scattered and directed by the light diffractive material away from the wavelength conversion layer **46**, decreasing the probability of externally originated photons interacting with a phosphor material particle and minimizing the generation of the yellowish/orange photoluminescent light. However, during an ON state, phosphor generated light caused by excitation light from the LED light source can nevertheless pass through the diffusing layer **44** with a lower probability of being scattered. Preferably, to enhance the white appearance of the lighting device in an OFF state, the light diffractive material within the light diffusing layer **44** is a "nano-particle" having an average particle size of less than about 150nm. For light sources that emit lights having other colors, the nano-particle may correspond to other average sizes. For example, the light diffractive material within the light diffusing layer **44** for an UV light source may have an average particle size of less than about 100nm.

[0066] Therefore, by appropriate selection of the average particle size of the light scattering material, it is possible to configure the light diffusing layer such that it scatters excitation light (e.g., blue light) more readily than other colors, namely green and red as emitted by the photoluminescence materials. FIG. **10** shows plots of relative light scattering versus TiO_2 average particle size (nm) for red, green and blue light. As can be seen from FIG. **10**, TiO_2 particles with an average particle size of 100nm to 150nm are more than twice as likely to scatter blue light (450nm to 480nm) than they will scatter green light (510nm to 550nm) or red light (630nm to 740nm). For example TiO_2 particles with an average particle size of 100nm will scatter blue light nearly three times (2.9=0.97/0.33) more than it will scatter green or red light. For TiO_2 particles with an average particle size of 200nm these will scatter blue light over twice

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(2.3=1.6/0.7) as much as they will scatter green or red light. In accordance with some embodiments of the invention, the light diffractive particle size is preferably selected such that the particles will scatter blue light relatively at least twice as much as light generated by the phosphor material(s).

[0067] Another problem with remote phosphor devices that can be addressed by embodiments of the invention is the variation in color of emitted light with emission angle. In particular, remote phosphor devices are often subject to perceptible non-uniformity in color when viewed from different angles.

[0068] Embodiments of the invention correct for this problem, since the addition of a light diffusing layer **44** in direct contact with the wavelength conversion layer **46** significantly increases the uniformity of color of emitted light with emission angle θ. The emission angle θ is measured with respect to an emission axis **48** (FIG. **1**). FIG. **4** shows plots of measured CIE color change versus emission angle θ for the lamp of FIG. **1** for wavelength conversion components **36** comprising diffusing layer **44** with percentage (%) weight loadings of light diffractive material to binder material of 0%, 7%, 12%, 16%, 23% and 35%, according to some example implementations of the invention. All emission color measurements were measured at a distance of 10m from the lamp **10** for wavelength conversion components in which the light diffusing layer comprises light diffractive particles of TiO_2 with an average particle size ≈5μm. For comparison the data for a 0% percentage loading of $Ti0_2$ correspond to a wavelength conversion component that does not include a light diffusing layer.

[0069] The measured color change is derived from the relationship:

$$\text{CIE change} = \sqrt{(\text{CIE } x_{\theta^\circ} - \text{CIE } x_{0^\circ})^2 + (\text{CIE } y_{\theta^\circ} - \text{CIE } y_{0^\circ})^2}$$

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where CIE x_{θ° is the measured CIE chromaticity x value at an emission angle of θ°, CIE x_{0° is the measured CIE chromaticity x value for an emission angle of $\theta=0^\circ$, CIE y_{θ° is the measured CIE chromaticity y value at an emission angle of θ° and CIE y_{0° is the measured CIE chromaticity y value at an emission angle of $\theta=0^\circ$. It will be appreciated that the CIE change is normalized to the light color at an emission angle $\theta=0^\circ$ (i.e. the CIE change is always 0 for $\theta=0^\circ$).

[0070] As can be seen in FIG. **4** for a wavelength conversion component with no light diffusing layer (i.e. 0% $Ti0_2$ loading), the color of light generated by such a lamp can alter by a CIE change of nearly 0.07 for emission angles up to $\theta=60^\circ$. In comparison for a wavelength conversion component **36** in accordance with the invention that includes a light diffusing layer **44** with a percentage weight loading of TiO_2 of only 7% the change in emission color over a 60° range drops to about 0.045. As can be seen from this figure, increasing the percentage weight loading of TiO_2 decreases the change in emission color over a 60° angular range. For example for a 35% TiO_2 percentage weight loading the CIE color change is less than 0.001. Although the change in emission color with emission angle decreases with increasing TiO_2 loading the total emission intensity will also decrease.

[0071] FIG. **5** shows measured luminous efficacy versus CIE color change at an emission angle $\theta=60^\circ$ for wavelength conversion components **36** comprising diffusing layer **44** with percentage (%) weight loadings of TiO_2 to binder material of 0%, 7%, 12%, 16%, 23% and 35% for an example implementation of the invention. The luminous efficacy values are normalized relative to a lamp that does not include a light diffusing layer (i.e. 0% TiO_2 loading). The CIE color change @ $\theta=60^\circ$ is determined from the relationship:

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$$\sqrt{(\text{CIE } x_{60°} - \text{CIE } x_{0°})^2 + (\text{CIE } y_{60°} - \text{CIE } y_{0°})^2}$$

where CIE $x_{60°}$ is the measured CIE chromaticity x value at an emission angle of 60°, CIE $x_{0°}$ is the measured CIE chromaticity x value for an emission angle of 0°, CIE $y_{60°}$ is the measured CIE chromaticity y value at an emission angle of 60° and CIE $y_{0°}$ is the measured CIE chromaticity y value at an emission angle of 0°. As can be seen from FIG. **5**, there can be as much as a 25% decrease in luminous efficacy for a wavelength conversion component with a light diffusing layer containing a 35% weight loading of TiO_2. It will be appreciated when selecting the weight loading of light diffractive material in light diffusing layer a balance should be struck between improving emission color uniformity with emission angle and the decrease in luminous efficacy of the lamp. Wavelength conversion component in accordance with some embodiments of the invention preferably has a light diffusing layer with percentage weight loading of light diffractive material to binder material in a range 10% to 20%.

[0072] FIG. **6** shows plots of measured CIE color change versus emission angle θ for an example implementation of a 3000K white light emitting lamp **10** for conversion components **36** comprising diffusing layer **44** with percentage (%) weight loadings of TiO_2 to binder material of 0%, 10%, 15% and 20% whilst FIG. **7** shows corresponding measured luminous efficacy versus CIE color change at an emission angle θ=60°.

[0073] FIG. **8** is a 1931 chromaticity diagram showing the color CIE x, CIE y) of emitted light at emission angles θ=0°, 15°, 30°, 45° and 60° for a an example 3000K white light emitting LED-based lamp in accordance with the invention for wavelength conversion components containing 0%, 10%, 15% and 20% weight loadings of TiO_2. For comparison FIG. **8** also includes the black body radiation curve and ANSI C78.377A *"Specification for chromaticity of*

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white solid state lighting products" S and R quadrangles for white light of 3500K and 3000K respectively. Each quadrangle is equivalent to approximately seven MacAdam ellipses whilst each sub quadrangle (S02, S03, S06, S07, R02, R03, R06, R07) is equivalent to approximately four McAdam ellipses. As is known a MacAdam ellipse is a region on a chromaticity diagram which contains all colors which are indistinguishable, to the average human eye **21**, from the color at the center of the ellipse. As can be seen from FIG. **8** for a lamp without a light diffusing layer (0% TiO_2), the variation in emission color for emission angles of over a range θ=0° to 60° is approximately three MacAdam ellipses. For a lamp including a light diffusing layer with a 10% weight loading of TiO_2, the variation in emission color with emission angle is less than two MacAdam ellipses with a corresponding decrease in luminous efficacy of about 2% (FIG. 7). For a lamp including a light diffusing layer with a 15% weight loading of TiO_2, the variation in emission color with emission angle is approximately one MacAdam ellipse with a corresponding decrease in luminous efficacy of about 5% (FIG. 7). For such a lamp, an average person **21** would be unable to perceive the variation in emission color with emission angle. For a lamp including a light diffusing layer with a 20% weight loading of TiO_2 the variation in emission color with emission angle is less than one MacAdam ellipse with a corresponding decrease in luminous efficacy of about 9% (FIG. 7). It will be appreciated the inclusion of a light diffusing layer **44** in accordance with the invention can virtually eliminate the effects of emission color variation with emission angle whilst maintaining an acceptable luminous efficacy.

[0074] Embodiments of the present invention can also be used to reduce the amount of phosphor materials that is required to manufacture an LED lighting product, thereby reducing the cost of manufacturing such products given the relatively costly nature of the phosphor materials. In particular, the addition of a light diffusing layer **44** composed of particles of a light diffractive

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material can substantially reduce the quantity of phosphor material required to generate a selected color of emitted light. This means that relatively less phosphor is required to manufacture a wavelength conversion component as compared to comparable prior art approaches. As a result, it will be much less costly to manufacture lighting apparatuses that employ such wavelength conversion components, particularly for remote phosphor lighting devices.

[0075] In operation, the diffusing layer **44** increases the probability that a photon will result in the generation of photoluminescence light by reflecting light back into the wavelength conversion layer **46**. Therefore, inclusion of a diffusing layer with the wavelength conversion layer can reduce the quantity of phosphor material required to generate a given color emission product, e.g., by up to 40%.

[0076] As previously noted, the light diffusing layer **44** can be configured such that it selectively scatters excitation light generated by the LEDs (e.g., blue light) more than it scatters light generated by the phosphor material. Such a light diffusing layer **44** ensures that a higher proportion of the blue light emitted from the wavelength conversion layer will be scattered and directed by the light diffractive material back into the wavelength conversion layer increasing the probability of the photon interacting with a phosphor material particle and resulting in the generation of photoluminescence light. At the same time phosphor generated light can pass through the diffusing layer with a lower probability of being scattered. Since the diffusing layer increases the probability of blue photons interacting with a phosphor material particle less phosphor material can be used to generate a selected emission color. Such an arrangement can also increase luminous efficacy of the wavelength conversion component/device.

[0077] The light diffusing layer **44** can be used in combination with additional scattering (or

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reflective/diffractive) particles in the wavelength conversion component to further reduce the amount of phosphor material that is required to generate a selected color of emitted light. As disclosed in U.S. Application Ser. No. 13/253,031 (which is hereby incorporated by reference in its entirety), a wavelength conversion component comprises particles of a light scattering material (also referred to herein as "light reflecting material") that is incorporated with the phosphor material to enhance photoluminescence light generation by the phosphor material. The enhanced light generation results from the light reflective material increasing the number of collisions of light generated by the light emitter(s) with particles of the phosphor material. The net result is a decrease in phosphor material usage for the light emitting devices.

[0078] To explain this aspect of the current embodiment, it is helpful to first provide an explanation of the prior art approach that does not mix phosphors with scattering particles. FIG. **11** shows a schematic of an LED-based light emitting device that utilizes phosphor wavelength conversion without scattering particles mixed in with phosphors. The known device of FIG. **11** includes a wavelength conversion component that includes phosphor material particles **120** homogeneously distributed throughout the volume of a light transmissive binder **124**. Unlike the device of the invention, the known devices do not include particles of a light scattering material. In operation blue light **126** from the LED is transmitted by the light transmissive binder **124** until it strikes a particle of phosphor material. It is believed that on average as little as 1 in a 10,000 interactions of a photon with a phosphor material particle results in absorption and generation of photoluminescence light. The majority, about 99.99%, of interactions of photons with a phosphor particle result in scattering of the photon. Due to the isotropic nature of the scattering process on average half the scattered photons will be in a direction back towards the LED. Tests indicate that typically about 10% of the total incident blue light is scattered and emitted from the

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wavelength conversion component in a direction back towards the LED. For a cool white light emitting device the amount of phosphor material is selected to allow approximately 10% of the total incident blue light to be emitted through the window and contribute to the emission product. The majority, approximately 80%, of the incident light is absorbed by the phosphor material and re-emitted as photoluminescence light **128**. Due to the isotropic nature of photoluminescence light generation, approximately half of the light **128** generated by the phosphor material will be emitted in a direction towards the LED. As a result up to (↑) 40% of the total incident light will be emitted as light **128** of wavelength λ_2 and contributes to the emission product **130** whilst up to (↑) 40% of the total incident light will be emitted as light **128** of wavelength λ_2 in a direction back towards the LED. Typically light that is emitted towards the LED is re-directed by a reflector (not shown) to increase the overall efficacy of the device.

[0079] FIG. **12** shows a schematic of operation of a device that is similar to that of FIG. **11** but additionally includes reflection or scattering of light (of wavelengths λ_1 and λ_2) by the particles of the light reflective/scattering material. By including particles of a light reflective material with the phosphor material, this can reduce the amount of phosphor material required to generate a given color emission product, e.g. by up to 33% in some embodiments. The particles of light reflective material increase the probability of photons striking a particle of phosphor material and thus for an emission product of a given color less phosphor material is required.

[0080] FIG. **13** is a plot of emission intensity versus chromaticity CIE x for a light emitting device in accordance with some embodiments of the invention for weight percent loadings of light reflective material of ♦- 0%, ■- 0.4%, ▲- 1.1% and ●- 2%. The data are for screen printed phosphor conversion layers in which the binder material comprises Nazdar's® UV curable litho clear overprint PSLC-294 and the phosphor material comprises Intematix Corporation's

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phosphor EY4453 with an average particle size of 15μm. The ratio of phosphor material to clear ink is in a proportion of 2:1 by weight. The light reflective material comprises Norcote International Inc's super white ink GN-027SA. The figures for loading of light reflective material refer to weight percent of super white ink to clear ink. The smaller reference numerals associated with each data point indicate the number 'n' of print passes used to form the phosphor layer.

[0081] The phosphor material and light scattering material, which can be in powder form, are thoroughly mixed in known proportions with the light transmissive binder material, such as a polymer material (for example a thermally or UV curable silicone or an epoxy material) or a clear ink such as for example Nazdar's® UV curable litho clear overprint PSLC-294. The mixture is applied to the face of a substrate as one or more layers of uniform thickness. In a preferred embodiment the mixture is applied to the light transmissive window by screen printing and the thickness **t** of the layer controlled by the number of printing passes. The phosphor/reflective material mixture can be applied using other methods including inkjet printing, spin coating or sweeping the mixture over the surface using a blade such as a squeegee (e.g. doctor blading).

[0082] It will be appreciated that the number of print passes is directly proportional to the thickness of the phosphor layer **118** and quantity of phosphor. The ovals **132, 134, 136, 138** are used to group data points for emission products that have substantially the same intensity and CIE x values. For example oval **132** indicates that an emission product of similar intensity and color can be produced for a phosphor conversion layers **118** comprising i) 3 print passes without light reflective material and ii) 2 print passes with a 2% loading of light reflective material. These data indicate that by the inclusion of a 2% weight loading of light reflective material it is

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possible to generate the same color and intensity of light using a phosphor conversion layer **118** that comprises about 33% less phosphor material. Oval **134** indicates that the same intensity and color of emission product is produced for a phosphor conversion layer comprising i) 4 print passes without light reflective material and ii) 3 print passes with a 0.4% loading of light reflective material. These data indicate that for this embodiment, by the inclusion of a 0.4% weight loading of light reflective material, the same color and intensity of light can be produced using a phosphor conversion layer comprising about 25% less phosphor. Oval **136** indicates that the same intensity and color of emission product is produced for a phosphor conversion layer comprising i) 4 print passes without light reflective material and ii) 3 print passes with a 1.1% loading of light reflective material. These data indicate that by the inclusion of a 1.1% weight loading of light reflective material the same color and intensity of light can be produced using a phosphor conversion layer comprising about 25% less phosphor. Oval **138** indicates that the same intensity and color of emission product is produced for a phosphor conversion layer comprising i) 4 print passes with a 0.4% weight loading of light reflective material and ii) 3 print passes with a 2% weight loading of light reflective material. These data indicate by the inclusion of a 0.4% weight loading of light reflective material that the same color and intensity of light can be produced using a phosphor conversion layer comprising about 25% less phosphor. Points **140** (n=4, 1.1% loading) and **142** (n=4, 2% loading) suggest that a saturation point exists above which an increase in light reflective material loading results in a decrease in emission intensity with little effect on the color.

[0083] It is envisioned in further embodiments to incorporate the mixture of phosphor and light reflective material mixture within a light transmissive window. For example the phosphor and light reflective material mixture can be mixed with a light transmissive polymer and the

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polymer/phosphor mixture extruded or injection molded to form the wavelength conversion component **36** with the phosphor and light reflective material homogeneously distributed throughout the volume of the component.

[0084] The light scattering material **122** comprises a powdered material with a high reflectivity typically a reflectance of 0.9 or higher. The particle size of the light reflective material is typically in a range 0.1μm to 10μm and in a preferred embodiment is within a range 0.1μm to 10μm. The weight percent loading of light reflective material to phosphor material is in a range 0.1% to 10% and in a preferred embodiment in a range 1% to 2%. Examples of light reflective materials include magnesium oxide (MgO), titanium dioxide (TiO_2), barium sulfate ($BaSO_4$) and combinations thereof. The light reflective material can also comprise a white ink such as for example Norcote International Inc's super white ink GN-027SA which already includes particles of a highly light reflective material, typically TiO_2.

[0085] FIG. **14** illustrates a representation of a LED-based white light emitting device in accordance with an embodiment of the invention, which includes a wavelength conversion component **36** having a wavelength conversion layer **46** that includes a mixture of phosphor material particles **120** and light scattering particles **122** distributed throughout the volume of a light transmissive binder material **124**. The particles of light scattering particles **122** increase the probability of photons striking phosphor material particles **120,** and thus for an emission product of a given color less phosphor material is required.

[0086] Wavelength conversion component **36** also includes a diffusing layer **44** that comprises light scattering particles **152** within a binder material **150**. The light scattering particles **152** within the light diffusing layer **44** selectively scatters blue light **126** generated by the LEDs more than it scatters light **128** generated by the phosphor material **120**. Such a light

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diffusing layer **44** ensures that a higher proportion of the blue light **126** emitted from the wavelength conversion layer **46** will be scattered and directed by the light scattering material **152** back into the wavelength conversion layer **46** increasing the probability of the photon interacting with a phosphor material particle **120** and resulting in the generation of photoluminescence light. At the same time phosphor generated light can pass through the diffusing layer **44** with a lower probability of being scattered. Since the diffusing layer **44** increases the probability of blue photons interacting with a phosphor material particle **120**, less phosphor material can be used to generate an emitted light **130** of a selected emission color that is visible to an observer **21**.

[0087] Therefore, the combination of a diffusing layer **44** having scattering particles **152** and a wavelength conversion layer **46** that also includes light scattering particles **122** results in a wavelength conversion component that requires much less phosphor materials **120** to generate a given color emission product. Both sets of scattering particles **122** and **152** act in combination to increase the probability of photons striking a particle of phosphor material **120**, and thus require less phosphor material for a given color.

[0088] The two sets of scattering particles **122** and **152** can have different material properties. For example, the scattering particles **122** within the wavelength conversion layer **46** can be selected to have a relatively larger average particle size. On the other hand, the scattering particles **152** within the diffusing layer **44** can be selected to be nano-particles having a relatively smaller average particle size that is selected such that the particles **152** will scatter excitation (typically blue) light relatively more than they will scatter light generated by the photoluminescence (phosphor) material(s). Therefore, some embodiments employ a light scattering material **152** that has an average particle size of less than about 150nm and typically has an average particle size in a range of 100nm to 150nm. Alternative embodiments can

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implement both sets of scattering particles **122** and **152** having the same or substantially the same particle size, e.g., to employ nano-particles in both the wavelength conversion layer **46** and the diffusing layer **44**.

[0089] The inventive concepts disclosed herein may be applied to wavelength conversion components that encompass any suitable shape. For example, consider the LED light bulb **200** illustrated in FIGS. **15** and **16** which illustrate a perspective view and a cross-sectional view of an application of an LED light bulb that utilizes a wavelength conversion component in accordance with some embodiments. The LED light bulb **200** is intended to be used as an energy efficient replacement for a conventional incandescent or fluorescent light bulb.

[0090] The light bulb **200** comprises a screw base **206** that is configured to fit within standard light bulb sockets, e.g. implemented as a standard Edison screw base. The light bulb **200** may further comprise a thermally conductive body **204** fabricated from, for example, die cast aluminum. The body **204** functions as a heat sink and dissipates heat generated by the light emitters **112**, which are mounted on a MCPCB (Metal Core Printed Circuit Board). To increase heat radiation from the light bulb **200** and thereby increase cooling of the light bulb **200**, the body **204** can include a series of latitudinal radially extending heat radiating fins **207**.

[0091] The light bulb **200** further comprises a wavelength conversion component **36** having a three-dimensional shape, e.g., elongated dome shape shell having an interior volume defined by its inner surface that encloses the light emitters **112** within the interior volume. The three dimensional wavelength conversion component **36** includes a three-dimensional light transmissive thermally conductive substrate **703** in thermal contact with a three-dimensional wavelength conversion layer **701.**

[0092] An envelope **208** extends around the upper portion of the LED light bulb **200**, enclosing the LEDs **112** and the wavelength conversion component **36**. The envelope **208** is a light-transmissive material (e.g. glass or plastic) that provides protective and/or diffusive properties for the LED light bulb **200**.

[0093] The blue LED device **112** resides on the top surface of the lighting base **204**, beneath the wavelength conversion component **36**, which comprises both a light diffusing layer **44** and a wavelength conversion layer **46**. The three-dimensional nature of the wavelength conversion component **36** creates a relatively large shape that surrounds the interior volume around and above the LEDs **112**. Using three-dimensional shapes for the wavelength conversion component **36** in a lighting device **200** allows for certain functional advantages, such as the ability to perform light shaping for the light emitted by the lighting device **200**.

[0094] However, these types of three-dimensional shapes for the wavelength conversion component **36** also correspond to a relatively large volume for the wavelength conversion component which needs to be populated with adequate amounts of the phosphor materials. With prior art approaches, a significantly large amount of phosphor material would therefore be required to manufacture such wavelength conversion components **36**.

[0095] Embodiments of the invention may be employed to reduce the amount of phosphor needed to manufacture such wavelength conversion components **36**. In particular, the wavelength conversion component **36** comprises a light diffusing layer **44** that is adjacent to a wavelength conversion layer **46**, where either or both of these layers may include a light scattering material. Since the scattering material within the wavelength conversion component **36** has the property of scattering light, this reduces the amount of phosphor material that is needed for the wavelength conversion component **36**.

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[0096] In addition, the light diffusing layer **44** also serves to improve the OFF state color appearance of the LED lighting device **200** based at least in part on the properties of the particles of diffracting materials within the diffusing layer **44**.

[0097] FIG. **17** illustrates an embodiment of the invention comprising a dome-shaped wavelength conversion component **36** that includes a light diffusing layer **44** adjacent to a wavelength conversion layer **46**, where either or both the light diffusing layer **44** and the wavelength conversion layer **46** comprise light scattering particles. As with the other described embodiments, the light scattering particles within the light diffusing layer **44** scatters blue light **126** generated by the LEDs **112** more than it scatters light **128** generated by the phosphor material within the wavelength conversion layer **46**, which ensures that a higher proportion of the blue light **126** emitted from the wavelength conversion layer **46** will be scattered and directed by the light scattering material **152** back into the wavelength conversion layer **46** increasing the probability of the photon interacting with a phosphor material particles and resulting in the generation of photoluminescence light. At the same time phosphor generated light can pass through the diffusing layer **44** with a lower probability of being scattered. Since the diffusing layer **44** increases the probability of blue photons interacting with a phosphor material particle, less phosphor material can be used to generate an emitted light **130** of a selected emission color that is visible to an observer **21**.

[0098] The three-dimensional wavelength conversion components of FIGs. **15-17** can be manufactured using any suitable means. For example, a molding process (e.g., injection molding) can be used to manufacture the two layers of the light diffusing layer **44** and the wavelength conversion layer **46**. For the light diffusing layer **44**, light diffractive material may be mixed with a solid light-transmissive polymer material, in which the phosphor material and

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the light-transmissive polymer material undergo a heating process that melts and mixes the phosphor material with the polymer material into a liquid, which is then injected into a mold and then cooled to form the final shape of the light diffusing layer **44**. For the wavelength conversion layer **46**, a similar molding process may be utilized, in which the phosphor material and the light-transmissive polymer material are heated and drawn into a mold (e.g., the light diffusing layer **44**). A heating process will melt and mix the phosphor material with the polymer material, which is then cooled to form the final shape of the wavelength conversion layer **46**. Hot runners may be employed to ensure efficient usage of the constituent components for the molding process. Vacuum molding may also be employed to manufacture the three-dimensional wavelength conversion components. In addition, light scattering particles may be introduced into the materials of the wavelength conversion layer **46**, thereby reducing the amount of phosphor material that is required.

[0099] FIG. **18** illustrates an alternative embodiment of the invention, comprising a three-dimensional wavelength conversion component **36** that includes a dome-shaped light diffusing layer **44**. In this embodiment, the wavelength conversion layer **46'** fills a substantial portion of the volume defined by the interior surface of the light diffusing layer **44**, rather than being embodied as a thin layer directly adjacent to the light diffusing layer **44** as described in FIG. **17**. One possible advantage of the approach of FIG. **17** over the approach of FIG. **18** is the increased conversion efficiency for converting the blue light **126** generated by the LEDs **112** into the light **128** generated by the phosphor material within the wavelength conversion layer **46'**. However, a possible disadvantage is the negative performance that may result from excessive heating of the phosphor material within the wavelength conversion layer **46'** due to its close proximity to the LEDs **112**.

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[00100] FIG. **19** illustrates another embodiment of the invention that comprises a wavelength conversion component **36** with a dome-shaped light diffusing layer **44**. In this embodiment, the wavelength conversion layer **46''** fills a substantial portion of the volume defined by the light diffusing layer **44**, but in which scattering particles are also distributed within the wavelength conversion layer **46''**. The scattering particles within the wavelength conversion layer **46''** has the property of scattering light, which reduces the amount of phosphor material that is needed for the wavelength conversion component **36**. In addition, the light diffractive material within the light diffusing layer **44** serves to improve the OFF state color appearance of the LED lighting device **200**, while also reducing the amount of phosphor material required for the wavelength conversion layer **46''**.

[00101] The wavelength conversion components of FIGs. **18** and **19** can be manufactured using any suitable means. For example, a molding process (e.g., injection molding or vacuum molding) can be used to manufacture the light diffusing layer **44**. For the light diffusing layer **44**, light diffractive material may be mixed with a solid light-transmissive polymer material (e.g., in the form of polymer pellets), which are heated and injected into a mold in the desired shape for the light diffusing layer **44**. The heating process will melt and mix the light diffractive material with the polymer material in the mold, which is then cooled to form the final shape of the light diffusing layer **44**. For the wavelength conversion layer, the phosphor material may be mixed with a liquid binder material, with the resulting mixture poured into the interior volume formed by the inner surfaces of the light diffusing layer **44**. A curing process is then employed to cure the wavelength conversion layer not its final form. Scattering particles may also be placed into the phosphor/binder mixture to reduce the amount of phosphor that is required.

[00102] A high CRI solid-state light emitting device **10** in accordance with another

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embodiment of the invention will now be described with reference to FIG. **9** which shows schematic partial cutaway plan and sectional views of the device. The device **10** is configured to generate warm white light with a CCT of ≈3000K, a luminous flux of about 1100 lumens and a CRI (Color Rendering Index) greater than 90. The device **10** is essentially the same as that of FIG. **1** and additionally comprises one or more red light emitting LEDs (red LEDs) **50**. As shown in FIG. **9** the red LED(s) can comprise a packaged array of red LED chips. The red LED chips can comprise AlGaAs (aluminum gallium arsenic), GaAsP (gallium arsenic phosphide), AlGaInP (aluminum gallium indium phosphide) or GaP (gallium phosphide) LED that are operable to generate red light **52** having a peak wavelength λ_3 in a wavelength range 610nm to 670nm. The emission product **38** of the device **10** comprises the combined blue **28** (λ_1) and red **52** (λ_3) light by generated by the LEDs **24, 50** and photoluminescence light **38** generated by the phosphor wavelength conversion component **36**. Operation of the device **10** of FIG. **9** is analogous to that of the device of FIG. **1** and is not described further. Initial tests of the device of FIG. **9** indicate that the light diffusing layer **44** increases the angular emission color uniformity of the device by blending the red, blue and phosphor generated light.

[00103] FIGs. **20A**, **20B**, and **20C** illustrate an example of an application of a wavelength conversion component in accordance with some embodiments of the invention. FIG. **20A**, **20B**, and **20C** illustrates an LED downlight **1000** that utilizes remote wavelength conversion in accordance with some embodiments. FIG. **20A** is an exploded perspective view of the LED downlight **1000**, FIG. **20B** is an end view of the downlight **1000**, and FIG. **20C** is a sectional view of the downlight **1000**. The downlight **1000** is configured to generate light with an emission intensity of 650-700 lumens and a nominal beam spread of 60° (wide flood). It is intended to be used as an energy efficient replacement for a conventional incandescent six inch downlight.

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[00104] The downlight **1000** comprises a hollow generally cylindrical thermally conductive body **1001** fabricated from, for example, die cast aluminum. The body **1001** functions as a heat sink and dissipates heat generated by the LEDs **1007**. To increase heat radiation from the downlight **1000** and thereby increase cooling of the light emitting device **1000**, the body **1001** can include a series of latitudinal spirally extending heat radiating fins **1003** located towards the base of the body **1001**. To further increase the radiation of heat, the outer surface of the body can be treated to increase its emissivity such as for example painted black or anodized. The body **1001** further comprises a generally frustoconical (i.e. a cone whose apex is truncated by a plane that is parallel to the base) axial chamber **1005** that extends from the front of the body a depth of approximately two thirds of the length of the body. The form factor of the body **1001** is configured to enable the downlight to be retrofitted directly in a standard six inch downlighting fixture (can) as are commonly used in the United States.

[00105] Four solid state light emitters **1007** are mounted as a square array on a circular shaped MCPCB **1009**. As is known an MCPCB comprises a layered structure composed of a metal core base, typically aluminum, a thermally conducting/electrically insulating dielectric layer and a copper circuit layer for electrically connecting electrical components in a desired circuit configuration. With the aid of a thermally conducting compound such as for example a standard heat sink compound containing beryllium oxide or aluminum nitride the metal core base of the MCPCB **1009** is mounted in thermal communication with the body via the floor of the chamber **1005**. The MCPCB **1009** can be mechanically fixed to the body floor by one or more screws, bolts or other mechanical fasteners.

[00106] The downlight **1000** further comprises a hollow generally cylindrical light reflective chamber wall mask **1015** that surrounds the array of light emitters **1007**. The chamber wall mask

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1015 can be made of a plastics material and preferably has a white or other light reflective finish. A wavelength conversion component **36** may be mounted overlying the front of the chamber wall mask **1015** using, for example, an annular steel clip that has resiliently deformable barbs that engage in corresponding apertures in the body. The wavelength conversion component **36** is remote to the light emitting devices **1007**.

[00107] The wavelength conversion component **36** comprises a light diffusing layer **44** adjacent to a wavelength conversion layer **46** as described above. By placing the wavelength conversion layer **46** adjacent to a light diffusing layer **44**, the light scattering particles within the light diffusing layer **44** scatters blue light generated by the light emitters **1007** more than it scatters light generated by the phosphor material within the wavelength conversion layer **46**. This ensures that a higher proportion of the blue light emitted from the wavelength conversion layer **46** will be scattered and directed by the light scattering material back into the wavelength conversion layer **46** increasing the probability of the photon interacting with a phosphor material particles and resulting in the generation of photoluminescence light. At the same time phosphor generated light can pass through the diffusing layer **44** with a lower probability of being scattered. Since the diffusing layer **44** increases the probability of blue photons interacting with a phosphor material particle, less phosphor material can be used to generate an emitted light of a selected emission color. In addition, during its OFF state, the diffusing layer **44** also serves to improve the white color of the light **1000**.

[00108] The downlight **1000** further comprises a light reflective hood **1025** which is configured to define the selected emission angle (beam spread) of the downlight (i.e. 60° in this example). The hood **1025** comprises a generally cylindrical shell with three contiguous (conjoint) inner light reflective frustoconical surfaces. The hood **1025** is preferably made of

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Acrylonitrile butadiene styrene (ABS) with a metallization layer. Finally the downlight **1025** can comprise an annular trim (bezel) **1027** that can also be fabricated from ABS.

[00109] FIGs. **21A**, **21B**, and **21C** illustrate another example of an application of a wavelength conversion component in accordance with some embodiments. FIGs. **21A**, **21B**, and **21C** illustrate an LED downlight **1100** that utilizes remote wavelength conversion in accordance with some embodiments. FIG. **21A** is an exploded perspective view of the LED downlight **1100**, FIG. **21B** is an end view of the downlight **1100**, and FIG. **21C** is a sectional view of the downlight **1100**. The downlight **1100** is configured to generate light with an emission intensity of 650-700 lumens and a nominal beam spread of 60° (wide flood). It is intended to be used as an energy efficient replacement for a conventional incandescent six inch downlight.

[00110] The downlight **1100** of FIGs. **21A**, **21B**, and **21C** is substantially the same as the downlight **1000** of FIGs. **20A**, **20B**, and **20C**. For purposes of discussion, only features of the downlight **1100** that are new relative to the embodiments of FIGs. **20A**, **20B**, and **20C** will be described.

[00111] Whereas the wavelength conversion component **36** of FIGs. **20A**, **20B**, and **20C** has a two-dimensional shape (e.g., is substantially planar), the wavelength conversion component **700** of FIGs. **21A**, **21B**, and **21C** has a three-dimensional shape (e.g., elongated dome shaped shell). The three dimensional wavelength conversion component **700** includes a three-dimensional light transmissive thermally conductive substrate **703** in thermal contact with a three-dimensional wavelength conversion layer **701**, such as the wavelength conversion component **700** described above in FIG. **7**. The wavelength conversion component may also be mounted enclosing the front of the chamber wall mask **1015**.

[00112] As discussed above, by placing the wavelength conversion layer **701** adjacent to a

light diffusing layer **703**, the light scattering particles within the light diffusing layer **703** scatters blue light generated by the light emitters **1007** more than it scatters light generated by the phosphor material within the wavelength conversion layer **701**. This ensures that a higher proportion of the blue light emitted from the wavelength conversion layer **701** will be scattered and directed by the light scattering material back into the wavelength conversion layer **700** increasing the probability of the photon interacting with a phosphor material particles and resulting in the generation of photoluminescence light. Therefore, less phosphor material is required to generate an emitted light of a selected emission color. In addition, during its OFF state, the diffusing layer **703** also improves the white color of the light **1100**.

[00113] FIG. **22** illustrates another example of an application of a wavelength conversion component in accordance with some embodiments, showing an exploded perspective view of a reflector lamp **1200** that utilizes remote wavelength conversion in accordance with some embodiments. The reflector lamp **1200** is configured to generate light with an emission intensity of 650-700 lumens and a nominal beam spread of 60° (wide flood). It is intended to be used as an energy efficient replacement for a conventional incandescent six inch downlight.

[00114] The reflector lamp **1200** comprises a generally rectangular thermally conductive body **1201** fabricated from, for example, die cast aluminum. The body **1201** functions as a heat sink and dissipates heat generated by the light emitting device **10"** To increase heat radiation from the reflector lamp **1000** and thereby increase cooling of the light emitting device **10''**, the body **1201** can include a series of heat radiating fins **1203** located on the sides of the body **1201**. The form factor of the body **1201** is configured to enable the reflector lamp to be retrofitted directly in a standard six inch downlighting fixture (a "can") as are commonly used in the United States.

[00115] The wavelength conversion component 36 may be implemented to have a wavelength

conversion layer that is adjacent to a light diffusing layer, such that the light scattering particles within the light diffusing layer scatters blue light more than it scatters light generated by the phosphor material within the wavelength conversion layer. Therefore, less phosphor material is required to generate an emitted light of a selected emission color. In addition, during its OFF state, the diffusing layer also improves the white color of the light **1200**.

[00116] The reflector lamp **1200** further comprises a generally frustroconical light reflector **1205** having a paraboloidal light reflective inner surface which is configured to define the selected emission angle (beam spread) of the downlight (i.e. 60° in this example). The reflector **1205** is preferably made of Acrylonitrile butadiene styrene (ABS) with a metallization layer.

[00117] FIGs. **23A** and **23B** illustrate another example of an application of a wavelength conversion component in accordance with some embodiments. FIGs. **23A** and **23B** illustrate an LED linear lamp **1300** that utilizes remote wavelength conversion in accordance with some embodiments. FIG. **23A** is a three-dimensional perspective view of the linear lamp **1300** and FIG. **23B** is a cross-sectional view of the linear lamp **1300**. The LED linear lamp **1300** is intended to be used as an energy efficient replacement for a conventional incandescent or fluorescent tube lamp.

[00118] The linear lamp **1300** comprises an elongated thermally conductive body **1301** fabricated from, for example, extruded aluminum. The form factor of the body **1301** can be configured to be mounted with a standard linear lamp housing. The body **1301** further comprises a first recessed channel **1304**, wherein a rectangular tube-like case **1307** containing some electrical components (e.g., electrical wires) of the linear lamp **1300** may be situated. The case **1307** may further comprise an electrical connector **1309** (e.g., plug) extending past the length of the body **1301** on one end, and a recessed complimentary socket (not shown) configured to

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receive a connector on another end. This allows several linear lamps **1300** to be connected in series to cover a desired area. Individual linear lamps **1300** may range from 1 foot to 6 feet in length.

[00119] The body **1301** functions as a heat sink and dissipates heat generated by the light emitters **1303**. To increase heat radiation from the linear lamp **1300** and thereby increase cooling of the light emitters **1303**, the body **1301** can include a series of heat radiating fins **1302** located on the sides of the body **1301**. To further increase heat radiation from the linear lamp **1300**, the outer surface of the body **1301** can be treated to increase its emissivity such as for example painted black or anodized.

[00120] Light emitters **1303** are mounted on a strip (rectangular shaped) MCPCB **1305** configured to sit above the first recessed channel **1304**. The under surface of the MCPCB **1305** sits in thermal contact with a second recessed channel **1306** that includes inclined walls **1302**.

[00121] A generally hemi-spherical elongate wavelength conversion component **1311** may be positioned remote to the light emitters **1303**. The wavelength conversion component **1311** may be secured within the second recessed channel **1306** by sliding the wavelength conversion component **1311** under the inclined walls **1308** such that the wavelength conversion component **1311** engages with inclined walls **1308**.

[00122] The wavelength conversion component **1311** may include a hemi-spherical elongate light diffusing layer **1313** and a hemi-spherical elongate wavelength conversion layer **1315**. As discussed above, less phosphor material is required to generate an emitted light of a selected emission color. In addition, during its OFF state, the diffusing layer also improves the white color of the light **1300**.

[00123] In alternative embodiments, the wavelength conversion component of the linear lamp

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may be configured in the shape of a generally planar strip. In such embodiments, it will be appreciated that the second recessed channel may instead have vertical walls that extend to allow the wavelength conversion component to be received by the second recessed channel.

[00124] FIG. **24** illustrates a perspective of another application of a wavelength conversion component in accordance with some embodiments. FIG. **24** illustrates an LED lantern **1500** that utilizes remote wavelength conversion. The LED light lantern **1500** is intended to be used as an energy efficient replacement for conventional gas and fluorescent lanterns (e.g., camping lanterns).

[00125] The lantern **1500** comprises a generally cylindrical thermally conductive body **1501** fabricated from, for example, plastic material or pressed metal. The body **1501** further includes an internal heat sink which dissipates heat generated by the light emitters **1503**, which are mounted on a circular shaped MCPCB **1505**. The MCPCB **1505** may be in thermal contact with the body **1501**.

[00126] The lantern **1500** comprises a three-dimensional (e.g., elongated dome shaped shell) wavelength conversion component **700**, such as the one described above in FIG. **17**, **18** or **19**, that extends from the MCPCB **1505**. While only an exterior surface of the wavelength conversion component **700** is depicted, it is important to note that the three dimensional wavelength conversion component **700** may include a three-dimensional light diffusing layer adjacent to a three-dimensional wavelength conversion layer. As discussed above, this configuration permits less phosphor material to be used to generate an emitted light of a selected emission color. In addition, during its OFF state, the diffusing layer also improves the white color of the light.

[00127] A light transmissive cover (e.g., plastic) **1507** may extend around the upper portion of

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the lantern, surrounding the LEDs **1503** and the wavelength conversion component **900**. The light transmissive cover **1507** comprises a light-transmissive material (e.g. glass or plastic) that provides protective and/or diffusive properties for the LED lantern **1500**. The lantern **1500** may further comprise a lid that sits on top of the glass receptacle to enclose the light emitters **1503** and the wavelength conversion component **700**.

[00128] The above applications of light emitting devices describe a remote wavelength conversion configuration, wherein a wavelength conversion component is remote to one or more light emitters. The wavelength conversion component and body of those light emitting devices define an interior volume wherein the light emitters are located. The interior volume may also be referred to as a light mixing chamber. For example, in the downlight **1000, 1100** of FIGs. 20A, 20B, 20C, 21A, 21B, and 21C, an interior volume **1029** is defined by the wavelength conversion component **36', 700**, the light reflective chamber mask **1015**, and the body of the downlight **1001**. In the linear lamp **1300** of FIGs. 23A and 23B, an interior volume **1325** is defined by the wavelength conversion component **1311** and the body of the linear lamp **1301**. In the light bulb **200** of FIGs. 15 and 16, an interior volume **1415** is defined by the wavelength conversion component **36** and the body of the light bulb **204**. Such an interior volume provides a physical separation (air gap) of the wavelength conversion component from the light emitters that improves the thermal characteristics of the light emitting device. Due to the isotropic nature of photoluminescence light generation, approximately half of the light generated by the phosphor material can be emitted in a direction towards the light emitters and can end up in the light mixing chamber. It is believed that on average as little as 1 in a 10,000 interactions of a photon with a phosphor material particle results in absorption and generation of photoluminescence light. The majority, about 99.99%, of interactions of photons with a phosphor particle result in

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scattering of the photon. Due to the isotropic nature of the scattering process on average half the scattered photons will be in a direction back towards the light emitters. As a result up to half of the light generated by the light emitters that is not absorbed by the phosphor material can also end up back in the light mixing chamber. To maximize light emission from the device and to improve the overall efficiency of the light emitting device the interior volume of the mixing chamber includes light reflective surfaces to redirect - light in- the interior volume towards the wavelength conversion component and out of the device. The light mixing chamber may be operated to mix light within the chamber. The light mixing chamber can be defined by the wavelength conversion component in conjunction with another component of the device such a device body or housing (e.g., dome-shaped wavelength conversion component encloses light emitters located on a base of device body to define light mixing chamber, or planar wavelength conversion component placed on a chamber shaped component to enclose light emitters located on a base of device body and surrounded by the chamber shaped component to define light mixing chamber). For example, the downlight **1000, 1100** of FIGs. 20A, 20B, 20C, 21A, 21B, and 21C, includes an MCPCB **1009**, on which the light emitters **1007** are mounted, comprising light reflective material and a light reflective chamber wall mask **1015** to facilitate the redirection of light reflected back into the interior volume towards the wavelength conversion component **36', 700**. The linear lamp **1300** of FIGs. 23A and 23B includes an MCPCB **1305**, on which the light emitters **1303** are mounted, comprising light reflective material to facilitate the redirection of light reflected back into the interior volume towards the wavelength conversion component **1311**. The light bulb **200** of FIGs. 12A and 12B also includes an MCPCB **1405** on which the light emitters **112** are mounted, to facilitate the redirection of light reflected back into the interior volume towards the wavelength conversion component **36**.

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[00129] The above applications of light emitting devices describe only a few embodiments with which the claimed invention may be applied. It is important to note that the claimed invention may be applied to other types of light emitting device applications, including but not limited to, wall lamps, pendant lamps, chandeliers, recessed lights, track lights, accent lights, stage lighting, movie lighting, street lights, flood lights, beacon lights, security lights, traffic lights, headlamps, taillights, signs, etc.

[00130] Therefore, what has been described is a novel wavelength conversion component that comprises a light diffusing layer. Light diffractive particles within the light diffusing layer are selected to have a size such that the particles will scatter blue light generated by the LED relatively more than they will scatter light generated by a wavelength conversion layer, e.g., where the particles have an average particle size that is less than about 150nm. This approach of using the light diffusing layer in combination with the wavelength conversion layer solves the problem of variations or non-uniformities in the color of emitted light with emission angle. In addition, the color appearance of the lighting apparatus in its OFF state can be improved by implementing the light diffusing layer in combination with the wavelength conversion layer. Moreover, significant reductions can be achieved in the amount phosphor materials that is required to implement phosphor-based LED devices.

[00131] It will be appreciated that the invention is not limited to the exemplary embodiments described and that variations can be made within the scope of the invention. For example whilst the devices of the invention have been described as comprising one or more LEDs the devices can comprise other solid-state light sources such as a laser diode or laser.

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SCORE Placeholder Sheet for IFW Content

Application Number: 13273215 Document Date: 10/13/2011

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Electronic Acknowledgement Receipt	
EFS ID:	11185550
Application Number:	13273215
International Application Number:	
Confirmation Number:	8978
Title of Invention:	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES
First Named Inventor/Applicant Name:	Bing Dai
Customer Number:	101130
Filer:	Peter C. Mei/Tony Nguyen
Filer Authorized By:	Peter C. Mei
Attorney Docket Number:	ITMX-VISTA-00318US2
Receipt Date:	13-OCT-2011
Filing Date:	
Time Stamp:	23:33:41
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	Application Data Sheet	ITMX-VISTA-00318US2_ADS.pdf	1425682 b308b717dcb581ed7aa28b3fce2f7dd31dba3035	no	5
Warnings:					
Information:					

2	Drawings-only black and white line drawings	ITMX-VISTA-00318US2_Drawings.pdf	747857 65be947c6cdd0c20d92d5fe3a886d9e73231e491	no	25
Warnings:					
Information:					
3		ITMX-VISTA-00318US2_Specification.pdf	346556 e3f269d920fea4c87012eb51c98af8b47cddcb44	yes	56

	Multipart Description/PDF files in .zip description		
	Document Description	**Start**	**End**
	Specification	1	49
	Claims	50	55
	Abstract	56	56

Warnings:	
Information:	
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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.

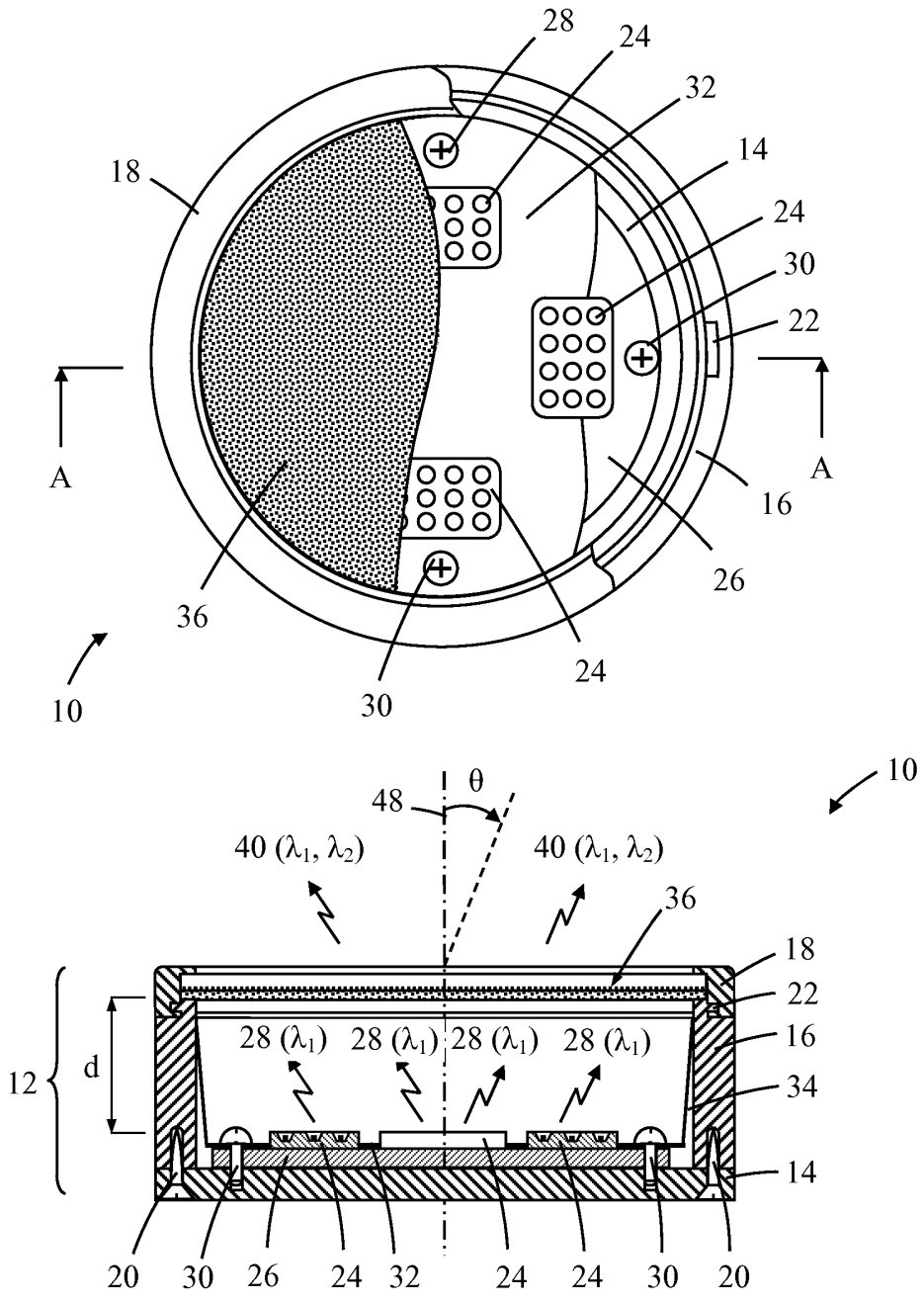

28
24
32
14
18
24
30
22
A
A
16
26
36
24
10
30
10
θ
48
40 (λ1, λ2)
40 (λ1, λ2)
36
18
22
28 (λ1)
28 (λ1)
28 (λ1)
28 (λ1)
16
12
d
34
14
20
30
26
24
32
24
24
30
20

FIG. 1

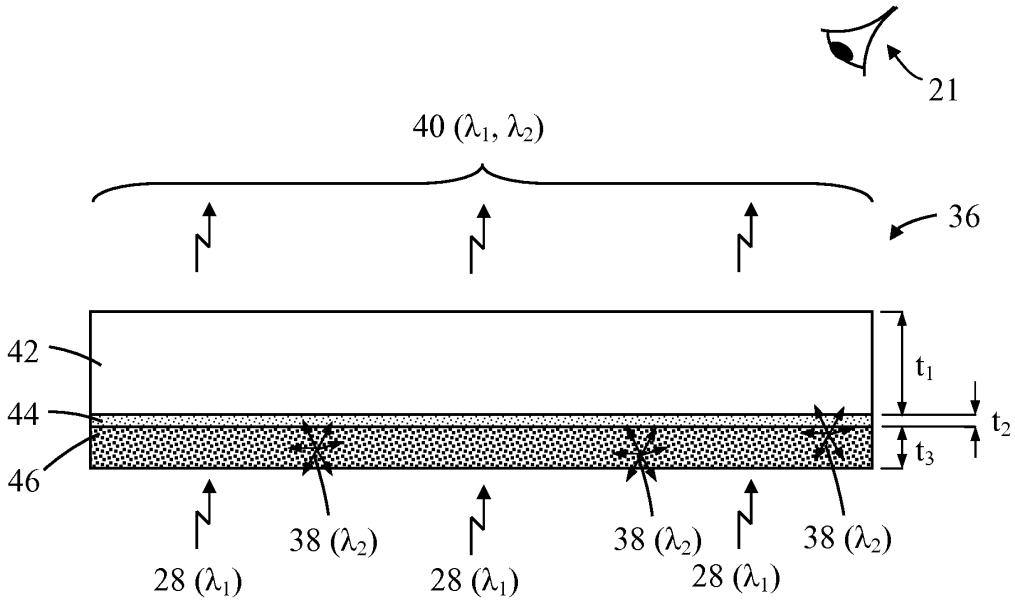

21
40 (λ1, λ2)
36
42
44
46
t1
t2
t3
38 (λ2)
38 (λ2)
38 (λ2)
28 (λ1)
28 (λ1)
28 (λ1)

FIG. 2

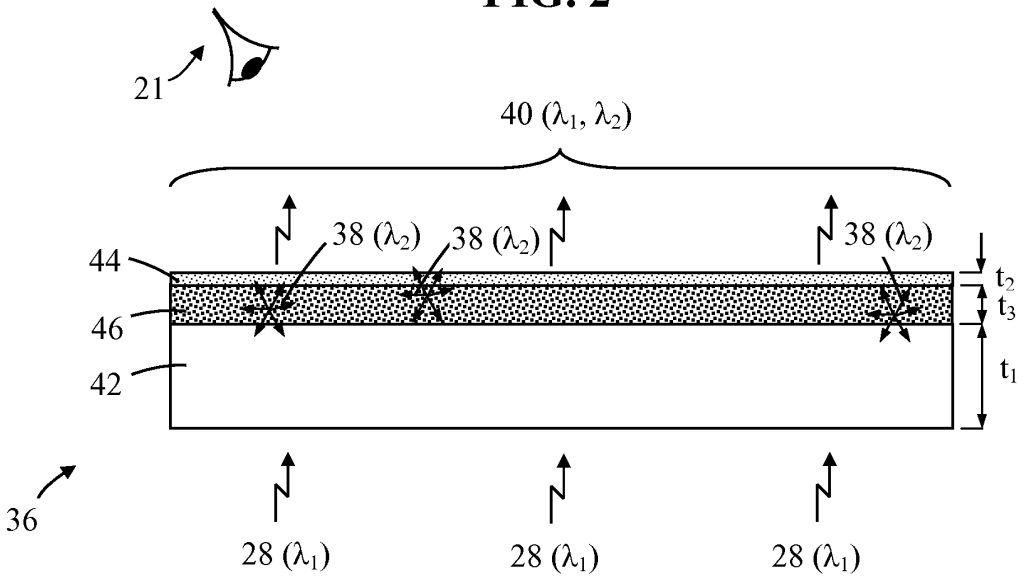

21
40 (λ1, λ2)
38 (λ2)
38 (λ2)
38 (λ2)
44
46
42
t2
t3
t1
36
28 (λ1)
28 (λ1)
28 (λ1)

FIG. 3

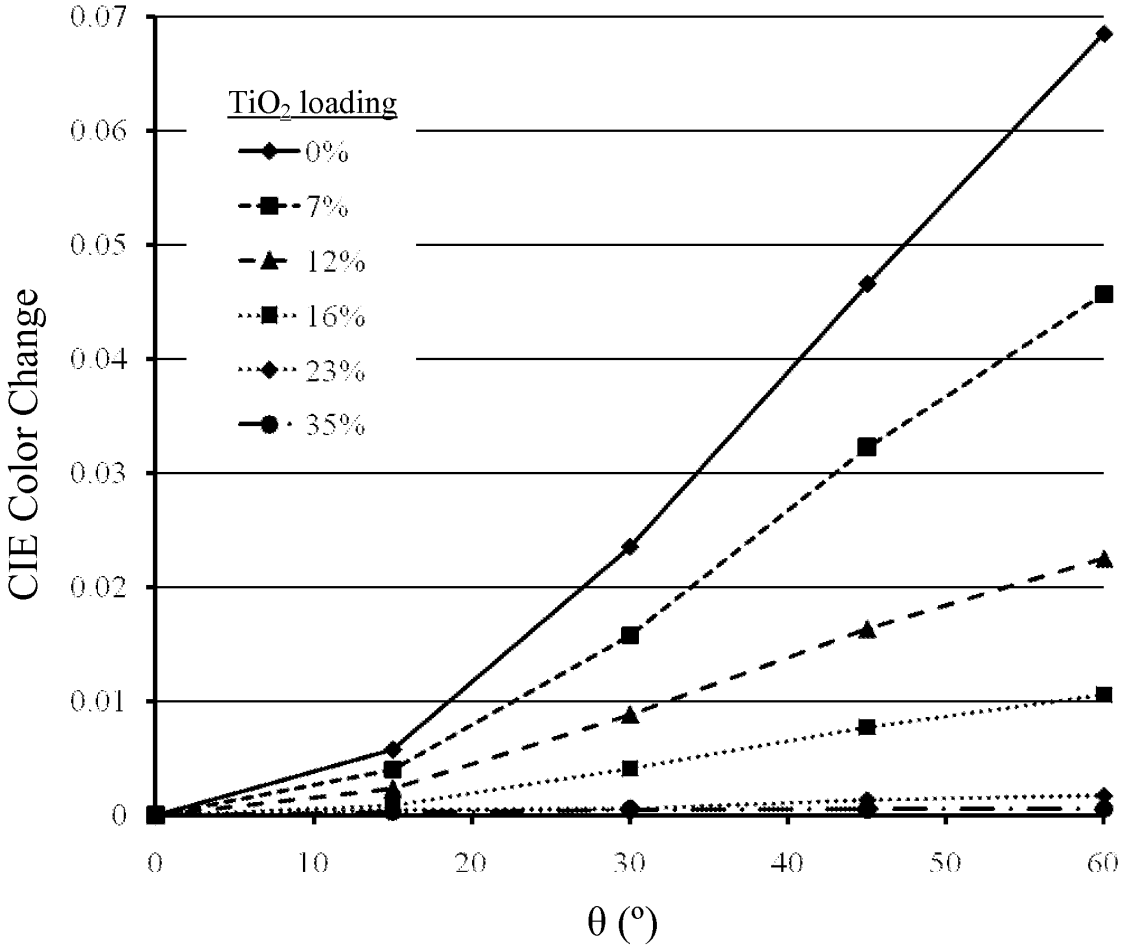

0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
CIE Color Change
TiO2 loading
0%
7%
12%
16%
23%
35%
0
10
20
30
40
50
60
θ (°)

FIG. 4

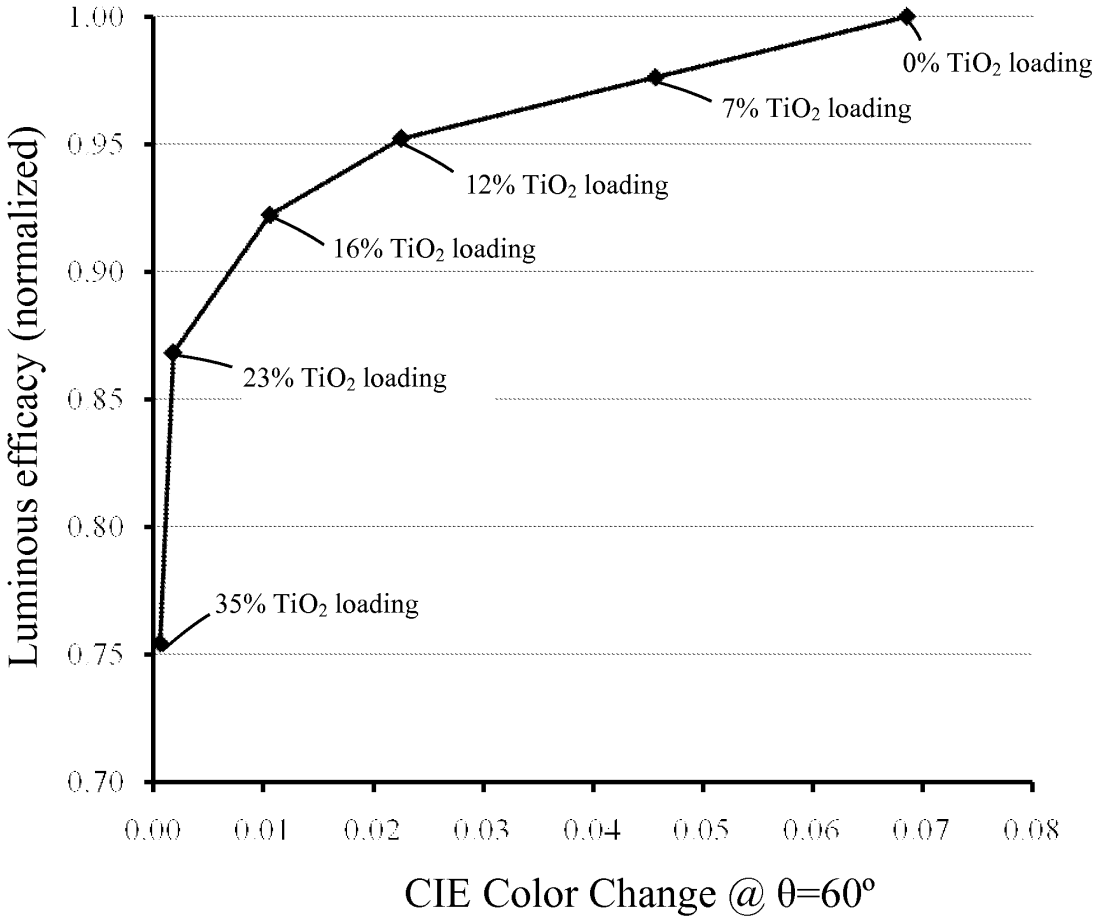

1.00
0.95
0.90
0.85
0.80
0.75
0.70
Luminous efficacy (normalized)
0% TiO2 loading
7% TiO2 loading
12% TiO2 loading
16% TiO2 loading
23% TiO2 loading
35% TiO2 loading
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
CIE Color Change @ θ=60º

FIG. 5

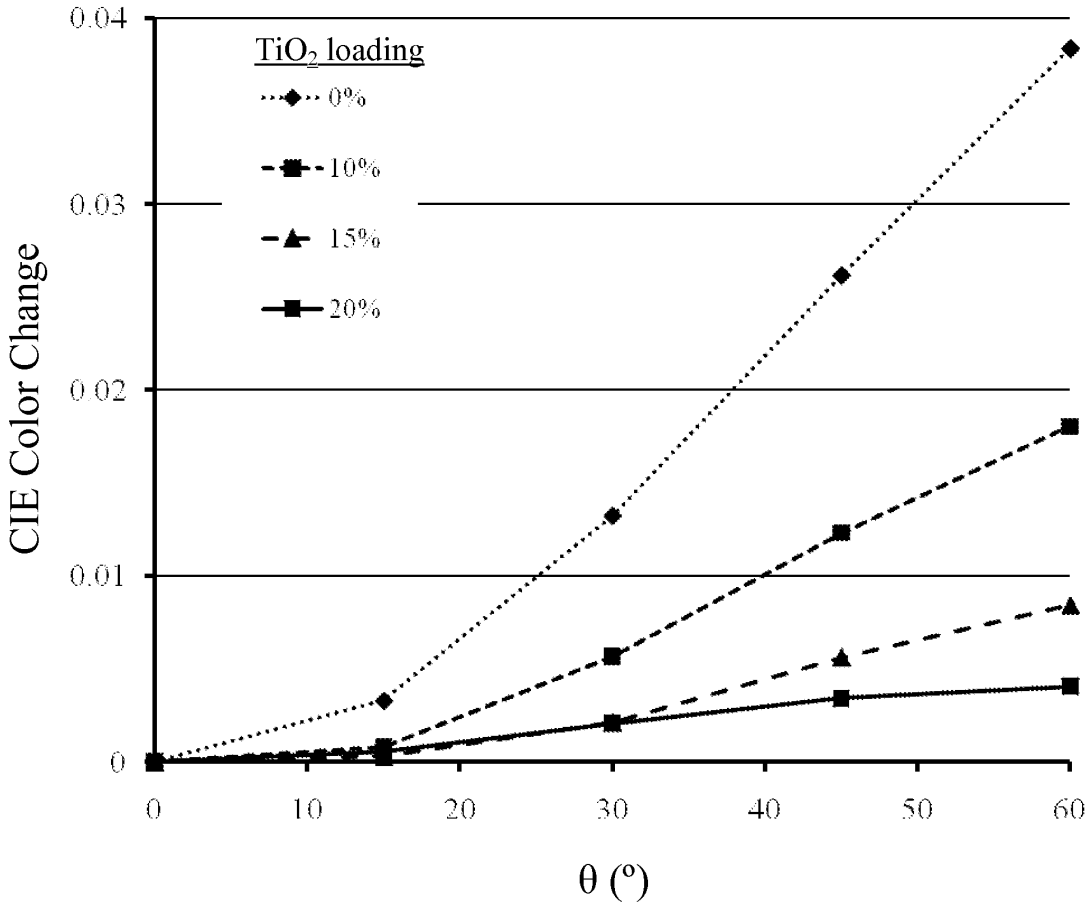

0.04
0.03
0.02
0.01
0
CIE Color Change
TiO2 loading
0%
10%
15%
20%
0
10
20
30
40
50
60
θ (°)

FIG. 6

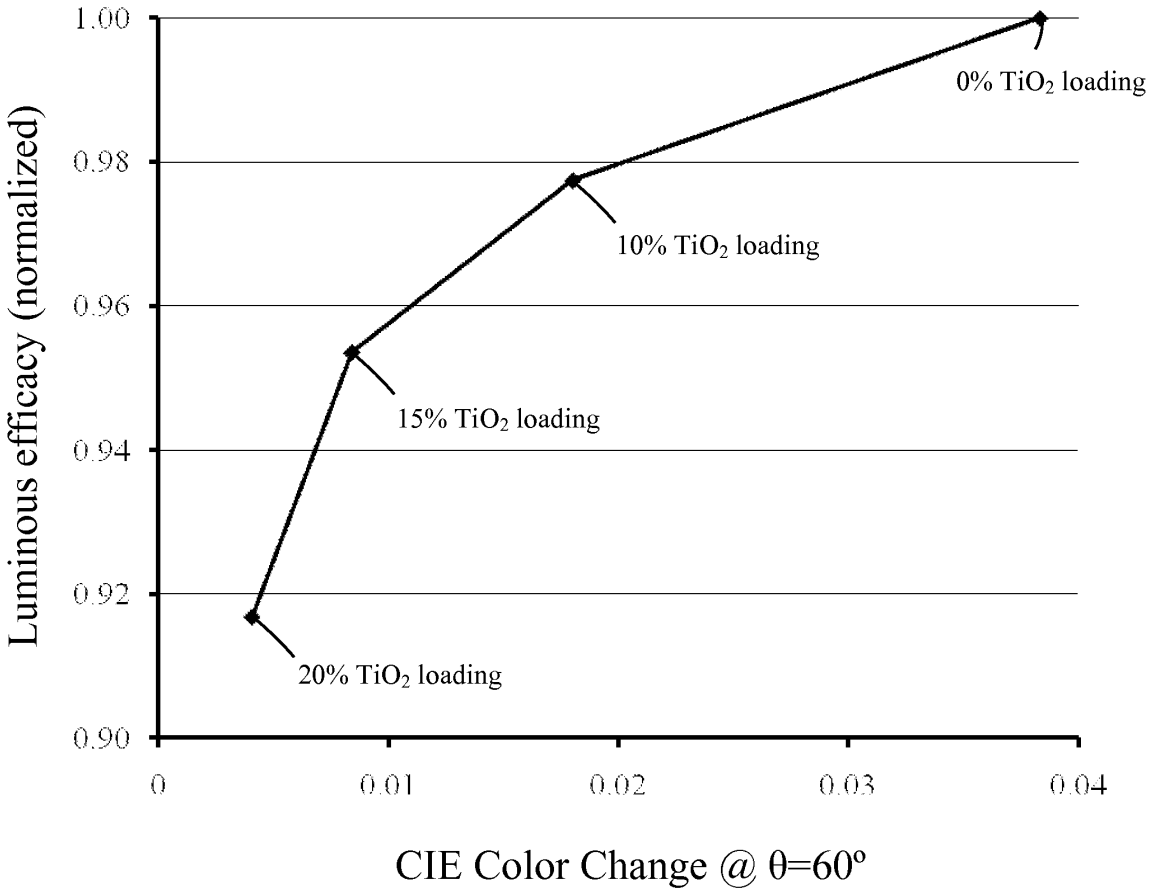

1.00
0.98
0.96
0.94
0.92
0.90
Luminous efficacy (normalized)
0% TiO2 loading
10% TiO2 loading
15% TiO2 loading
20% TiO2 loading
0
0.01
0.02
0.03
0.04
CIE Color Change @ θ=60º

FIG. 7

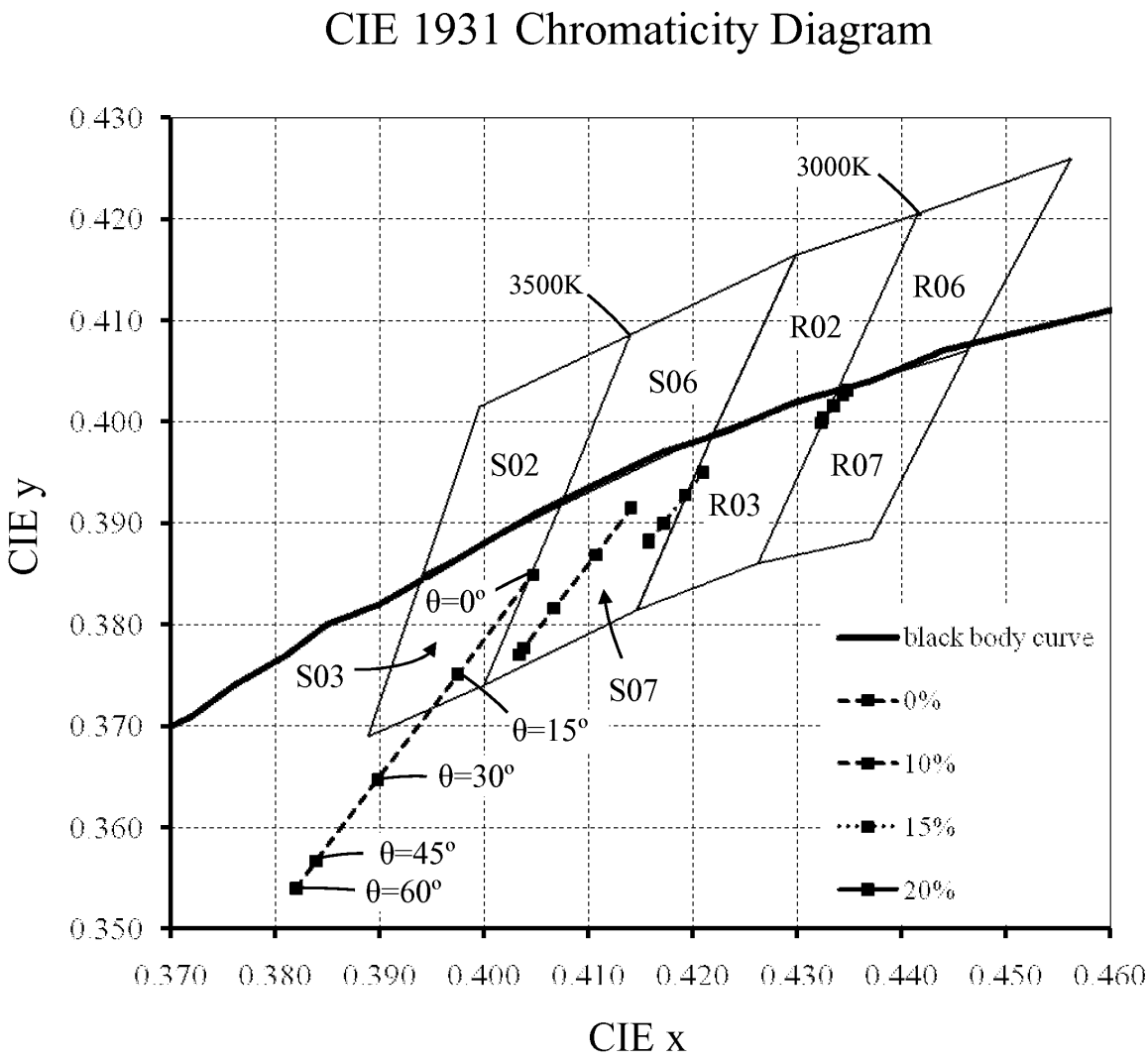

CIE 1931 Chromaticity Diagram
0.430
0.420
0.410
0.400
0.390
0.380
0.370
0.360
0.350
CIE y
0.370
0.380
0.390
0.400
0.410
0.420
0.430
0.440
0.450
0.460
CIE x
3000K
3500K
R06
R02
S06
S02
R07
R03
S03
S07
θ=0º
θ=15º
θ=30º
θ=45º
θ=60º
black body curve
0%
10%
15%
20%

FIG. 8

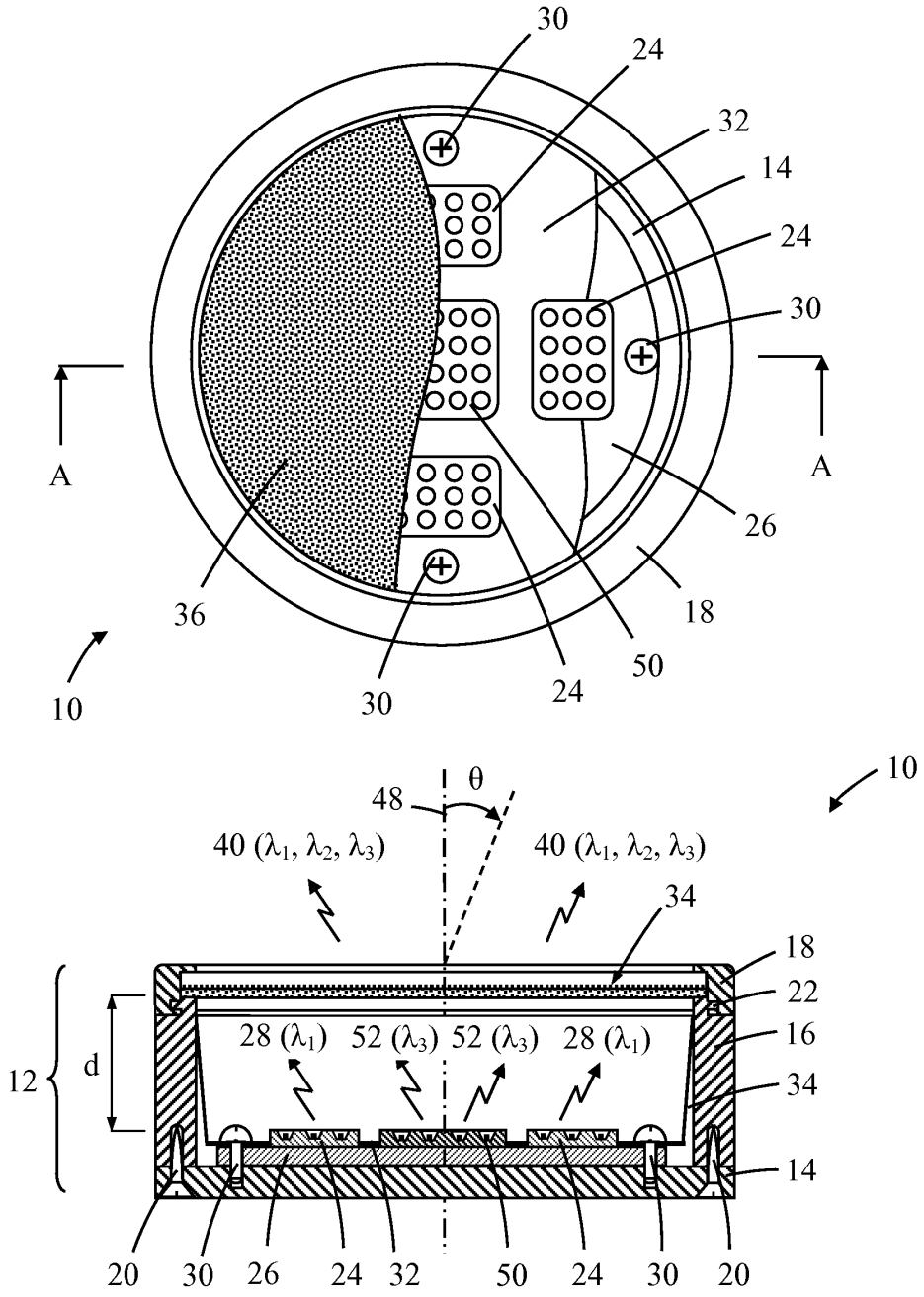

30
24
32
14
24
30
A
A
26
36
18
50
10
30
24
10
θ
48
40 (λ1, λ2, λ3)
40 (λ1, λ2, λ3)
34
18
22
16
34
14
12
d
28 (λ1)
52 (λ3)
52 (λ3)
28 (λ1)
20
30
26
24
32
50
24
30
20

FIG. 9

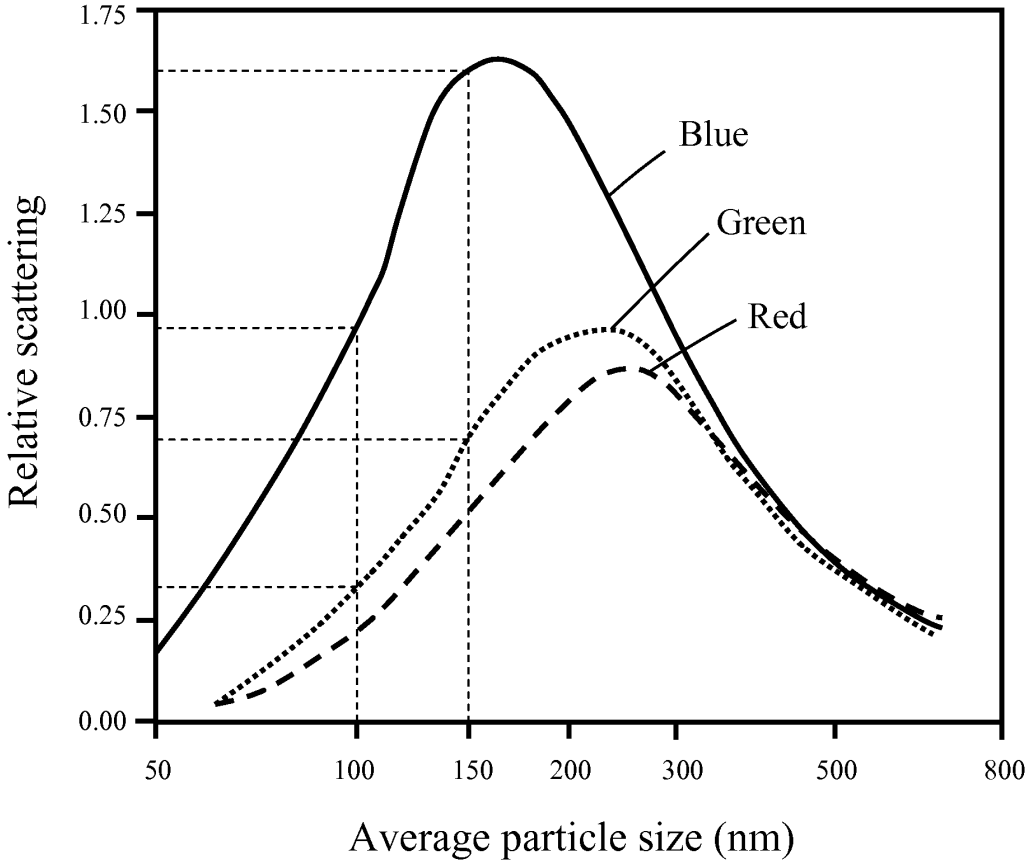
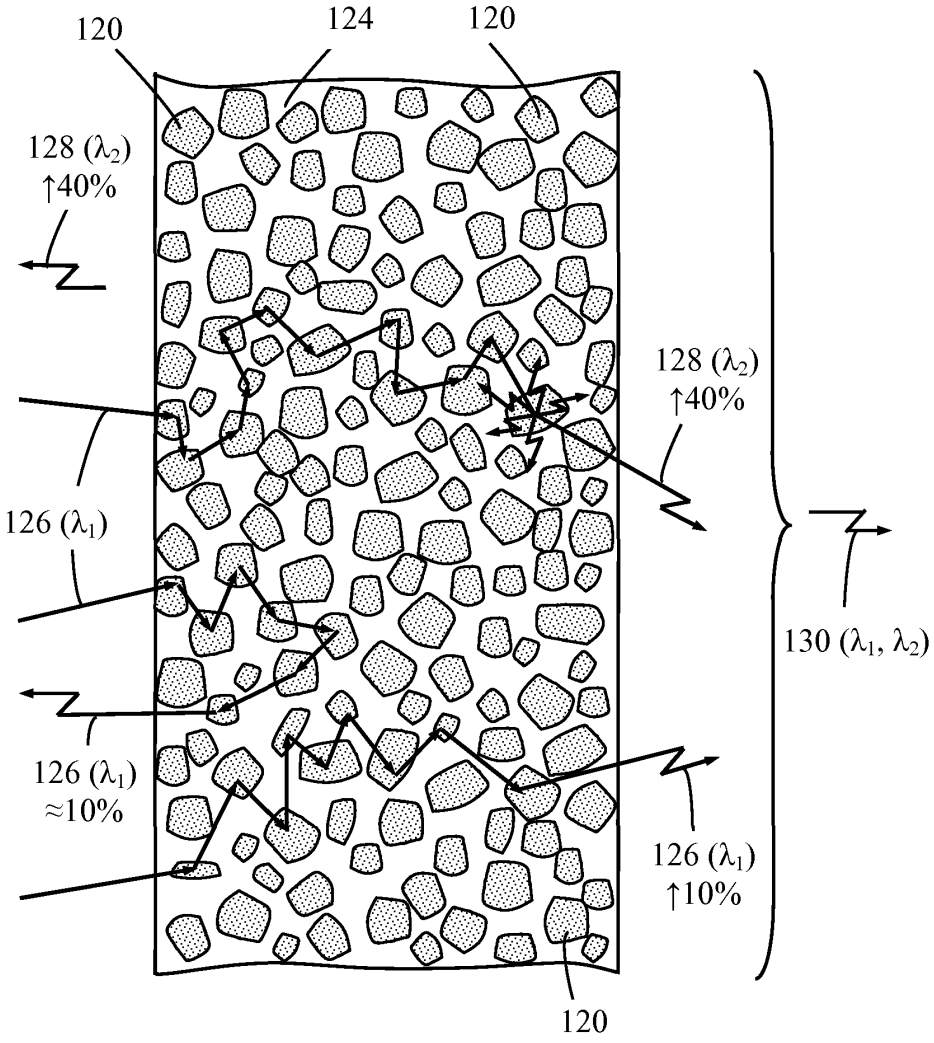

1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
Relative scattering
Blue
Green
Red
50
100
150
200
300
500
800
Average particle size (nm)

FIG. 10



PRIOR ART

FIG. 11

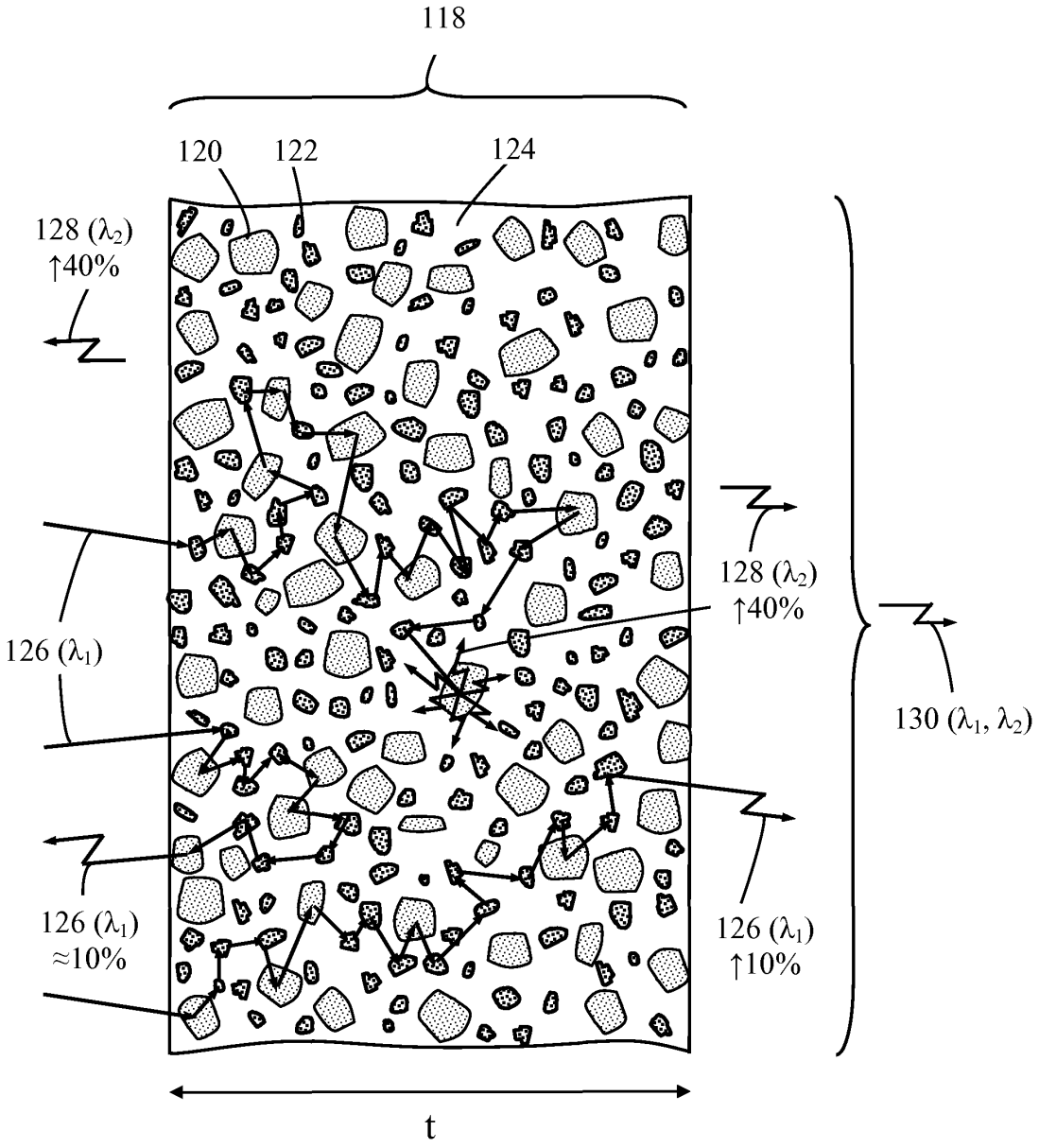

118
120
122
124
128 (λ_2)
↑40%
126 (λ_1)
126 (λ_1)
≈10%
128 (λ_2)
↑40%
126 (λ_1)
↑10%
130 (λ_1, λ_2)
t

FIG. 12

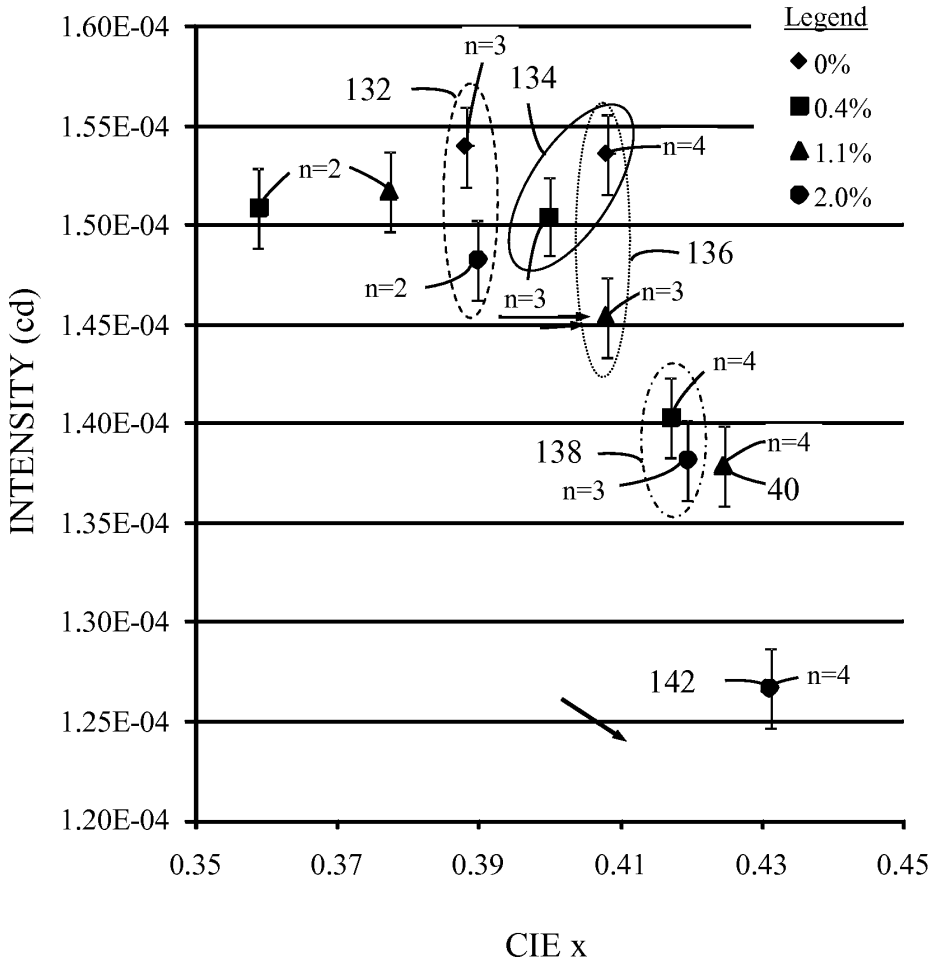

1.60E-04
1.55E-04
1.50E-04
1.45E-04
1.40E-04
1.35E-04
1.30E-04
1.25E-04
1.20E-04
INTENSITY (cd)
0.35
0.37
0.39
0.41
0.43
0.45
CIE x
Legend
0%
0.4%
1.1%
2.0%
132
134
136
138
140
142
n=2
n=3
n=4

FIG. 13

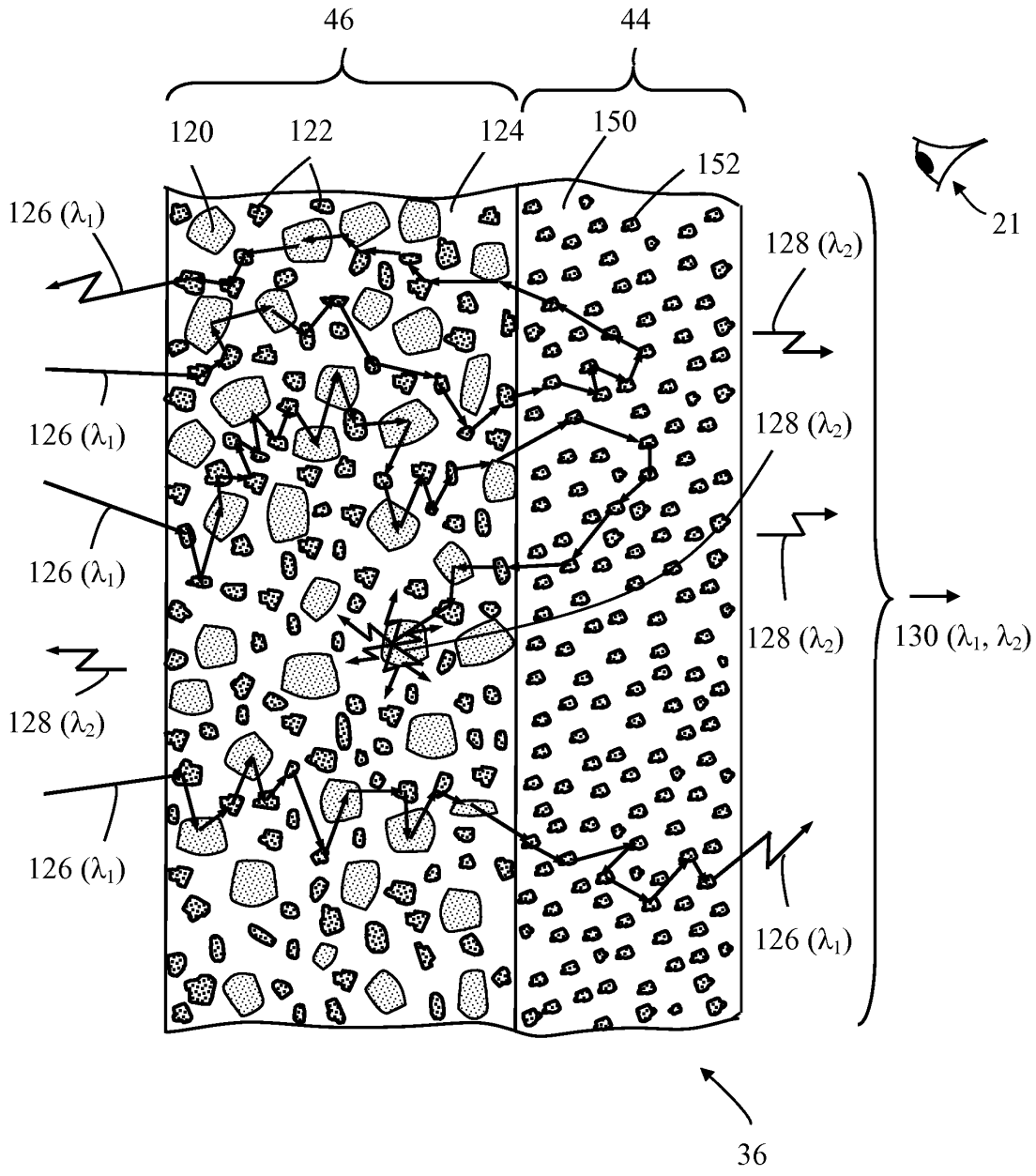

46
44
120
122
124
150
152
21
126 (λ1)
126 (λ1)
126 (λ1)
128 (λ2)
126 (λ1)
128 (λ2)
128 (λ2)
128 (λ2)
126 (λ1)
130 (λ1, λ2)
36

FIG. 14

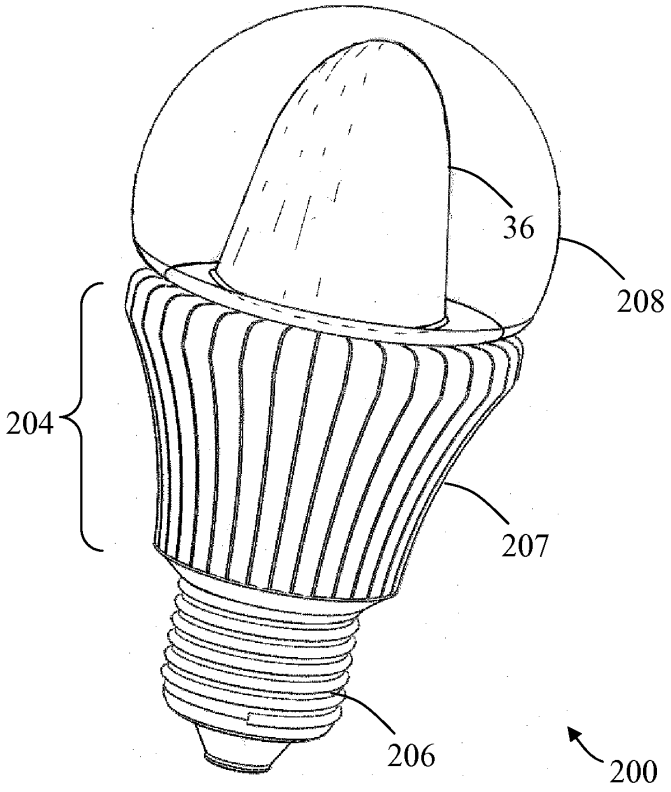


FIG. 15

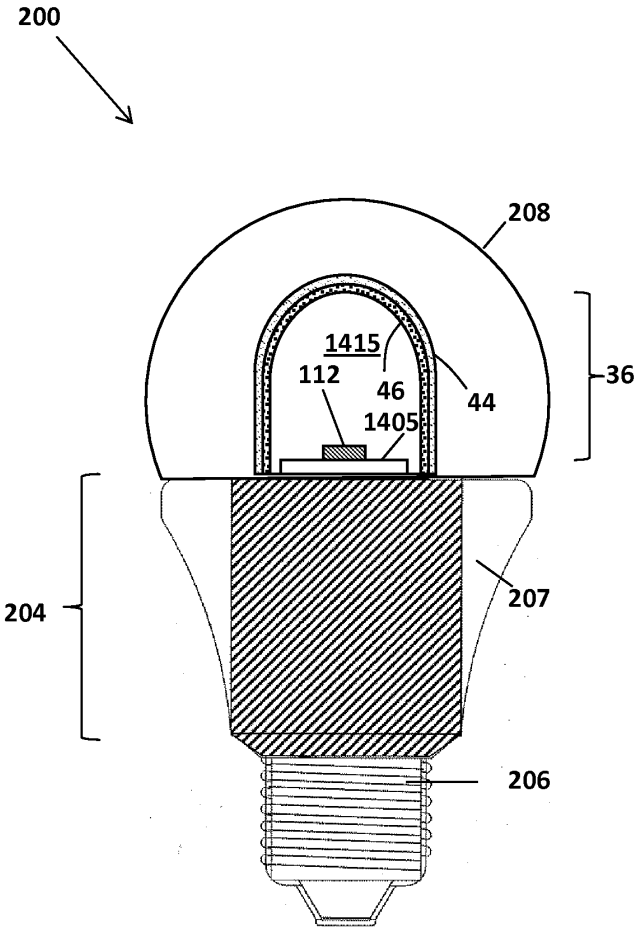


FIG. 16

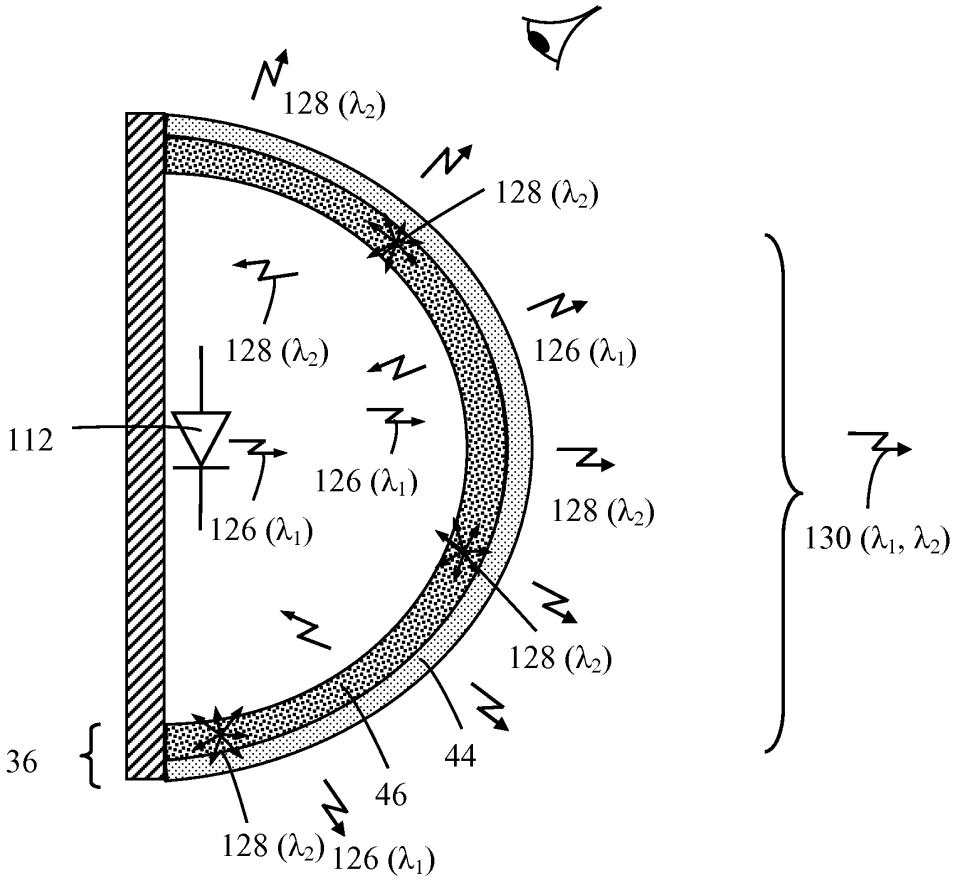


FIG. 17

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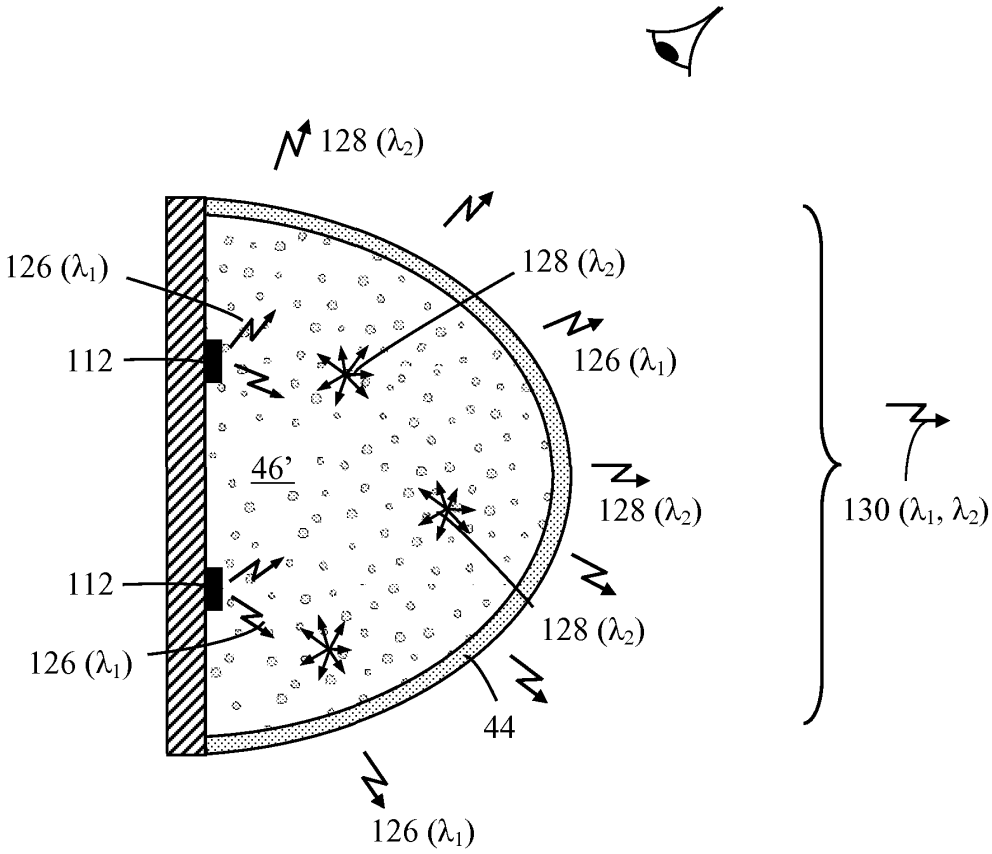
128 (λ2)
126 (λ1)
128 (λ2)
112
126 (λ1)
46'
128 (λ2)
130 (λ1, λ2)
112
128 (λ2)
126 (λ1)
44
126 (λ1)

FIG. 18

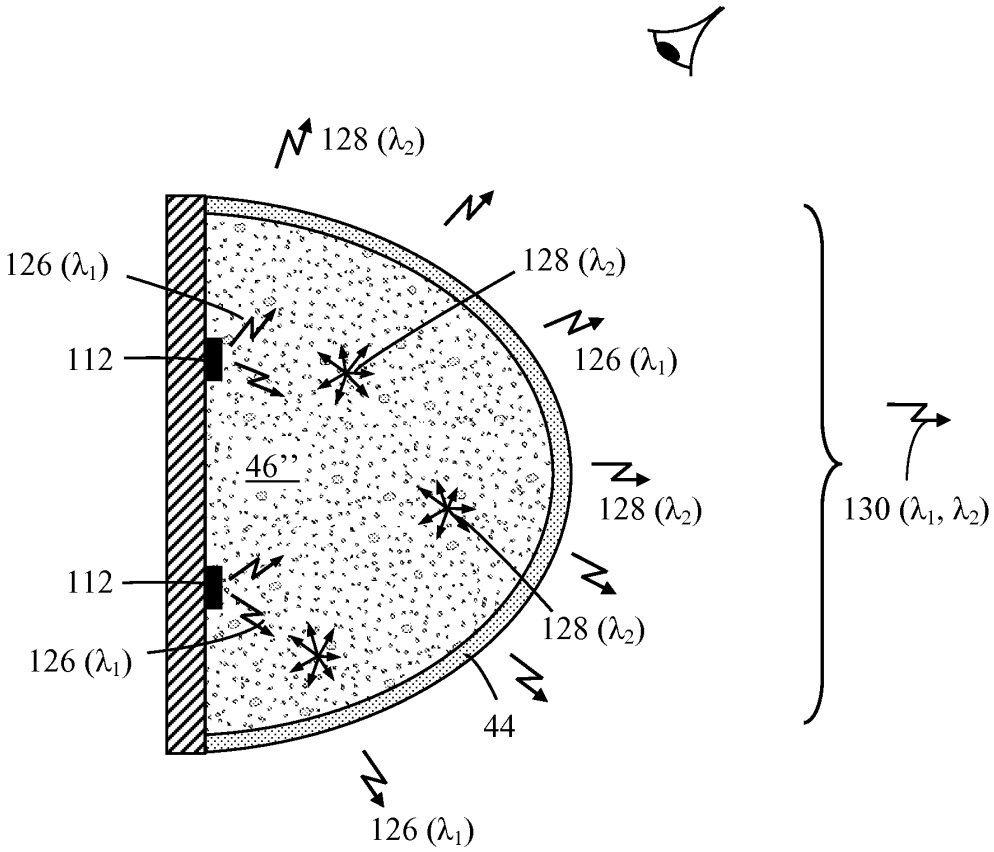
128 (λ2)
126 (λ1)
128 (λ2)
112
126 (λ1)
46''
128 (λ2)
130 (λ1, λ2)
112
128 (λ2)
126 (λ1)
44
126 (λ1)

FIG. 19

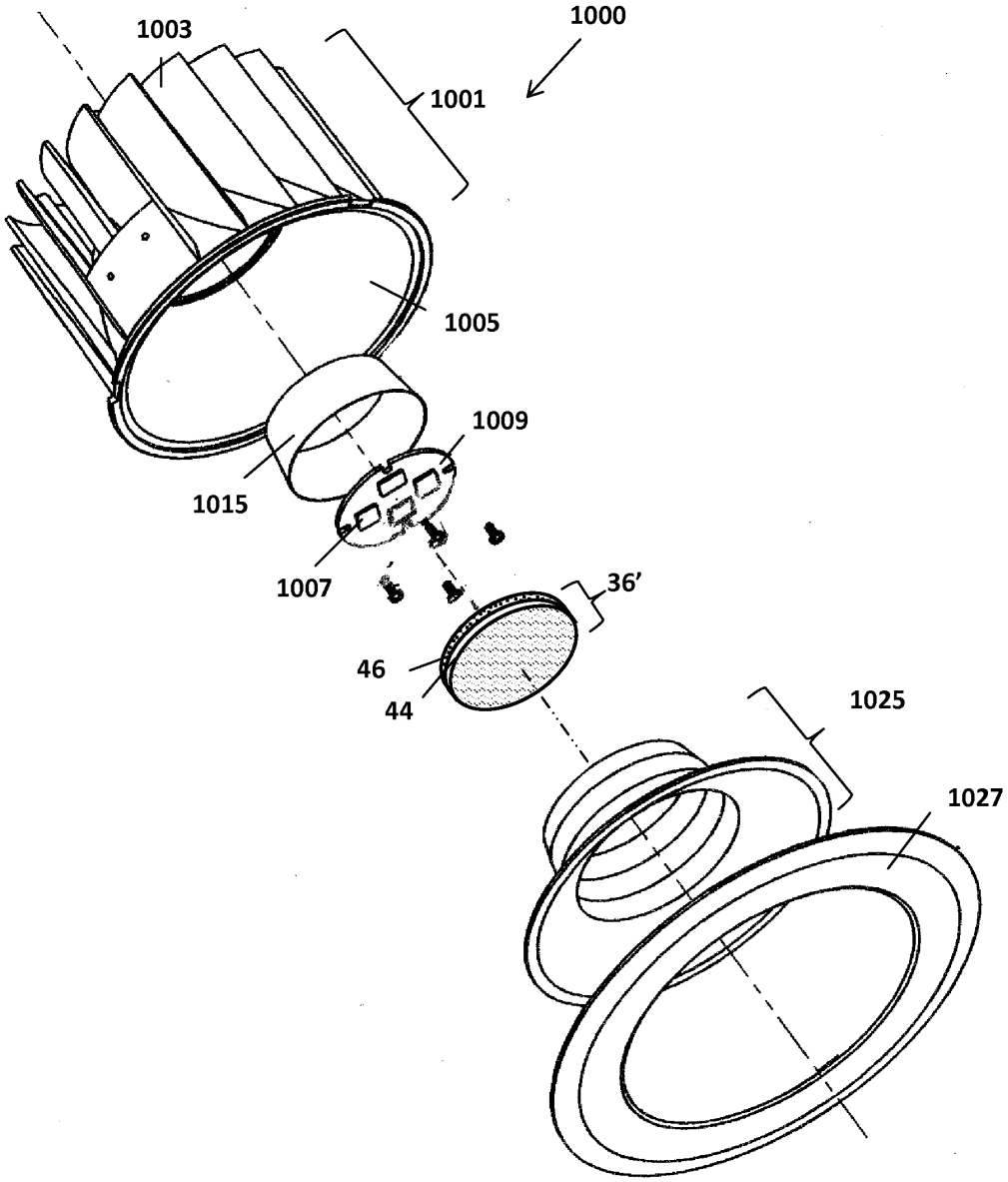

FIG. 20A

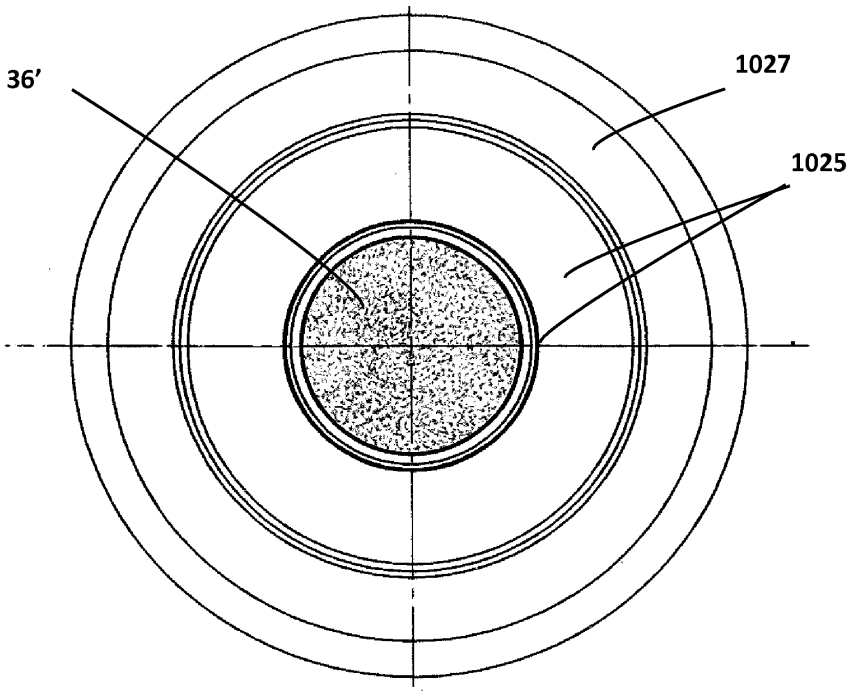

FIG. 20B

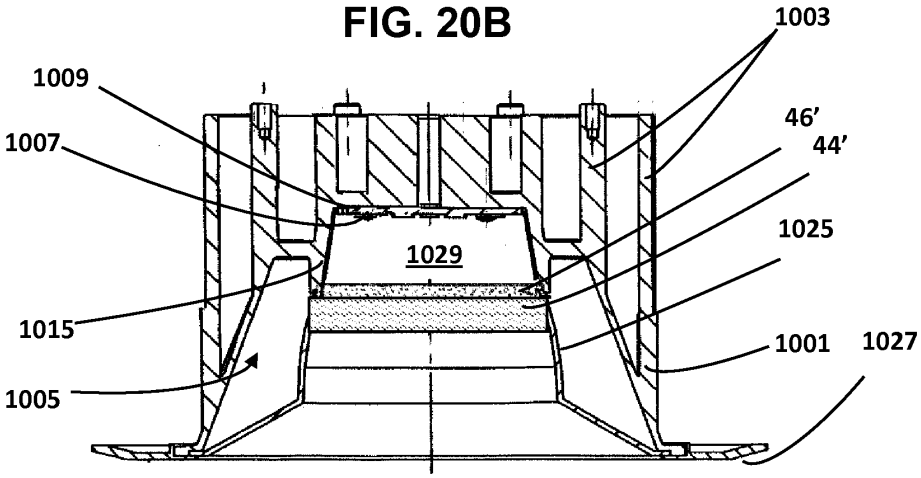

FIG. 20C

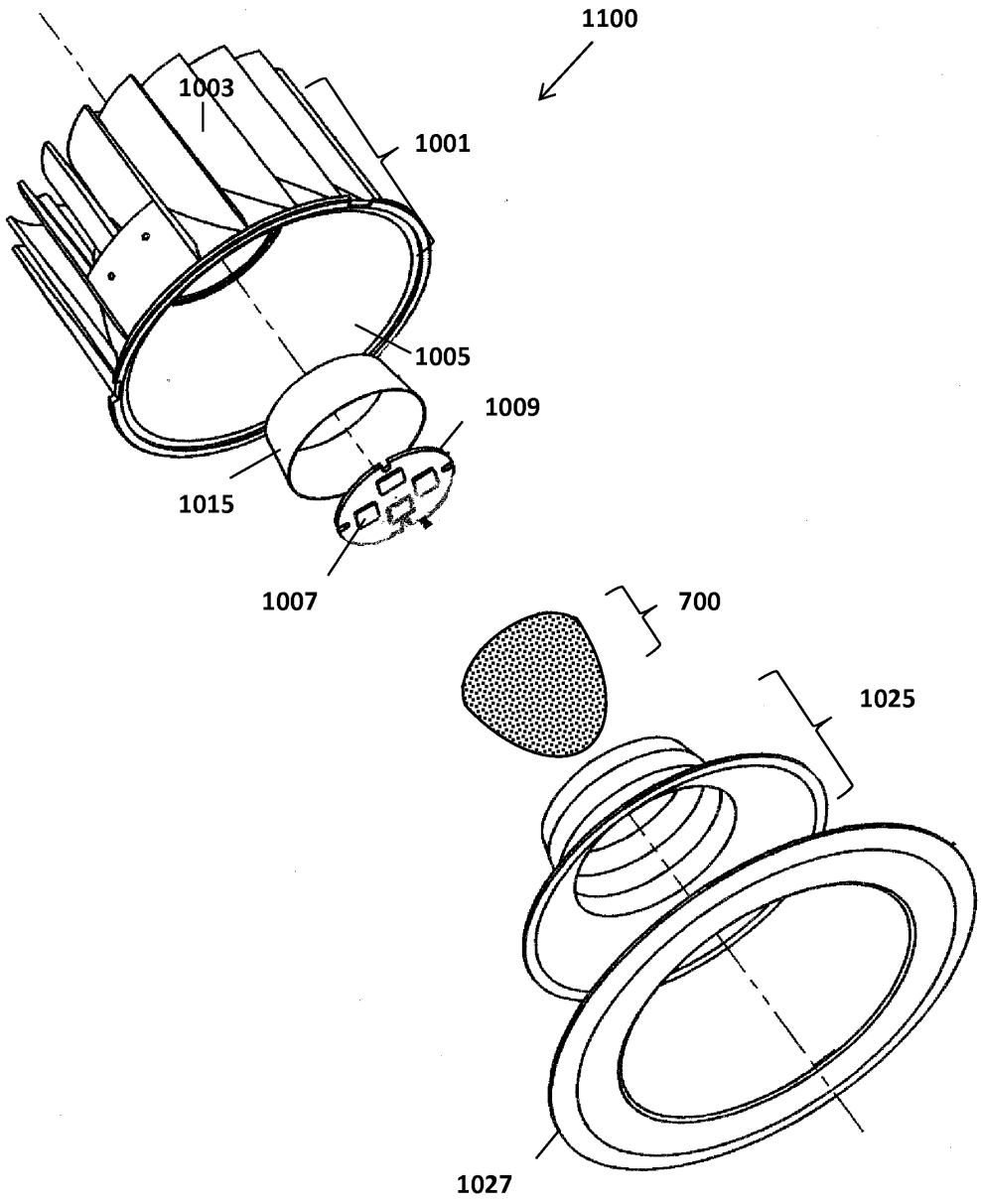

FIG. 21A

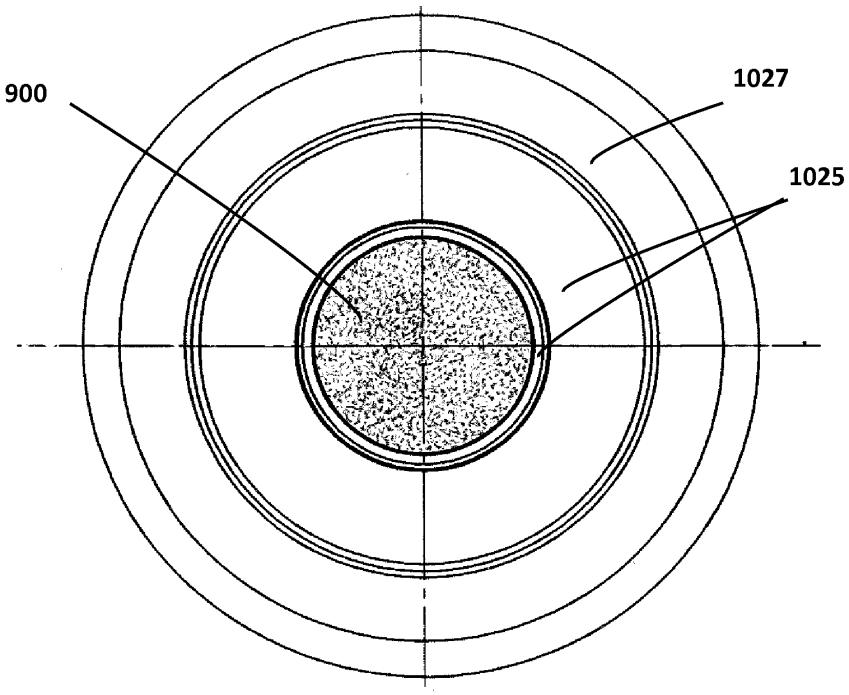

FIG. 21B

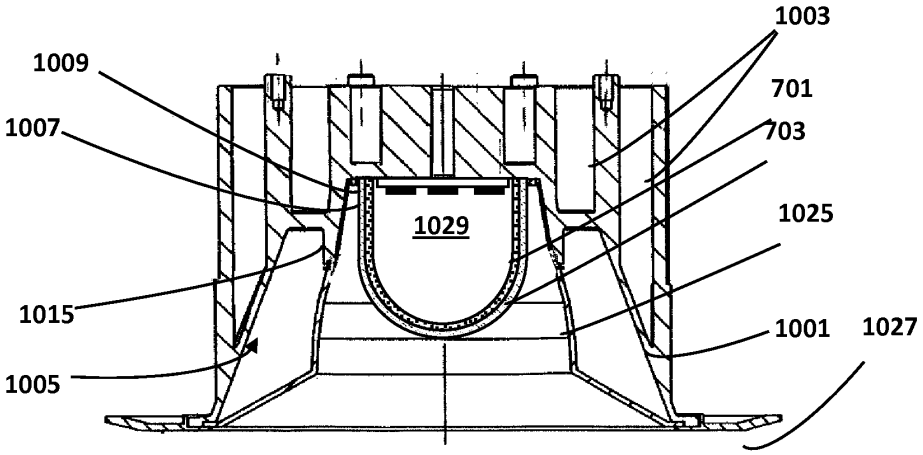

FIG. 21C

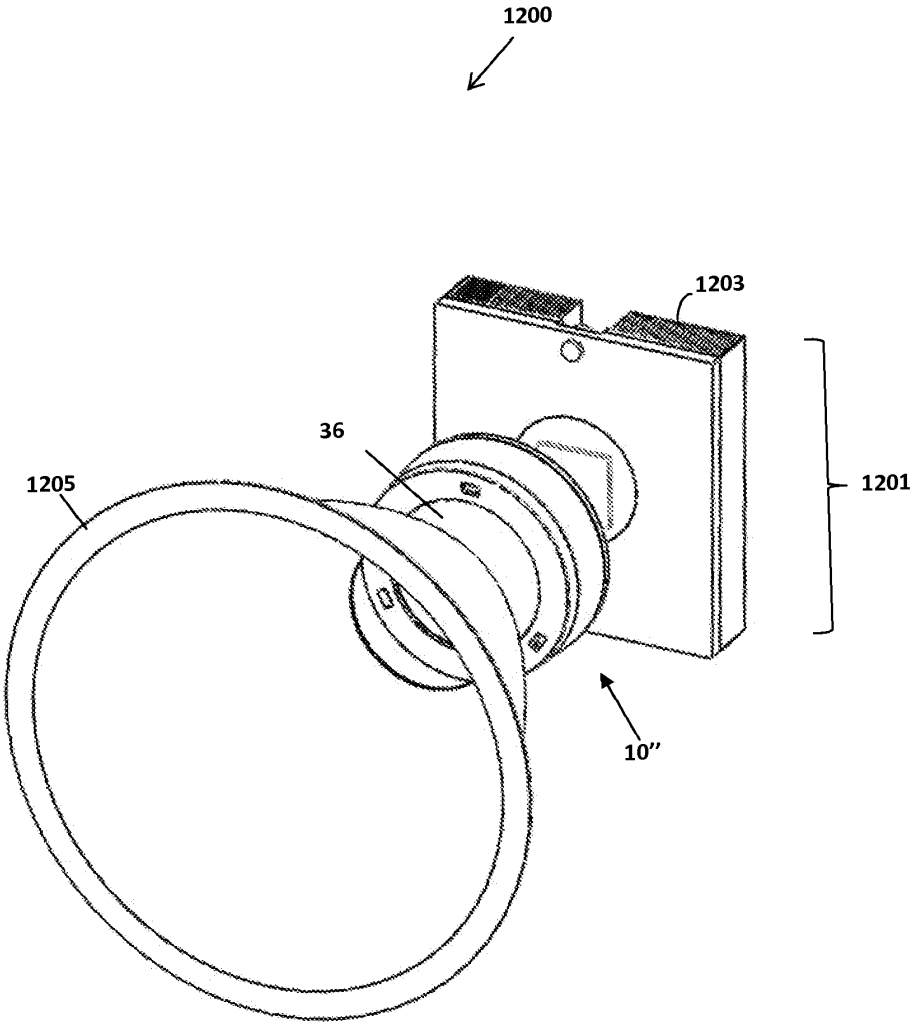

FIG. 22

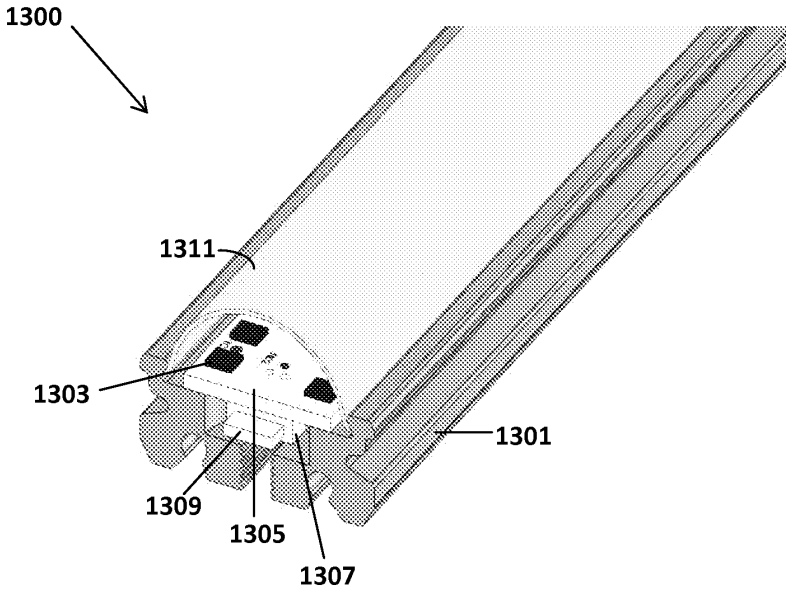

FIG. 23A

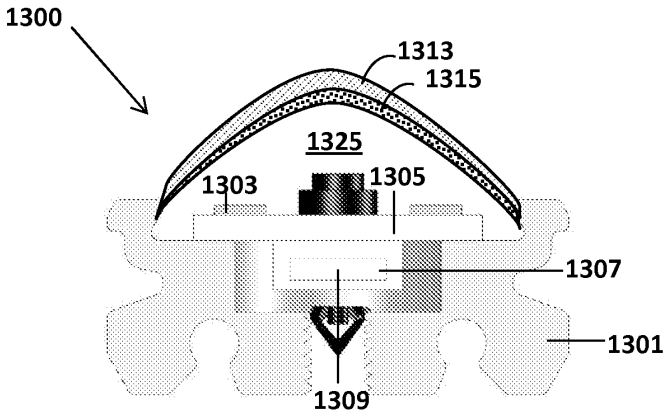

FIG. 23B

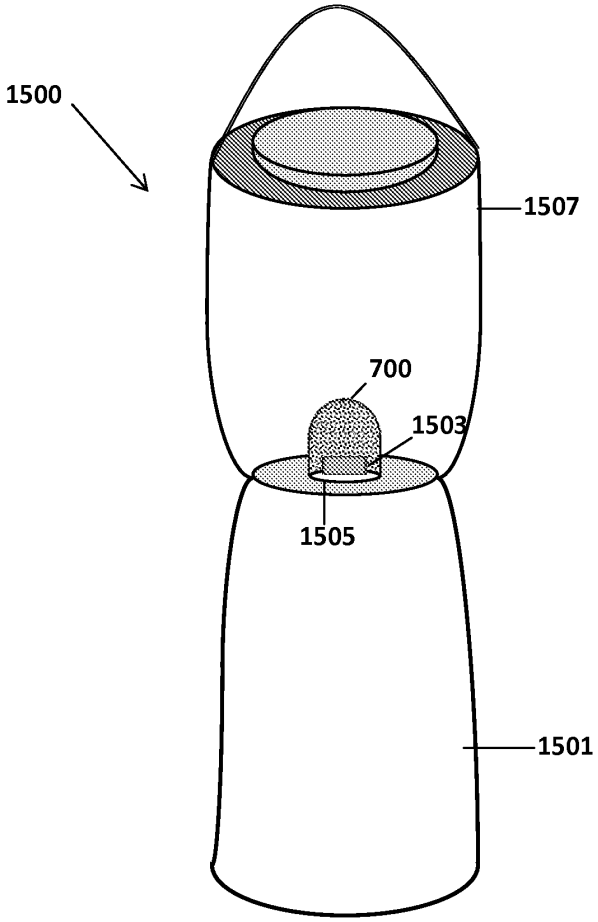

FIG. 24

CLAIMS

What is claimed is:

1. A wavelength conversion component for a light emitting device comprising:

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from a radiation source relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material.

2. The component of Claim 1, wherein the excitation light comprises blue light.

3. The component of Claim 2, wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material.

4. The component of Claim 2, wherein the light scattering material has an average particle size that is less than about 150nm.

5. The component of Claim 1, wherein the light scattering material is selected from the group consisting of: titanium dioxide, barium sulfate, magnesium oxide, silicon dioxide and aluminum oxide.

6. The component of Claim 1 wherein the at least one photoluminescence material is located in a wavelength conversion layer and the light scattering material is located in a diffusing

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layer.

7. The component of Claim 6, wherein the wavelength conversion layer and the light diffusing layer are in direct contact with each other.

8. The component of Claim 7, wherein the wavelength conversion layer comprises a mixture of the at least one phosphor material and a light transmissive binder and the light diffusing layer comprises a mixture of the light scattering material and the light transmissive binder.

9. The component of Claim 8, wherein the light transmissive binder comprises a curable liquid polymer selected from the group consisting of: a polymer resin, a monomer resin, an acrylic, an epoxy, a silicone and a fluorinated polymer.

10. The component of Claim 8, wherein the weight loading of light scattering material to binder selected from the group consisting of: 7% to 35% and 10% to 20%.

11. The component of Claim 6, wherein the wavelength conversion and light diffusing layers are deposited using a method selected from the group consisting of: screen printing, slot die coating, spin coating, roller coating, drawdown coating and doctor blading.

12. The component of Claim 6 in which the wavelength conversion layer and the light diffusing layer comprises planar shapes.

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13. The component of Claim 6 in which the light diffusing layer comprises a dome or elongated dome shape.

14. The component of claim 13 in which the wavelength conversion layer fills a volume formed beneath the dome or elongated dome shapes.

15. The component of Claim 1, wherein both the at least one photoluminescence material and the light scattering material are located in a wavelength conversion layer.

16. The component of Claim 1, wherein the light scattering material has an average particle size in a range selected from the group consisting of: 1μm to 50μm and 10μm to 20μm.

17. The component of Claim 1, wherein the at least one photoluminescence material is deposited onto a light transmissive substrate, and the light transmissive substrate is selected from the group consisting of: a polycarbonate, an acrylic and a glass.

18. The component of Claim 1, wherein the excitation light comprises ultraviolet light.

19. The component of Claim 18, wherein the light scattering material has an average particle size that is less than about 100nm.

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20. A light emitting device, comprising:

at least one solid-state light emitter operable to generate excitation light;

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from a radiation source relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material.

21. The device of claim 20, wherein the light emitting device is selected from the group consisting of: downlights, light bulbs, linear lamps, lanterns, wall lamps, pendant lamps, chandeliers, recessed lights, track lights, accent lights, stage lighting, movie lighting, street lights, flood lights, beacon lights, security lights, traffic lights, headlamps, taillights, and signs.

22. The device of claim 20 in which the average particle size of the light scattering material is selected to improve an OFF state white appearance of the light emitting device.

23. The device of claim 20 in which the average particle size of the light scattering material is selected to obtain substantially uniform color for emitted light from the light emitting device for emission angles over a $\pm 60^{o}$ range from an emission axis.

24. The device of claim 23, wherein a weight loading of the light scattering material to a binder selected from the group consisting of: 7% to 35% and 10% to 20%.

25. The device of Claim 20, wherein the excitation light comprises blue light and the light

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scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material.

26. The device of Claim 25, wherein the light scattering material has an average particle size that is less than about 150nm.

27. The device of Claim 20 in which the wavelength conversion layer and the light diffusing layer comprises planar shapes.

28. The device of Claim 20 in which the light diffusing layer comprises a dome or elongated dome shape.

29. A linear lamp comprising:

an elongate housing;

a plurality of solid-state light emitters housed within the housing and configured along the length of the housing; and

an elongate wavelength conversion component remote to the plurality of solid-state light emitters and configured to in part at least define a light mixing chamber,

wherein the elongate wavelength conversion component comprises

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from a radiation source relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material.

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30. A downlight comprising:

a body comprising one or more solid-state light emitters, wherein the body is configured to be positioned within a downlighting fixture such that the downlight emits light in a downward direction; and

a wavelength conversion component remote to the one or more solid-state light emitters and configured to in part at least define a light mixing chamber,

wherein the wavelength conversion component comprises

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from a radiation source relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material.

31. A light bulb comprising:

a connector base configured to be inserted in a socket to form an electrical connection for the light bulb;

a body comprising one or more solid-state light emitters;

a wavelength conversion component having a three dimensional shape that is configured to enclose the one or more solid-state light emitters and to in part at least define a light mixing chamber,

wherein the wavelength conversion component comprises

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from a radiation source relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	ITMX-VISTA-00318US2
	Application Number	
Title of Invention	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Applicant Information:

Applicant 1 Remove

Applicant Authority	◉ Inventor	○ Legal Representative under 35 U.S.C. 117	○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Bing		Dai	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Fremont	State/Province	CA	Country of Residence [i]	US

Citizenship under 37 CFR 1.41(b) [i] CN

Mailing Address of Applicant:

Address 1	4987 Central Avenue, #237
Address 2	

City	Fremont	State/Province	CA
Postal Code	94536	Country [i]	US

Applicant 2 Remove

Applicant Authority	◉ Inventor	○ Legal Representative under 35 U.S.C. 117	○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Xianglong		Yuan	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Fremont	State/Province	CA	Country of Residence [i]	US

Citizenship under 37 CFR 1.41(b) [i] CN

Mailing Address of Applicant:

Address 1	360 Escobar Street
Address 2	

City	Fremont	State/Province	CA
Postal Code	94539	Country [i]	US

Applicant 3 Remove

Applicant Authority	◉ Inventor	○ Legal Representative under 35 U.S.C. 117	○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Gang		Wang	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Milpitas	State/Province	CA	Country of Residence [i]	US

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	ITMX-VISTA-00318US2
	Application Number	
Title of Invention	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES	

Citizenship under 37 CFR 1.41(b) i	CN				
Mailing Address of Applicant:					
Address 1	416 Capella Way				
Address 2					
City	Milpitas	**State/Province**	CA		
Postal Code	95035	**Country**i	US		

Applicant 4 Remove

Applicant Authority ◉ Inventor	○ Legal Representative under 35 U.S.C. 117	○ Party of Interest under 35 U.S.C. 118		
Prefix	**Given Name**	**Middle Name**	**Family Name**	**Suffix**
	Charles		Edwards	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Pleasanton	**State/Province**	CA	**Country of Residence** i	US
Citizenship under 37 CFR 1.41(b) i	US				
Mailing Address of Applicant:					
Address 1	4380 Entrada Drive				
Address 2					
City	Pleasanton	**State/Province**	CA		
Postal Code	94566	**Country**i	US		

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	101130		
Email Address	pcm@viplawgroup.com	Add Email	Remove Email

Application Information:

Title of the Invention	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES		
Attorney Docket Number	ITMX-VISTA-00318US2	**Small Entity Status Claimed**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		**Sub Class (if any)**	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	25	**Suggested Figure for Publication (if any)**	

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	ITMX-VISTA-00318US2
	Application Number	
Title of Invention	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES	

Publication Information:

☐	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐	**Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S. C. 122(b) and 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 international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Enter either Customer Number or complete the Representative Name section below. If both sections are completed the Customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	101130		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	non provisional of	61427411	2010-12-27
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation in part of	13253031	2011-10-04
Prior Application Status	Expired		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
13253031	non provisional of	61390091	2010-10-05

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).

Remove

Application Number	Country [i]	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
			◉ Yes ○ No

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	ITMX-VISTA-00318US2
	Application Number	
Title of Invention	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES	

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Assignee Information:

Providing this information in the application data sheet does not substitute for compliance with any requirement of part 3 of Title 37 of the CFR to have an assignment recorded in the Office.

Assignee 1 Remove

If the Assignee is an Organization check here. ☒			
Organization Name	Intematix Corporation		
Mailing Address Information:			
Address 1	46430 Fremont Blvd.		
Address 2			
City	Fremont	**State/Province**	CA
Country [i]	US	Postal Code	94538
Phone Number		Fax Number	
Email Address			

Additional Assignee Data may be generated within this form by selecting the **Add** button. Add

Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.

Signature	/Peter C. Mei/			Date (YYYY-MM-DD)	2011-10-13
First Name	Peter C.	Last Name	Mei	Registration Number	39768

This collection of information is required by 37 CFR 1.76. 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 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet 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.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

ABSTRACT

A light emitting device comprises at least one solid-state light source (LED) operable to generate excitation light and a wavelength conversion component located remotely to the at least one source and operable to convert at least a portion of the excitation light to light of a different wavelength. The wavelength conversion component comprises a light transmissive substrate having a wavelength conversion layer comprising particles of at least one photoluminescence material and a light diffusing layer comprising particles of a light diffractive material. This approach of using the light diffusing layer in combination with the wavelength conversion layer solves the problem of variations or non-uniformities in the color of emitted light with emission angle. In addition, the color appearance of the lighting apparatus in its OFF state can be improved by implementing the light diffusing layer in combination with the wavelength conversion layer. Moreover, significant reductions can be achieved in the amount phosphor materials required to implement phosphor-based LED devices.

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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	ATTY. DOCKET NO./TITLE
13/273,215	10/13/2011	Bing Dai	ITMX-VISTA-00318US2

CONFIRMATION NO. 8978

101130
Vista IP Law Group, LLP (Intematix)
2160 Lundy Avenue, Suite 230
San Jose, CA 95131

FORMALITIES LETTER

OC000000050624262

Date Mailed: 10/27/2011

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 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 $**95** to complete the basic filing fee for a small entity.*
- 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 application is informal since it does not comply with the regulations for the reason(s) indicated below.

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

- A replacement abstract not exceeding 150 words in length and commencing on a separate sheet in compliance with 37 CFR 1.72(b) and 37 CFR 1.121 is required.

Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.

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 $**580** as a 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.

- 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 $**65** for a small entity in compliance with 37 CFR 1.27, must be submitted.

SUMMARY OF FEES DUE:

Total fee(s) required within **TWO MONTHS** from the date of this Notice is $**1175** for a small entity
- $**95** Statutory basic filing fee.
- $**65** Surcharge.
- The application search fee has not been paid. Applicant must submit $**310** to complete the search fee.
- The application examination fee has not been paid. Applicant must submit $**125** to complete the examination fee for a small entity in compliance with 37 CFR 1.27.
- Total additional claim fee(s) for this application is $**580**
  - $**250** for **2** independent claims over 3.
  - $**330** for **11** total claims over 20.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.
https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at **1-866-217-9197** or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

/bzewdie/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

UNITED STATES PATENT AND TRADEMARK OFFICE

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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	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
13/273,215	10/13/2011	2811	0.00	ITMX-VISTA-00318US2	31	5

CONFIRMATION NO. 8978

101130
Vista IP Law Group, LLP (Intematix)
2160 Lundy Avenue, Suite 230
San Jose, CA 95131

FILING RECEIPT

OC000000050624261

Date Mailed: 10/27/2011

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Bing Dai, Fremont, CA;
Xianglong Yuan, Fremont, CA;
Gang Wang, Milpitas, CA;
Charles Edwards, Pleasanton, CA;

Assignment For Published Patent Application

INTEMATIX CORPORATION, Fremont, CA

Power of Attorney: None

Domestic Priority data as claimed by applicant

This appln claims benefit of 61/427,411 12/27/2010
and is a CIP of 13/253,031 10/04/2011
which claims benefit of 61/390,091 10/05/2010

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)

If Required, Foreign Filing License Granted: 10/26/2011

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/273,215**

Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No
**** SMALL ENTITY ****

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Title

WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES

Preliminary Class

257

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as

set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 13/273,215

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))	N/A	N/A	N/A	95		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	310		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	125		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	31 minus 20 =	* 11	x 30 =	330	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	5 minus 3 =	* 2	x 125 =	250			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 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).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	1110		TOTAL	

APPLICATION AS AMENDED - PART II

		(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($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	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	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)		RATE($)	ADDITIONAL FEE($)
AMENDMENT B	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 found in the appropriate box in column 1.

AMENDMENTS TO THE SPECIFICATION

The Abstract of the application is currently being amended. Please make this amendment by deleting the entire section identified by the heading "ABSTRACT" on page 56 of the application, and replacing that deleted section with the following replacement section:

ABSTRACT

A light emitting device comprises at least one solid-state light source (LED) operable to generate excitation light and a wavelength conversion component located remotely to the at least one source and operable to convert at least a portion of the excitation light to light of a different wavelength. The wavelength conversion component has at least one photoluminescence material and a light scattering material, where the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from a radiation source relatively more than the light scattering material will scatter light generated by the photoluminescence material. ~~The wavelength conversion component comprises a light transmissive substrate having a wavelength conversion layer comprising particles of at least one photoluminescence material and a light diffusing layer comprising particles of a light diffractive material. This approach of using the light diffusing layer in combination with the wavelength conversion layer solves the problem of variations or non-uniformities in the color of emitted light with emission angle. In addition, the color appearance of the lighting apparatus in its OFF state can be improved by implementing the light diffusing layer in combination with the wavelength conversion layer. Moreover, significant reductions can be achieved in the amount phosphor materials required to implement phosphor-based LED devices.~~

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DECLARATION
Utility Application

As a below named inventors, I hereby declare that:

Our residence, post office addresses and citizenships are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES** the specification of which

☐ is attached hereto OR
☒ was filed on **October 13, 2011** as United States Application Serial No. **13/273,215**.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment(s) referred to above.

I acknowledge the duty to disclose information which is material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, § 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Date of Filing	Priority Claimed Yes	Priority Claimed No

I hereby claim the benefit under Title 35, United States Code §119(e) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date
61/427,411	December 27, 2010
61/390,091	October 5, 2010

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s), or § 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to

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patentability as defined in Title 37, Code of Federal Regulations § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. Parent Application Number	PCT Parent Number	Parent Filing Date	Status-Patented, Pending or Abandoned
13/253,031		October 4, 2011	Pending

I further declare 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 are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Title 18, United States Code, § 1001 and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

1	FULL NAME OF INVENTOR	FIRST Name **Bing**	MIDDLE Initial	LAST Name **Dai**	
	RESIDENCE & CITIZENSHIP	City **Fremont**	State or Foreign Country **California**	Country of Citizenship **CN**	
	POST OFFICE ADDRESS	**4987 Central Avenue, #237**	City **Fremont**	State or Country **California**	Zip Code **94536**

INVENTOR'S SIGNATURE _____ DATE Dec 20, 2011

Savant Technologies EX1104, Page 99 of 485

2	FULL NAME OF INVENTOR	FIRST Name **Xianglong**	MIDDLE Initial	LAST Name **Yuan**	
	RESIDENCE & CITIZENSHIP	City **Fremont**	State or Foreign Country **California**	Country of Citizenship **CN**	
	POST OFFICE ADDRESS	~~109 Linmore Drive~~ 360 Escobar St	City **Fremont**	State or Country **California**	Zip Code **94539**

XLY

INVENTOR'S SIGNATURE XLY DATE 12/20/2011

Savant Technologies EX1104, Page 100 of 485

3	FULL NAME OF INVENTOR	FIRST Name **Gang**	MIDDLE Initial	LAST Name **Wang**	
	RESIDENCE & CITIZENSHIP	City **Milpitas**	State or Foreign Country **California**	Country of Citizenship **CN**	
	POST OFFICE ADDRESS	**416 Capella Way**	City **Milpitas**	State or Country **California**	Zip Code **95035**

INVENTOR'S SIGNATURE _____ DATE 12/20/11

4	FULL NAME OF INVENTOR	FIRST Name **Charles**	MIDDLE Initial	LAST Name **Edwards**	
	RESIDENCE & CITIZENSHIP	City **Pleasanton**	State or Foreign Country **California**	Country of Citizenship **US**	
	POST OFFICE ADDRESS	**4380 Entrada Drive**	City **Pleasanton**	State or Country **California**	Zip Code **94566**

INVENTOR'S SIGNATURE _____ DATE 20 DEC 2011

5	FULL NAME OF INVENTOR	FIRST Name **James**	MIDDLE Initial	LAST Name **Caruso**	
	RESIDENCE & CITIZENSHIP	City **Albuquerque**	State or Foreign Country **New Mexico**	Country of Citizenship **US**	
	POST OFFICE ADDRESS	**7721 Cedar Canyon Ct. NE**	City **Albuquerque**	State or Country **New Mexico**	Zip Code **87122**

INVENTOR'S SIGNATURE _____ DATE 12/23/11

Electronic Patent Application Fee Transmittal

Application Number:	13273215
Filing Date:	13-Oct-2011
Title of Invention:	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES
First Named Inventor/Applicant Name:	Bing Dai
Filer:	Peter C. Mei/Tony Nguyen
Attorney Docket Number:	ITMX-VISTA-00318US2

Filed as Small Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	95	95
Utility Search Fee	2111	1	310	310
Utility Examination Fee	2311	1	125	125
Pages:				
Claims:				
Claims in excess of 20	2202	11	30	330
Independent claims in excess of 3	2201	2	125	250
Miscellaneous-Filing:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Late filing fee for oath or declaration	2051	1	65	65
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**1175**

Electronic Acknowledgement Receipt	
EFS ID:	11714689
Application Number:	13273215
International Application Number:	
Confirmation Number:	8978
Title of Invention:	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES
First Named Inventor/Applicant Name:	Bing Dai
Customer Number:	101130
Filer:	Peter C. Mei/Tony Nguyen
Filer Authorized By:	Peter C. Mei
Attorney Docket Number:	ITMX-VISTA-00318US2
Receipt Date:	27-DEC-2011
Filing Date:	13-OCT-2011
Time Stamp:	20:06:27
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$1175
RAM confirmation Number	5240
Deposit Account	501105
Authorized User	VISTA IP LAW GR
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees) Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	ITMX-VISTA-00318US2_Response-to-missing-parts.pdf	69066 e6979f81c27789ed0992df5d7085f9f536c3782f	no	3
Warnings:					
Information:					
2	Application Data Sheet	ITMX-VISTA-00318US2_ADS.pdf	1421648 174da9111a711b67e79b252cb1f33dbeabbf0c0b	no	6
Warnings:					
Information:					
3	Oath or Declaration filed	ITMX-VISTA-00318US2_Declaration-executed.pdf	3410341 123a8657c756ae04030d2ed2f3baecc1658976d9	no	7
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	40135 b769f6d20bcc39cc40dfffba88f73c04f3a6ef41	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	4941190		

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/14 (11-08)
Approved for use through 01/31/2014. 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 contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	ITMX-VISTA-00318US2
	Application Number	
Title of Invention	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Applicant Information:

Applicant 1 Remove

Applicant Authority	◉ Inventor	○ Legal Representative under 35 U.S.C. 117	○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Bing		Dai	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Fremont	State/Province	CA	Country of Residence [i]	US

Citizenship under 37 CFR 1.41(b) [i]	CN

Mailing Address of Applicant:

Address 1	4987 Central Avenue, #237
Address 2	

City	Fremont	State/Province	CA
Postal Code	94536	Country [i]	US

Applicant 2 Remove

Applicant Authority	◉ Inventor	○ Legal Representative under 35 U.S.C. 117	○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Xianglong		Yuan	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Fremont	State/Province	CA	Country of Residence [i]	US

Citizenship under 37 CFR 1.41(b) [i]	CN

Mailing Address of Applicant:

Address 1	360 Escobar Street
Address 2	

City	Fremont	State/Province	CA
Postal Code	94539	Country [i]	US

Applicant 3 Remove

Applicant Authority	◉ Inventor	○ Legal Representative under 35 U.S.C. 117	○ Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Gang		Wang	

Residence Information (Select One) ◉ US Residency ○ Non US Residency ○ Active US Military Service

City	Milpitas	State/Province	CA	Country of Residence [i]	US

PTO/SB/14 (11-08)
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	ITMX-VISTA-00318US2
	Application Number	
Title of Invention	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES	

Citizenship under 37 CFR 1.41(b) i	CN				
Mailing Address of Applicant:					
Address 1	416 Capella Way				
Address 2					
City	Milpitas	**State/Province**	CA		
Postal Code	95035	**Country**i	US		

Applicant 4 Remove

Applicant Authority ◉ Inventor	○ Legal Representative under 35 U.S.C. 117	○ Party of Interest under 35 U.S.C. 118			
Prefix	**Given Name**	**Middle Name**	**Family Name**	**Suffix**	
	Charles		Edwards		
Residence Information (Select One) ◉ US Residency	○ Non US Residency	○ Active US Military Service			
City	Pleasanton	**State/Province**	CA	**Country of Residence** i	US
Citizenship under 37 CFR 1.41(b) i	US				
Mailing Address of Applicant:					
Address 1	4380 Entrada Drive				
Address 2					
City	Pleasanton	**State/Province**	CA		
Postal Code	94566	**Country**i	US		

Applicant 5 Remove

Applicant Authority ◉ Inventor	○ Legal Representative under 35 U.S.C. 117	○ Party of Interest under 35 U.S.C. 118			
Prefix	**Given Name**	**Middle Name**	**Family Name**	**Suffix**	
	James		Caruso		
Residence Information (Select One) ◉ US Residency	○ Non US Residency	○ Active US Military Service			
City	Albuquerque	**State/Province**	NM	**Country of Residence** i	US
Citizenship under 37 CFR 1.41(b) i	US				
Mailing Address of Applicant:					
Address 1	7721 Cedar Canyon Ct NE				
Address 2					
City	Albuquerque	**State/Province**	NM		
Postal Code	87122	**Country**i	US		

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	101130

EFS Web 2.2.2

PTO/SB/14 (11-08)
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U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	ITMX-VISTA-00318US2
	Application Number	
Title of Invention	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES	

Email Address	pcm@viplawgroup.com	Add Email	Remove Email

Application Information:

Title of the Invention	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES		
Attorney Docket Number	ITMX-VISTA-00318US2	Small Entity Status Claimed	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	25	Suggested Figure for Publication (if any)	

Publication Information:

☐	Request Early Publication (Fee required at time of Request 37 CFR 1.219)
☐	**Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S. C. 122(b) and 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 international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Enter either Customer Number or complete the Representative Name section below. If both sections are completed the Customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	101130		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	non provisional of	61427411	2010-12-27
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation in part of	13253031	2011-10-04
Prior Application Status	Expired		Remove

PTO/SB/14 (11-08)
Approved for use through 01/31/2014. 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 contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	ITMX-VISTA-00318US2
	Application Number	
Title of Invention	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES	

Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
13253031	non provisional of	61390091	2010-10-05

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button. Add

Foreign Priority Information:

This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).

Remove

Application Number	Country [i]	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
			(•) Yes ( ) No

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button. Add

Assignee Information:

Providing this information in the application data sheet does not substitute for compliance with any requirement of part 3 of Title 37 of the CFR to have an assignment recorded in the Office.

Assignee 1 Remove

If the Assignee is an Organization check here. ☒			
Organization Name	Intematix Corporation		
Mailing Address Information:			
Address 1	46430 Fremont Blvd.		
Address 2			
City	Fremont	**State/Province**	CA
Country [i] US		Postal Code	94538
Phone Number		Fax Number	
Email Address			

Additional Assignee Data may be generated within this form by selecting the **Add** button. Add

Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.

Signature	/Peter C. Mei/			Date (YYYY-MM-DD)	2011-12-27
First Name	Peter C.	Last Name	Mei	Registration Number	39768

PTO/SB/14 (11-08)
Approved for use through 01/31/2014. 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 contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76	Attorney Docket Number	ITMX-VISTA-00318US2
	Application Number	
Title of Invention	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES	

This collection of information is required by 37 CFR 1.76. 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 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet 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.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:	Group Art Unit: 2811
Bing Dai, et al.	Examiner: Not Yet Assigned
Serial No.: 13/273,215	Confirmation No.: 8978
Filed: October 13, 2011	
For: WAVELENGTH CONVERSION COMPONENT WITH A SCATTERING PARTICLES	

RESPONSE TO NOTICE TO FILE MISSING PARTS

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

Dear Sir:

This paper is in response to the Notice to File Missing Parts mailed on October 27, 2011. Prior to substantive examination of the application, Applicants respectfully request entry of the present amendment in accordance with the following sheets.

Amendments to the Specification begin on page 2.

Remarks begin on page 3.

REMARKS

The Notice to File Missing Parts mailed on October 27, 2011 required the application to be amended to include a replacement Abstract not exceeding 150 words in length. In response, the current amendment has provided a replacement Abstract in compliance with 37 CFR section 1.72.

The Notice to File Missing Parts also requires submission of the Oath/Declaration and payment of required fees. Submitted herewith is an executed Declaration and payment of the required fees.

The Commissioner is authorized to charge any fees due in connection with the filing of this document to Vista IP Law Group's Deposit Account No. **50-1105**, referencing billing number **ITMX-VISTA-00318US2**. The Commissioner is authorized to credit any overpayment or to charge any underpayment to Vista IP Law Group's Deposit Account No. **50-1105**, referencing billing number **ITMX-VISTA-00318US2**.

Respectfully submitted,

Dated: December 27, 2011

By: /Peter C. Mei/
Peter C. Mei
Registration No.: 39,768

VISTA IP LAW GROUP LLP
2160 Lundy Ave., Suite 230
San Jose, CA 95131
Telephone: (408) 321-8663 Ext. 208
Facsimile: (408) 877-1662

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	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
13/273,215	10/13/2011	2811	1175	ITMX-VISTA-00318US2	31	5

CONFIRMATION NO. 8978

101130
Vista IP Law Group, LLP (Intematix)
2160 Lundy Avenue, Suite 230
San Jose, CA 95131

UPDATED FILING RECEIPT

OC000000051795956

Date Mailed: 01/05/2012

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

Bing Dai, Fremont, CA;
Xianglong Yuan, Fremont, CA;
Gang Wang, Milpitas, CA;
Charles Edwards, Pleasanton, CA;
James Caruso, Albuquerque, NM;

Assignment For Published Patent Application

INTEMATIX CORPORATION, Fremont, CA

Power of Attorney: None

Domestic Priority data as claimed by applicant

This appln claims benefit of 61/427,411 12/27/2010
and is a CIP of 13/253,031 10/04/2011
which claims benefit of 61/390,091 10/05/2010

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.)

If Required, Foreign Filing License Granted: 10/26/2011

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 13/273,215**

Projected Publication Date: 04/12/2012

Non-Publication Request: No

Early Publication Request: No

**** SMALL ENTITY ****

Savant Technologies EX1104, Page 116 of 485

Title

WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES

Preliminary Class

257

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as

set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage, facilitate, and accelerate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 13/273,215

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))	N/A	N/A	N/A	95		N/A	
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	310		N/A	
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	125		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	31 minus 20 =	* 11	x 30 =	330	OR		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	5 minus 3 =	* 2	x 125 =	250			
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 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).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				0.00			
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	1110		TOTAL	

APPLICATION AS AMENDED - PART II

		(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($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	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	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)	OR	RATE($)	ADDITIONAL FEE($)
AMENDMENT B	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 found in the appropriate box in column 1.

UNITED STATES PATENT AND TRADEMARK OFFICE

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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/273,215	10/13/2011	Bing Dai	ITMX-VISTA-00318US2

CONFIRMATION NO. 8978

101130
Vista IP Law Group, LLP (Intematix)
2160 Lundy Avenue, Suite 230
San Jose, CA 95131

PUBLICATION NOTICE

OC000000053685064

Title:WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES

Publication No.US-2012-0087104-A1
Publication Date:04/12/2012

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 1-866-217-9197.

Office of Data Managment, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13273215	DAI ET AL.
	Examiner	Art Unit
	313MARY ELLEN BOWMAN	2879

SEARCHED			
Class	Subclass	Date	Examiner
313	112, 498, 501, 512	9/18/12	MB
257	98	9/18/12	MB
438	27	9/18/12	MB

SEARCH NOTES		
Search Notes	Date	Examiner
inventor search in eDan	9/18/12	MB

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

/MARY ELLEN BOWMAN/ Examiner.Art Unit 2879	

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/273,215	10/13/2011	Bing Dai	ITMX-VISTA-00318US2	8978

101130 7590 09/24/2012

Vista IP Law Group, LLP (Intematix)
2160 Lundy Avenue, Suite 230
San Jose, CA 95131

EXAMINER	
BOWMAN, MARY ELLEN	
ART UNIT	**PAPER NUMBER**
2879	
MAIL DATE	**DELIVERY MODE**
09/24/2012	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)	
	13/273,215	DAI ET AL.	
	Examiner	Art Unit	
	MARY ELLEN BOWMAN	2879	

-- 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 *13 October 2011*.

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

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ 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

5)☒ Claim(s) *1-31* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-31* is/are rejected.

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

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

Application Papers

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

11)☒ The drawing(s) filed on *13 October 2011* 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).

12)☐ 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

13)☐ 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: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

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.

Claims 1-9, 11-15, 18-20, 22, 23 and 25-28 are rejected under 35 U.S.C. 102(b) as being anticipated by McNulty et al., US 2002/0180351 A1, published December 5, 2002 (hereinafter referred to as "McNulty").

Regarding claim 1, McNulty teaches a wavelength conversion component for a light emitting device (at least in Figure 2 and [0022]) comprising: at least one photoluminescence material (40); and a light scattering material wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from a radiation source relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material (Abstract, [0022-0024] and claim 5; Note: The average particle size of the scattering material is around 1/10 of the wavelength of the light emitted from the LED light source, which is within the range taught by Applicant, therefore the particles would perform in the same manner).

Regarding claim 2, McNulty further teaches the excitation light comprises blue light ([0002]).

Regarding claim 3, McNulty further teaches the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material (see

claim 1 above and [0022-0024], the material would act in the same manner as that explained by Applicant because it is the same material and the same relative size).

Regarding claim 4, McNulty further teaches the light scattering material has an average particle size that is less than about 150 nm (Abstract and [0022-0024]; Average particle size of between 30-42nm).

Regarding claim 5, McNulty further teaches the light scattering material is silica ([0023-0024] and Table 1).

Regarding claim 6, McNulty further teaches the at least one photoluminescence material is located in a wavelength conversion layer and the light scattering material is located in a diffusing layer (Figure 2, layers 40 and 42 and [0022]).

Regarding claim 7, McNulty further teaches the wavelength conversion layer and the light diffusing layer are in direct contact with each other ([0022] and Figure 2, layers 40 and 42).

Regarding claim 8, McNulty further teaches the wavelength conversion layer comprises a mixture of the at least one phosphor material and a light transmissive binder and the light diffusing layer comprises a mixture of the light scattering material and the light transmissive binder ([0021-0022]).

Regarding claim 9, McNulty further teaches the light transmissive binder comprises a curable liquid polymer selected from the group consisting of a polymer resin, a monomer resin, an acrylic, an epoxy, a silicone and a fluorinated polymer ([0021]).

Regarding claim 11, McNulty teaches the invention as explained above. Further, the process limitations of claim 11 lend weight to the claim only in so far as they affect the structure

of the device. It is the position of the Examiner that the structure of McNulty is capable of being manufactured by said method, and therefore meets the limitations of the claim.

Regarding claim 12, McNulty further teaches the wavelength conversion layer and the light diffusing layer comprise planar shapes (Figure 2 and [0022]).

Regarding claim 13, McNulty further teaches the light diffusing layer comprises a dome or elongated dome shape (Figure 2 and [0022]).

Regarding claim 14, McNulty further teaches the wavelength conversion layer fills a volume formed beneath the dome or elongated dome shape (Figure 2 and [0022]).

Regarding claim 15, McNulty further teaches both the at least one photoluminescence material and the light scattering material are located in a wavelength conversion layer (Figure 1 and [0022]).

Regarding claim 18, McNulty further teaches the excitation light comprises ultraviolet light ([0022]).

Regarding claim 19, McNulty further teaches the light scattering material has an average particle size of less than about 100 nm (Abstract, [0022-0024] and claim 5, see also explanation from claim 1 above).

Regarding claim 20, McNulty teaches the invention as explained above regarding claim 1 and further teaches a light emitting device comprising a solid state light emitter operable to generate excitation light (LED 20, Figure 2).

Regarding claims 22 and 23, McNulty further teaches the average particle size of the light scattering material is selected to improve an OFF state white appearance of the light emitting device and to obtain substantially uniform color for emitted light from the light emitting

device for emission angles over a 60 degree range from an emission axis (see explanation regarding claim 1 above, the scattering particles are of the same material and same size as those used by Applicant, therefore it is the position of the Examiner that the light scattering layer would function in a similar manner).

Regarding claim 25, McNulty further teaches the excitation light comprises blue light ([0002]) and the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material (see claims 2 and 3 above).

Regarding claim 26, McNulty further teaches the invention as explained above regarding claim 4.

Regarding claim 27, McNulty further teaches the invention as explained above regarding claim 12.

Regarding claim 28, McNulty further teaches the invention as explained above regarding claim 13.

Claim Rejections - 35 USC § 103

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.

Claims 10 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over McNulty in view of Cairns et al., US 4191943, published March 4, 1980 (hereinafter referred to as "Cairns").

Regarding claims 10 and 24, McNulty teaches the inventions as explained above, but is silent as to the loading of scattering material into the transmissive binder.

In the same field of endeavor of LEDs, Cairns teaches a light scattering material should be employed in the amount claimed in order to achieve optimum light scattering (col 3, lines 60-62). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to utilize the light scattering particles of McNulty in the amount taught by Cairns in order to achieve optimum light scattering without loss due to absorption.

Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over McNulty in view of Chakraborty et al., US 2009/0272996, filed May 2, 2008 (hereinafter referred to as "Chakraborty").

Regarding claim 16, McNulty teaches the invention as explained above but is silent as to the particles being from 1 to 50 micrometers in size.

However, in the same field of endeavor of LEDs, Chakraborty teaches light scattering particles of the claimed size in a light transmissive binder ([0084]). Chakraborty further teaches that said particle size optimizes the light scattering effect of the layer (id). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to utilize light scattering particles in the claimed range in order to optimize the light scattering effect of the layer.

Regarding claim 17, McNulty teaches the invention as explained above but is silent as to the substrate upon which the LED and phosphor layer are formed.

In the same field of endeavor of LEDs, Chakraborty teaches the LED and phosphor layer are formed on a substrate having a reflective film thereon ([0097-0098]). Further, it was well

known to those of ordinary skill in the art at the time the invention was made that materials such as glass make excellent device substrates due to their electrical insulation properties and ease of manufacturing. Therefore, in light of the state of the art as well as the teaching in Chakraborty, it would have been obvious for one of ordinary skill in the art at the time the invention was made to utilize a light transmissive substrate such as glass in order to form the LED and phosphor layers of an LED lighting device.

Claims 21 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over McNulty in view of Robertson et al., US 6860628 B2, published March 1, 2005 (hereinafter referred to as "Robertson").

Regarding claim 21, McNulty teaches the invention as explained above but is silent as to the myriad of uses for an LED.

In the same field of endeavor of LEDs, Robertson teaches an LED may be used in a linear lamp as a replacement for a fluorescent bulb (Figure 3A). Further, it was well known to those of ordinary skill in the art at the time the invention was made that LEDs have many applications in the lighting field including several different types of bulbs with and without reflectors. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to utilize the LED taught by McNulty in several different ways, including as a linear lamp, such as the lighting device in Robertson.

Regarding claim 29, McNulty teaches the invention as explained above, but is silent as to the LED being used in a linear lamp.

In the same field of endeavor of LEDs, Robertson teaches a linear lamp comprising an elongate housing and a plurality of LEDs housed within the housing and configured along the

length of the housing and an elongate wavelength conversion component (Figure 3A). Further, it was well known to those of ordinary skill in the art at the time the invention was made that LEDs have many applications in the lighting field including several different types of bulbs with and without reflectors. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to utilize the LED taught by McNulty in several different ways, including as a linear lamp, such as the lighting device in Robertson.

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over McNulty in view of Soules et al, US 2007/0120135 A1, published May 31, 2007 (hereinafter referred to as "Soules").

Regarding claim 30, McNulty teaches the invention as explained above but is silent as to the LED being used in a downlight.

In the same field of endeavor of LEDs, Soules teaches a downlight comprising a body comprising one or more LEDs, and the body is configured within a downlighting fixture ([0052]). Further, it was well known to those of ordinary skill in the art at the time the invention was made that LEDs have many applications in the lighting field including several different types of bulbs with and without reflectors. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to utilize the LED taught by McNulty in several different ways, including in a downlight, such as the lighting device in Soules.

Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over McNulty in view of Negley et al., US 2008/0130285 A1, published June 5, 2008 (hereinafter referred to as "Negley").

Regarding claim 31, McNulty teaches the invention as explained above but is silent as to the LED being used in a light bulb.

In the same field of endeavor of LEDs, Negley teaches a light bulb comprising a connector base and a body comprising one or more LEDs ([0022]). Further, it was well known to those of ordinary skill in the art at the time the invention was made that LEDs have many applications in the lighting field including several different types of bulbs with and without reflectors. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to utilize the LED taught by McNulty in several different ways, including in a light bulb, such as the lighting device in Negley.

Double Patenting

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).

Claims 1-31 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over the claims of copending Application No. 13/253031, 13/273212 and 13/272217. Although the conflicting claims are not identical, they are not patentably distinct from each other because they teach each of the limitations of the present claims.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARY ELLEN BOWMAN whose telephone number is (571)270-5383. The examiner can normally be reached on Monday-Friday, 5:30-8:30a.m. and 12:00-5:00 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. 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.

/MARY ELLEN BOWMAN/
Examiner, Art Unit 2879

Notice of References Cited	Application/Control No. 13/273,215	Applicant(s)/Patent Under Reexamination DAI ET AL.	
	Examiner MARY ELLEN BOWMAN	Art Unit 2879	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-4,191,943 A	03-1980	Cairns et al.	340/815.42
*	B	US-2002/0180351 A1	12-2002	McNulty et al.	313/512
*	C	US-6,860,628 B2	03-2005	Robertson et al.	362/555
*	D	US-2007/0120135 A1	05-2007	Soules et al.	257/098
*	E	US-2008/0130285 A1	06-2008	Negley et al.	362/257
*	F	US-2009/0272996 A1	11-2009	Chakraborty, Arpan	257/98
	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.

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13273215	DAI ET AL.
	Examiner	Art Unit
	MARY ELLEN BOWMAN	2879

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	09/18/2012								
	1	✓								
	2	✓								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	✓								
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	28	✓								
	29	✓								
	30	✓								
	31	✓								

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1	"20090272996"	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/17 14:20
L2	2	"20070240346"	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/17 14:28
L3	356	(257/98.ccls. 438/27.ccls. 313/498,501,512,112.ccls.) and ("light emitting diode" LED.U/C.) and ((scatter$3 reflect$3) with particle with (size nanometer micrometer))	US-PGPUB; USPAT; USOCR	OR	ON	2012/09/17 14:34
L4	215	(257/98.ccls. 438/27.ccls. 313/498,501,512,112.ccls.) and ("light emitting diode" LED.U/C.) and ((scatter$3 reflect$3) with particle with (concentration weight percent$3 amount))	US-PGPUB; USPAT; USOCR	OR	ON	2012/09/17 15:37
L5	9	(257/98.ccls. 438/27.ccls. 313/498,501,512,112.ccls.) and ("light emitting diode" LED.U/C.) and (down$light) and (base near4 socket)	US-PGPUB; USPAT; USOCR	OR	ON	2012/09/17 16:20
L6	2	(257/98.ccls. 438/27.ccls. 313/498,501,512,112.ccls.) and ("light emitting diode" LED.U/C.) and (down$light) and ((housing envelope bulb) with (elongat$2 linear))	US-PGPUB; USPAT; USOCR	OR	ON	2012/09/17 16:30
L7	46	(257/98.ccls. 438/27.ccls. 313/498,501,512,112.ccls.) and ("light emitting diode" LED.U/C.) and ((housing envelope bulb) with (elongat$2 linear))	US-PGPUB; USPAT; USOCR	OR	ON	2012/09/17 16:31
L8	50	(257/98.ccls. 438/27.ccls. 313/498,501,512,112.ccls.) and ("light emitting diode" LED.U/C.) and (downlight)	US-PGPUB; USPAT; USOCR	OR	ON	2012/09/17 16:33

EAST Search History (Interference)

<This search history is empty>

9/17/2012 4:36:15 PM
C:\Users\mbowman\Documents\EAST\Workspaces\13273215.wsp

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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P.O. Box 1450
Alexandria, Virginia 22313-1450
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BIB DATA SHEET

CONFIRMATION NO. 8978

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
13/273,215	10/13/2011 RULE	313	2879	ITMX-VISTA-00318US2

APPLICANTS

Bing Dai, Fremont, CA;
Xianglong Yuan, Fremont, CA;
Gang Wang, Milpitas, CA;
Charles Edwards, Pleasanton, CA;
James Caruso, Albuquerque, NM;

**** CONTINUING DATA **************************

This appln claims benefit of 61/427,411 12/27/2010
and is a CIP of 13/253,031 10/04/2011
which claims benefit of 61/390,091 10/05/2010

**** FOREIGN APPLICATIONS **************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED **** ** SMALL ENTITY **
10/26/2011

Foreign Priority claimed	☐ Yes ☑ No	☐ Met after Allowance	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
35 USC 119(a-d) conditions met	☐ Yes ☑ No		CA	25	31	5
Verified and Acknowledged	/MARY ELLEN BOWMAN/ Examiner's Signature	Initials				

ADDRESS

Vista IP Law Group, LLP (Intematix)
2160 Lundy Avenue, Suite 230
San Jose, CA 95131
UNITED STATES

TITLE

WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES

FILING FEE RECEIVED		
1175	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

BIB (Rev. 05/07).

PTO/SB/25 (08-11)
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TERMINAL DISCLAIMER TO OBVIATE A PROVISIONAL DOUBLE PATENTING REJECTION OVER A PENDING "REFERENCE" APPLICATION	Docket Number (Optional) ITMX-00318US2

In re Application of: Bing Dai et al.

Application No.: 13/273,215

Filed: 10-13-2011

For: WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES

The owner*, Intematix Corporation, of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of any patent granted on pending **reference** Application Number 13/273,217, filed 10-13-2011, as the term of any patent granted on said **reference** application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending **reference** application. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and any patent granted on the **reference** application are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

In making the above disclaimer, the owner does not disclaim the terminal part of any patent granted on the instant application that would extend to the expiration date of the full statutory term of any patent granted on said **reference** application, "as the term of any patent granted on said **reference** application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending **reference** application," in the event that: any such patent: granted on the pending **reference** application: expires for failure to pay a maintenance fee, is held unenforceable, is found invalid by a court of competent jurisdiction, is statutorily disclaimed in whole or terminally disclaimed under 37 CFR 1.321, has all claims canceled by a reexamination certificate, is reissued, or is in any manner terminated prior to the expiration of its full statutory term as shortened by any terminal disclaimer filed prior to its grant.

Check either box 1 or 2 below, if appropriate.

1. ☐ For submissions on behalf of a business/organization (e.g., corporation, partnership, university, government agency, etc.), the undersigned is empowered to act on behalf of the business/organization.

I hereby declare 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 Section 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 issued thereon.

2. ☑ The undersigned is an attorney or agent of record. Reg. No. 39,768

/Peter C. Mei/ — Signature
Dec. 23, 2012 — Date

Peter C. Mei — Typed or printed name

408-321-8663 ext. 208 — Telephone Number

☑ Terminal disclaimer fee under 37 CFR 1.20(d) is included.

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.

*Statement under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee (owner).
Form PTO/SB/96 may be used for making this statement. See MPEP § 324.

This collection of information is required by 37 CFR 1.321. 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: 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.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PTO/SB/25 (08-11)
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TERMINAL DISCLAIMER TO OBVIATE A PROVISIONAL DOUBLE PATENTING REJECTION OVER A PENDING "REFERENCE" APPLICATION	Docket Number (Optional) ITMX-00318US2

In re Application of: Bing Dai et al.

Application No.: 13/273,215

Filed: 10-13-2011

For: WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES

The owner*, Intematix Corporation, of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of any patent granted on pending **reference** Application Number 13/273,212, filed 10-13-2011, as the term of any patent granted on said **reference** application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending **reference** application. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and any patent granted on the **reference** application are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

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Check either box 1 or 2 below, if appropriate.

1. ☐ For submissions on behalf of a business/organization (e.g., corporation, partnership, university, government agency, etc.), the undersigned is empowered to act on behalf of the business/organization.

I hereby declare 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 Section 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 issued thereon.

2. ☑ The undersigned is an attorney or agent of record. Reg. No. 39,768

/Peter C. Mei/ — Signature
Dec. 23, 2012 — Date

Peter C. Mei — Typed or printed name

408-321-8663 ext. 208 — Telephone Number

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PTO/SB/25 (08-11)
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TERMINAL DISCLAIMER TO OBVIATE A PROVISIONAL DOUBLE PATENTING REJECTION OVER A PENDING "REFERENCE" APPLICATION	Docket Number (Optional) ITMX-00318US2

In re Application of: Bing Dai et al.

Application No.: 13/273,215

Filed: 10-13-2011

For: WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES

The owner*, Intematix Corporation, of 100 percent interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application which would extend beyond the expiration date of the full statutory term of any patent granted on pending **reference** Application Number 13/253,031, filed 10-04-2011, as the term of any patent granted on said **reference** application may be shortened by any terminal disclaimer filed prior to the grant of any patent on the pending **reference** application. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and any patent granted on the **reference** application are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.

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2. ☑ The undersigned is an attorney or agent of record. Reg. No. 39,768

/Peter C. Mei/ — Signature
Dec. 23, 2012 — Date

Peter C. Mei — Typed or printed name

408-321-8663 ext. 208 — Telephone Number

☑ Terminal disclaimer fee under 37 CFR 1.20(d) is included.

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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

☑ Practitioners associated with the Customer Number: 101130

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

☑ The address associated with Customer Number: 101130

OR

☐ Firm or Individual Name			
Address			
City		State	Zip
Country			
Telephone		Email	

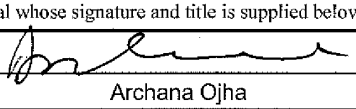
Assignee Name and Address:

Intematix Corporation,
46430 Fremont Blvd.,
Fremont, CA 94538

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	1-9-2012
Name	Archana Ojha	Telephone	510-933-3240
Title	Assistant General Counsel		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. 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 3 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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Electronic Patent Application Fee Transmittal	
Application Number:	13273215
Filing Date:	13-Oct-2011
Title of Invention:	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES
First Named Inventor/Applicant Name:	Bing Dai
Filer:	Peter C. Mei/Tony Nguyen
Attorney Docket Number:	ITMX-00318US2
Filed as Small 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($)
Miscellaneous:				
Statutory or terminal disclaimer	2814	3	80	240
		Total in USD ($)		**240**

PTO/SB/06 (07-06)
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 13/273,215	Filing Date 10/13/2011	☐ To be Mailed

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	95		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	95		TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT	12/23/2012	(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))	* 28	Minus	** 31	= 0	X $31 =	0	OR	X $ =	
	Independent (37 CFR 1.16(h))	* 5	Minus	***5	= 0	X $125 =	0	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	0	OR	TOTAL ADD'L FEE	

AMENDMENT		(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))							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:
/FELICIA ALLEN-JENKINS/

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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Electronic Acknowledgement Receipt	
EFS ID:	14553511
Application Number:	13273215
International Application Number:	
Confirmation Number:	8978
Title of Invention:	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES
First Named Inventor/Applicant Name:	Bing Dai
Customer Number:	101130
Filer:	Peter C. Mei/Tony Nguyen
Filer Authorized By:	Peter C. Mei
Attorney Docket Number:	ITMX-00318US2
Receipt Date:	23-DEC-2012
Filing Date:	13-OCT-2011
Time Stamp:	16:22:14
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$240
RAM confirmation Number	7795
Deposit Account	501105
Authorized User	VISTA IP LAW GR
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)	

File Listing:					
Document Number	**Document Description**	**File Name**	**File Size(Bytes)/ Message Digest**	**Multi Part /.zip**	**Pages (if appl.)**
1	Amendment/Req. Reconsideration-After Non-Final Reject	ITMX-00318US2_Response-to-OA_122312.pdf	154705 fc016c1d381e2dfb13e431c2dee1132ed2059cce	no	17
Warnings:					
Information:					
2	Terminal Disclaimer Filed	ITMX-00318US2_sb0025-031.pdf	342070 8ff337871ba5d4701c8f1f9083e0a4b96ee4aa2c	no	2
Warnings:					
Information:					
3	Terminal Disclaimer Filed	ITMX-00318US2_sb0025-212.pdf	342070 6f7261dd2ec9e6b24f4afe5d0974675c4eda948c	no	2
Warnings:					
Information:					
4	Terminal Disclaimer Filed	ITMX-00318US2_sb0025-217.pdf	342071 45941a793cd25d05618ea8fe74b83da6c62192fc	no	2
Warnings:					
Information:					
5	Assignee showing of ownership per 37 CFR 3.73.	ITMX-00318US2_373b.pdf	422725 9e6c6b16e1a28cc474314713065a4fef45e4ea7c	no	2
Warnings:					
Information:					
6	Power of Attorney	Power_of_Attorney_to_Prosecute_Applns_PTO_SB_80_1-9-2012.pdf	75521 37360e7a2ef4eb360d01f198106ae674cfcbd504	no	1
Warnings:					
Information:					
7	Fee Worksheet (SB06)	fee-info.pdf	30170 2e7a87f5b60baaf76a1d317613538468c10db5e3	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1709332		

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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.

AMENDMENT TO THE CLAIMS

Claims 1-31 are pending. Claims 1, 4, 20 and 29-31 have been amended without acquiescence in the Office Action's basis for rejections and without prejudice to pursue canceled subject matter in a related application. Claims 2-3 and 25 are cancelled. Support for these amendments can be found, for example, in at least paragraphs 60, 63 and 64 of the subject application. No new matter has been added. A complete listing of the pending claims is provided below and supersedes all previous claim lists.

1. (Currently Amended) A wavelength conversion component for a light emitting device comprising:

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from a radiation source relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material,

wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light is emitted through the wavelength conversion component to contribute to a final visible emission product;

wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material.

2. (Canceled)

3. (Canceled)

4. (Currently Amended) The component of Claim [[2]] 1, wherein the light scattering material has an average particle size that is less than about 150nm.

5. (Original) The component of Claim 1, wherein the light scattering material is selected from the group consisting of: titanium dioxide, barium sulfate, magnesium oxide, silicon dioxide and aluminum oxide.

6. (Original) The component of Claim 1 wherein the at least one photoluminescence material is located in a wavelength conversion layer and the light scattering material is located in a diffusing layer.

7. (Original) The component of Claim 6, wherein the wavelength conversion layer and the light diffusing layer are in direct contact with each other.

8. (Original) The component of Claim 7, wherein the wavelength conversion layer comprises a mixture of the at least one phosphor material and a light transmissive binder and the light diffusing layer comprises a mixture of the light scattering material and the light transmissive binder.

9. (Original) The component of Claim 8, wherein the light transmissive binder comprises a curable liquid polymer selected from the group consisting of: a polymer resin, a monomer resin, an acrylic, an epoxy, a silicone and a fluorinated polymer.

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10. (Original) The component of Claim 8, wherein the weight loading of light scattering material to binder selected from the group consisting of: 7% to 35% and 10% to 20%.

11. (Original) The component of Claim 6, wherein the wavelength conversion and light diffusing layers are deposited using a method selected from the group consisting of: screen printing, slot die coating, spin coating, roller coating, drawdown coating and doctor blading.

12. (Original) The component of Claim 6 in which the wavelength conversion layer and the light diffusing layer comprises planar shapes.

13. (Original) The component of Claim 6 in which the light diffusing layer comprises a dome or elongated dome shape.

14. (Original) The component of claim 13 in which the wavelength conversion layer fills a volume formed beneath the dome or elongated dome shapes.

15. (Original) The component of Claim 1, wherein both the at least one photoluminescence material and the light scattering material are located in a wavelength conversion layer.

16. (Original) The component of Claim 1, wherein the light scattering material has an average particle size in a range selected from the group consisting of: 1μm to 50μm and 10μm to 20μm.

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17. (Original) The component of Claim 1, wherein the at least one photoluminescence material is deposited onto a light transmissive substrate, and the light transmissive substrate is selected from the group consisting of: a polycarbonate, an acrylic and a glass.

18. (Original) The component of Claim 1, wherein the excitation light comprises ultraviolet light.

19. (Original) The component of Claim 18, wherein the light scattering material has an average particle size that is less than about 100nm.

20. (Currently Amended) A light emitting device, comprising:

at least one solid-state light emitter operable to generate excitation light; and

a wavelength conversion component comprising:

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from ~~a radiation source~~ the at least one solid-state light emitter relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material,

wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light is emitted through the wavelength conversion component to contribute to a final visible emission product;

wherein the light scattering material scatters the blue light at least twice as much as light

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generated by the at least one photoluminescence material.

21. (Original) The device of claim 20, wherein the light emitting device is selected from the group consisting of: downlights, light bulbs, linear lamps, lanterns, wall lamps, pendant lamps, chandeliers, recessed lights, track lights, accent lights, stage lighting, movie lighting, street lights, flood lights, beacon lights, security lights, traffic lights, headlamps, taillights, and signs.

22. (Original) The device of claim 20 in which the average particle size of the light scattering material is selected to improve an OFF state white appearance of the light emitting device.

23. (Original) The device of claim 20 in which the average particle size of the light scattering material is selected to obtain substantially uniform color for emitted light from the light emitting device for emission angles over a $\pm 60^{o}$ range from an emission axis.

24. (Original) The device of claim 23, wherein a weight loading of the light scattering material to a binder selected from the group consisting of: 7% to 35% and 10% to 20%.

25. (Canceled)

26. (Original) The device of Claim 25, wherein the light scattering material has an average particle size that is less than about 150nm.

27. (Original) The device of Claim 20 in which the wavelength conversion layer and the light diffusing layer comprises planar shapes.

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28. (Original) The device of Claim 20 in which the light diffusing layer comprises a dome or elongated dome shape.

29. (Currently Amended) A linear lamp comprising:

an elongate housing;

a plurality of solid-state light emitters housed within the housing and configured along the length of the housing; and

an elongate wavelength conversion component remote to the plurality of solid-state light emitters and configured to in part at least define a light mixing chamber,

wherein the elongate wavelength conversion component comprises

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from the plurality of solid-state light emitters ~~a radiation source~~ relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material,

wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light is emitted through the wavelength conversion component to contribute to a final visible emission product;

wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material.

30. (Currently Amended) A downlight comprising:

a body comprising one or more solid-state light emitters, wherein the body is configured to be positioned within a downlighting fixture such that the downlight emits light in a downward direction; and

a wavelength conversion component remote to the one or more solid-state light emitters and configured to in part at least define a light mixing chamber,

wherein the wavelength conversion component comprises

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from the one or more solid-state light emitters ~~a radiation source~~ relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material,

wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light is emitted through the wavelength conversion component to contribute to a final visible emission product;

wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material.

31. (Currently Amended) A light bulb comprising:

a connector base configured to be inserted in a socket to form an electrical connection for the light bulb;

a body comprising one or more solid-state light emitters;

a wavelength conversion component having a three dimensional shape that is configured to enclose the one or more solid-state light emitters and to in part at least define a light mixing chamber,

wherein the wavelength conversion component comprises

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at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from the one or more solid-state light emitters~~a radiation source~~ relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material,

wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light is emitted through the wavelength conversion component to contribute to a final visible emission product;

wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material.

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PTO/SB/96 (07-09)
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STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: Bing Dai et al.

Application No./Patent No.: 13/273,215 Filed/Issue Date: 10-13-2011

Titled: WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES

Intematix Corporation , a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.

states that it is:

1. ☒ the assignee of the entire right, title, and interest in;

2. ☐ an assignee of less than the entire right, title, and interest in
(The extent (by percentage) of its ownership interest is _____ %); or

3. ☐ the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made)

the patent application/patent identified above, by virtue of either:

A. ☒ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 027448, Frame 0650, or for which a copy therefore is attached.

OR

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: _____ To: _____
The document was recorded in the United States Patent and Trademark Office at
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The document was recorded in the United States Patent and Trademark Office at
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The document was recorded in the United States Patent and Trademark Office at
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☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☒ As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (*i.e.*, a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Peter C. Mei/ Dec. 23, 2012

Signature Date

Peter C. Mei Attorney of Record

Printed or Typed Name Title

This collection of information is required by 37 CFR 3.73(b). 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: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

REMARKS

Claims 1-31 are pending. Claims 1, 4, 20 and 29-31 have been amended without acquiescence in the Office Action's basis for rejections and without prejudice to pursue canceled subject matter in a related application. Claims 2, 3 and 25 are cancelled. Support for these amendments can be found, for example, in at least paragraphs 60, 63 and 64 of the subject application. As such, no new matter has been added.

I. Double Patent Rejection

Claims 1-31 stand provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims of co-pending Application No. 13/253,031, 13/273,212 and 13/272,217. In response to these rejections, Applicants have provided herewith a Terminal Disclaimer over US Patent Application Nos. 13/253,031, 13/273,212 and 13/272,217. The filing of this Terminal Disclaimer in no way manifests an admission by the Patentee as to the propriety of the double patenting determination and serves simply to remove the issue of double patenting, and raises neither a presumption nor estoppel on the merits of the double patenting determination. MPEP §804.02 citing *Quad Environmental Technologies Corp. v. Union Sanitary District,* 946 F. 2d 870, 20 USPQ 2d 1392 (Fed Cir. 1991). In light of this submission, the double patenting rejections are now overcome.

II. Claim rejections under 35 U.S.C. §102(b)

Claims 1-8, 11-21, 23, 25, 27 and 28 stand rejected under 35 U.S.C. §102(b) as allegedly being anticipated by Publication No. 2002/0180351 to McNulty et al. (hereinafter McNulty). Applicants respectfully traverse.

Claim 1 recites at least the following limitations.

> "wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light is emitted through the wavelength conversion component to contribute to a final visible emission product;
> wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material."

Claim 23 recites similar limitations.

A. Applicants submit that McNulty fails to disclose "wherein the wavelength component is configured such that in operation a portion of excitation light comprising blue light is emitted through the wavelength conversion component to contribute to a final visible emission product"

McNulty discloses UV reflectors incorporated in a UV LED-based light source to reduce the amount of UV radiation emission into the surroundings and increase the efficiency of such light sources. *See abstract*. Figure 2 of McNulty illustrates an embodiment of a UV LED-based light source wherein a layer of phosphor material is applied to a surface of the UV LED and a layer of scattering material is applied on top of the phosphor layer. *See paragraph 22*. The UV radiation emitted by the UV LED is absorbed by the phosphor layer and converted into visible light. *See paragraph 22*. A portion of the UV radiation is not emitted through the phosphor layer and layer of scattering material to contribute to a final visible emission product. The UV radiation does not contribute to the final visible emission product because UV radiation is not visible. As such, McNulty fails to teach or suggest "a wavelength conversion component such that in operation a portion of excitation light comprising blue light is emitted through the wavelength conversion component to contribute to a final visible emission product".

B. MPEP requires that "[a] prior art reference must be considered **in its entirety**, i.e., as a whole, including portions that would lead away from the claimed invention." MPEP §2141.03 citing *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F. 2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984) (emphasis added). The U.S. Court of Appeals for the Federal Circuit held that "[t]he Supreme Court went on to state that 'when a patent simply arranges old elements…the combination is obvious' (citation omitted)", and that "[t]he opposite conclusion would follow, however, if the prior art indicated that the invention would not have worked for its intended purpose or otherwise taught away from the invention. (Citation omitted.)" *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.* 567 F. 3d 1314, ____ (Fed. Cir. 2009) (emphasis added).

Claim 1 recites at least the limitation "wherein the wavelength component is configured such that in operation a portion of excitation light comprising blue light is emitted through the wavelength conversion component to contribute to a final visible emission product".

Applicants respectfully submit that McNulty in fact teaches away from at least the claimed limitation "wherein the wavelength component is configured such that in operation a portion of excitation light comprising blue light is emitted through the wavelength conversion component to contribute to a final visible emission product".

McNulty discloses UV reflectors incorporated in a UV LED-based light source to reduce the amount of UV radiation emission into the surroundings and increase the efficiency of such light sources. *See abstract*. Figure 2 of McNulty illustrates an embodiment of a UV LED-based light source wherein a layer of phosphor material is applied to a surface of the UV LED and a layer of scattering material is applied on top of the phosphor layer. *See paragraph 22*. McNulty discloses that the scattering layer serves the purpose of reflecting UV radiation back into the layer of phosphor material for further absorption and conversion to visible light such that the amount of UV radiation leakage to the surroundings is significantly reduced. *See paragraph 22*. The UV radiation that leaks into the surroundings does not contribute a final visible emission product, as only the light converted from the layer of phosphor material is visible. *See paragraph 22*.

Thus, McNulty teaches a scattering layer that serves the purpose of reflecting UV radiation back into the layer of phosphor material for further absorption and conversion to visible light in order to significantly reduce the amount of UV radiation leakage to the surroundings. As such, McNulty clearly teaches away from configuring a wavelength conversion component such that in operation a portion of excitation light comprising blue light is emitted through the wavelength conversion component to contribute to a final visible emission product.

Therefore, Applicants respectfully submit that McNulty cannot be combined with other references to support claim rejections under 35 U.S.C. §103(a) as mandated by MPEP §2143.01 and the current 35 U.S.C. §103 jurisdprudence.

C. MPEP requires that the proposed modification cannot change the principle of operation of a reference, and that the suggested combination may not require a change in the basic principle under which the [primary reference] construction was designed to operate." MPEP

§2143.01 citing *In re Ratti*, 270 F. 2d 810, 813, 123 USPQ 349, 352 (CCPA 1959) (emphasis added).

Claim 1 recites at least the limitation "a wavelength conversion component such that in operation a portion of excitation light comprising blue light".

In contrast, McNulty teaches a UV LED-based light source wherein a layer of phosphor material is applied to a surface of the UV LED and a layer of scattering material is applied on top of the phosphor layer and the scattering layer serves the purpose of reflecting UV radiation back into the layer of phosphor material for further absorption and conversion to visible light such that the amount of UV radiation leakage to the surroundings is significantly reduced. *See paragraph 22*. The UV radiation that leaks into the surroundings does not contribute a final visible emission product, as only the light converted from the layer of phosphor material is visible. *See paragraph 22*.

That is, the principle of operation for McNulty's approach requires UV radiation to be reflected back into the layer of phosphor material in order to significantly reduce the amount of UV radiation leakage to the surroundings. Nonetheless, claim 1 recites "a wavelength conversion component such that in operation a portion of excitation light comprising blue light".

It would therefore frustrate the principle or operation of McNulty, to permit a modification of the UV LED-based light source to possess the claimed aspect "a wavelength conversion component such that in operation a portion of excitation light comprising blue light".

D. Applicants submit that McNulty fails to disclose "wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material".

McNulty discloses UV reflectors incorporated in a UV LED-based light source to reduce the amount of UV radiation emission into the surroundings and increase the efficiency of such light sources. *See abstract*. Figure 2 of McNulty illustrates an embodiment of a UV LED-based light source wherein a layer of phosphor material is applied to a surface of the UV LED and a layer of scattering material is applied on top of the phosphor layer. *See paragraph 22*. The

Examiner asserts that the light scattering material layer is taught by the layer of scattering material in McNulty. However, nothing in McNulty teaches or suggests that the layer of scattering material scattering blue light twice as much as light generated by at the layer photoluminescence material. In fact, McNulty never even mentions anything about excitation light that comprises blue light. As such, McNulty fails to teach or suggest "wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material".

For at least these reasons, claim 1 and its dependent claims should be allowable over the cited art. For the reasons discussed, claim 23 and its dependent claims should also be allowable over the cited art.

III. Claim rejections under 35 U.S.C. §103(a)

Claims 10 and 14 stand rejected as allegedly being unpatentable over McNulty in view of US Patent No. 4,191,943 (Cairns). The Applicants respectfully traverse.

Regardless of whether or not Cairns discloses or suggests the additional limitations as embodied in this rejected claim, Applicants respectfully submit that McNulty cannot be combined to support claim rejections under 35 U.S.C. §103(a) for at least the reasons provided in sub-section II above. Therefore, Applicants respectfully submit that this claim is believed to be allowable over McNulty and Cairns because Cairns fails to cure McNulty's deficiencies, and further because the Office Action does not rely on Cairns in supporting the basis for rejection in claims 1 and 20 from which these rejected claims respectively depend.

IV. Claim rejections under 35 U.S.C. §103(a)

Claims 16 and 17 stand rejected as allegedly being unpatentable over McNulty in view of US Publication No. 2009/0272996 (Chakraborty). The Applicants respectfully traverse.

Regardless of whether or not Chakraborty discloses or suggests the additional limitations as embodied in these rejected claims, Applicants respectfully submit that McNulty cannot be combined to support claim rejections under 35 U.S.C. §103(a) for at least the reasons provided in

sub-section II above. Therefore, Applicants respectfully submit that these claims are believed to be allowable over McNulty and Chakraborty because Chakraborty fails to cure McNulty's deficiencies, and further because the Office Action does not rely on Chakraborty in supporting the basis for rejection in claim 1 from which these rejected claims respectively depend.

V. Claim rejections under 35 U.S.C. §103(a)

Claims 21 and 29 stand rejected as allegedly being unpatentable over McNulty in view of US Patent No. 6,860,628 (Robertson). The Applicants respectfully traverse.

Regardless of whether or not Robertson discloses or suggests the additional limitations as embodied in these rejected claims, Applicants respectfully submit that McNulty cannot be combined to support claim rejections under 35 U.S.C. §103(a) for at least the reasons provided in sub-section II above. Therefore, Applicants respectfully submit that these claims are believed to be allowable over McNulty and Robertson because Robertson fails to cure McNulty's deficiencies.

VI. Claim rejections under 35 U.S.C. §103(a)

Claim 30 stands rejected as allegedly being unpatentable over McNulty in view of US Publication No. 2007/0120135 (Soules). The Applicants respectfully traverse.

Regardless of whether or not Soules discloses or suggests the additional limitations as embodied in these rejected claims, Applicants respectfully submit that McNulty cannot be combined to support claim rejections under 35 U.S.C. §103(a) for at least the reasons provided in sub-section II above. Therefore, Applicants respectfully submit that these claims are believed to be allowable over McNulty and Soules because Soules fails to cure McNulty's deficiencies.

VII. Claim rejections under 35 U.S.C. §103(a)

Claim 31 stands rejected as allegedly being unpatentable over McNulty in view of US Publication No. 2008/0130285 (Negley). The Applicants respectfully traverse.

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Regardless of whether or not Negley discloses or suggests the additional limitations as embodied in these rejected claims, Applicants respectfully submit that McNulty cannot be combined to support claim rejections under 35 U.S.C. §103(a) for at least the reasons provided in sub-section II above. Therefore, Applicants respectfully submit that these claims are believed to be allowable over McNulty and Negley because Negley fails to cure McNulty's deficiencies.

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CONCLUSION

Based on the foregoing, all claims are believed allowable, and an allowance of the claims is respectfully requested. If the Examiner has any questions or comments, the Examiner is respectfully requested to contact the undersigned at the number listed below.

Applicant(s) hereby explicitly retracts and rescinds any and all of the arguments and disclaimers presented to distinguish the prior art of record during the prosecution of all parent and related application(s)/patent(s), and respectfully requests that the Examiner re-visit the prior art that such arguments and disclaimers were made to avoid.

The Commissioner is authorized to charge any fees due in connection with the filing of this document to Vista IP Law Group's Deposit Account No. **50-1105**, referencing billing number **ITMX-00318US2**. The Commissioner is authorized to credit any overpayment or to charge any underpayment to Vista IP Law Group's Deposit Account No. **50-1105**, referencing billing number **ITMX-00318US2**.

Respectfully submitted,

Dated: December 23, 2012

By: /Frederick Hsu/
Frederick Hsu
Reg. No. 65,375
For Peter C. Mei, Reg. No. 39,768

VISTA IP LAW GROUP LLP
2160 Lundy Ave., Suite 230
San Jose, CA 95131
Telephone: (408) 321-8663 x. 210
Facsimile: (408) 877-1662

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of Bing Dai et al.	Group Art Unit: 2879
Application No.: 13/273,215	Examiner: Bowman, Mary Ellen
Filed: October 13, 2011	Confirmation No.: 8978
For: WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES	Customer No.: 101130

RESPONSE TO OFFICE ACTION

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

Dear Sir:

In response to the Official Action sent on September 24, 2011, Applicants request that this application be amended in accordance with the following sheets.

Amendments to the Claims begin on page 2.

Remarks begin on page 10 of this paper.

Savant Technologies EX1104, Page 169 of 485

Application Number	Application/Control No.	Applicant(s)/Patent under Reexamination	
	13/273,215	DAI ET AL.	

Document Code - DISQ	Internal Document – DO NOT MAIL

TERMINAL DISCLAIMER	☒ APPROVED	☐ DISAPPROVED
Date Filed : 23 DEC 2012	This patent is subject to a Terminal Disclaimer	

Approved/Disapproved by:

THREE TDS FILED AND APPROVED.

JAB

U.S. Patent and 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	ATTY. DOCKET NO./TITLE
13/273,215	10/13/2011	Bing Dai	ITMX-00318US2

CONFIRMATION NO. 8978

101130
Vista IP Law Group, LLP (Intematix)
2160 Lundy Avenue, Suite 230
San Jose, CA 95131

POA ACCEPTANCE LETTER

OC000000058434238

Date Mailed: 01/09/2013

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 12/23/2012.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/snguyen/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

Savant Technologies EX1104, Page 171 of 485

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13273215	DAI ET AL.
	Examiner	Art Unit
	313MARY ELLEN BOWMAN	2879

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
313	112, 498, 501, 512	9/18/12	MB
257	98	9/18/12	MB
438	27	9/18/12	MB

SEARCH NOTES		
Search Notes	Date	Examiner
inventor search in eDan	9/18/12	MB

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

	/MARY ELLEN BOWMAN/ Primary Examiner, Art Unit 2879

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13273215	DAI ET AL.
	Examiner	Art Unit
	MARY ELLEN BOWMAN	2879

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	09/18/2012	02/25/2013							
	1	✓	✓							
	2	✓	-							
	3	✓	-							
	4	✓	✓							
	5	✓	✓							
	6	✓	✓							
	7	✓	✓							
	8	✓	✓							
	9	✓	✓							
	10	✓	✓							
	11	✓	✓							
	12	✓	✓							
	13	✓	✓							
	14	✓	✓							
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	22	✓	✓							
	23	✓	✓							
	24	✓	✓							
	25	✓	-							
	26	✓	✓							
	27	✓	✓							
	28	✓	✓							
	29	✓	✓							
	30	✓	✓							
	31	✓	✓							

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/273,215	10/13/2011	Bing Dai	ITMX-00318US2	8978

101130 7590 03/01/2013

Vista IP Law Group, LLP (Intematix)
2160 Lundy Avenue, Suite 230
San Jose, CA 95131

EXAMINER	
BOWMAN, MARY ELLEN	
ART UNIT	**PAPER NUMBER**
2879	

NOTIFICATION DATE	DELIVERY MODE
03/01/2013	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):

docketing@viplawgroup.com
ttn@viplawgroup.com

Office Action Summary	Application No.	Applicant(s)	
	13/273,215	DAI ET AL.	
	Examiner	Art Unit	
	MARY ELLEN BOWMAN	2879	

-- 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 December 2013*.

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

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ 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

5)☒ Claim(s) *1,4-24 and 26-31* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1, 4-24, 26-31* is/are rejected.

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

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

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

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

11)☐ 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).

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) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments filed January 16, 2013 have been fully considered but they are not persuasive. Specifically, Applicant argues that McNulty fails to teach an LED emitting a light that contributes to the final visible emission. However, in light of the new rejection set forth below and necessitated by the amendment, Examiner demonstrates that McNulty at least makes obvious the use of a blue LED which would contribute to the final visible emission product of the device. Further, Applicant's argument that the reflective particles taught by McNulty would reflect all of the UV/blue light back into the phosphor layer and thereby prevent the blue light from contributing to the final emission product is not persuasive. The reflective particles of McNulty are the same size and in the same concentration as those taught in the current application, therefore the particles would reflect a similar amount of the blue light as in the current application. Although most of the final visible emission product would be a result of the photoluminescence material, at least a small portion of the light would be the UV/blue light emitted from the LED. Therefore, the rejection as set forth below is maintained and made final.

Claim Rejections - 35 USC § 103

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.

Claims 1, 4-9, 11-15, 18-20, 22, 23 and 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over McNulty et al., US 2002/0180351 A1, published December 5, 2002 (hereinafter referred to as "McNulty").

Regarding claim 1, McNulty teaches a wavelength conversion component for a light emitting device (at least in Figure 2 and [0022]) comprising: at least one photoluminescence material (40); and a light scattering material wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from a radiation source relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material (Abstract, [0022-0024] and claim 5; Note: The average particle size of the scattering material is around 1/10 of the wavelength of the light emitted from the LED light source, which is within the range taught by Applicant, therefore the particles would perform in the same manner). McNulty further teaches the light scattering material scatters the light emitted by the LED at least twice as much as light generated by the at least one photoluminescence material (see claim 1 above and [0022-0024], the material would act in the same manner as that explained by Applicant because it is the same material and the same relative size).

McNulty further teaches that one must balance the type of light emitted from an LED between UV and blue in order to prevent utilizing a UV light that would be dangerous upon emission and a blue LED that would contribute too heavily to the final emission product ([0004-0005]). Further, Applicant's specification teaches that the reflective particles help prevent most of the LED emitted light from passing through the photoluminescence layer without being converted. Therefore, in light of the Applicant's own disclosure, as well as McNulty's teaching

that a UV/blue LED may be used, it is the position of the Examiner that it would have been obvious to one of ordinary skill in the art to have a small portion of the light emitted from the LED contribute to a final emission product of the device.

Regarding claim 4, McNulty further teaches the light scattering material has an average particle size that is less than about 150 nm (Abstract and [0022-0024]; Average particle size of between 30-42nm).

Regarding claim 5, McNulty further teaches the light scattering material is silica ([0023-0024] and Table 1).

Regarding claim 6, McNulty further teaches the at least one photoluminescence material is located in a wavelength conversion layer and the light scattering material is located in a diffusing layer (Figure 2, layers 40 and 42 and [0022]).

Regarding claim 7, McNulty further teaches the wavelength conversion layer and the light diffusing layer are in direct contact with each other ([0022] and Figure 2, layers 40 and 42).

Regarding claim 8, McNulty further teaches the wavelength conversion layer comprises a mixture of the at least one phosphor material and a light transmissive binder and the light diffusing layer comprises a mixture of the light scattering material and the light transmissive binder ([0021-0022]).

Regarding claim 9, McNulty further teaches the light transmissive binder comprises a curable liquid polymer selected from the group consisting of a polymer resin, a monomer resin, an acrylic, an epoxy, a silicone and a fluorinated polymer ([0021]).

Regarding claim 11, McNulty teaches the invention as explained above. Further, the process limitations of claim 11 lend weight to the claim only in so far as they affect the structure

of the device. It is the position of the Examiner that the structure of McNulty is capable of being manufactured by said method, and therefore meets the limitations of the claim.

Regarding claim 12, McNulty further teaches the wavelength conversion layer and the light diffusing layer comprise planar shapes (Figure 2 and [0022]).

Regarding claim 13, McNulty further teaches the light diffusing layer comprises a dome or elongated dome shape (Figure 2 and [0022]).

Regarding claim 14, McNulty further teaches the wavelength conversion layer fills a volume formed beneath the dome or elongated dome shape (Figure 2 and [0022]).

Regarding claim 15, McNulty further teaches both the at least one photoluminescence material and the light scattering material are located in a wavelength conversion layer (Figure 1 and [0022]).

Regarding claim 18, McNulty further teaches the excitation light comprises ultraviolet light ([0022]).

Regarding claim 19, McNulty further teaches the light scattering material has an average particle size of less than about 100 nm (Abstract, [0022-0024] and claim 5, see also explanation from claim 1 above).

Regarding claim 20, McNulty teaches the invention as explained above regarding claim 1 and further teaches a light emitting device comprising a solid state light emitter operable to generate excitation light (LED 20, Figure 2).

Regarding claims 22 and 23, McNulty further teaches the average particle size of the light scattering material is selected to improve an OFF state white appearance of the light emitting device and to obtain substantially uniform color for emitted light from the light emitting

device for emission angles over a 60 degree range from an emission axis (see explanation regarding claim 1 above, the scattering particles are of the same material and same size as those used by Applicant, therefore it is the position of the Examiner that the light scattering layer would function in a similar manner).

Regarding claim 26, McNulty further teaches the invention as explained above regarding claim 4.

Regarding claim 27, McNulty further teaches the invention as explained above regarding claim 12.

Regarding claim 28, McNulty further teaches the invention as explained above regarding claim 13.

Claims 10 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over McNulty in view of Cairns et al., US 4191943, published March 4, 1980 (hereinafter referred to as "Cairns").

Regarding claims 10 and 24, McNulty teaches the inventions as explained above, but is silent as to the loading of scattering material into the transmissive binder.

In the same field of endeavor of LEDs, Cairns teaches a light scattering material should be employed in the amount claimed in order to achieve optimum light scattering (col 3, lines 60-62). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to utilize the light scattering particles of McNulty in the amount taught by Cairns in order to achieve optimum light scattering without loss due to absorption.

Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over McNulty in view of Chakraborty et al., US 2009/0272996, filed May 2, 2008 (hereinafter referred to as "Chakraborty").

Regarding claim 16, McNulty teaches the invention as explained above but is silent as to the particles being from 1 to 50 micrometers in size.

However, in the same field of endeavor of LEDs, Chakraborty teaches light scattering particles of the claimed size in a light transmissive binder ([0084]). Chakraborty further teaches that said particle size optimizes the light scattering effect of the layer (id). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to utilize light scattering particles in the claimed range in order to optimize the light scattering effect of the layer.

Regarding claim 17, McNulty teaches the invention as explained above but is silent as to the substrate upon which the LED and phosphor layer are formed.

In the same field of endeavor of LEDs, Chakraborty teaches the LED and phosphor layer are formed on a substrate having a reflective film thereon ([0097-0098]). Further, it was well known to those of ordinary skill in the art at the time the invention was made that materials such as glass make excellent device substrates due to their electrical insulation properties and ease of manufacturing. Therefore, in light of the state of the art as well as the teaching in Chakraborty, it would have been obvious for one of ordinary skill in the art at the time the invention was made to utilize a light transmissive substrate such as glass in order to form the LED and phosphor layers of an LED lighting device.

Claims 21 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over McNulty in view of Robertson et al., US 6860628 B2, published March 1, 2005 (hereinafter referred to as "Robertson").

Regarding claim 21, McNulty teaches the invention as explained above but is silent as to the myriad of uses for an LED.

In the same field of endeavor of LEDs, Robertson teaches an LED may be used in a linear lamp as a replacement for a fluorescent bulb (Figure 3A). Further, it was well known to those of ordinary skill in the art at the time the invention was made that LEDs have many applications in the lighting field including several different types of bulbs with and without reflectors. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to utilize the LED taught by McNulty in several different ways, including as a linear lamp, such as the lighting device in Robertson.

Regarding claim 29, McNulty teaches the invention as explained above, but is silent as to the LED being used in a linear lamp.

In the same field of endeavor of LEDs, Robertson teaches a linear lamp comprising an elongate housing and a plurality of LEDs housed within the housing and configured along the length of the housing and an elongate wavelength conversion component (Figure 3A). Further, it was well known to those of ordinary skill in the art at the time the invention was made that LEDs have many applications in the lighting field including several different types of bulbs with and without reflectors. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to utilize the LED taught by McNulty in several different ways, including as a linear lamp, such as the lighting device in Robertson.

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over McNulty in view of Soules et al, US 2007/0120135 A1, published May 31, 2007 (hereinafter referred to as "Soules").

Regarding claim 30, McNulty teaches the invention as explained above but is silent as to the LED being used in a downlight.

In the same field of endeavor of LEDs, Soules teaches a downlight comprising a body comprising one or more LEDs, and the body is configured within a downlighting fixture ([0052]). Further, it was well known to those of ordinary skill in the art at the time the invention was made that LEDs have many applications in the lighting field including several different types of bulbs with and without reflectors. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to utilize the LED taught by McNulty in several different ways, including in a downlight, such as the lighting device in Soules.

Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over McNulty in view of Negley et al., US 2008/0130285 A1, published June 5, 2008 (hereinafter referred to as "Negley").

Regarding claim 31, McNulty teaches the invention as explained above but is silent as to the LED being used in a light bulb.

In the same field of endeavor of LEDs, Negley teaches a light bulb comprising a connector base and a body comprising one or more LEDs ([0022]). Further, it was well known to those of ordinary skill in the art at the time the invention was made that LEDs have many applications in the lighting field including several different types of bulbs with and without reflectors. Therefore, it would have been obvious for one of ordinary skill in the art at the time

the invention was made to utilize the LED taught by McNulty in several different ways, including in a light bulb, such as the lighting device in Negley.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). 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 date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARY ELLEN BOWMAN whose telephone number is (571)270-5383. The examiner can normally be reached on Monday-Friday, 5:30-8:30a.m. and 12:00-5:00 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. 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.

/MARY ELLEN BOWMAN/
Primary Examiner, Art Unit 2879

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:	)	Group Art Unit: 2879
	)	
Bing Dai et al.	)	Examiner: Bowman, Mary Ellen
	)	
Serial No.: 13/273,215	)	Confirmation No.: 8978
	)	
Filed: October 13, 2011	)	
	)	
For: WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES	)	

CONCISE EXPLANATION OF RELEVANCE

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

Dear Sir:

In connection with the Information Disclosure Statement (PTO/SB/08a) filed herewith, Applicants have identified non-English references as Foreign Patent Documents Nos. 1-8.

The relevance of Foreign Patent Documents Nos. 1-2 for submission is that they were cited in an International Search Report from related PCT Application No. PCT/US07/17299.

The relevance of Foreign Patent Documents Nos. 3-4 for submission is that they were cited in an office action from related Japanese Application No. 2009-522877.

The relevance of Foreign Patent Documents No. 5 for submission is that it was cited in an office action from related U.S. Application No. 11/640,533.

The relevance of Foreign Patent Documents No. 6 for submission is that it was cited in an office action from related Taiwanese. Application No. 96128666.

The relevance of Foreign Patent Documents Nos. 7-8 for submission is that they were cited in an International Search Report from related PCT Application No. PCT/US12/59892.

Savant Technologies EX1104, Page 186 of 485

Respectfully submitted,

DATE: 06-03-2013

By: /Peter C. Mei/
Peter C. Mei
Reg. No. 39,768

VISTA IP LAW GROUP LLP
2160 Lundy Drive, Suite 230
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Doc code: RCEX
Doc description: Request for Continued Examination (RCE)

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. 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
(Submitted Only via EFS-Web)

Application Number	13273215	Filing Date	2011-10-13	Docket Number (if applicable)	ITMX-00318US2	Art Unit	2879
First Named Inventor	Bing Dai			Examiner Name	Bowman, Mary Ellen		

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. The Instruction Sheet for this form is located at WWW.USPTO.GOV

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).

☐ 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.

- ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ☐ Other _____

☒ Enclosed

- ☒ Amendment/Reply
- ☒ Information Disclosure Statement (IDS)
- ☐ Affidavit(s)/ Declaration(s)
- ☐ Other _____

MISCELLANEOUS

☐ 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)

☐ Other _____

FEES

☒ **The RCE fee under 37 CFR 1.17(e) is required by 37 CFR 1.114 when the RCE is filed.**
The Director is hereby authorized to charge any underpayment of fees, or credit any overpayments, to Deposit Account No 501105

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

☒ Patent Practitioner Signature
☐ Applicant Signature

EFS - Web 2.1.15

PTO/SB/30EFS (07-09)
Approved for use through 07/31/2012. 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.

Signature of Registered U.S. Patent Practitioner			
Signature	/Peter C. Mei/	Date (YYYY-MM-DD)	2013-06-03
Name	Peter C. Mei	Registration Number	39768

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.

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

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

CAH

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
CLAUDE A.S. HAMRICK
BUCHANAN INGERSOLL, LLP
P.O. BOX 1404
ALEXANDRIA, VA 22313-1404

RECEIVED
SEP 04 2008
FLIESLER MEYER LLP

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 1034172-216 -00160 WOΦ	Date of mailing (*day/month/year*) 15 AUG 2008
International application No. PCT/US07/17299 ✓	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
Applicant INTEMATIX CORPORATION	International filing date (*day/month/year*) 02 August 2007 (02.08.2007)

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: (41-22) 338.82.70.

   For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☒ **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

   ☒ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90*bis*.1 and 90*bis*.3, respectively, before the completion of the technical preparations for international publication.

   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

   See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/ US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Authorized officer Nimeshkumar D Patel Telephone No. (571) 272-1550

Form PCT/ISA/220 (January 2004) (*See notes on accompanying sheet*)

BUCHANAN INGERSOLL & ROONEY PC
AUG 18 2008

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 1034172-216	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US07/17299	International filing date (*day/month/year*) 02 August 2007 (02.08.2007)	(Earliest) Priority Date (*day/month/year*) 03 August 2006 (03.08.2006)
Applicant INTEMATIX CORPORATION		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the Report**
   a. With regard to the **language**, the international search was carried out on the basis of:
      ☒ the international application in the language in which it was filed.
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 Rule 43.6 *bis(a)*
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title**,
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 2
      ☐ as suggested by the applicant.
      ☐ as selected by this Authority, because the applicant failed to suggest a figure.
      ☒ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figures is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (April 2007)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US07/17299

A. CLASSIFICATION OF SUBJECT MATTER
IPC: **H05B 33/00**(2006.01)

USPC: 313/484,485,486,487,489,501,512;252/301.4R,301.6R,301.6S,301.4H,301.4F
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)
U.S. : 313/484,485,486,487,489,501,512; 252/301.4R,301.6R,301.6S,301.4H,301.4F

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 practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 7,029,935 B2 (NEGLEY et al.) 18 April 2006 (18.04.2006)	1,2,4-8,13,14,22-27,29-33,38,40,47,48,50-54,59-61,63-67,72,80,83,85 --- 18-21,43-46,76-79
X	US 5,371,434 A (RAWLINGS) 06 December 1994 (06.12.1994)	1,3,26,28,47,49,60,62
X	US 20020047516 A1 (IWASA et al.) 25 April 2002 (25.04.2002)	1,11,12,26,36,37,47,57,58,60,70,71
X	CA 2466979 A1 (PRODANOV) 18 November 2005 (18.11.2005)	1,9,26,34,47,55,60,68

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
07 August 2008 (07.08.2008)	15 AUG 2008
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	Authorized officer Nimeshkumar D. Patel Telephone No. (571) 272-1550

Form PCT/ISA/210 (second sheet) (April 2007)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US07/17299

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,614,170 B2 (WANG et al.) 02 September 2003 (02.09.2003)	1,14,15,26,38,39,60,73,83,84
X	US 2004/0227465 A1 (MENKARA et al.) 18 November 2004 (18.11.2004)	1,16,26,41,60,74
X	US 2004/0016908 A1 (HOHN et al.) 29 January 2004 (29.01.2004)	1,17,26,42,60,75
X	US 2005/0057917 A1 (YATSUDA et al.) 17 March 2005 (17.03.2005)	60,81,82
Y	JP 07-094785 A (TANAKA et al.) 07 April 1995 (07.04.1995)	1,10,26,35,47,56,60,69
Y	US 6,555,958 A (SRIVASTAVA et al.) 29 April 2003 (29.04.2003)	1,10,26,35,47,56,60,69
Y	US 2005/0168127 A1 (SHEl et al.) 04 August 2005 (04.08.2005)	18,43,76
Y	US 6,717,353 B1 (MUELLER et al.) 06 April 2004 (06.04.2004)	19,20,44,45,77,78
Y	US 2003/0052595 A1 (ELLENS et al.) 20 March 2003 (20.03.2003)	21,46,79

Form PCT/ISA/210 (continuation of second sheet) (April 2007)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
CLAUDE A.S. HAMRICK
BUCHANAN INGERSOLL, LLP
P.O. BOX 1404
ALEXANDRIA, VA 22313-1404

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Applicant's or agent's file reference 1034172-216	Date of mailing *(day/month/year)* **FOR FURTHER ACTION** 15 AUG 2008 See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US07/17299	02 August 2007 (02.08.2007)	03 August 2006 (03.08.2006)

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

IPC: **H05B 33/00**(2006.01)
USPC: 313/110,111,112,4854,485,486,487,489,501,512

Applicant

INTEMATIX CORPORATION

1. This opinion contains indications relating to the following items:

- ☒ Box No. I — Basis of the opinion
- ☐ Box No. II — Priority
- ☐ Box No. III — Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV — Lack of unity of invention
- ☒ Box No. V — Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI — Certain documents cited
- ☐ Box No. VII — Certain defects in the international application
- ☐ Box No. VIII — Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis(b)* that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/ US	Date of completion of this opinion	Authorized officer
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (571) 273-3201	08 August 2008 (08.08.2008)	Nimeshkumar D. Patel Telephone No. (571) 272-1550

Form PCT/ISA/237 (cover sheet) (April 2007)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/17299

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

☒ the international application in the language in which it was filed

☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

a. type of material

☐ a sequence listing

☐ table(s) related to the sequence listing

b. format of material

☐ on paper

☐ in electronic form

c. time of filing/furnishing

☐ contained in the international application as filed.

☐ filed together with the international application in electronic form.

☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/17299

Box No. V Reasoned statement under Rule 43 *bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 10,18-21,35,43-46,56,69,76-79	YES
	Claims 1-9,11-17,22-34,36-42,47-55,57-68,70-75,80-85	NO
Inventive step (IS)	Claims NONE	YES
	Claims 1-85	NO
Industrial applicability (IA)	Claims 1-85	YES
	Claims NONE	NO

2. Citations and explanations:

Please See Continuation Sheet

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US07/17299

Supplemental Box
In case the space in any of the preceding boxes is not sufficient.

V. 2. Citations and Explanations:

Claims 1, 2, 4-8, 13, 14, 22-27, 29-33, 38, 40, 47, 48, 50-54, 59-61, 63-67, 72, 80, 83 and 85 lack novelty under PCT Article 33(2) as being anticipated by Negley et al. (US 2005/0051782).

Regarding claims 1 and 26, Negley discloses an optical component for a lighting arrangement of a type comprising a radiation source (260) configured to emit radiation having a first wavelength range; a phosphor (110) configured to absorb at least a portion of said first wavelength range radiation and emit radiation having a second wavelength range; and said optical component being configured such that at least said first wavelength range radiation passes though the optical component, and characterized in that said phosphor is provided on a surface of said optical component.

Regarding claims 47 and 60, Negley discloses a method of fabricating an optical component for a lighting arrangement of a type comprising a radiation source (260) configured to emit radiation having a first wavelength range; a phosphor (110) configured to absorb at least a portion of said first wavelength range radiation and emit radiation having a second wavelength range; and said optical component being configured such that at least said first wavelength range radiation passes through said optical component, the method comprising providing said phosphor on a surface of the optical component.

Regarding claim 83, Negley discloses a phosphor material for coating an optical component of an LED lighting arrangement comprising a phosphor powder incorporated within one of an epoxy resin, a silicone material and a polymer material (¶[0020]).

Regarding claim 85, Negley discloses an optical component for a lighting arrangement of a type comprising a radiation source (260) configured to emit radiation having a first wavelength range; a phosphor (120) configured to absorb at least a portion of said first wavelength range radiation and emit radiation having a second wavelength range; and said optical component being configured such that at least said first wavelength range radiation passes through said optical component, and characterized in that said phosphor is incorporated in said optical component (Fig. 1B).

Regarding claims 2, 27, 48 and 61, Negley discloses the phosphor being provided as a substantially uniform thickness layer on said surface of the optical component.

Regarding claims 4, 29, 50 and 63, Negley discloses the optical component has a convex surface and the phosphor is provided on said convex surface (Fig. 1C).

Regarding claims 6, 31, 52 and 65, Negley discloses the optical component having a substantially hemispherical surface and the phosphor is provided on said hemispherical surface (Fig. 1F).

Regarding claims 5, 30, 51 and 64, Negley discloses the optical component (252) having a concave surface and comprising providing the phosphor on the concave surface (Fig. 2B).

Regarding claims 7, 32, 53 and 66, Negley discloses the optical component (252) comprising a substantially hemispherical shell and the phosphor (202) is provided on the inner hemispherical surface (Fig. 2B).

Supplemental Box
In case **the space in any of the preceding boxes is not sufficient**.

Regarding claims 8, 33, 54 and 67, Negley discloses the optical component comprises a substantially hemispherical shell and the phosphor is provided on at least a part of the outer hemispherical surface (Fig. 2B).

Regarding claims 13, 40, 59 and 80, Negley discloses the optical component is made from one of a plastics material, glass (Column 4, lines (19-20).

Regarding claims 14, 38 and 72, Negley discloses the phosphor comprising a powder which is incorporated within one of an epoxy resin, a silicone material and a polymer material to form a mixture (¶[0020]) and in which the phosphor mixture is applied to the optical component to form a layer of phosphor on the optical component surface (Fig. 1E).

Regarding claim 22, Negley discloses the radiation source comprising a light emitting diode (¶[0027]).

Regarding claim 23, Negley discloses the LED chip comprising a gallium nitride LED (¶[0027]).

Regarding claim 24, Negley discloses the radiation source being operable to emit radiation having a wavelength range of 300 to 500 nm (from GaN LED, ¶[0027]).

Regarding claim 25, Negley discloses the phosphor being configured to emit radiation having a wavelength from 450 to 700 nm (YAG:Ce, ¶[0020]).

Claims 1, 3, 26, 28, 47, 49, 60 and 62 lack novelty under PCT Article 33(2) as being anticipated by Rawlings (US 5,371,434).

Regarding claims 1 and 26, Rawlings substantially discloses an optical component (1) for a lighting arrangement of a type comprising a radiation source (20) configured to emit radiation having a first wavelength range; a phosphor (16) configured to absorb at least a portion of said first wavelength range radiation and emit radiation having a second wavelength range; and said optical component being configured such that at least said first wavelength range radiation passes though the optical component, and characterized in that said phosphor is provided on a surface of said optical component (Fig. 2).

Regarding claims 47 and 60, Rawlings discloses a method of fabricating an optical component (1) for a lighting arrangement of a type comprising a radiation source (20) configured to emit radiation having a first wavelength range; a phosphor (16) configured to absorb at least a portion of said first wavelength range radiation and emit radiation having a second wavelength range; and said optical component being configured such that at least said first wavelength range radiation passes through said optical component, the method comprising providing said phosphor on a surface of the optical component (Fig. 2).

Regarding claims 3, 28, 49 and 62, Rawlings discloses the optical component having a substantially planar surface and comprising providing the phosphor on said substantially planar surface (Fig. 2).

Claims 1, 9, 26, 34, 47, 55, 60 and 68 lack novelty under PCT Article 33(2) as being anticipated by Prodanov (CA 2466979 A1).

Regarding claims 1 and 26, Prodanov substantially discloses an optical component (8) for a lighting arrangement of a type comprising a radiation source (6) configured to emit radiation having a first wavelength range; a phosphor (7) configured to absorb at least a portion of said first wavelength range radiation and emit radiation having a second wavelength range; and said optical component being configured such that at least said first wavelength range radiation passes though the optical component, and characterized in that said phosphor is provided on a surface of said optical component (Fig. 3).

Regarding claims 47 and 60, Prodanov discloses a method of fabricating an optical component (8) for a lighting arrangement of a type comprising a radiation source (6) configured to emit radiation having a first wavelength range; a phosphor (7) configured to absorb at least a portion of said first wavelength range radiation and emit radiation having a second wavelength range; and said optical component being configured such that at least said first wavelength range radiation passes through said optical component, the method comprising providing said phosphor on a surface of the optical component (Fig. 3).

Regarding claims 9, 34, 55 and 68, Prodanov discloses the optical component comprising a substantially spherical shell and the phosphor provided on at least a part of the inner spherical surface (Fig. 3).

Claims 1, 11, 12, 26, 36, 37, 47, 57, 58, 60, 70 and 71 lack novelty under PCT Article 33(2) as being anticipated by Iwasa et al. (US 2002/0047516 A1).

Regarding claims 1 and 26, Iwasa substantially discloses an optical component (114a, 115b) for a lighting arrangement of a type comprising a radiation source (104) configured to emit radiation having a first wavelength range; a phosphor (114b, 115a) configured to absorb at least a portion of said first wavelength range radiation and emit radiation having a second wavelength range; and said optical component being configured such that at least said first wavelength range radiation passes though the optical component, and characterized in that said phosphor is provided on a surface of said optical component (Figs. 8A-8B).

Regarding claims 47 and 60, Iwasa discloses a method of fabricating an optical component (114a, 115b) for a lighting arrangement of a type comprising a radiation source (104) configured to emit radiation having a first wavelength range; a phosphor (114b, 115a) configured to absorb at least a portion of said first wavelength range radiation and emit radiation having a second wavelength range; and said optical component being configured such that at least said first wavelength range radiation passes through said optical component, the method comprising providing said phosphor on a surface of the optical component (Fig. 8A-8B).

Regarding claims 11, 36, 57 and 70, Iwasa discloses the optical component comprising a hollow cylinder and comprising providing the phosphor (114b) on at least a part of the inner surface (Fig. 8A).

Regarding claims 12, 37, 58 and 71, Iwasa discloses the optical component comprising a hollow cylinder and comprising providing the phosphor (115a) on at least a part of the outer surface (Fig. 8B).

Claims 1, 14, 15, 26, 38, 39, 60, 73, 83 and 84 lack novelty under PCT Article 33(2) as being anticipated by Wang et al. (US 6,614,170 A).

Regarding claims 1 and 26, Wang substantially discloses an optical component (37) for a lighting arrangement of a type

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Supplemental Box
In case **the space in any of the preceding boxes is not sufficient**.

comprising a radiation source (31) configured to emit radiation having a first wavelength range; a phosphor (21) configured to absorb at least a portion of said first wavelength range radiation and emit radiation having a second wavelength range; and said optical component being configured such that at least said first wavelength range radiation passes though the optical component, and characterized in that said phosphor is provided on a surface of said optical component (Fig. 3).

Regarding claim 60, Wang discloses a method of fabricating an optical component (37) for a lighting arrangement of a type comprising a radiation source (31) configured to emit radiation having a first wavelength range; a phosphor (21) configured to absorb at least a portion of said first wavelength range radiation and emit radiation having a second wavelength range; and said optical component being configured such that at least said first wavelength range radiation passes through said optical component, the method comprising providing said phosphor on a surface of the optical component (Fig. 3).

Regarding claims 14, 38, 72 and 83, Wang discloses the phosphor comprising a powder which is incorporated within one of an epoxy resin, a silicone material and a polymer material to form a mixture (39, Column 8, lines 47-65) and in which the phosphor mixture (312) is applied to the optical component to form a layer of phosphor on the optical component surface (Fig. 3).

Regarding claims 15, 39, 73 and 84, Wang discloses incorporating a light diffusing material (311, Column 8, lines 47-65) with the phosphor powder.

Claims 1, 16, 26, 41, 60 and 74 lack novelty under PCT Article 33(2) as being anticipated by Menkara et al. (US 2004/0227465 A1).

Regarding claims 1 and 26, Menkara discloses an optical component for a lighting arrangement of a type comprising a radiation source configured to emit radiation having a first wavelength range; a phosphor configured to absorb at least a portion of said first wavelength range radiation and emit radiation having a second wavelength range; and said optical component being configured such that at least said first wavelength range radiation passes though the optical component, and characterized in that said phosphor is provided on a surface of said optical component (Figs. 2A-2C, ¶[0044]).

Regarding claims 47 and 60, Menkara discloses a method of fabricating an optical component for a lighting arrangement of a type comprising a radiation source configured to emit radiation having a first wavelength range; a phosphor configured to absorb at least a portion of said first wavelength range radiation and emit radiation having a second wavelength range; and said optical component being configured such that at least said first wavelength range radiation passes through said optical component, the method comprising providing said phosphor on a surface of the optical component (Figs. 2A-2C, ¶[0044]).

Regarding claims 16, 41 and 74, Menkara discloses the phosphor comprising a photoluminescence material having a formula Sr2SiO4:Eu (¶[0057]).

Claims 1, 17, 26, 42, 60 and 75 lack novelty under PCT Article 33(2) as being anticipated by Hohn et al. (US 2004/0016908 A1).

Regarding claims 1 and 26, Hohn discloses an optical component (15) for a lighting arrangement of a type comprising a radiation source (1) configured to emit radiation having a first wavelength range; a phosphor (5) configured to absorb at least a portion of said first wavelength range radiation and emit radiation having a second wavelength range; and said optical component being configured such that at least said first wavelength range radiation passes though the optical component, and characterized in that said phosphor is provided on a surface of said optical component (Fig. 2).

Regarding claims 47 and 60, Hohn discloses a method of fabricating an optical component (15) for a lighting arrangement of a type comprising a radiation source (1) configured to emit radiation having a first wavelength range; a phosphor (5) configured to absorb at least a portion of said first wavelength range radiation and emit radiation having a second wavelength range; and said optical component being configured such that at least said first wavelength range radiation passes through said optical component, the method comprising providing said phosphor on a surface of the optical component (Fig. 2).

Regarding claims 17, 42 and 75, Hohn discloses the phosphor comprising a photoluminescence material having a formula Y3Al5O12:Ce (¶[0042]).

Claims 60, 81 and 82 lack novelty under PCT Article 33(2) as being anticipated by Yatsuda et al. (US 2005/0057917 A1).

Regarding claim 60, Yatsuda discloses a method of fabricating an optical component (23) for a lighting arrangement of a type comprising a radiation source (21) configured to emit radiation having a first wavelength range; a phosphor (25) configured to absorb at least a portion of said first wavelength range radiation and emit radiation having a second wavelength range; and said optical component being configured such that at least said first wavelength range radiation passes through said optical component, the method comprising providing said phosphor on a surface of the optical component (Fig. 15).

Regarding claim 81, Yatsuda discloses a plurality of optical component (52) in the form of an array of optical components having a common planar surface and depositing said phosphor (25) on the planar surface (Fig. 3).

Regarding claim 82, Yatsuda discloses providing the phosphor as a substantially uniform thickness layer on the planar surface of the array of optical components (Fig. 15).

Claims 1,10, 26, 35, 47, 56, 60 and 69 lack an inventive step under PCT Article 33(3) as being obvious over Tanaka et al. (JP 07-094785 A) in view of Srivastava et al. (US 6,555,958).

Regarding claims 1, 10, 26 and 35, Tanaka substantially discloses an optical component (54) for a lighting arrangement of a type comprising a radiation source (50) configured to emit radiation having a first wavelength range; and said optical component being configured such that at least said first wavelength range radiation passes though the optical component, the optical component comprising a substantially spherical shell (540). Tanaka fails to exemplify the limitations of a phosphor configured to absorb at least a portion of said first wavelength range radiation and emit radiation having a second wavelength range and characterized in that said

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Supplemental Box
In case **the space in any of the preceding boxes is not sufficient**.

phosphor is provided on an outer spherical surface of said optical component. Srivastava discloses an optical component (19) provided with a phosphor (21) configured to absorb at least a portion of said first wavelength range radiation and emit radiation having a second wavelength range and characterized in that said phosphor is provided on an outer spherical surface of said optical component so as to modify the light generated by the radiation source to a desired color emission. Thus, it would have been obvious to one skilled in the art to modify Tanaka's teaching to incorporate a phosphor layer as disclosed by Srivastava as to modify the light generated by the radiation source to a desired color emission.

Regarding claims 47, 56, 60 and 69, Tanaka discloses a method of fabricating an optical component (54) for a lighting arrangement of a type comprising a radiation source (50) configured to emit radiation having a first wavelength range; said optical component being configured such that at least said first wavelength range radiation passes through said optical component. Srivastava discloses an optical component (19) provided with a phosphor (21) configured to absorb at least a portion of said first wavelength range radiation and emit radiation having a second wavelength range and characterized in that said phosphor is provided on an outer spherical surface of said optical component so as to modify the light generated by the radiation source to a desired color emission. Thus, it would have been obvious to one skilled in the art to modify Tanaka's teaching to incorporate a phosphor layer as disclosed by Srivastava as to modify the light generated by the radiation source to a desired color emission.

Claims 18, 43 and 76 lack an inventive step under PCT Article 33(3) as being obvious over Negley et al. (US 2005/0051782) in view of Shei et al. (US 2005/0168127 A1).

Regarding claims 18, 43 and 76, Negley fails to exemplify the phosphor comprising an orange-red based phosphor having a formula Sr3SiO5:Eu. Shei discloses a light source provided with a phosphor comprising an orange-red based phosphor having a formula Sr3SiO5:Eu.It is considered within the capabilities of one skilled in the art the selection of a material based on its known suitability for an intended application as an obvious matter of design engineering.

Claims 19, 20, 44, 45, 77 and 78 lack an inventive step under PCT Article 33(3) as being obvious over Negley et al. (US 2005/0051782) in view of Mueller et al. (US 6,717,353).

Regarding claims 19, 44 and 77, Negley fails to exemplify the phosphor comprising a red-silicon nitride based phosphor having a formula SrSi5N8. Mueller discloses a light source provided with a phosphor comprising a red-silicon nitride based phosphor having a formula SrSi5N8. It is considered within the capabilities of one skilled in the art the selection of a material based on its known suitability for an intended application as an obvious matter of design engineering.

Regarding claims 20, 45 and 78, Negley fails to exemplify the phosphor comprising a red sulfate based phosphor having a formula SrCaS. Mueller discloses a light source provided with a phosphor comprising a red sulfate based phosphor having a formula SrCaS. It is considered within the capabilities of one skilled in the art the selection of a material based on its known suitability for an intended application as an obvious matter of design engineering.

Claims 21, 46 and 79 lack an inventive step under PCT Article 33(3) as being obvious over Negley et al. (US 2005/0051782) in view of Ellens et al. (US 2003/0052595 A1).

Regarding claims 21, 46 and 79, Negley fails to exemplify the phosphor comprising a green sulfate based phosphor having a formula SrGa2S4:Eu. Ellens discloses a light source provided with a phosphor comprising a green sulfate based phosphor having a formula SrGa2S4:Eu. It is considered within the capabilities of one skilled in the art the selection of a material based on its known suitability for an intended application as an obvious matter of design engineering.

Claims 1-85 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under Article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*, a publication of WIPO.

In these Notes, "Article," "Rule" and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report and the written opinion of the International Searching Authority, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only (see *PCT Applicant's Guide*, Volume I/A, Annexes B1 and B2).

The attention of the applicant is drawn to the fact that amendments to the claims under Article 19 are not allowed where the International Searching Authority has declared, under Article 17(2), that no international search report would be established (see *PCT Applicant's Guide*, Volume I/A, paragraph 296).

What parts of the international application may be amended ?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Preliminary Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When ? Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments ?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How ? Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments ?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

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The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

(i) the claim is unchanged;
(ii) the claim is cancelled;
(iii) the claim is new;
(iv) the claim replaces one or more claims as filed;
(v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under Article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments and any accompanying statement, under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the time of filing the amendments (and any statement) with the International Bureau, also file with the International Preliminary Examining Authority a copy of such amendments (and of any statement) and, where required, a translation of such amendments for the procedure before that Authority (see Rules 55.3(a) and 62.2, first sentence). For further information, see the Notes to the demand form (PCT/IPEA/401).

If a demand for international preliminary examination is made, the written opinion of the International Searching Authority will, except in certain cases where the International Preliminary Examining Authority did not act as International Searching Authority and where it has notified the International Bureau under Rule 66.1*bis*(b), be considered to be a written opinion of the International Preliminary Examining Authority. If a demand is made, the applicant may submit to the International Preliminary Examining Authority a reply to the written opinion together, where appropriate, with amendments before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later (Rule 43*bis*.1(c)).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see the *PCT Applicant's Guide*, Volume II.

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PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
PETER C. MEI
VISTA IP LAW GROUP, LLP
1885 LUNDY AVE., STE. 108
SAN JOSE, CA 95131

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing *(day/month/year)*	26 JAN 2012
Applicant's or agent's file reference ITMX00307WO0	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. PCT/US 11/54827	International filing date *(day/month/year)* 04 October 2011 (04.10.2011)
Applicant INTEMATIX CORPORATION	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

   For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 – 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

   ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

   Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

   For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

Name and mailing address of the ISA/ Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450	Authorized officer Lee W. Young
Facsimile No. 571-273-3201	Telephone No. PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference ITMX00307WO0	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US 11/54827	International filing date *(day/month/year)* 04 October 2011 (04.10.2011)	(Earliest) Priority Date *(day/month/year)* 05 October 2010 (05.10.2010)
Applicant INTEMATIX CORPORATION		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

☒ the international application in the language in which it was filed.

☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (see Box No. II).

3. ☐ **Unity of invention is lacking** (see Box No. III).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. the figure of the **drawings** to be published with the abstract is Figure No. 1

☒ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 11/54827

Box No. IV Text of the abstract (Continuation of item 5 of the first sheet)

A solid-state light emitting device comprises a solid-state light emitter (LED) operable to generate excitation light and a wavelength conversion component including a mixture of particles of a photoluminescence material and particles of a light reflective material. The phosphor absorbs at least a portion of the excitation light and emits light of a different color. The emission product of the device comprises the combined light generated by the LED and the phosphor. The wavelength conversion component can be light transmissive and comprise a light transmissive substrate on which the mixture of phosphor and reflective materials is provided as a layer or homogeneously distributed throughout the volume of the substrate. Alternatively the wavelength conversion component can be light reflective with the mixture of phosphor and light reflective materials being provided as a layer on the light reflective surface.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 11/54827

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - G09G 3/34 (2011.01)
USPC - 345/84
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(8): G09G 3/34 (2011.01)
USPC: 345/84

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
IPC(8): G09G 3/34 (2011.01)
USPC: 362/84; 345/82, 84, 107

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PubWEST; PGPB, USPT, EPAB, JPAB; Google Scholar; Google Patent; Search Terms: LED OLED light emitting diode solid-state phosphor light converting reflect refract scatter particle nano-particle texture diffuse substrate layer coating encapsulate density distribute homogeneous heterogeneous per-cent volume weight sign letter display

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ---- Y	US 2009/0272996 A1 (Chakraborty) 05 November 2009 (05.11.2009) para. [0010] through [0105], Fig. 1-7E	1-14 and 16-24 ---------- 15
Y	US 2007/0240346 A1 (Li et al.) 18 October 2007 (18.10.2007) para. [0040] through [0044], Fig. 1	15
A	US 2009/0050911 A1 (Chakraborty) 26 February 2009 (26.02.2009) entire document	1-24
A	US 2009/0026908 A1 (Bechtel et al.) 29 January 2009 (29.01.2009) entire document	1-24
A	US 2008/0308825 A1 (Chakraborty et al.) 18 December 2008 (18.12.2008) entire document	1-24

☐ Further documents are listed in the continuation of Box C. ☐

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 January 2012 (10.01.2012)	26 JAN 2012
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (July 2009)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: PETER C. MEI
VISTA IP LAW GROUP, LLP
1885 LUNDY AVE., STE. 108
SAN JOSE, CA 95131

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	26 JAN 2012
Applicant's or agent's file reference ITMX00307WO0	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US 11/54827	04 October 2011 (04.10.2011)	05 October 2010 (05.10.2010)

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - G09G 3/34 (2011.01)
USPC - 345/84

Applicant INTEMATIX CORPORATION

1. This opinion contains indications relating to the following items:

- [X] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [X] Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1 *bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Fom PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer:
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	10 January 2012 (10.01.2012)	Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 11/54827

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed.

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

   a. (means)

      ☐ on paper

      ☐ in electronic form

   b. (time)

      ☐ in the international application as filed

      ☐ together with the international application in electronic form

      ☐ subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

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Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	2, 3 and 15	YES
	Claims	1, 4-14 and 16-24	NO
Inventive step (IS)	Claims	none	YES
	Claims	1-24	NO
Industrial applicability (IA)	Claims	1-24	YES
	Claims	none	NO

2. Citations and explanations:
Claims 1, 4-14 and 16-24 lack novelty under PCT Article 33(2) as being anticipated by US 2009/0272996 A1 to Chakraborty.

Regarding claim 1, Chakraborty discloses a light emitting device (LED device 200, para. [0027], Fig. 2) comprising: at least one solid-state light emitter operable to generate excitation light (LED chip 202 is disposed on a mount surface; LED 202 can emit light of different colors and can also emit radiation outside the visible spectrum, such as infrared or ultraviolet, para. [0027]); and a photoluminescence wavelength conversion component (conversion process takes place in the conversion layer 204 which may be loaded with phosphors; wavelength conversion layer 204 converts a portion of the emitted light to a different wavelength; Yttrium aluminum garnet (YAG) is an example of a common phosphor that may be used, para. [0028] through [0032], [0055] through [0058], [0082], [0085], [0087], [0092] through [0095]) comprising a mixture of particles of at least one photoluminescence material (phosphor comprises many different compositions and phosphor materials alone or in combination, para. [0028] through [0041]) and particles of a light reflective material (light scattering particles; light extraction efficiency and the color temperature distribution uniformity are improved by the introduction of both nanoparticles and light scattering particles proximate to the light source; light scattering particles (LSPs) 210 are disposed proximate to the LED chip 202; strikes one or more of the scattering particles 210 the index of refraction differential between the medium and the particles 210 causes the light to refract and travel in a different direction, para. [0021], [0058] through [0084]).

Regarding claim 4, Chakraborty discloses the light emitting device of claim 1, wherein the light reflective material has a particle size in a range selected from the group consisting of: 0.01u to 10un; 0.01un to 1un and 0.1um to 1um (nanoparticles and light scattering particles proximate to the light source. Nanoparticles having a high index of refraction are dispersed throughout a wavelength conversion layer to adjust the index of refraction of the layer for improved light extraction, para. [0021], [0056], [0057], [0089], [0093], [0095], [0103]).

Regarding claim 5, Chakraborty discloses the light emitting device of claim 1, wherein a weight percent loading of light reflective material (light scattering particles (LSPs) 210) to the at least one photoluminescence material (phosphor) is in a range selected from the group consisting of: .01% to 10%; 0.01% to 1%; 0.1% to 1% and 0.5% to 1% (e.g.: if the conversion layer material has a RI of 1.5 and the target effective RI is 1.7, then the conversion layer 204 should comprise approximately 20% TiO.sub.2 nanoparticles by volume; other material combinations and compositions may also be used; e.g.: some embodiments may have greater than 5% nanoparticles by volume; other embodiments may have greater than 10% nanoparticles by volume; other embodiments may include 20-40% by volume nanoparticle loading; various percentages of composition of the LSPs 210 can be used as dictated by the application; depending on the materials used, the LSPs 210 will typically be found in concentrations ranging from 0.01% to 5% by volume; other concentrations can be used; however, the loss due to absorption increases with the concentration of the scattering particles; concentrations of the LSPs should be chosen in order to maintain an acceptable loss figure, para. [0057], [0083]).

See Continuation Sheet.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

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Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
Box V, item 2. Citations and explanations.

Regarding claim 6, Chakraborty discloses the light emitting device of claim 1, wherein the light reflective material (light scattering particles (LSPs) 210, para. [0060]) is selected from the group consisting of: titanium dioxide (para. [0060], [0065]), barium sulfate (para. [0060], [0066]) and combinations thereof (para. [0060], [0079]).

Regarding claim 7, Chakraborty discloses the light emitting device of claim 1, wherein the wavelength conversion component (conversion process takes place in the conversion layer 204 which may be loaded with phosphors; wavelength conversion layer 204 converts a portion of the emitted light to a different wavelength; Yttrium aluminum garnet (YAG) is an example of a common phosphor that may be used, para. [0028] through [0032], [0055] through [0058], [0082], [0085], [0087], [0092] through [0095]) is selected from the group consisting of:
a light transmissive substrate on which the mixture of photoluminescence material and light reflective material is provided as at least one layer (LSPs 210 can be dispersed throughout various elements so long as they are proximate to the LED chip 202 such that substantially all of the emitted light has a probability of interacting with the LSPs 210; e.g. LSPs 210 are disposed throughout the binder material 206 along with the nanoparticles 208 and the phosphor; conversion layer 204 is disposed on the LED chip 202, substantially all of the emitted light travels through the conversion layer where the LSPs 210 are dispersed before being emitted from the device 200, para. [0082] and [0086]);
a light transmissive substrate configured as a light guide and wherein the mixture of photoluminescence material and light reflective material is provided on at least a part of a face of the light guide (LSPs 210 can be dispersed throughout various elements so long as they are proximate to the LED chip 202 such that substantially all of the emitted light has a probability of interacting with the LSPs 210; e.g. LSPs 210 are disposed throughout the binder material 206 along with the nanoparticles 208 and the phosphor; conversion layer 204 is disposed on the LED chip 202, substantially all of the emitted light travels through the conversion layer where the LSPs 210 are dispersed before being emitted from the device 200, para. [0082] and [0086]); and
a light reflective surface on which the mixture of the photoluminescence material and light reflective material are provided as at least one layer (textured light emission surface 214, the LED chip 202 has a reflective element 216 such as a layer of reflective material; reflective element 216 redirects some of the light generated in the LED chip 202 back towards the textured light emission surface 214; reflective element 214 may comprise a thick silver mirror, para. [0086]).

Regarding claim 8, Chakraborty discloses the light emitting device of claim 1, wherein the at least one solid-state light emitter comprises an LED that is operable to generate blue excitation light having a peak wavelength in a wavelength range 440nm to 480nm (wavelength of light emitted from the LED chip 202 e.g., about.450 nm for a blue emitter, para. [0056]).

Regarding claim 9, Chakraborty discloses the light emitting device of claim 1, wherein the mixture of the photoluminescence material and the light reflective material is distributed over an area of at least 0.8cm^2 (LED devices can be formed from a single wafer; e.g.: when fabricating LED devices having a 1 millimeter (mm) square size, up to 4500 LED devices can be fabricated on a 3 inch wafer, para. [0096], [0098]).

Regarding claim 10, Chakraborty discloses the light emitting device of claim 1, wherein the particles of the light reflective material (light scattering particles; light extraction efficiency and the color temperature distribution uniformity are improved by the introduction of both nanoparticles and light scattering particles proximate to the light source; light scattering particles (LSPs) 210 are disposed proximate to the LED chip 202; strikes one or more of the scattering particles 210 the index of refraction differential between the medium and the particles 210 causes the light to refract and travel in a different direction, para. [0021], [0058] through [0084]) corresponds to a particle size (nanoparticles and light scattering particles proximate to the light source; nanoparticles having a high index of refraction are dispersed throughout a wavelength conversion layer to adjust the index of refraction of the layer for improved light extraction, para. [0021], [0056], [0057], [0089], [0093], [0095], [0103]) such that the particles scatter excitation light relatively more than light generated by the at least one phosphor material (LSPs 210 can be dispersed throughout various elements so long as they are proximate to the LED chip 202 such that substantially all of the emitted light has a probability of interacting with the LSPs 210; e.g. LSPs 210 are disposed throughout the binder material 206 along with the nanoparticles 208 and the phosphor; conversion layer 204 is disposed on the LED chip 202, substantially all of the emitted light travels through the conversion layer where the LSPs 210 are dispersed before being emitted from the device 200, para. [0082]).

Regarding claim 11, Chakraborty discloses the light emitting device of claim 1, further comprising a light diffusing layer that is adjacent to the photoluminescence wavelength conversion component (LED chip 202 has a textured light emission surface 214 included to increase light extraction from the LED chip 202 by reducing total internal reflection (TIR), para. [0008], [0009], [0011], [0013], [0086] through [0090], [0099]).

See Continuation Sheet.

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In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
Box V, item 2. Citations and explanations.

Regarding claim 12, Chakraborty discloses the light emitting device of claim 11, in which the light diffusing layer (conversion process takes place in the conversion layer 204 which may be loaded with phosphors; wavelength conversion layer 204 converts a portion of the emitted light to a different wavelength; Yttrium aluminum garnet (YAG) is an example of a common phosphor that may be used, para. [0028] through [0032], [0055] through [0058], [0082], [0085], [0087], [0092] through [0095]) comprises particles of light reflective material (light scattering particles; light extraction efficiency and the color temperature distribution uniformity are improved by the introduction of both nanoparticles and light scattering particles proximate to the light source; light scattering particles (LSPs) 210 are disposed proximate to the LED chip 202; strikes one or more of the scattering particles 210 the index of refraction differential between the medium and the particles 210 causes the light to refract and travel in a different direction, para. [0021], [0058] through [0084]) corresponding to a particle size (nanoparticles and light scattering particles proximate to the light source; nanoparticles having a high index of refraction are dispersed throughout a wavelength conversion layer to adjust the index of refraction of the layer for improved light extraction, para. [0021], [0056], [0057], [0089], [0093], [0095], [0103]) such that the particles scatter excitation light relatively more than light generated by the at least one photoluminescence material (LSPs 210 can be dispersed throughout various elements so long as they are proximate to the LED chip 202 such that substantially all of the emitted light has a probability of interacting with the LSPs 210; e.g. LSPs 210 are disposed throughout the binder material 206 along with the nanoparticles 208 and the phosphor; conversion layer 204 is disposed on the LED chip 202, substantially all of the emitted light travels through the conversion layer where the LSPs 210 are dispersed before being emitted from the device 200, para. [0082]).

Regarding claim 13, Chakraborty discloses the light emitting device of claim 12, wherein the light reflective material has a particle size in a range 100nm to 150nm (nanoparticles and light scattering particles proximate to the light source; nanoparticles having a high index of refraction are dispersed throughout a wavelength conversion layer to adjust the index of refraction of the layer for improved light extraction, para. [0021], [0056], [0057], [0089], [0093], [0095], [0103]).

Regarding claim 14, Chakraborty discloses the light emitting device of claim 1, in which the at least one photoluminescence material comprises phosphor (phosphor comprises many different compositions and phosphor materials alone or in combination, para. [0028] through [0041], [0060] through [0079]).

Regarding claim 16, Chakraborty discloses a wavelength conversion component (conversion layer 204 phosphor particles are dispersed throughout a binder material 206 such as silicone; refractive index (RI) of the phosphor particles and the RI of the binder 206 can be the same, or they can be different, para. [0041] through [0058]) for a solid-state light emitting device (LED device 200; LED chip 202 is disposed on a mount surface; LED 202 can emit light of different colors and can also emit radiation outside the visible spectrum, such as infrared or ultraviolet, para. [0027], Fig. 2) comprising a mixture of particles of at least one photoluminescence material (phosphor comprises many different compositions and phosphor materials alone or in combination, para. [0028] through [0041]) and particles of a light reflective material (light scattering particles; light extraction efficiency and the color temperature distribution uniformity are improved by the introduction of both nanoparticles and light scattering particles proximate to the light source; light scattering particles (LSPs) 210 are disposed proximate to the LED chip 202; strikes one or more of the scattering particles 210 the index of refraction differential between the medium and the particles 210 causes the light to refract and travel in a different direction, para. [0021], [0058] through [0084]).

Regarding claim 17, Chakraborty discloses the wavelength conversion component of claim 16, wherein the light reflective material has a particle size in a range selected from the group consisting of: 0.01um to 10un; 0.01un to 1um and 0.1 to 1um (nanoparticles and light scattering particles proximate to the light source. Nanoparticles having a high index of refraction are dispersed throughout a wavelength conversion layer to adjust the index of refraction of the layer for improved light extraction, para. [0021], [0056], [0057], [0089], [0093], [0095], [0103]).

Regarding claim 18, Chakraborty discloses the wavelength conversion component of claim 16, wherein a weight percent loading of light reflective material (light scattering particles (LSPs) 210) to the at least one photoluminescence material (phosphor) is in a range selected from the group consisting of: 0.01% to 10%; 0.01% to 1%; 0.1% to 1% and 0.5% to 1% (e.g.: if the conversion layer material has a RI of 1.5 and the target effective RI is 1.7, then the conversion layer 204 should comprise approximately 20% TiO.sub.2 nanoparticles by volume; other material combinations and compositions may also be used; e.g.: some embodiments may have greater than 5% nanoparticles by volume; other embodiments may have greater than 10% nanoparticles by volume; other embodiments may include 20-40% by volume nanoparticle loading; various percentages of composition of the LSPs 210 can be used as dictated by the application; depending on the materials used, the LSPs 210 will typically be found in concentrations ranging from 0.01% to 5% by volume; other concentrations can be used; however, the loss due to absorption increases with the concentration of the scattering particles; concentrations of the LSPs should be chosen in order to maintain an acceptable loss figure, para. [0057], [0083]).

See Continuation Sheet.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
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Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
Box V, item 2. Citations and explanations.

Regarding claim 19, Chakraborty discloses the wavelength conversion component of claim 16, wherein the wavelength conversion component (conversion process takes place in the conversion layer 204 which may be loaded with phosphors; wavelength conversion layer 204 converts a portion of the emitted light to a different wavelength; Yttrium aluminum garnet (YAG) is an example of a common phosphor that may be used, para. [0028] through [0032], [0055] through [0058], [0082], [0085], [0087], [0092] through [0095]) is selected from the group consisting of:
a light transmissive substrate on which the mixture of the at least one photoluminescence material and light reflective material are provided as at least one layer (LSPs 210 can be dispersed throughout various elements so long as they are proximate to the LED chip 202 such that substantially all of the emitted light has a probability of interacting with the LSPs 210; e.g. LSPs 210 are disposed throughout the binder material 206 along with the nanoparticles 208 and the phosphor; conversion layer 204 is disposed on the LED chip 202, substantially all of the emitted light travels through the conversion layer where the LSPs 210 are dispersed before being emitted from the device 200, para. [0082] and [0086]);
a light transmissive substrate configured as a light guide and wherein the mixture of photoluminescence material and light reflective material is provided on at least a part of a face of the light guide (LSPs 210 can be dispersed throughout various elements so long as they are proximate to the LED chip 202 such that substantially all of the emitted light has a probability of interacting with the LSPs 210; e.g. LSPs 210 are disposed throughout the binder material 206 along with the nanoparticles 208 and the phosphor; conversion layer 204 is disposed on the LED chip 202, substantially all of the emitted light travels through the conversion layer where the LSPs 210 are dispersed before being emitted from the device 200, para. [0082] and [0086]); and
a light reflective surface on which the mixture of the photoluminescence material and light reflective material are provided as at least one layer (textured light emission surface 214, the LED chip 202 has a reflective element 216 such as a layer of reflective material; reflective element 216 redirects some of the light generated in the LED chip 202 back towards the textured light emission surface 214; reflective element 214 may comprise a thick silver mirror, para. [0086]).

Regarding claim 20, Chakraborty discloses the wavelength conversion component of claim 16, wherein the mixture of the at least one photoluminescence material and the light reflective material are distributed over an area of at least 0.8cm^2 (LED devices can be formed from a single wafer; e.g.: when fabricating LED devices having a 1 millimeter (mm) square size, up to 4500 LED devices can be fabricated on a 3 inch wafer, para. [0096], [0098]).

Regarding claim 21, Chakraborty discloses the wavelength conversion component of claim 16, wherein the particles of the light reflective material (light scattering particles; light extraction efficiency and the color temperature distribution uniformity are improved by the introduction of both nanoparticles and light scattering particles proximate to the light source; light scattering particles (LSPs) 210 are disposed proximate to the LED chip 202; strikes one or more of the scattering particles 210 the index of refraction differential between the medium and the particles 210 causes the light to refract and travel in a different direction, para. [0021], [0058] through [0084]) corresponds to a particle size (nanoparticles and light scattering particles proximate to the light source; nanoparticles having a high index of refraction are dispersed throughout a wavelength conversion layer to adjust the index of refraction of the layer for improved light extraction, para. [0021], [0056], [0057], [0089], [0093], [0095], [0103]) such that the particles scatter excitation light relatively more than light generated by the at least one phosphor material (LSPs 210 can be dispersed throughout various elements so long as they are proximate to the LED chip 202 such that substantially all of the emitted light has a probability of interacting with the LSPs 210; e.g. LSPs 210 are disposed throughout the binder material 206 along with the nanoparticles 208 and the phosphor; conversion layer 204 is disposed on the LED chip 202, substantially all of the emitted light travels through the conversion layer where the LSPs 210 are dispersed before being emitted from the device 200, para. [0082]).

Regarding claim 22, Chakraborty discloses the wavelength conversion component of claim 21, wherein the light reflective material has a particle size in a range 100nm to 150nm (nanoparticles and light scattering particles proximate to the light source; nanoparticles having a high index of refraction are dispersed throughout a wavelength conversion layer to adjust the index of refraction of the layer for improved light extraction, para. [0021], [0056], [0057], [0089], [0093], [0095], [0103]).

Regarding claim 23, Chakraborty discloses the wavelength conversion component of claim 16, further comprising a light diffusing layer that is adjacent to the photoluminescence wavelength conversion component (LED chip 202 has a textured light emission surface 214 included to increase light extraction from the LED chip 202 by reducing total internal reflection (TIR), para. [0008], [0009], [0011], [0013], [0086] through [0090], [0099]).

See Continuation Sheet.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 11/54827

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:
Box V, item 2. Citations and explanations.

Regarding claim 24, Chakraborty discloses the wavelength conversion component of claim 23, in which the light reflective layer (conversion layer 204) comprises particles of light reflective material (light scattering particles; light extraction efficiency and the color temperature distribution uniformity are improved by the introduction of both nanoparticles and light scattering particles proximate to the light source; light scattering particles (LSPs) 210 are disposed proximate to the LED chip 202; strikes one or more of the scattering particles 210 the index of refraction differential between the medium and the particles 210 causes the light to refract and travel in a different direction, para. [0021], [0058] through [0084]) corresponding to a particle size (nanoparticles and light scattering particles proximate to the light source; nanoparticles having a high index of refraction are dispersed throughout a wavelength conversion layer to adjust the index of refraction of the layer for improved light extraction, para. [0021], [0056], [0057], [0089], [0093], [0095], [0103]) such that the particles scatter excitation light relatively more than light generated by the at least one phosphor material (LSPs 210 can be dispersed throughout various elements so long as they are proximate to the LED chip 202 such that substantially all of the emitted light has a probability of interacting with the LSPs 210; e.g. LSPs 210 are disposed throughout the binder material 206 along with the nanoparticles 208 and the phosphor; conversion layer 204 is disposed on the LED chip 202, substantially all of the emitted light travels through the conversion layer where the LSPs 210 are dispersed before being emitted from the device 200, para. [0082]).

Claims 2 and 3 lack an inventive step under PCT Article 33(3) as being obvious over Chakraborty.

Regarding claim 2, Chakraborty discloses the light emitting device of claim 1, wherein an area over which the mixture of photoluminescence material and light reflective material is distributed (conversion process takes place in the conversion layer 204 which may be loaded with phosphors; wavelength conversion layer 204 converts a portion of the emitted light to a different wavelength; Yttrium aluminum garnet (YAG) is an example of a common phosphor that may be used, para. [0028] through [0032]) is larger than the light emitting area of the light emitter (LED chip 202 is disposed on a mount surface; LED 202 can emit light of different colors and can also emit radiation outside the visible spectrum, such as infrared or ultraviolet, para. [0027], illustrated, Fig. 2, 5), yet fails to disclose wherein an area over which the mixture of photoluminescence material and light reflective material is distributed is at least fifty times the light emitting area of the light emitter. However, since the manufacturing methods used by Chakraborty include physical/chemical deposition techniques, electroplating, electrophoretic deposition, spin coating, spray coating, screen printing, and dispensing (para. [0101] through [0103]), it would have been obvious to one of skill in the art to size the area of distribution of the mixture of photoluminescence material and light reflective material to be least fifty times the light emitting area of the light emitter, since such a modification would have been a matter of routine experimentation. (Chakraborty: para. [0101] through [0103]).

Regarding claim 3, Chakraborty discloses the light emitting device of claim 1, wherein the wavelength conversion component (conversion process takes place in the conversion layer 204 which may be loaded with phosphors; wavelength conversion layer 204 converts a portion of the emitted light to a different wavelength; Yttrium aluminum garnet (YAG) is an example of a common phosphor that may be used, para. [0028] through [0032]) is locatable at a distance of at least 5mm from (conversion layer 708 has a thickness such that it may cover/bury the pedestal 706, para. [0103], [0104], [0105]) the at least one light emitter (LED chip 202 is disposed on a mount surface; LED 202 can emit light of different colors and can also emit radiation outside the visible spectrum, such as infrared or ultraviolet, para. [0027]), yet fails to disclose a distance of at least 5mm. However, it would have been obvious to one of skill in the art to size the distance between the wavelength conversion component and the light emitter to at least 5 mm, since such a modification would have been a matter of routine experimentation.

Claim 15 lacks an inventive step under PCT Article 33(3) as being obvious over Chakraborty in view of US 2007/0240346 A1 to Li et al. (hereinafter Li).

Regarding claim 15, Chakraborty discloses the light emitting device of claim 1, yet fails to disclose wherein the device is configured as a light emitting sign. Li discloses wherein a device configured as a light emitting sign (number of light emitting diodes (LEDs) 4 are provided within the light box 2 and are preferably blue LEDs which emit blue light in a wavelength range 410 to 470 nm; layer of phosphor material 6, photo luminescent material, is provided on an under surface, that is the surface facing the LEDs, excitable by the radiation emitted by the LEDs 4; para. [0040] through [0044], Fig. 1). Since both references are directed toward LED lighting, it would have been obvious to one of skill in the art to configure the device of Chakraborty into a light emitting sign as suggested by Li, since such a modification would result in an light emitting sign with greater color saturation. (Li: para. [0044]).

Claims 1-24 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry.

SEARCH HISTORY

Application Number	PCT/US 11/54827
Search Conducted By	MEG
Search Approved By	HHB

US/IPC Classifications Searched	IPC(8): G09G 3/34 (2011.01) USPC: 345/84
Date Conducted	10 January 2012

Documentation Searched	IPC(8): G09G 3/34 (2011.01) USPC: 362/84; 345/82, 84, 107 (keyword limited; terms below)
Search Terms Used	LED OLED light emitting diode solid-state phosphor light converting reflect refract scatter particle nano-particle texture diffuse substrate layer coating encapsulate density distribute homogeneous heterogeneous per-cent volume weight sign letter display
Date Conducted	10 January 2012

Electronic Database Searched	PubWEST
Files Searched	PGPB, USPT, EPAB, JPAB
Date Conducted	10 January 2012
Search Logic:	

DB=PGPB,USPT,USOC,EPAB,JPAB; PLUR=YES; OP=OR DATE: Tuesday, January 10, 2012		
L31	L30 and (sign lettering display)	26
L30	L29 and (LED)	47
L29	L28 and (phosphor)	107
L28	L27 and (scattering adj particle)	107
L27	L25 and ((reflective refractive scattering) adj particle)	113
L26	L25 and ((reflective refractive) adj particle)	8
L25	L24 and (layer encapsulant)	113
L24	L23 and (density percent per-cent volume weight)	113
L23	L22 and (light adj (reflective refractive scattering) adj (particle nano-particle nanoparticle))	127
L22	L21 and (reflective scattered)	284

L21	L20 and ((phosphor conversion) adj (layer region coat$4 material))	322
L20	L19 and (density distribut$4 homogeneous$4 heterogeneous$4)	359
L19	L18 and (substrate layer coating encapsulant)	428
L18	L17 and ((scattering reflective refractive) adj (particle nano-particle nanoparticle))	433
L17	L15 and ((phosphor) adj (particle nano-particle nanoparticle))	2246
L16	L15 and ((phosphor scattering reflective refractive) adj (particle nano-particle nanoparticle))	2787
L15	(LED "light emitting" solid-state OLED) and (phosphor (light adj converting)) and (reflective refractive scattering) and (particle nano-particle nanoparticle)	8717
L14	L13 and (reflecting reflective)	29
L13	L12 and (texture diffuse$4)	29
L12	L11 and (light adj (reflecti$4 refract$4 scatter$4))	41
L11	L10 and ((light reflective refractive scattering) adj (particle nano-particle nanoparticle))	54
L10	L9 and (phosphor (light adj converting))	864
L9	L8 and (LED "light emitting" solid-state OLED)	4886
L8	L7 L6 L5 L4 L3	10520
L7	345/107.ccls.	1621
L6	345/84.ccls.	1256
L5	345/82.ccls.	2291
L4	362/84.ccls.	2054
L3	L2 L1	5582
L2	345/84.ccls.	1256
L1	G09G3/34.ipc.	4724

Electronic Database Searched	Google
Files Searched	Google Patents
Date Conducted	10 January 2012
Search Logic:	
About 505 results (0.28 seconds) LED diode (phosphor OR photoluminescent OR photoluminescence) (reflective OR specular) particle (wavelength OR conversion)	

Electronic Database Searched	Google
Files Searched	Google Scholar
Date Conducted	10 January 2012
Search Logic:	
Results 1 - 10 of about 1,210. (0.28 sec) LED phosphor reflective particle Results 1 - 10 of about 1,400. (0.15 sec) LED diode (phosphor OR photoluminescent OR	

photoluminescence) (reflective OR specular) particle (wavelength OR conversion)

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:

ROBINSON ROSS T.

WINSTEAD PC P.O. BOX 131851 DALLAS TX 75313 USA

RECEIVED ON

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Date of mailing *(day/month/year)* 28 March 2013 (28.03.2013)

Applicant's or agent's file reference

51026-P222WO

BY WINSTEAD

FOR FURTHER ACTION See paragraphs 1 and 4 below

International application No.

PCT/US2012/059892

International filing date *(day/month/year)*

12 October 2012 (12.10.2012)

Applicant

INTEMATIX CORPORATION

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 . 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the PCT Applicant's Guide, National Chapters.

Name and mailing address of the ISA/KR

Korean Intellectual Property Office
189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

COMMISSIONER

Telephone No. 82-42-481-8754

DOCKETED ON APR 08 2013

By:

Form PCT/ISA/220 (July 2010)

* Attention

Copies of the documents cited in the international search report can be searched in the following Korean Intellectual Property Office English website for three months from the date of mailing of the international search report.

http://www.kipo.go.kr/en/ => PCT Services => PCT Services

ID : PCT international application number
PW : **X53X36RK**

Inquiries related to PCT International Search Report or Written Opinion prepared by KIPO as an International Searching Authority can be answered not only by KIPO but also through IPKC (Intellectual Property Korea Center), located in Vienna, VA, which functions as a PCT Help Desk for PCT applicants.

Homepage: http://www.ipkcenter.com
Email: ipkc@ipkcenter.com
Phone: +1 703 388 1066
Fax: +1 703 388 1084

Notes to Form PCT/ISA/220 (July 2010)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
51026-P222WO		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/US2012/059892	**12 OCTOBER 2012 (12.10.2012)**	13 OCTOBER 2011 (13.10.2011)

Applicant

INTEMATIX CORPORATION

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of **4** sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of :
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☒ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. **1**
      ☒ as suggested by the applicant.
      ☐ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

DOCKETED ON
APR 09 2013
By:

Form PCT/ISA/210 (first sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/059892

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 7,9,11,14
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

Claims 7,9,11,14 are too broad to make a meaningful search because they are dependent claims of multiple dependent claims which also refer to other multiple dependent claims.

3. ☒ Claims Nos.: 4-6,8,10,12,13,15-17,21-23
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required addtional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
☐ No protest accompanied the payment of additional search fees.

Savant Technologies EX1104, Page 221 of 485

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/059892

A. CLASSIFICATION OF SUBJECT MATTER

H01L 33/50(2010.01)i, H01L 33/48(2010.01)i, F21S 2/00(2006.01)i

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)

H01L 33/50; H01J 1/62; H01J 63/04; H01L 33/00

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

Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: photoluminescence, scatter, particle size

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2011-0147778 A1 (MASATSUGU ICHIKAWA) 23 June 2011 See abstract, paragraphs [0014]-[0016],[0033]-[0044], and figrues 1,3.	1-3,18-20
A	US 2002-0180351 A1 (THOMAS FRANCIS MCNULTY et al.) 05 December 2002 See paragraphs [0022]-[0024] and figure 1.	1-3,18-20
A	KR 10-2007-0065486 A (SAMSUNG ELECTRO-MECHANICS CO., LTD.) 25 June 2007 See page 5, line 13 - page 6, line 7 and figures 10-12.	1-3,18-20
A	WO 2008-043519 A1 (LEXEDIS LIGHTING GMBH et al.) 17 April 2008 See abstract, page 9, line 9 - page 10, line 28, and figure 2.	1-3,18-20
A	KR 10-2009-0017346 A (SEOUL SEMICONDUCTOR CO., LTD.) 29 February 2009 See paragraphs [0020],[0021] and figure 2.	1-3,18-20

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 March 2013 (27.03.2013)	**28 March 2013 (28.03.2013)**

Name and mailing address of the ISA/KR
Korean Intellectual Property Office
189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea
Facsimile No. 82-42-472-7140

Authorized officer
PARK, Hye Lyun
Telephone No. 82-42-481-3463

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2012/059892

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2011-0147778 A1	23.06.2011	JP 2011-129661 A	30.06.2011
US 2002-0180351 A1	05.12.2002	EP 1390966 A1	25.02.2004
		EP 1390966 A4	19.03.2008
		JP 2004-528714 A	16.09.2004
		JP 2004-528714 T	16.09.2004
		KR 10-2004-0012776 A	11.02.2004
		US 6686676 B2	03.02.2004
		WO 02-089175 A1	07.11.2002
KR 10-2007-0065486 A	25.06.2007	None	
WO 2008-043519 A1	17.04.2008	EP 2074668 A1	01.07.2009
KR 10-2009-0017346 A	18.02.2009	None	

Savant Technologies EX1104, Page 223 of 485

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
ROBINSON ROSS T.

WINSTEAD PC P.O. BOX 131851 DALLAS TX 75313 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**28 March 2013 (28.03.2013)**
Applicant's or agent's file reference 51026-P222WO	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2012/059892	**12 OCTOBER 2012 (12.10.2012)**	13 OCTOBER 2011 (13.10.2011)

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

H01L 33/50(2010.01)i, H01L 33/48(2010.01)i, F21S 2/00(2006.01)i

Applicant

INTEMATIX CORPORATION

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☒ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

DOCKETED ON
APR 09 2013
By:

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea Facsimile No. 82-42-472-7140	27 March 2013 (27.03.2013)	PARK, Hye Lyun Telephone No.82-42-481-3463

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2012/059892

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Savant Technologies EX1104, Page 225 of 485

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2012/059892

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application

☒ claims Nos. 4-17,21-23

because:

☐ the said international application, or the said claims Nos. _____ relate to the following subject matter which does not require an international search *(specify)*:

☒ the description, claims or drawings *(indicate particular elements below)* or said claims Nos. 7,9,11,14 are so unclear that no meaningful opinion could be formed *(specify)*:

Claims 7,9,11,14 are too broad to make a meaningful search because they are dependent claims on multiple dependent claims which also refer to other multiple dependent claims.

☐ the claims, or said claims Nos. _____ are so inadequately supported by the description that no meaningful opinion could be formed *(specify)*:

☒ no international search report has been established for said claims Nos. 4-17,21-23

☐ a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

☐ furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Istructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.

☐ furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Istructions, and such listing was not available to the International Searching Authority in a form and manner acceptable to it.

☐ pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rule 13ter.1(a) or (b).

☐ See Supplemental Box for further details.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2012/059892

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-3,18-20	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	NONE	YES
	Claims	1-3,18-20	NO
Industrial applicability (IA)	Claims	1-3,18-20	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following document:

D1: US 2011-0147778 A1 (MASATSUGU ICHIKAWA) 23 June 2011

1. Novelty and Inventive Step

1.1 Claims 1-3

1.1.1 Independent claim 1

D1, which is considered to be the closest prior art to the subject matter of independent claim 1, discloses a scattering layer and a fluorescent material layer comprising: fluorescent material particles (14) (see paragraph [0033], figure 1 in D1); and particles (20) scattering light (see paragraph [0040], figure 1 in D1). D1 does not explicitly disclose the feature of claim 1 that a light scattering material has an average particle size, such that the light scattering material will scatter excitation light from a radiation source relatively more than the light scattering material generated by the at least one photoluminescence material. However, this feature is virtually suggested by the same document, considering the particles having a mean particle size D that satisfies: $20nm<D\leq 0.4\times\lambda/\pi$ (λ is the wavelength of the primary light propagating in the transparent medium), the particles scattering the primary light of the semiconductor light emitting element significantly more strongly than the secondary light of longer wavelength of the fluorescent material layer (see paragraphs [0014]-[0016],[0039]-[0044], figures 1,3 in D1). Accordingly, claim 1 would have been obvious over D1. Therefore, claim 1 lacks an inventive step under PCT Article 33(3).

1.1.2 Dependent claims 2, 3

Claim 2 further specifies that the light scattering material scatters the excitation light at least twice as much as light generated by the at least one photoluminescence material. However, the additional feature of claim 2 is virtually suggested by the feature of D1 considering that the primary light is scattered twice more strongly than the secondary light (see paragraph [0016] in D1). Accordingly, claim 2 would have been obvious over D1. Therefore, claim 2 lacks an inventive step under PCT Article 33(3).

(Continued on Supplemental Box)

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WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2012/059892

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Claims 4-6,8,10,12,13,15-17,21-23 do not comply with PCT Rule 6.4(a) because multiple dependent claims should not serve as a basis for any other multiple dependent claim.

Savant Technologies EX1104, Page 228 of 485

Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of :

Box No. V

The additional feature of claim 3 is identical to the feature of D1 in that the semiconductor light emitting element (2) is constituted by forming a semiconductor layer (6) and has a light emitting layer capable of emitting blue light (see paragraph [0033], figure 1 in D1). Accordingly, claim 3 would have been obvious over D1. Therefore, claim 3 lacks an inventive step under PCT Article 33(3).

1.2 Claims 18-20

1.2.1 Independent claim 18
D1, which is considered to be the closest prior art to the subject matter of independent claim 18, discloses a light emitting device comprising: a semiconductor light emitting element (2) (see paragraph [0033], figure 1 in D1); fluorescent material particles (14) (see paragraph [0033], figure 1 in D1); and particles (20) scattering light (see paragraph [0040], figure 1 in D1). Although D1 does not explicitly disclose that a light scattering material has an average particle size such that the light scattering material will scatter excitation light from a radiation source relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material, this feature is virtually suggested by the same document considering the particles having a mean particle size D that satisfies: $20nm<D\leq 0.4\times\lambda/\pi$ (λ is the wavelength of the primary light propagating in the transparent medium), the particles scattering the primary light of the semiconductor light emitting element significantly more strongly than the secondary light of longer wavelength of the fluorescent material layer (see paragraphs [0014]-[0016],[0039]-[0044], figures 1,3 in D1). Accordingly, claim 18 would have been obvious over D1. Therefore, claim 18 lacks an inventive step under PCT Article 33(3).

1.2.2 Dependent claims 19, 20
Claim 19 further specifies that the average particle size of the light scattering material is selected to improve an OFF state white appearance of the light emitting device. However, the additional feature of claim 19 is virtually suggested by the feature of D1 considering that the particles having a mean particle size D that satisfies: $20nm<D\leq 0.4\times\lambda/\pi$ (λ is the wavelength of the primary light propagating in the transparent medium), the particles scattering the primary light of the semiconductor light emitting element significantly more strongly than the secondary light of longer wavelength of the fluorescent material layer (see paragraphs [0014]-[0016],[0039]-[0044], figures 1,3 in D1).

(Continued on Supplemental Box)

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Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of:

Box No. V

Claim 20 further specifies that the average particle size of the light scattering material is selected to obtain substantially uniform color for emitted light from the light emitting device for emission angles over a ±60° from an emission axis. However, the additional feature of claim 20 is virtually suggested by the feature of D1 considering that the effect of improving the color unevenness becomes more remarkable when the angle of light emission of the light emitting device (1) around the semiconductor light emitting element (2) increases, and the light emission angle θ of the light emitting device is 180 degrees. Accordingly, claim 20 would have been obvious over D1. Therefore, claim 20 lacks an inventive step under PCT Article 33(3).

2. Industrial Applicability

Claims 1-3, 18-20 are industrially applicable under PCT Article 33(4).

Savant Technologies EX1104, Page 230 of 485

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:	Group Art Unit: 2879
Bing Dai et al.	Examiner: Bowman, Mary Ellen
Serial No.: 13/273,215	Confirmation No.: 8978
Filed: October 13, 2011	
For: WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES	

INFORMATION DISCLOSURE STATEMENT

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

Sir:

In accordance with 37 CFR §§ 1.97 and 1.98, the items identified in this Information Disclosure Statement (IDS) are being brought to the attention of the Office. The Examiner is requested to make these documents of record.

The items identified in this IDS may or may not be "material" pursuant to 37 CFR § 1.56. The submission thereof by Applicant(s) is not to be construed as an admission that any such patent, publication or other information referred to therein is material or considered to be material (37 CFR § 1.97(h)), or even qualifies as "prior art" under 35 USC § 102 with respect to this invention unless specifically designated by Applicant(s) as such.

1. Fee:

☐ Charge the fee due under 37 CFR § 1.17(p) to the deposit account referenced below.

☐ The fee due under 37 CFR § 1.17(p) is being concurrently submitted with the filing of an electronic IDS submission. Thus, no additional fee is required.

Savant Technologies EX1104, Page 231 of 485

☒ Applicant believes that no fee is required for this submission. However, if Applicant is mistaken, then please charge the fee due under 37 CFR § 1.17(p) to the deposit account referenced below.

2. Statement Under 37 CFR § 1.97(e):

☐ That each item of information contained in the information disclosure statement was first cited in any 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. See 37 CFR 1.97(e)(1); or

☐ That no item of information 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

3. Copies of the Cited Items:

☒ Copies of all of the items listed under Foreign Patent Documents and/or Non Patent Literature Documents are enclosed.

☐ Copies of the following items listed under Item Nos. ___ under Foreign Patent Documents and Item Nos. ___ under Non Patent Literature Documents are enclosed.

☐ Copies of the following documents listed under Item Nos. ___ under Foreign Patent Documents and Item Nos. ___ under Non Patent Literature Documents are not supplied because they were previously cited by the Office or submitted in Information Disclosure Statements in parent U.S. Application No. _____, of which the current application is a _____ and relied upon in this application for an earlier filing date under 35 USC § 120. See 37 CFR § 1.98(d). The Examiner is requested to make these documents of record.

4. Conclusion:

Citation of the above documents shall not be construed as:

1. an admission that the documents are necessarily prior art with respect to the instant invention;
2. a representation that a search has been made, other than as described above; and
3. an admission that the information cited herein is, or is considered to be, material to patentability as defined in § 1.56(b).

It is respectfully requested that the Examiner indicate consideration of the cited references by returning a copy of the attached form with initials or other appropriate marks. If the U.S. Patent Office determines that an extension and/or other relief is required, Applicant(s) petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 501105**, referencing **Docket No. ITMX-00318US2**. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

Respectfully submitted,

Dated: 06-03-2013

By: /Peter C. Mei/
Peter C. Mei
Registration No. 39,768

Vista IP Law Group, LLP
2160 Lundy Ave., Ste. 230
San Jose, CA 95131
Telephone: (408) 321-8663 (Ext. 208)
Facsimile: (408) 877-1662

Savant Technologies EX1104, Page 233 of 485

PTO/SB/08a (07-09) (modified)
Approved for use through 07/31/2012. 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				***Complete if Known***	
				Application Number	13/273,215
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				Filing Date	10-13-2011
				First Named Inventor	Bing Dai
				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	4	of	10	Attorney Docket Number	ITMX-00318US2

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No.	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	5371434	12/06/1994	Rawlings, Keith C.	
	2	5947587	09/07/1999	Keuper, et al.	
	3	6147367	11/14/2000	Yang et al.	
	4	6255670	07/03/2001	Srivastava et al.	
	5	6538375	03/25/2003	Duggal et al.	
	6	6555958	04/29/2003	Srivastava, et al.	
	7	6576930	06/10/2003	Reeh et al.	
	8	6580097	06/17/2003	Soules et al.	
	9	6614170	09/02/2003	Wang et al.	
	10	6680569	01/20/2004	Meueller-Mach et al.	
	11	6717353	04/06/2004	Mueller et al.	
	12	6834979	12/28/2004	Cleaver et al.	
	13	7029935	04/18/2006	Negley et al.	
	14	7220022	05/22/2007	Allen et al.	
	15	7663315	02/16/2010	Hulse, George R.	
	16	7686478	03/30/2010	Hulse et al.	
	17	7943951	05/17/2011	Kim et al.	
	18	7972030	07/05/2011	Li, Yi-Qun	

Examiner Signature		Date Considered	

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PTO/SB/08a (07-09) (modified)
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Substitute for form 1449/PTO				***Complete if Known***	
				Application Number	13/273,215
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				Filing Date	10-13-2011
				First Named Inventor	Bing Dai
				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	5	of	10	Attorney Docket Number	ITMX-00318US2

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No.	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
	19	20010000622	05/01/2001	Reeh et al.	
	20	20020047516	04/25/2002	Iwasa et al.	
	21	20030038596	02/27/2003	Ho, Wen-Chih	
	22	20030052595	03/20/2003	Ellens et al.	
	23	20030102810	06/05/2003	Cross et al.	
	24	20040016908	01/29/2004	Hohn et al.	
	25	20040104391	06/03/2004	Maeda et al.	
	26	20040183081	09/23/2004	Alexander Shishov	
	27	20040227465	11/18/2004	Menkara et al.	
	28	20040239242	12/02/2004	Yasuhisa Mano	
	29	20050051782	03/10/2005	Negley et al.	
	30	20050052885	03/10/2005	Wu, Han Wen	
	31	20050057917	03/17/2005	Yatsuda et al.	
	32	20050093430	05/05/2005	Ibbertson et al.	
	33	20050168127	08/04/2005	Shei et al.	
	34	20060001352	01/05/2006	Maruta et al.	
	35	20060027786	02/09/2006	Dong,et al.	
	36	20060028122	02/09/2006	Wang, et al.	
	37	20060028837	02/09/2006	Mrakovich	

Examiner Signature		Date Considered	

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				Filing Date	10-13-2011
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				First Named Inventor	Bing Dai
				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	6	of	10	Attorney Docket Number	ITMX-00318US2

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No.	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
	38	20060124947	06/15/2006	Mueller et al.	
	39	20060158090	07/20/2006	Wang, et al.	
	40	20060261309	11/23/2006	Li, et al.	
	41	20060262532	11/23/2006	Blumel	
	42	20070029526	02/08/2007	Cheng, et al.	
	43	20070091601	04/26/2007	Hsieh, et al.	
	44	20070170840	07/26/2007	Chang-Hae et al.	
	45	20070240346	10/18/2007	Li et al.	
	46	20080246044	10/09/2008	Siew It Pang	
	47	20080308825	12/18/2008	Chakraborty et al.	
	48	20090026908	01/29/2009	Bechtel et al.	
	49	20090050911	02/26/2009	Chakraborty	
	50	20110147778	06/23/2011	Ichikawa, Masatsugu	

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				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	7	of	10	Attorney Docket Number	ITMX-00318US2

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]
	1	CA 2466979	11/18/2005	Prodanov D.		
	2	JP 07094785	04/07/1995	Stanley Electric CO. LTD		
	3	JP 2003101078	04/04/2003	Toyoda Gosei Co Ltd		
	4	JP 2005011953	01/13/2005	Toyoda Gosei Co Ltd		
	5	RU 214492	06/27/1998	Abramov V. S., et al.		
	6	TW 200527664	08/16/2005	Cree, Inc. US		
	7	KR 10-2007-0065486 A	06/25/2007	Samsung Electro-Mechanics Co., Ltd.		
	8	KR 10-2009-0017346 A	02/29/2009	Seoul Semiconductor Co., Ltd.		
	9	WO 2002007228	01/24/2002	Elliiott C. T et al.		
	10	WO 2004077580	09/10/2004	James, IBBETSON et al.		
	11	WO 2005025831	03/24/2005	Gerald NEGLEY et al.		
	12	WO 2006022792	03/02/2006	Wang et al.		
	13	WO 2008043519 A1	04/17/2008	Lexedis Lighting GMBH		
	14					
	15					

Examiner Signature		Date Considered	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT				Filing Date	10-13-2011
				First Named Inventor	Bing Dai
				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	8	of	10	Attorney Docket Number	ITMX-00318US2

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	Docket No. ITMX-00116CN0; First Office Action for Chinese Patent Application No. 200780032995.8 Issued on March 19, 2010	
	2	Docket No. ITMX-00116CN0; Foreign Office Action dated Oct. 29, 2012 for Chinese Appln. No. 200780032995.8	
	3	Docket No. ITMX-00116CN0; Second Office Action for Chinese Patent Application No. 200780032995.8 Issued on August 10, 2011	
	4	Docket No. ITMX-00116CN0; Third Office Action for Chinese Patent Application No. 200780032995.8 Issued on December 12, 2011	
	5	Docket No. ITMX-00116CN1; Foreign Office Action dated Apr. 24, 2012 for Chinese Appln. No. 201010525492.8	
	6	Docket No. ITMX-00116EP0; Foreign Office Action dated July 5, 2012 for European Appln. No. 07811039.2	
	7	Docket No. ITMX-00116JP0; Foreign Office Action for Japanese Application No. 2009-522877 mailed on April 16, 2013	
	8	Docket No. ITMX-00116JP0; Foreign Office Action for Japanese Application No. 2009-522877 mailed on April 24, 2012	
	9	Docket No. ITMX-00116TW0; Taiwanese Office Action and Search Report for ROC (Taiwan) Patent Applicatoin No. 096128666 mailed on September 1, 2011	
	10	Docket No. ITMX-00116US06; Non-Final Office Action dated Sep. 27, 2012 for U.S. Appln. No. 13/436,471	
	11	Docket No. ITMX-00116US1; Final Office Action Mailed on June 23, 2009 for U.S. Application No. 11/640,533	
	12	Docket No. ITMX-00116US1; Final Office Action Mailed on September 23, 2011 for U.S. Application No. 11/640,533	
	13	Docket No. ITMX-00116US1; Final Office Action Mailed on September 9, 2010 for U.S. Application No. 11/640,533	
	14	Docket No. ITMX-00116US1; Non-Final Office Action Mailed on January 20, 2010 for U.S. Application No. 11/640,533	

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	15	Docket No. ITMX-00116US1; Non-Final Office Action Mailed on March 3, 2011 for U.S. Application No. 11/640,533	
	16	Docket No. ITMX-00116US1; Non-Final Office Action Mailed on October 27, 2008 for U.S. Application No. 11/640,533	
	17	Docket No. ITMX-00116US2; Notice of Allowance Mailed on August 12, 2011 for U.S. Application No. 12/624,839	
	18	Docket No. ITMX-00116US2; Notice of Allowance Mailed on September 26, 2011 for U.S. Application No. 12/624,839	
	19	Docket No. ITMX-00116US3; Final Office Action dated Jan. 11, 2013 for U.S. Appln. No. 12/624,900	
	20	Docket No. ITMX-00116US3; Final Office Action Mailed on December 19, 2011 for U.S. Application No. 12/624,900	
	21	Docket No. ITMX-00116US3; Non-Final Office Action Mailed on June 25, 2012 for U.S. Application No. 12/624,900	
	22	Docket No. ITMX-00116US3; Non-Final Office Action Mailed on March 24, 2011 for U.S. Application No. 12/624,900	
	23	Docket No. ITMX-00116US4; Final Office Action dated Jan. 30, 2013 for U.S. Appln. No. 13/087,615	
	24	Docket No. ITMX-00116US4; Non-Final Office Action dated September 21, 2012 for U.S. Appln. No. 13/087,615	
	25	Docket No. ITMX-00116US6; Advisory Action dated May 15, 2013 for U.S. Appln. No. 13/436,471	
	26	Docket No. ITMX-00116US6; Final Office Action dated Mar. 1, 2013 for U.S. Appln. No. 13/436,471	
	27	Docket No. ITMX-00116US8; Final Office Action dated Apr. 5, 2013 for U.S. Appln. No. 13/441,714	
	28	Docket No. ITMX-00116US8; Non-Final Office Action dated September 19, 2012 for U.S. Appln. No. 13/441,714	

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				First Named Inventor	Bing Dai
				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	10	of	10	Attorney Docket Number	ITMX-00318US2

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	29	Docket No. ITMX-00116WO0; International Search Report and the Written Opinion dated August 15, 2008 for PCT International Application No. PCT/US2007/017299	
	30	Docket No. ITMX-00307US1; Final Office Action dated Mar. 1, 2013 for U.S. Appln. No. 13/253,031	
	31	Docket No. ITMX-00307US1; Non-Final Office Action dated Oct. 16, 2012 for U.S. Appln. No. 13/253,031	
	32	Docket No. ITMX-00307WO0; International Search Report and Written Opinion dated Jan. 26, 2012 for PCT Application No. PCT/US11/54827	
	33	Docket No. ITMX-00318US1; Final Office Action dated Mar. 6, 2013 for U.S. Appln. No. 13/273,212	
	34	Docket No. ITMX-00318US1; Non-Final Office Action dated Sep. 24, 2012 for U.S. Appln. No. 13/273,212	
	35	Docket No. ITMX-00318US3; Final Office Action dated Mar. 1, 2013 for U.S. Appln. No. 13/273,217	
	36	Docket No. ITMX-00318US3; Non-Final Office Action dated Sep. 24, 2012 for U.S. Appln. No. 13/273,217	
	37	Docket No. ITMX-00318WO0; International Search Report and Written Opinion dated Mar. 28, 2013 for PCT/US2012/0598292	
	38	PARK J.K., et al., Optical Properties of Eu2+ Activated Sr2Sio4 Phosphor for Light-Emitting Diodes, Electrochemical and Solid-State Letters, February 25, 2004, pp. H15-H17, Vol. 7, No. 5.	
	39	Supplementary European Search Report for EP 07811039.2, April 15, 2011, 15 pages; Docket No. ITMX-00116EP0	
	40	YOO, J.S., et al., Control of Spectral Properties of Strontium-Alkaline Earth-Silicate-Europiem Phosphors for LED Applications, Journal of the Electrochemical Society, April 1, 2005 pp.G382-G385, Vol. 152, No. 5.	
	41	BARRY, T., Flurrescence of EU2+ Activated Phases in Bunary Alkaline Earth Orthosilicate Systems, Journal of the Electrochemical Society, November 1968, pp. 1181-1184, Vol. 115, No. 1.	

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Electronic Patent Application Fee Transmittal	
Application Number:	13273215
Filing Date:	13-Oct-2011
Title of Invention:	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES
First Named Inventor/Applicant Name:	Bing Dai
Filer:	Peter C. Mei/Tony Nguyen
Attorney Docket Number:	ITMX-00318US2
Filed as Small 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($)
Miscellaneous:				
Request for Continued Examination	2801	1	600	600
		Total in USD ($)		**600**

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. 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 13/273,215	Filing Date 10/13/2011	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	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 $310 ($155 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	

APPLICATION AS AMENDED – PART II

AMENDMENT	06/03/2013	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 28	Minus	** 31	= 0	X $40 =	0
	Independent (37 CFR 1.16(h))	* 5	Minus	***5	= 0	X $210 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	0

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

LIE
/MONIQUE BRUNSON/

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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Electronic Acknowledgement Receipt	
EFS ID:	15938163
Application Number:	13273215
International Application Number:	
Confirmation Number:	8978
Title of Invention:	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES
First Named Inventor/Applicant Name:	Bing Dai
Customer Number:	101130
Filer:	Peter C. Mei/Tony Nguyen
Filer Authorized By:	Peter C. Mei
Attorney Docket Number:	ITMX-00318US2
Receipt Date:	03-JUN-2013
Filing Date:	13-OCT-2011
Time Stamp:	21:39:43
Application Type:	Utility under 35 USC 111(a)

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Payment Type	Credit Card
Payment was successfully received in RAM	$600
RAM confirmation Number	7407
Deposit Account	501105
Authorized User	VISTA IP LAW GR
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees) Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)	

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)	ITMX-00318US2_RCE.pdf	697786 843d923100a30ebd7d7f857627c509be27edef7e	no	3
Warnings:					
Information:					
2	Amendment Submitted/Entered with Filing of CPA/RCE	ITMX-00318US2_Response-to-OA_060313.pdf	213340 1823cd98780aba31bf4630b2dc92edf0732b36b1	no	14
Warnings:					
Information:					
3	Transmittal Letter	ITMX-00318US2_IDS-Statement-of-Relevance.pdf	51559 1ee44e4b6201ef1c38dc44adc3cc12d04ec1a6e5	no	2
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4	Non Patent Literature	ITMX-00116CN0_First_OA_3192010.pdf	1334243 b830210f5f0cfeb8bae0620c0d667a696459c129	no	15
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5	Non Patent Literature	ITMX-00116CN0_Second_OA_8102011.pdf	1204987 4da3b991103abe89e9e86d24ee42ad3b7c5f1cf7	no	5
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6	Non Patent Literature	ITMX-00116CN0_Third_OA_12122011.pdf	307990 42cf29f14aab11a07082429043b8102863ef7b62	no	4
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7	Non Patent Literature	ITMX-00116CN1_OA_04-24-12.pdf	186649 9381637e713ef4b626028c735a7cb170aa292266	no	5
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8	Non Patent Literature	ITMX-00116EP0_OA_07-05-12.pdf	315547 54b4939cfcf9b2699f9ca89694124e50ef3475a5	no	7
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9	Non Patent Literature	ITMX-00116TW0_OA_and_ISR_09-01-11.pdf	9252410 00ab8005dfa1886773b9e248d21421297e5a00ea	no	12
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10	Non Patent Literature	ITMX-00116US6_NFOA_9_27_2012.pdf	367958 18b3d160e2831af8634390259c7c22174360c6c4	no	11
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11	Non Patent Literature	ITMX-00116US1_FOA_9_23_2011.pdf	472174 631ca8df025abbabdf42e439bb098b23eae4a5f1	no	12
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12	Non Patent Literature	ITMX-00116US1_NFOA_3_3_2011.pdf	510390 db24e932bde6e331d549a58ac2dd3dd418e849a8	no	13
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13	Non Patent Literature	ITMX-00116US1_FOA_9_9_2010.pdf	420147 8a237aeee63103a3b606811b91b86358d90e3ccf	no	11
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14	Non Patent Literature	ITMX-00116US1_NFOA_1_20_2010.pdf	377758 9fae5c5f3ca656918ffaf1ffa708b88cf8d587d4	no	10
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15	Non Patent Literature	ITMX-00116US1_FOA_6_23_2009.pdf	304900 6bbc0227fa54ac144775162943f73d97dd6ad1d3	no	8
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16	Non Patent Literature	ITMX-00116US1_NFOA_10_27_2008.pdf	314728 aeb73be3ac11099c5490d431752db5c5e60ca34a	no	8
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17	Non Patent Literature	ITMX-00116JP0_OA2_04-16-13-f.pdf	724337 e57d1998857e3a0dfe02e99067163202e1ef6098	no	3
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18	Non Patent Literature	ITMX-00116JP0_OA_04-24-12.pdf	675058 678b94673897d2709a60c0f8eda9f53ae80f3e90	no	6
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19	Non Patent Literature	ITMX-00116US2_NOA_9_26_2011.pdf	444414 1ab0d8703f978237c88faf7cddc7456c6a0d7edf	no	8
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20	Non Patent Literature	ITMX-00116US2_NOA_8_12_2011.pdf	167176 7d09df998d88b54283e1346b5c221ac67e4bf52a	no	5
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21	Non Patent Literature	ITMX-00116US3_FOA_1_11_2013.pdf	454646 d1759c75250612c0717a25f18065595fc42bdb2d	no	13
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22	Non Patent Literature	ITMX-00116US3_FOA_12_19_2011.pdf	416090 62201de443cad52ee6a5d9ca96c2dfbe7e6aae0a	no	12
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23	Non Patent Literature	ITMX-00116US3_NFOA_6_25_2012.pdf	416735 da6b7ca6a5c47b3e9f40a046fa9d60cf33644e30	no	12
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24	Non Patent Literature	ITMX-00116US3_NFOA_3_24_2011.pdf	353555 78482348ac2cbba94c832efe494e49550e2d07c5	no	11
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25	Non Patent Literature	ITMX-00116US4_FOA_1_30_2013.pdf	458268 635209db44b7ed5b7711946e75b309461edfc3bf	no	12
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26	Non Patent Literature	ITMX-00116US4_NFOA_9_21_2012.pdf	434743 873205ebf7a7009c8433f013fe174e259c208843	no	11
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27	Non Patent Literature	ITMX-00116US6_AA_05-15-13.pdf	168712 d7d38d39054ba7416a6916a46727a75bf7d6d017	no	4
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29	Non Patent Literature	ITMX-00116US8_NFOA_9_19_2012.pdf	311508 1b25e5fcd2797ba21e0eb725e72d7c21afe9b04d	no	9
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31	Non Patent Literature	ITMX-00116WO0_ISR_08-15-08.pdf	542824 b9781ad6ba5eac4cee329d2e528d0e0eae99e0c4	no	13
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32	Non Patent Literature	ITMX-00307US1_FOA_3_1_2013.pdf	321298 97369b3414ca3ef1fb6f9551855855f7b6fd8116	no	8
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33	Non Patent Literature	ITMX-00307US1_NFOA_10-16-12.pdf	421038 02dc97ac7a559acd5fdffb33ef42dcb54aabeb8cb	no	12
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34	Non Patent Literature	ITMX-00307WO0_Search-report-and-written-opinion_01-26-12.pdf	905003 446a7abba048883eae6961c7e94c04d97ee82b43	no	14
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35	Non Patent Literature	ITMX-00318US1_Final_OA_03-06-13.pdf	460389 51848c3f97895af9a6eeb4d78fce607c5ce25f80	no	12
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36	Non Patent Literature	ITMX-VISTA-00318US1_Non_Final_OA_09-24-12.pdf	442964 e8c4fe6c4ba151537d06722894218d7c34f1b8f9	no	12
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38	Non Patent Literature	ITMX-VISTA-00318US3_Non_Final_OA_09-24-12.pdf	456811 ee90a666401a52d4673c2f8692f846fe38d2cae3	no	13
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39	Non Patent Literature	ITMX-00318WO0_Search-report_03-28-13.pdf	247862 44d0ad07278a7c743d61141c2308b9f669503523	no	13
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40	Non Patent Literature	PARK.pdf	813681 7275b90d410c13bf57198f6bf6c44b09c90dbc02	no	15
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41	Non Patent Literature	ITMX-00116EP0_Search-Report_04-15-11.pdf	800052 6d27f2f411d936c69cd37fd562db224b6daa425d	no	15
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42	Non Patent Literature	JSYOO.pdf	883417 4b5553d3303f290f98c56bf45b8bd08b29881987	no	16
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43	Foreign Reference	CA2466979A1.pdf	691320 418b94b2cfb7b6bc100fb372696ebc299d4c0071	no	14
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44	Foreign Reference	JP07-094785.pdf	632789 da678bff1440fbb2e53198bdbd9c902529d0af49	no	5
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45	Foreign Reference	JP2003101078A.pdf	584594 3cb949ee2fff72a7bc3c2733c398601b5f99a1ae	no	10
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46	Foreign Reference	JP2005011953A.pdf	605424 a6ab1bb2cd51cea9e84764aceaa306aeb4f12bda	no	13
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47	Foreign Reference	RU2114492C1.pdf	344890 10f9a99b14ddbe7b4c3aa84ed339ef38d17ad213	no	8
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48	Foreign Reference	TW200527664.pdf	16648174 3051aa6ce376a5715feafbe9acfd45ce7e4f8083	no	27
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49	Foreign Reference	KR20070065486A.pdf	709320 c2f63ccd872e13f6931d15637e9ced4a9fb0731e	no	18
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50	Foreign Reference	KR20090017346A.pdf	224758 097a4950eee2b34c72989b64055ade8b649675ea	no	6
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52	Foreign Reference	WO2004077580A2.pdf	990878 27ef51c20796a2424e9116f2f626518018e4d131	no	35
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53	Foreign Reference	WO2005025831A1.pdf	593808 4346b90591184339b662c30c77adc44af7572020	no	22
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54	Foreign Reference	WO2006022792A2.pdf	2000869 cc35d2afc21210678cec38dcf08a4311fe712d48	no	51
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55	Foreign Reference	WO2008043519A1.pdf	862717 6c4c642bc4e85002992a25ed87e862f5107eef9	no	27
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56	Non Patent Literature	ITMX-00116CN0_OA_10-29-12.pdf	353913 ab3292599f090a78ed9d8d6e94c2f974526db9b2	no	16
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The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing					
Information:					
57	Non Patent Literature	BARRY.pdf	1019926 cb9448db1f125cb26bfabf74d0075ba52654fc18	no	16
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58	Information Disclosure Statement (IDS) Form (SB08)	ITMX-00318US2_IDS-sb08-transmittal.pdf	198234 f63b6065ea8a2e72a40ada37d033e7e40c07ff02	no	10
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		Total Files Size (in bytes):	56961136		

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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.

AMENDMENT TO THE CLAIMS

Claims 1, 4-24 and 26-31 are pending. Claims 1, 20 and 29-31 have been amended without acquiescence to the basis of rejections set forth in the Office Action, and without prejudice to pursue the previously presented claims in related application(s). No new matter has been added. A complete listing of the pending claims is provided below and supersedes all previous claim lists.

1. (Currently Amended) A wavelength conversion component for a light emitting device comprising:

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from a radiation source relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material,

wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light having a wavelength of greater than or equal to 440 nm is emitted through the wavelength conversion component to contribute to a final visible emission product;

wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material.

2. (Canceled)

3. (Canceled)

4. (Previously Presented) The component of Claim 1, wherein the light scattering material has an average particle size that is less than about 150nm.

5. (Original) The component of Claim 1, wherein the light scattering material is selected from the group consisting of: titanium dioxide, barium sulfate, magnesium oxide, silicon dioxide and aluminum oxide.

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6. (Original) The component of Claim 1 wherein the at least one photoluminescence material is located in a wavelength conversion layer and the light scattering material is located in a diffusing layer.

7. (Original) The component of Claim 6, wherein the wavelength conversion layer and the light diffusing layer are in direct contact with each other.

8. (Original) The component of Claim 7, wherein the wavelength conversion layer comprises a mixture of the at least one phosphor material and a light transmissive binder and the light diffusing layer comprises a mixture of the light scattering material and the light transmissive binder.

9. (Original) The component of Claim 8, wherein the light transmissive binder comprises a curable liquid polymer selected from the group consisting of: a polymer resin, a monomer resin, an acrylic, an epoxy, a silicone and a fluorinated polymer.

10. (Original) The component of Claim 8, wherein the weight loading of light scattering material to binder selected from the group consisting of: 7% to 35% and 10% to 20%.

11. (Original) The component of Claim 6, wherein the wavelength conversion and light diffusing layers are deposited using a method selected from the group consisting of: screen printing, slot die coating, spin coating, roller coating, drawdown coating and doctor blading.

12. (Original) The component of Claim 6 in which the wavelength conversion layer and the light diffusing layer comprises planar shapes.

13. (Original) The component of Claim 6 in which the light diffusing layer comprises a dome or elongated dome shape.

14. (Original) The component of claim 13 in which the wavelength conversion layer fills a

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volume formed beneath the dome or elongated dome shapes.

15. (Original) The component of Claim 1, wherein both the at least one photoluminescence material and the light scattering material are located in a wavelength conversion layer.

16. (Original) The component of Claim 1, wherein the light scattering material has an average particle size in a range selected from the group consisting of: 1μm to 50μm and 10μm to 20μm.

17. (Original) The component of Claim 1, wherein the at least one photoluminescence material is deposited onto a light transmissive substrate, and the light transmissive substrate is selected from the group consisting of: a polycarbonate, an acrylic and a glass.

18. (Original) The component of Claim 1, wherein the excitation light comprises ultraviolet light.

19. (Original) The component of Claim 18, wherein the light scattering material has an average particle size that is less than about 100nm.

20. (Currently Amended) A light emitting device, comprising:

at least one solid-state light emitter operable to generate excitation light; and

a wavelength conversion component comprising:

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from the at least one solid-state light emitter relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material,

wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light <u>having a wavelength of greater than or equal to 440 nm</u> is emitted through the wavelength conversion component to contribute to a final visible emission product;

wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material.

21. (Original) The device of claim 20, wherein the light emitting device is selected from the group consisting of: downlights, light bulbs, linear lamps, lanterns, wall lamps, pendant lamps, chandeliers, recessed lights, track lights, accent lights, stage lighting, movie lighting, street lights, flood lights, beacon lights, security lights, traffic lights, headlamps, taillights, and signs.

22. (Original) The device of claim 20 in which the average particle size of the light scattering material is selected to improve an OFF state white appearance of the light emitting device.

23. (Original) The device of claim 20 in which the average particle size of the light scattering material is selected to obtain substantially uniform color for emitted light from the light emitting device for emission angles over a $\pm 60^{o}$ range from an emission axis.

24. (Original) The device of claim 23, wherein a weight loading of the light scattering material to a binder selected from the group consisting of: 7% to 35% and 10% to 20%.

25. (Canceled)

26. (Original) The device of Claim 25, wherein the light scattering material has an average particle size that is less than about 150nm.

27. (Original) The device of Claim 20 in which the wavelength conversion layer and the light diffusing layer comprises planar shapes.

28. (Original) The device of Claim 20 in which the light diffusing layer comprises a dome or elongated dome shape.

29. (Currently Amended) A linear lamp comprising:

an elongate housing;

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a plurality of solid-state light emitters housed within the housing and configured along the length of the housing; and

an elongate wavelength conversion component remote to the plurality of solid-state light emitters and configured to in part at least define a light mixing chamber,

wherein the elongate wavelength conversion component comprises

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from the plurality of solid-state light emitters relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material,

wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light having a wavelength of greater than or equal to 440 nm is emitted through the wavelength conversion component to contribute to a final visible emission product;

wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material.

30. (Currently Amended) A downlight comprising:

a body comprising one or more solid-state light emitters, wherein the body is configured to be positioned within a downlighting fixture such that the downlight emits light in a downward direction; and

a wavelength conversion component remote to the one or more solid-state light emitters and configured to in part at least define a light mixing chamber,

wherein the wavelength conversion component comprises

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from the one or more solid-state light emitters relatively

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more than the light scattering material will scatter light generated by the at least one photoluminescence material,

wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light having a wavelength of greater than or equal to 440 nm is emitted through the wavelength conversion component to contribute to a final visible emission product;

wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material.

31. (Currently Amended) A light bulb comprising:

a connector base configured to be inserted in a socket to form an electrical connection for the light bulb;

a body comprising one or more solid-state light emitters;

a wavelength conversion component having a three dimensional shape that is configured to enclose the one or more solid-state light emitters and to in part at least define a light mixing chamber,

wherein the wavelength conversion component comprises

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from the one or more solid-state light emitters relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material,

wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light having a wavelength of greater than or equal to 440 nm is emitted through the wavelength conversion component to contribute to a final visible emission product;

wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material.

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REMARKS

Claims 1, 4-24 and 26-31 are currently pending in the application. Claims 1, 20 and 29-31 have been amended without acquiescence to the basis of rejections set forth in the Office Action, and without prejudice to pursue the previously presented claims in related application(s). No new matter has been added.

I. Claim Rejections under 35 U.S.C. §103

Claims 1, 4-9, 11-15, 18-20, 22, 23 and 26-28 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable U.S. Patent Pub. No. 2002/0180351 (McNulty). Applicants respectfully traverse.

A. Claim 1 currently recites the following limitation. Claim 20 currently recites similar limitations.

> wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light having a wavelength of greater than or equal to 440 nm is emitted through the wavelength conversion component to contribute to a final visible emission product

Applicants respectfully submit McNulty fails to render the claim unpatentable, because McNulty does not disclose the claimed limitation of a portion of the excitation light contributing to the final visible emission product, and also because the Office Action makes an impermissible determination of obviousness based on Applicants' own disclosure.

1. McNulty does not disclose the claimed element, because McNulty teaches using a UV LED, and teaches away from using a blue LED

The Office Action states that "McNulty at least makes obvious the use of a blue LED," and cites paragraphs [0004]-[0005] of McNulty as teaching that "one must balance the type of light emitted from an LED between UV and blue in order to prevent utilizing a UV light that would be dangerous upon emission and a blue LED that would contribute too heavily in the final emission product." *See Office Action, pg. 2-3*. However, Applicants respectfully submit that McNulty does not make obvious the use of a blue LED, and in fact teaches away from using a blue LED. Paragraphs [0004]-[0005] of McNulty are reproduced below for reference.

[0004] UV light-emitting LEDs are particularly preferred in applications in which visible light is extracted because the color of the light emitted by UV LED-based lamps is controlled largely by the phosphor blend since the UV LED chip does not contribute significantly to the visible light emission. As used herein, the term "UV LEDs" means LEDs that emit UV radiation having wavelengths less than or equal to about 420 nm. However, as the wavelengths of radiation emitted by the LED becomes shorter, and the radiation, thus, becomes more energetic, there is an increasing need to ensure that UV radiation preferably does not escape substantially from the lighting device into the surrounding environment.

[0005] U.S. Pat. Nos. 5,813,752 and 5,813,753 disclose a UV/blue LED-phosphor device that emits visible light. In U.S. Pat. No. 5,813,752 the UV/blue LED is disposed on a sapphire substrate and a phosphor layer is applied directly on the UV/blue LED. A long-wave pass ("LWP") filter preferably composed of a multilayer dielectric stack of alternating materials having high and low refractive indices is disposed directly on the phosphor layer. In U.S. Pat. No. 5,813,753 the UV/blue LED is disposed in a cup. In both patents, the UV/blue LED emits radiation in the UV-to-blue wavelength range. The cup is filled with an epoxy having a UV/blue-excitable phosphor dispersed therein that converts part of the UV/blue radiation to visible light. A LWP filter, preferably composed of alternating layers of dielectric materials having high and low refractive indices, is disposed on top of the phosphor layer. The LWP filter is believed to reflect UV/blue light back to the phosphor and to transmit visible light emitted by the phosphor. However, these patents do not teach the selection of the materials having high and low refractive indices, the design, or the construction of the multilayer LWP filter to achieve these goals. Material selection is among the critical considerations for the success of such a filter in a device of this nature because the effectiveness of the filter in reflecting UV radiation depends, among other things, on the refractive index of the layer disposed adjacent to the epoxy layer relative to the refractive index of the epoxy.

First, Applicants respectfully submit that McNulty does not disclose the claimed element because McNulty teaches using a UV LED and not a blue LED, and in fact teaches away from using a blue LED. McNulty specifically "relates to visible light sources that are based on

semiconductor UV light-emitting devices and have reduced UV emission to the surroundings." *See McNulty, para. [0001]*.

In addition, McNulty teaches that UV LEDs "are particularly preferred" for "applications in which visible light is extracted." This is because UV LEDs do not contribute to the visible light emission of the device, allowing for the light emitted by the device to be "controlled largely by the phosphor blend." *See McNulty, para. [0004]*. In other words, paragraph [0004] of McNulty teaches using UV LEDs and teaches away from using blue LEDs. Paragraph [0004] also teaches LED devices wherein the emitted light is controlled by the phosphor blend, and thus teaches away from LED devices wherein the emitted light is a combination of LED light and phosphor light.

Therefore, for at least these reasons, Applicants respectfully submit that McNulty fails to disclose the limitation recited by the claim, because McNulty teaches using a UV LED and teaches away from using a blue LED.

2. McNulty does not disclose the claimed element, because the cited portions of McNulty teach reflecting LED light so that only phosphor light is emitted

Paragraph [0005] of McNulty also does not teach the claimed element. Paragraph [0005] of McNulty gives examples of prior patents that disclose a UV/blue LED and using a LWP filter "to reflect UV/blue light back to the phosphor and to transmit visible light emitted by the phosphor." In other words, the prior patents described in paragraph [0005] disclose that only the light emitted by the phosphor is transmitted from the device, while the light from the LED is reflected back and thus does not contribute to the final emission product. This is the direct opposite of the claimed element, which recites that excitation light emitted by the light emitter contributes to the final emission product. Therefore, paragraph [0005] of McNulty also does not teach the claimed element of excitation light from the LED contributing to the final emission product of the LED device, because it teaches reflecting light from the LED so that only light emitted by the phosphor is transmitted.

Therefore, for at least these reasons, Applicants respectfully submit that McNulty fails to disclose the claimed limitation of a portion of the excitation light contributing to the final visible

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emission product because McNulty teaches reflecting the light from the LED so that only light emitted by the phosphor is transmitted.

3. The Office Action determination of obviousness is impermissible due to hindsight

Second, the Office Action makes an impermissible determination of obviousness based on Applicants' own disclosure. The Office Action states that "in light of the Applicant's own disclosure, as well as McNulty's teaching that a UV/blue LED may be used,… it would have been obvious to one of ordinary skill in the art to have a small portion of the light emitted from the LED contribute to a final emission product of the device." *See Office Action, pg. 3.*

MPEP 2142 states that "[t]o reach a proper determination under 35 U.S.C. 103, the examiner must step backward in time and into the shoes worn by the hypothetical 'person of ordinary skill in the art' when the invention was unknown and just before it was made…. The tendency to resort to 'hindsight' based upon applicant's disclosure is often difficult to avoid due to the very nature of the examination process. However, impermissible hindsight must be avoided and the legal conclusion must be reached on the basis of the facts gleaned from the prior art." (emphasis added).

Applicants respectfully submit that the Applicant's own disclosure of particles of light reflective material cannot be used to form a 35 U.S.C. §103(a) rejection of the claims because Applicant's own disclosure is not prior art. Instead, using the teachings of Applicant's own disclosure would constitute impermissible hindsight and thus cannot be used to support a rejection under 35 U.S.C. 103.

Consequently, for at least these reasons, it is respectfully submitted that claim 1 and its dependent claims are allowable over the cited reference. For at least this same reason, claim 20 and its dependent claims are allowable over the cited reference.

II. Claim Rejections under 35 U.S.C. §103

Claims 10 and 24 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over McNulty in view of U.S. Patent No. 4,191,943 (Cairns). Applicants respectfully traverse.

Applicants respectfully submit that these claims are believed to be allowable over McNulty in view of Cairns because Cairns fails to cure McNulty's deficiencies, and further because the Office action does not rely on Cairns in supporting the basis for rejection in claims 1 and 20 from which these rejected claims depend.

III. Claim Rejections under 35 U.S.C. §103

Claims 16 and 17 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over McNulty in view of U.S. Publication No. 2009/0272996 (Chakraborty). Applicants respectfully traverse.

Applicants respectfully submit that these claims are believed to be allowable over McNulty in view of Chakraborty because Chakraborty fails to cure McNulty's deficiencies, and further because the Office action does not rely on Chakraborty in supporting the basis for rejection in claim 1 from which these rejected claims depend.

IV. Claim Rejections under 35 U.S.C. §103

Claims 21 and 29 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over McNulty in view of U.S. Patent No. 6,860,628 (Robertson). Applicants respectfully traverse.

These claims are allowable for at least the same reasons that claim 1 is allowable.

V. Claim Rejections under 35 U.S.C. §103

Claim 30 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over McNulty in view of U.S. Publication No. 2007/0120135 (Soules). Applicants respectfully traverse.

This claim is allowable for at least the same reasons that claim 1 is allowable.

VI. Claim Rejections under 35 U.S.C. §103

Claim 31 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over McNulty in view of U.S. Publication No. 2008/0130285 (Negley). Applicants respectfully traverse.

This claim is allowable for at least the same reasons that claim 1 is allowable.

CONCLUSION

Based on the foregoing, all claims are believed allowable, and an allowance of the claims is respectfully requested. If the Examiner has any questions or comments, the Examiner is respectfully requested to contact the undersigned at the number listed below.

Applicant(s) hereby explicitly retracts and rescinds any and all of the arguments and disclaimers presented to distinguish the prior art of record during the prosecution of all parent and related application(s)/patent(s), and respectfully requests that the Examiner re-visit the prior art that such arguments and disclaimers were made to avoid.

The Commissioner is authorized to charge any fees due in connection with the filing of this document to Vista IP Law Group's Deposit Account No. 50-1105, referencing billing number ITMX-00318US2. The Commissioner is authorized to credit any overpayment or to charge any underpayment to Vista IP Law Group's Deposit Account No. 50-1105, referencing billing number ITMX-00318US2.

Respectfully submitted,

Dated: June 3, 2013

By: /Frederick Hsu /
Frederick Hsu
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For Peter C. Mei, Reg. No. 39,768

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Savant Technologies EX1104, Page 265 of 485

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:	Group Art Unit: 2879
Bing Dai et al.	Examiner: Bowman, Mary Ellen
Serial No.: 13/273,215	Confirmation No.: 8978
Filed: October 13, 2011	
For: WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES	

REQUEST FOR CONTINUED EXAMINATION UNDER 37 CFR §1.114 WITH AMENDMENT AND RESPONSE TO FINAL OFFICE ACTION

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

Dear Sir:

In response to the Office action dated March 1, 2013, Applicants request that this application be amended in accordance with the following sheets.

Amendment to the Claims begins on page 2.

Remarks begin on page 8.

Savant Technologies EX1104, Page 266 of 485

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:	Group Art Unit: 2879
Bing Dai et al.	Examiner: Bowman, Mary Ellen
Serial No.: 13/273,215	Confirmation No.: 8978
Filed: October 13, 2011	
For: WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES	

INFORMATION DISCLOSURE STATEMENT

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

Sir:

In accordance with 37 CFR §§ 1.97 and 1.98, the items identified in this Information Disclosure Statement (IDS) are being brought to the attention of the Office. The Examiner is requested to make these documents of record.

The items identified in this IDS may or may not be "material" pursuant to 37 CFR § 1.56. The submission thereof by Applicant(s) is not to be construed as an admission that any such patent, publication or other information referred to therein is material or considered to be material (37 CFR § 1.97(h)), or even qualifies as "prior art" under 35 USC § 102 with respect to this invention unless specifically designated by Applicant(s) as such.

1. Fee:

☐ Charge the fee due under 37 CFR § 1.17(p) to the deposit account referenced below.

☐ The fee due under 37 CFR § 1.17(p) is being concurrently submitted with the filing of an electronic IDS submission. Thus, no additional fee is required.

Savant Technologies EX1104, Page 267 of 485

☒ Applicant believes that no fee is required for this submission. However, if Applicant is mistaken, then please charge the fee due under 37 CFR § 1.17(p) to the deposit account referenced below.

2. Statement Under 37 CFR § 1.97(e):

☐ That each item of information contained in the information disclosure statement was first cited in any 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. See 37 CFR 1.97(e)(1); or

☐ That no item of information 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

3. Copies of the Cited Items:

☒ Copies of all of the items listed under Foreign Patent Documents and/or Non Patent Literature Documents are enclosed.

☐ Copies of the following items listed under Item Nos. ___ under Foreign Patent Documents and Item Nos. ___ under Non Patent Literature Documents are enclosed.

☐ Copies of the following documents listed under Item Nos. ___ under Foreign Patent Documents and Item Nos. ___ under Non Patent Literature Documents are not supplied because they were previously cited by the Office or submitted in Information Disclosure Statements in parent U.S. Application No. _____, of which the current application is a _____ and relied upon in this application for an earlier filing date under 35 USC § 120. See 37 CFR § 1.98(d). The Examiner is requested to make these documents of record.

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4. Conclusion:

Citation of the above documents shall not be construed as:

1. an admission that the documents are necessarily prior art with respect to the instant invention;
2. a representation that a search has been made, other than as described above; and
3. an admission that the information cited herein is, or is considered to be, material to patentability as defined in § 1.56(b).

It is respectfully requested that the Examiner indicate consideration of the cited references by returning a copy of the attached form with initials or other appropriate marks. If the U.S. Patent Office determines that an extension and/or other relief is required, Applicant(s) petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 501105**, referencing **Docket No. ITMX-00318US2**. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

Respectfully submitted,

Dated: 06-04-2013

By: /Peter C. Mei/
Peter C. Mei
Registration No. 39,768

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Savant Technologies EX1104, Page 269 of 485

PTO/SB/08a (07-09) (modified)
Approved for use through 07/31/2012. 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				***Complete if Known***	
				Application Number	13/273,215
				Filing Date	10-13-2011
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				First Named Inventor	Bing Dai
				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	4	of	6	Attorney Docket Number	ITMX-00318US2

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No.	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	5998925	12-07-1999	YOSHINORI SHIMIZU	
	2	7575697	08-18-2009	Yi-Qun Li	
	3	7601276	10-13-2009	Yi-Qun Li	
	4	7655156	02-02-2010	Shifan Cheng	
	5	7311858	12-25-2007	Ning Wang	
	6	7390437	06-24-2008	Yi Dong	
	7	8274215	09-25-2012	Shengfeng Liu	
	8	20080111472	05-15-2008	Shengfeng Liu	
	9	20090283721	11-19-2009	Shengfeng Liu	
	10	20120086034	04-12-2012	Xianglong Yuan	
	11	20080218992	09-11-2008	Yi-Qun Li	
	12				
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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. 5Kind 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.**

PTO/SB/08a (07-09) (modified)
Approved for use through 07/31/2012. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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				Application Number	13/273,215
				Filing Date	10-13-2011
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				First Named Inventor	Bing Dai
				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	5	of	6	Attorney Docket Number	ITMX-00318US2

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]
	1	WO 2010074963	01-07-2010	LIU, Shengfeng		
	2					
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Examiner Signature		Date Considered	

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				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	6	of	6	Attorney Docket Number	ITMX-00318US2

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]
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:	Group Art Unit: 2879
Bing Dai et al.	Examiner: Bowman, Mary Ellen
Serial No.: 13/273,215	Confirmation No.: 8978
Filed: October 13, 2011	
For: WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES	

INFORMATION DISCLOSURE STATEMENT

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

Sir:

In accordance with 37 CFR §§ 1.97 and 1.98, the items identified in this Information Disclosure Statement (IDS) are being brought to the attention of the Office. The Examiner is requested to make these documents of record.

The items identified in this IDS may or may not be "material" pursuant to 37 CFR § 1.56. The submission thereof by Applicant(s) is not to be construed as an admission that any such patent, publication or other information referred to therein is material or considered to be material (37 CFR § 1.97(h)), or even qualifies as "prior art" under 35 USC § 102 with respect to this invention unless specifically designated by Applicant(s) as such.

1. Fee:

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☐ The fee due under 37 CFR § 1.17(p) is being concurrently submitted with the filing of an electronic IDS submission. Thus, no additional fee is required.

Savant Technologies EX1104, Page 273 of 485

☒ Applicant believes that no fee is required for this submission. However, if Applicant is mistaken, then please charge the fee due under 37 CFR § 1.17(p) to the deposit account referenced below.

2. Statement Under 37 CFR § 1.97(e):

☐ That each item of information contained in the information disclosure statement was first cited in any 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. See 37 CFR 1.97(e)(1); or

☐ That no item of information 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

3. Copies of the Cited Items:

☒ Copies of all of the items listed under Foreign Patent Documents and/or Non Patent Literature Documents are enclosed.

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☐ Copies of the following documents listed under Item Nos. ___ under Foreign Patent Documents and Item Nos. ___ under Non Patent Literature Documents are not supplied because they were previously cited by the Office or submitted in Information Disclosure Statements in parent U.S. Application No. _____, of which the current application is a _____ and relied upon in this application for an earlier filing date under 35 USC § 120. See 37 CFR § 1.98(d). The Examiner is requested to make these documents of record.

Savant Technologies EX1104, Page 274 of 485

4. Conclusion:

Citation of the above documents shall not be construed as:

1. an admission that the documents are necessarily prior art with respect to the instant invention;
2. a representation that a search has been made, other than as described above; and
3. an admission that the information cited herein is, or is considered to be, material to patentability as defined in § 1.56(b).

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Respectfully submitted,

Dated: 06-04-2013

By: /Peter C. Mei/
Peter C. Mei
Registration No. 39,768

Vista IP Law Group, LLP
2160 Lundy Ave., Ste. 230
San Jose, CA 95131
Telephone: (408) 321-8663 (Ext. 208)
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PTO/SB/08a (07-09) (modified)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT				First Named Inventor	Bing Dai
				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	4	of	18	Attorney Docket Number	ITMX-00318US2

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No.	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	3290255	12-06-1966	Smith, I.	
	2	3593055	07-13-1971	Geusic, Joseph E., et al.	
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Substitute for form 1449/PTO				***Complete if Known***	
				Application Number	13/273,215
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				Filing Date	10-13-2011
				First Named Inventor	Bing Dai
				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	5	of	18	Attorney Docket Number	ITMX-00318US2

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				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	12	of	18	Attorney Docket Number	ITMX-00318US2

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	13	BOONKOSUM, W. ET AL., "Novel Flat Panel display made of amorphous SiN:H/SiC:H thin film LED", "Physical Concepts and Materials for Novel Optoelectronic Device Applications II", 1993, Page(s) 40-51, Volume 1985	
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Substitute for form 1449/PTO				***Complete if Known***	
				Application Number	13/273,215
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				Filing Date	10-13-2011
				First Named Inventor	Bing Dai
				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	18	of	18	Attorney Docket Number	ITMX-00318US2

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]
	92	ZANONI, E., ET AL., "Impact ionization, recombination, and visible light emission in ALGaAs/GaAs high electron mobility transistors", "J. Appl. Phys.", 1991, Page(s) 529-531, Volume 70, Number 1	
	93	ZANONI, E., ET AL., "Measurements of Avalanche Effects and Light Emission in Advanced Si and SiGe Bipolar Transistors", "Microelectronic Engineering", 1991, Page(s) 23-26, Volume 15	
	94	ZDANOWSKI, MAREK, "Pulse operating up-converting phosphor LED", "Electron Technol. ", 1978, Page(s) 49-61, Volume 11, Number 3	
	95	ZHIMING, CHEN, ET AL., "Amorphous thin film white-LED and its light-emitting mechanism", "Conference Record of the 1991 International Display Research Conference", October 1991, Page(s) 122-125	

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Electronic Acknowledgement Receipt	
EFS ID:	15950008
Application Number:	13273215
International Application Number:	
Confirmation Number:	8978
Title of Invention:	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES
First Named Inventor/Applicant Name:	Bing Dai
Customer Number:	101130
Filer:	Peter C. Mei/Tony Nguyen
Filer Authorized By:	Peter C. Mei
Attorney Docket Number:	ITMX-00318US2
Receipt Date:	04-JUN-2013
Filing Date:	13-OCT-2011
Time Stamp:	19:37:37
Application Type:	Utility under 35 USC 111(a)

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File Listing:

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Application Number:	13273215
International Application Number:	
Confirmation Number:	8978
Title of Invention:	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES
First Named Inventor/Applicant Name:	Bing Dai
Customer Number:	101130
Filer:	Peter C. Mei/Tony Nguyen
Filer Authorized By:	Peter C. Mei
Attorney Docket Number:	ITMX-00318US2
Receipt Date:	04-JUN-2013
Filing Date:	13-OCT-2011
Time Stamp:	20:03:21
Application Type:	Utility under 35 USC 111(a)

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<u>National Stage of an International Application under 35 U.S.C. 371</u>
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<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.

Electronic Acknowledgement Receipt	
EFS ID:	15950347
Application Number:	13273215
International Application Number:	
Confirmation Number:	8978
Title of Invention:	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES
First Named Inventor/Applicant Name:	Bing Dai
Customer Number:	101130
Filer:	Peter C. Mei
Filer Authorized By:	
Attorney Docket Number:	ITMX-00318US2
Receipt Date:	04-JUN-2013
Filing Date:	13-OCT-2011
Time Stamp:	20:41:08
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	Foreign Reference	JPP3724498.pdf	230960 a2a44a4e14315c400f1d413e28bea65ebe501255	no	6
Warnings:					
Information:					

2	Foreign Reference	JPP2003234513.pdf	211323 75bc702db415b13b74779a06d233da07f96a29da	no	6
Warnings:					
Information:					
3	Foreign Reference	JPS5079379.pdf	212564 cd987620cf3988a881811d45e398ae55aa644bed	no	6
Warnings:					
Information:					
4	Foreign Reference	WO9108508.pdf	1108415 fca00ce9eeb53e9c15d51ed53d3727fb417d2d52	no	35
Warnings:					
Information:					
			Total Files Size (in bytes):	1763262	

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.

Electronic Acknowledgement Receipt	
EFS ID:	15950336
Application Number:	13273215
International Application Number:	
Confirmation Number:	8978
Title of Invention:	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES
First Named Inventor/Applicant Name:	Bing Dai
Customer Number:	101130
Filer:	Peter C. Mei/Tony Nguyen
Filer Authorized By:	Peter C. Mei
Attorney Docket Number:	ITMX-00318US2
Receipt Date:	04-JUN-2013
Filing Date:	13-OCT-2011
Time Stamp:	20:38:36
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	Non Patent Literature	MIURA-NOBORU-ET-AL-Several-Blue-Emitting-Thin-Film-Electroluminescent-Devices-Jpn-J-Appl-.pdf	306075 082ae0aebb22377936b9a0c6da5e7aa07075fab4	no	3
Warnings:					
Information:					

2	Non Patent Literature	MORKOC-H-ET-AL--Large-band-gap-SiC-111-V-nitride-and-II-VI-ZnSe-based-semiconductor-devic.pdf	3426524 67b658c3316bd37898e4b66d54eb241b038ba0a2	no	37
Warnings:					
Information:					
3	Non Patent Literature	MUENCH-WV-ET-AL-Silicon-carbide-light-emitting-diodes-with-epitaxial-junctions-Solid-Stat.pdf	294467 f80ffe19fceb57a137acc46f753571e4f0745111	no	4
Warnings:					
Information:					
4	Non Patent Literature	MUKAI-T-ET-AL-Recent-progress-of-nitride-based-light-emitting-devices-Phys-Stat-Sol-Septe.pdf	464046 87399e7df74dc22ad5edc5e9aa3b6f73fa7a8f82	no	6
Warnings:					
Information:					
5	Non Patent Literature	NAKAMURA-S-ET-AL-High-power-InGaN-single-quantum-well-structure-blue-and-violet-light-emi.pdf	365476 b925d84782c428a85351c0da97653763830fb2ce	no	4
Warnings:					
Information:					
6	Non Patent Literature	NAKAMURA-S-ET-AL-The-Blue-Laser-Diode-GaN-Based-Light-Emitters-and-Lasers-March-21-1997-P.pdf	165150 2a7d61b2c78401218c4b7bdbcc8a0bddefc9ece0	no	3
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Information:					
7	Non Patent Literature	NAKAMURA-S-ET-AL-The-Blue-Laser-Diode-The-Complete-Story-2nd-Revised-and-Enlarged-Edition.pdf	1138344 ee696e79694fc7129c0c7ee60612310dde1a0fc5	no	6
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Information:					
8	Non Patent Literature	November-30-2010-Office-Action-in-US-Patent-Application-No-12131118issued-by-Examin.pdf	1707712 9d861358b0d8debd78283adc3b6326a172b0032a	no	32
Warnings:					
Information:					
9	Non Patent Literature	October-20-2008-Office-Action-in-US-Patent-Application-No-10623198-issued-by-Abu-l-Kalam-.pdf	584630 3fc8719fc9f09c9fbee3a20b5e105dd637af4b0d	no	13
Warnings:					
Information:					
10	Non Patent Literature	PANKOVE-JI-ET-AL-Scanning-electron-microscopy-studies-of-GaN-Journal-of-Applied-Physics-A.pdf	305204 e341e17695e7df97028d49680126fdf805e1d024	no	2
Warnings:					
Information:					

11	Non Patent Literature	PAVAN-P-ET-AL-Explanation-of-Current-Crowding-Phenomena-Induced-by-Impact-Ionization-in-A.pdf	346806 438160c1e030161cf9fc8ffe9b249c2885e273aa	no	4
Warnings:					
Information:					
12	Non Patent Literature	PEI-Q-ET-AL-Polymer-Light-Emitting-Electrochemical-Cells-Science-August-25-1995-Pages-108.pdf	430602 64afb3ff571baaafcff948a1e78e30203a6b2107	no	3
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Information:					
13	Non Patent Literature	90010940_Advisory_Action_09_28_12.pdf	128872 5e405426b01321a68b1d53b7fbfd9d1481b9b408	no	4
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Information:					
14	Non Patent Literature	90010940_FOA_05_24_12.pdf	13256417 0d62efff1a734aae0f80931a6e3642b46cde1d82	no	256
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15	Non Patent Literature	90010940_FOA_11_07_11.pdf	8452676 963b7fee1d7c9e58f748432da065dc121da1e5f1	no	82
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16	Non Patent Literature	90010940_NFOA_01_26_12.pdf	3359476 179d51d5de75fd57809d23844af908d4a03b3cce	no	70
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18	Non Patent Literature	90010940_NFOA_09_20_10.pdf	2003750 adb384cb2049f17995c54ae7de9535f32ef4db36	no	43
Warnings:					
Information:					
19	Non Patent Literature	ROMAN-D-LEDs-Turn-A-Brighter-Blue.pdf	245012 6d7b2b76b7771a6f2ca088e510c02b7e1042a106	no	1
Warnings:					
Information:					

20	Non Patent Literature	Saleh-and-Teich-Fundamentals-of-Photonics-New-York-John-Wiley-Sons-1991-pp-592-594.pdf	380774 bea939fd6273532623759bfe75ff1a027dceecf7	no	8
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21	Non Patent Literature	SATO-YUICHI-ET-AL-Full-color-fluorescent-display-devices-using-a-near-UV-light-emitting.pdf	291633 fca00dc8cf74e88d9e9b0ba067c888805e01fa8c	no	2
Warnings:					
Information:					
22	Non Patent Literature	September-17-2009-Notice-of-Allowance-Notice-of-Allowability-Examiners-AmendmeniComment-a.pdf	494281 1f2f872a60ce0d43d4f8a34e37148cb8a49210ba	no	7
Warnings:					
Information:					
23	Non Patent Literature	September-29-2009-Office-Action-in-US-Patent-Application-No-11264124-issued-by-Abu-l-Kala.pdf	389890 fe42bfae8ef4904058a9ab489b07727b8c69ade9	no	8
Warnings:					
Information:					
24	Non Patent Literature	TANAKA-SHOSAKU-ET-AL-Bright-white-light-electroluminescence-based-on-nonradiative-energy.pdf	5197316 74780a138832b494ea144534185a05e50e395166	no	3
Warnings:					
Information:					
25	Non Patent Literature	TANAKA-SHOSAKU-ET-AL-White-Light-Emitting-Thin-Film-Electroluminescent-Devices-with-SrSCe.pdf	299075 8c9495534a5066d960defa4d109427dc8da99fa8	no	3
Warnings:					
Information:					
26	Non Patent Literature	The-Penguin-Dictionary-of-Electronics-3rd-edition-pp-315437-438-509-510-copyright-1979-19.pdf	371676 153fb23b9df689ab5770d574623e89f19a297211	no	7
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Information:					
27	Non Patent Literature	URA-M--Recent-trends-of-development-of-silicon-monocarbide-blue-light-emission-diodes-Kin.pdf	645334 d9a28064eedb2a072b482f2de5da7963fdd868d6	no	10
Warnings:					
Information:					
28	Non Patent Literature	WERNER-K--Higher-Visibility-for-LEOs-IEEE-Spectrum-July-1994-Pages-30-392.pdf	888503 0df5fd7ff072bbe306b476592d1136d9f9c7b832	no	8
Warnings:					
Information:					

29	Non Patent Literature	WOJCIECHOWSKI-J-ET-AL--INFRARED-TO-BLUE-UP-CONVERTING-PHOSPHOR-Electron-Technology-1978-P.pdf	1022966 609869a513925e8cd32a68cdcc80bfd905e4e251	no	17
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Information:					
30	Non Patent Literature	YAMAGUCHI-Y-ET-AL-HIGH-BRIGHTNESS-SiC-BLUE-LEOS-AND-THEIR-APPLICATION-TO-FULL-COLOR-LED-L.pdf	710940 29910a19a5d7343fb8385923ecf461f6025a9ddf	no	12
Warnings:					
Information:					
31	Non Patent Literature	YANG-Y-ET-AL-Voltage-controlled-two-color-light-emitting-electrochemical-cells-Appl-Phys-.pdf	331194 6b7f3a9fec973ba28d7efa3963ed166426e117bd	no	3
Warnings:					
Information:					
32	Non Patent Literature	YOSHIMI-MASASHI-ET-AL-Amorphous-carbon-basis-blue-light-electroluminescent-device-Optoele.pdf	913802 74108ba0360f67070d05c49287859c17f4f26901	no	13
Warnings:					
Information:					
33	Non Patent Literature	ZANONI-E-ET-AL-Impact-ionization-recombination-and-visible-light-emission-in-ALGaAsGaAs-h.pdf	322215 a9604b4d98f3978c5e9596daf82092ecc7021321	no	3
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Information:					
34	Non Patent Literature	ZANONI-E-ET-AL-Measurements-of-Avalanche-Effects-and-Light-Emission-in-Advanced-Si-and-Si.pdf	297094 6cd8f4d3db5d3d34f11a016f1ae3f4cbd8031c7e	no	4
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Information:					
35	Non Patent Literature	ZDANOWSKI-MAREK-Pulse-operating-up-converting-phosphor-LED-Electron-Technol--1978-Pages-4.pdf	873951 407210b8cce68987d09507c309bbf4c95ee379c3	no	13
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36	Non Patent Literature	ZHIMING-CHEN-ET-AL-Amorphous-thin-film-white-LED-and-its-light-emitting-mechanism-Confere.pdf	439005 c7fcead7c7585c7857cba85a56544d76e3c01cc3	no	5
Warnings:					
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37	Foreign Reference	EP0647694.pdf	1873951 0f64ec5c49eec0ac02c1bef4d7930d8dc827b3f5	no	45
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Information:					

38	Foreign Reference	GB2017409.pdf	245621 92975abc2eddbdfa7e2c96248fd0609a56ec1a90	no	4
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Information:					
39	Foreign Reference	JP01260707.pdf	581345 3935ca2b6ecf689284976206375a2dc279462a65	no	13
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40	Foreign Reference	JP2900928.pdf	359238 ed982a40546512019f62ccb6f5cbdf86afa39d8b	no	5
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41	Foreign Reference	JP4010665.pdf	424294 ff092a849d61edca299854aec777c1de76032282	no	11
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43	Foreign Reference	JP04289691.pdf	311762 5bd300b7b42824620b47966ced976136ed2a2aeb	no	5
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44	Foreign Reference	JP4321280.pdf	234224 bcea377011afc4df3ad91be539ce45ba5ae52ee0	no	5
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46	Foreign Reference	JP6207170.pdf	1582344 0fbb4d69aba7806da0ce22bd7005b95ad37a00f9	no	49
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47	Foreign Reference	JP6267301.pdf	917725 78b68dbb35198010ae3dd77ec127ccf6a3c0055b	no	15
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48	Foreign Reference	JP6283755.pdf	778913 27c889830fb67d678da97ae07d333465cd1b02e3	no	10
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51	Foreign Reference	JP7235207.pdf	1651635 e90b28644bbd0b32a55349ac76798d6f86c5d3c7	no	21
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52	Foreign Reference	JP8250281.pdf	731127 334ced75ba098cfe7ff810fe6b4679d5a64b16f2	no	15
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53	Foreign Reference	JP60170194.pdf	516944 bbc41c79ed2b8f3a6842f7ef83ecc7b7e5d9b7a5	no	12
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54	Foreign Reference	JP862189770.pdf	456672 83b31c87ece10fa4beb1214d92a722a96837745e	no	11
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55	Foreign Reference	JPH087614.pdf	372475 5ccc8cd038a01dae2883dcd1094b962023a61b86	no	11
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Information:					

56	Foreign Reference	JPH0291980.pdf	519609 4f07a4735faa4c1ca2fe36ed0f97e8bfcb119d68	no	14
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57	Foreign Reference	JPH324692.pdf	177021 a7c34c6bb0134331aeca5b588cd3ec1f7c848825	no	8
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58	Foreign Reference	JPH01179471.pdf	250507 1db6bb928d48e16304b5d7ad53b335833b7f87a1	no	8
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59	Foreign Reference	JPH7282609.pdf	752559 489e8a4c4c7904d7a7b7ac1b00ae3ab76144befc	no	18
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Information:					
			Total Files Size (in bytes):	68339213	

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.

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13273215	DAI ET AL.
	Examiner	Art Unit
	313MARY ELLEN BOWMAN	2879

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
313257438	112, 498, 501, 5129827	9/18/129/18/129/ 18/12	MBMBMB

SEARCH NOTES		
Search Notes	Date	Examiner
inventor search in eDan	9/18/12	MB

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

	/MARY ELLEN BOWMAN/ Primary Examiner, Art Unit 2879

UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/273,215	10/13/2011	Bing Dai	ITMX-00318US2	8978

101130 7590 06/14/2013

Vista IP Law Group, LLP (Intematix)
2160 Lundy Avenue, Suite 230
San Jose, CA 95131

EXAMINER	
BOWMAN, MARY ELLEN	
ART UNIT	**PAPER NUMBER**
2879	

NOTIFICATION DATE	DELIVERY MODE
06/14/2013	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):

docketing@viplawgroup.com
ttn@viplawgroup.com

Office Action Summary	Application No. 13/273,215	Applicant(s) DAI ET AL.	
	Examiner MARY ELLEN BOWMAN	Art Unit 2879	AIA (First Inventor to File) Status No

-- 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 *3 June 2013*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

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

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ 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

5)☒ Claim(s) *1,4-24 and 26-31* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1,4-24 and 26-31* is/are rejected.

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

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

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

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

11)☐ 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).

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).

Certified copies:

a)☐ All b)☐ Some * c)☐ None of the:

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.

Interim copies:

a)☐ All b)☐ Some c)☐ None of the: Interim copies of the priority documents have been received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/3/13,6/4/13,6/4/13*.

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

4) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/3/13 has been entered.

Claim Rejections - 35 USC § 103

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.

Claims 1, 4-9, 11-15, 18-20, 22, 23 and 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reeh, US 2001/0000622 (hereinafter “Reeh”) in view of McNulty et al., US 2002/0180351 A1, published December 5, 2002 (hereinafter referred to as "McNulty”).

Regarding claim 1, Reeh teaches a solid state light emitting device emitting blue excitation light and having a phosphor comprising light scattering property wherein a portion of the blue excitation light is scattered to reduce halo and penumbra effects ([0053-0055]).

In the same field of endeavor of LEDs, McNulty further teaches a wavelength conversion component for a light emitting device (at least in Figure 2 and [0022]) comprising: at least one photoluminescence material (40); and a light scattering material wherein the light scattering material has an average particle size that is selected such that the light scattering material will

scatter excitation light from a radiation source relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material (Abstract, [0022-0024] and claim 5; Note: The average particle size of the scattering material is around 1/10 of the wavelength of the light emitted from the LED light source, which is within the range taught by Applicant, therefore the particles would perform in the same manner). McNulty further teaches the light scattering material scatters the light emitted by the LED at least twice as much as light generated by the at least one photoluminescence material (see claim 1 above and [0022-0024], the material would act in the same manner as that explained by Applicant because it is the same material and the same relative size).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to utilize the scattering particles of McNulty in the Reeh device in order to ensure more efficient scattering of blue excitation light to prevent the halo and penumbra effects that are common to LED devices.

Regarding claim 4, Reeh and McNulty teach the invention as explained above and McNulty further teaches the light scattering material has an average particle size that is less than about 150 nm (Abstract and [0022-0024]; Average particle size of between 30-42nm). It would have been obvious to combine the references for the reasons set forth above regarding claim 1.

Regarding claim 5, Reeh and McNulty teach the invention as explained above and McNulty further teaches the light scattering material is silica ([0023-0024] and Table 1). It would have been obvious to combine the references for the reasons set forth above regarding claim 1.

Regarding claim 6, Reeh and McNulty teach the invention as explained above and McNulty further teaches the at least one photoluminescence material is located in a wavelength conversion layer and the light scattering material is located in a diffusing layer (Figure 2, layers 40 and 42 and [0022]). It would have been obvious to combine the references for the reasons set forth above regarding claim 1.

Regarding claim 7, Reeh and McNulty teach the invention as explained above and McNulty further teaches the wavelength conversion layer and the light diffusing layer are in direct contact with each other ([0022] and Figure 2, layers 40 and 42). It would have been obvious to combine the references for the reasons set forth above regarding claim 1.

Regarding claim 8, Reeh and McNulty teach the invention as explained above and McNulty further teaches the wavelength conversion layer comprises a mixture of the at least one phosphor material and a light transmissive binder and the light diffusing layer comprises a mixture of the light scattering material and the light transmissive binder ([0021-0022]). It would have been obvious to combine the references for the reasons set forth above regarding claim 1.

Regarding claim 9, Reeh and McNulty teach the invention as explained above and McNulty further teaches the light transmissive binder comprises a curable liquid polymer selected from the group consisting of a polymer resin, a monomer resin, an acrylic, an epoxy, a silicone and a fluorinated polymer ([0021]). It would have been obvious to combine the references for the reasons set forth above regarding claim 1.

Regarding claim 11, Reeh and McNulty teach the invention as explained above and McNulty teaches the invention as explained above. Further, the process limitations of claim 11 lend weight to the claim only in so far as they affect the structure of the device. It is the position

of the Examiner that the structure of McNulty is capable of being manufactured by said method, and therefore meets the limitations of the claim. It would have been obvious to combine the references for the reasons set forth above regarding claim 1.

Regarding claim 12, Reeh and McNulty teach the invention as explained above and McNulty further teaches the wavelength conversion layer and the light diffusing layer comprise planar shapes (Figure 2 and [0022]). It would have been obvious to combine the references for the reasons set forth above regarding claim 1.

Regarding claim 13, Reeh and McNulty teach the invention as explained above and McNulty further teaches the light diffusing layer comprises a dome or elongated dome shape (Figure 2 and [0022]). It would have been obvious to combine the references for the reasons set forth above regarding claim 1.

Regarding claim 14, Reeh and McNulty teach the invention as explained above and McNulty further teaches the wavelength conversion layer fills a volume formed beneath the dome or elongated dome shape (Figure 2 and [0022]). It would have been obvious to combine the references for the reasons set forth above regarding claim 1.

Regarding claim 15, Reeh and McNulty teach the invention as explained above and McNulty further teaches both the at least one photoluminescence material and the light scattering material are located in a wavelength conversion layer (Figure 1 and [0022]). It would have been obvious to combine the references for the reasons set forth above regarding claim 1.

Regarding claim 18, Reeh and McNulty teach the invention as explained above and McNulty further teaches the excitation light comprises ultraviolet light ([0022]). It would have been obvious to combine the references for the reasons set forth above regarding claim 1.

Regarding claim 19, Reeh and McNulty teach the invention as explained above and McNulty further teaches the light scattering material has an average particle size of less than about 100 nm (Abstract, [0022-0024] and claim 5, see also explanation from claim 1 above). It would have been obvious to combine the references for the reasons set forth above regarding claim 1.

Regarding claim 20, Reeh and McNulty teach the invention as explained above and McNulty teaches the invention as explained above regarding claim 1 and further teaches a light emitting device comprising a solid state light emitter operable to generate excitation light (LED 20, Figure 2). It would have been obvious to combine the references for the reasons set forth above regarding claim 1.

Regarding claims 22 and 23, Reeh and McNulty teach the invention as explained above and McNulty further teaches the average particle size of the light scattering material is selected to improve an OFF state white appearance of the light emitting device and to obtain substantially uniform color for emitted light from the light emitting device for emission angles over a 60 degree range from an emission axis (see explanation regarding claim 1 above, the scattering particles are of the same material and same size as those used by Applicant, therefore it is the position of the Examiner that the light scattering layer would function in a similar manner). It would have been obvious to combine the references for the reasons set forth above regarding claim 1.

Regarding claim 26, Reeh and McNulty teach the invention as explained above and McNulty further teaches the invention as explained above regarding claim 4. It would have been obvious to combine the references for the reasons set forth above regarding claim 1.

Regarding claim 27, Reeh and McNulty teach the invention as explained above and McNulty further teaches the invention as explained above regarding claim 12. It would have been obvious to combine the references for the reasons set forth above regarding claim 1.

Regarding claim 28, Reeh and McNulty teach the invention as explained above and McNulty further teaches the invention as explained above regarding claim 13. It would have been obvious to combine the references for the reasons set forth above regarding claim 1.

Claims 10 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reeh and McNulty in view of Cairns et al., US 4191943, published March 4, 1980 (hereinafter referred to as "Cairns").

Regarding claims 10 and 24, Reeh and McNulty teach the invention as explained above and McNulty teaches the inventions as explained above, but is silent as to the loading of scattering material into the transmissive binder.

In the same field of endeavor of LEDs, Cairns teaches a light scattering material should be employed in the amount claimed in order to achieve optimum light scattering (col 3, lines 60-62). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to utilize the light scattering particles of McNulty in the amount taught by Cairns in order to achieve optimum light scattering without loss due to absorption.

Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reeh and McNulty in view of Chakraborty et al., US 2009/0272996, filed May 2, 2008 (hereinafter referred to as "Chakraborty").

Regarding claim 16, Reeh and McNulty teach the invention as explained above and McNulty teaches the invention as explained above but is silent as to the particles being from 1 to 50 micrometers in size.

However, in the same field of endeavor of LEDs, Chakraborty teaches light scattering particles of the claimed size in a light transmissive binder ([0084]). Chakraborty further teaches that said particle size optimizes the light scattering effect of the layer (id). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to utilize light scattering particles in the claimed range in order to optimize the light scattering effect of the layer.

Regarding claim 17, Reeh and McNulty teach the invention as explained above and McNulty teaches the invention as explained above but is silent as to the substrate upon which the LED and phosphor layer are formed.

In the same field of endeavor of LEDs, Chakraborty teaches the LED and phosphor layer are formed on a substrate having a reflective film thereon ([0097-0098]). Further, it was well known to those of ordinary skill in the art at the time the invention was made that materials such as glass make excellent device substrates due to their electrical insulation properties and ease of manufacturing. Therefore, in light of the state of the art as well as the teaching in Chakraborty, it would have been obvious for one of ordinary skill in the art at the time the invention was made to utilize a light transmissive substrate such as glass in order to form the LED and phosphor layers of an LED lighting device.

Claims 21 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Reeh and McNulty in view of Robertson et al., US 6860628 B2, published March 1, 2005 (hereinafter referred to as "Robertson").

Regarding claim 21, Reeh and McNulty teach the invention as explained above and McNulty teaches the invention as explained above but is silent as to the myriad of uses for an LED.

In the same field of endeavor of LEDs, Robertson teaches an LED may be used in a linear lamp as a replacement for a fluorescent bulb (Figure 3A). Further, it was well known to those of ordinary skill in the art at the time the invention was made that LEDs have many applications in the lighting field including several different types of bulbs with and without reflectors. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to utilize the LED taught by McNulty in several different ways, including as a linear lamp, such as the lighting device in Robertson.

Regarding claim 29, Reeh and McNulty teach the invention as explained above and McNulty teaches the invention as explained above, but is silent as to the LED being used in a linear lamp.

In the same field of endeavor of LEDs, Robertson teaches a linear lamp comprising an elongate housing and a plurality of LEDs housed within the housing and configured along the length of the housing and an elongate wavelength conversion component (Figure 3A). Further, it was well known to those of ordinary skill in the art at the time the invention was made that LEDs have many applications in the lighting field including several different types of bulbs with and without reflectors. Therefore, it would have been obvious for one of ordinary skill in the art at

the time the invention was made to utilize the LED taught by McNulty in several different ways, including as a linear lamp, such as the lighting device in Robertson.

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Reeh and McNulty in view of Soules et al, US 2007/0120135 A1, published May 31, 2007 (hereinafter referred to as "Soules").

Regarding claim 30, Reeh and McNulty teach the invention as explained above and McNulty teaches the invention as explained above but is silent as to the LED being used in a downlight.

In the same field of endeavor of LEDs, Soules teaches a downlight comprising a body comprising one or more LEDs, and the body is configured within a downlighting fixture ([0052]). Further, it was well known to those of ordinary skill in the art at the time the invention was made that LEDs have many applications in the lighting field including several different types of bulbs with and without reflectors. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to utilize the LED taught by McNulty in several different ways, including in a downlight, such as the lighting device in Soules.

Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Reeh and McNulty in view of Negley et al., US 2008/0130285 A1, published June 5, 2008 (hereinafter referred to as "Negley").

Regarding claim 31, Reeh and McNulty teach the invention as explained above and McNulty teaches the invention as explained above but is silent as to the LED being used in a light bulb.

In the same field of endeavor of LEDs, Negley teaches a light bulb comprising a connector base and a body comprising one or more LEDs ([0022]). Further, it was well known to those of ordinary skill in the art at the time the invention was made that LEDs have many applications in the lighting field including several different types of bulbs with and without reflectors. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to utilize the LED taught by McNulty in several different ways, including in a light bulb, such as the lighting device in Negley.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARY ELLEN BOWMAN whose telephone number is (571)270-5383. The examiner can normally be reached on Monday-Friday, 5:30-8:30a.m. and 12:00-5:00 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. 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.

/MARY ELLEN BOWMAN/
Primary Examiner, Art Unit 2879

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Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)				Application Number	13/273,215
				Filing Date	10-13-2011
				First Named Inventor	Bing Dai
				Art Unit	2879
				Examiner Name	Bowman, Mary Ellen
Sheet	4	of	18	Attorney Docket Number	ITMX-00318US2

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	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
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Examiner Signature	/Mary Ellen Bowman/	Date Considered	06/07/2013

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Examiner Signature	/Mary Ellen Bowman/	Date Considered	06/07/2013

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)				Application Number	13/273,215
				Filing Date	10-13-2011
				First Named Inventor	Bing Dai
				Art Unit	2879
				Examiner Name	Bowman, Mary Ellen
Sheet	8	of	18	Attorney Docket Number	ITMX-00318US2

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	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
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	9	August 24, 2007 Office Action in U.S. Patent Application No. 11/264,124, issued by Thao X. Le (Art Unit 2814)	
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Filing Date	10-13-2011
First Named Inventor	Bing Dai
Art Unit	2879
Examiner Name	Bowman, Mary Ellen
Attorney Docket Number	ITMX-00318US2

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Sheet 15 of 18

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Examiner Signature	/Mary Ellen Bowman/	Date Considered	06/07/2013

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Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				Application Number	13/273,215
				Filing Date	10-13-2011
				First Named Inventor	Bing Dai
				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	6	of	10	Attorney Docket Number	ITMX-00318US2

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	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
	38	20060124947	06/15/2006	Mueller et al.	
	39	20060158090	07/20/2006	Wang, et al.	
	40	20060261309	11/23/2006	Li, et al.	
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	49	20090050911	02/26/2009	Chakraborty	
	50	20110147778	06/23/2011	Ichikawa, Masatsugu	

Examiner Signature	/Mary Ellen Bowman/	Date Considered	06/07/2013

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 7 of 10

Complete if Known	
Application Number	13/273,215
Filing Date	10-13-2011
First Named Inventor	Bing Dai
Art Unit	2879
Examiner Name	Bowman, Mary Ellen
Attorney Docket Number	ITMX-00318US2

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	1	CA 2466979	11/18/2005	Prodanov D.		
	2	JP 07094785	04/07/1995	Stanley Electric CO. LTD		
	3	JP 2003101078	04/04/2003	Toyoda Gosei Co Ltd		
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	11	WO 2005025831	03/24/2005	Gerald NEGLEY et al.		
	12	WO 2006022792	03/02/2006	Wang et al.		
	13	WO 2008043519 A1	04/17/2008	Lexedis Lighting GMBH		
~~[illegible]~~	~~14~~					
	15					

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				Art Unit	2879
				Examiner Name	Bowman, Mary Ellen
Sheet	8	of	10	Attorney Docket Number	ITMX-00318US2

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	1	Docket No. ITMX-00116CN0; First Office Action for Chinese Patent Application No. 200780032995.8 Issued on March 19, 2010	
	2	Docket No. ITMX-00116CN0; Foreign Office Action dated Oct. 29, 2012 for Chinese Appln. No. 200780032995.8	
	3	Docket No. ITMX-00116CN0; Second Office Action for Chinese Patent Application No. 200780032995.8 Issued on August 10, 2011	
	4	Docket No. ITMX-00116CN0; Third Office Action for Chinese Patent Application No. 200780032995.8 Issued on December 12, 2011	
	5	Docket No. ITMX-00116CN1; Foreign Office Action dated Apr. 24, 2012 for Chinese Appln. No. 201010525492.8	
	6	Docket No. ITMX-00116EP0; Foreign Office Action dated July 5, 2012 for European Appln. No. 07811039.2	
	7	Docket No. ITMX-00116JP0; Foreign Office Action for Japanese Application No. 2009-522877 mailed on April 16, 2013	
	8	Docket No. ITMX-00116JP0; Foreign Office Action for Japanese Application No. 2009-522877 mailed on April 24, 2012	
	9	Docket No. ITMX-00116TW0; Taiwanese Office Action and Search Report for ROC (Taiwan) Patent Applicatoin No. 096128666 mailed on September 1, 2011	
	10	Docket No. ITMX-00116US06; Non-Final Office Action dated Sep. 27, 2012 for U.S. Appln. No. 13/436,471	
	11	Docket No. ITMX-00116US1; Final Office Action Mailed on June 23, 2009 for U.S. Application No. 11/640,533	
	12	Docket No. ITMX-00116US1; Final Office Action Mailed on September 23, 2011 for U.S. Application No. 11/640,533	
	13	Docket No. ITMX-00116US1; Final Office Action Mailed on September 9, 2010 for U.S. Application No. 11/640,533	
	14	Docket No. ITMX-00116US1; Non-Final Office Action Mailed on January 20, 2010 for U.S. Application No. 11/640,533	

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Sheet 9 of 10

Complete if Known	
Application Number	13/273,215
Filing Date	10-13-2011
First Named Inventor	Bing Dai
Art Unit	2879
Examiner Name	Bowman, Mary Ellen
Attorney Docket Number	ITMX-00318US2

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	15	Docket No. ITMX-00116US1; Non-Final Office Action Mailed on March 3, 2011 for U.S. Application No. 11/640,533	
	16	Docket No. ITMX-00116US1; Non-Final Office Action Mailed on October 27, 2008 for U.S. Application No. 11/640,533	
	17	Docket No. ITMX-00116US2; Notice of Allowance Mailed on August 12, 2011 for U.S. Application No. 12/624,839	
	18	Docket No. ITMX-00116US2; Notice of Allowance Mailed on September 26, 2011 for U.S. Application No. 12/624,839	
	19	Docket No. ITMX-00116US3; Final Office Action dated Jan. 11, 2013 for U.S. Appln. No. 12/624,900	
	20	Docket No. ITMX-00116US3; Final Office Action Mailed on December 19, 2011 for U.S. Application No. 12/624,900	
	21	Docket No. ITMX-00116US3; Non-Final Office Action Mailed on June 25, 2012 for U.S. Application No. 12/624,900	
	22	Docket No. ITMX-00116US3; Non-Final Office Action Mailed on March 24, 2011 for U.S. Application No. 12/624,900	
	23	Docket No. ITMX-00116US4; Final Office Action dated Jan. 30, 2013 for U.S. Appln. No. 13/087,615	
	24	Docket No. ITMX-00116US4; Non-Final Office Action dated September 21, 2012 for U.S. Appln. No. 13/087,615	
	25	Docket No. ITMX-00116US6; Advisory Action dated May 15, 2013 for U.S. Appln. No. 13/436,471	
	26	Docket No. ITMX-00116US6; Final Office Action dated Mar. 1, 2013 for U.S. Appln. No. 13/436,471	
	27	Docket No. ITMX-00116US8; Final Office Action dated Apr. 5, 2013 for U.S. Appln. No. 13/441,714	
	28	Docket No. ITMX-00116US8; Non-Final Office Action dated September 19, 2012 for U.S. Appln. No. 13/441,714	

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(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
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	29	Docket No. ITMX-00116WO0; International Search Report and the Written Opinion dated August 15, 2008 for PCT International Application No. PCT/US2007/017299	
	30	Docket No. ITMX-00307US1; Final Office Action dated Mar. 1, 2013 for U.S. Appln. No. 13/253,031	
	31	Docket No. ITMX-00307US1; Non-Final Office Action dated Oct. 16, 2012 for U.S. Appln. No. 13/253,031	
	32	Docket No. ITMX-00307WO0; International Search Report and Written Opinion dated Jan. 26, 2012 for PCT Application No. PCT/US11/54827	
	33	Docket No. ITMX-00318US1; Final Office Action dated Mar. 6, 2013 for U.S. Appln. No. 13/273,212	
	34	Docket No. ITMX-00318US1; Non-Final Office Action dated Sep. 24, 2012 for U.S. Appln. No. 13/273,212	
	35	Docket No. ITMX-00318US3; Final Office Action dated Mar. 1, 2013 for U.S. Appln. No. 13/273,217	
	36	Docket No. ITMX-00318US3; Non-Final Office Action dated Sep. 24, 2012 for U.S. Appln. No. 13/273,217	
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	38	PARK J.K., et al., Optical Properties of Eu2+ Activated Sr2Sio4 Phosphor for Light-Emitting Diodes, Electrochemical and Solid-State Letters, February 25, 2004, pp. H15-H17, Vol. 7, No. 5.	
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	40	YOO, J.S., et al., Control of Spectral Properties of Strontium-Alkaline Earth-Silicate-Europiem Phosphors for LED Applications, Journal of the Electrochemical Society, April 1, 2005 pp.G382-G385, Vol. 152, No. 5.	
	41	BARRY, T., Flurrescence of EU2+ Activated Phases in Bunary Alkaline Earth Orthosilicate Systems, Journal of the Electrochemical Society, November 1968, pp. 1181-1184, Vol. 115, No. 1.	

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	1	5998925	12-07-1999	YOSHINORI SHIMIZU	
	2	7575697	08-18-2009	Yi-Qun Li	
	3	7601276	10-13-2009	Yi-Qun Li	
	4	7655156	02-02-2010	Shifan Cheng	
	5	7311858	12-25-2007	Ning Wang	
	6	7390437	06-24-2008	Yi Dong	
	7	8274215	09-25-2012	Shengfeng Liu	
	8	20080111472	05-15-2008	Shengfeng Liu	
	9	20090283721	11-19-2009	Shengfeng Liu	
	10	20120086034	04-12-2012	Xianglong Yuan	
	11	20080218992	09-11-2008	Yi-Qun Li	
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Attorney Docket Number	ITMX-00318US2

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]
	1	WO 2010074963	01-07-2010	LIU, Shengfeng		
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Examiner Signature	/Mary Ellen Bowman/	Date Considered	06/07/2013

*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. 5Kind 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.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.B./

PTO/SB/08a (07-09) (modified)
Approved for use through 07/31/2012. 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				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)				Application Number	13/273,215
				Filing Date	10-13-2011
				First Named Inventor	Bing Dai
				Art Unit	2879
				Examiner Name	Bowman, Mary Ellen
Sheet	6	of	6	Attorney Docket Number	ITMX-00318US2

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]
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Examiner Signature	/Mary Ellen Bowman/	Date Considered	06/07/2013

*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. 5Kind 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.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.B./

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13273215	DAI ET AL.
	Examiner	Art Unit
	MARY ELLEN BOWMAN	2879

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	09/18/2012	02/25/2013	06/07/2013						
	1	✓	✓	✓						
	2	✓	-	-						
	3	✓	-	-						
	4	✓	✓	✓						
	5	✓	✓	✓						
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	7	✓	✓	✓						
	8	✓	✓	✓						
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	23	✓	✓	✓						
	24	✓	✓	✓						
	25	✓	-	-						
	26	✓	✓	✓						
	27	✓	✓	✓						
	28	✓	✓	✓						
	29	✓	✓	✓						
	30	✓	✓	✓						
	31	✓	✓	✓						

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L2	67	("20080308825" | "20070120135" | "6860628" | "20040016908" | "20060158090" | "20070029526" | "5947587" | "6576930" | "6834979" | "7220022" | "20030052595" | "20060027786" | "20060261309" | "20070170840" | "20080111472" | "6147367" | "6680569" | "7943951" | "20090272996" | "20090272996" | "20030102810" | "20040104391" | "20050093430" | "20050168127" | "20060028837" | "5998925" | "6538375" | "6580097" | "7601276" | "20020180351" | "20020047516" | "20080218992" | "6255670" | "6555958" | "7311858" | "7575697" | "7972030" | "20070240346" | "20050051782" | "20050057917" | "20060262532" | "7663315" | "4191943" | "20010000622" | "20030038596" | "20050052885" | "20060001352" | "20060028122" | "20090283721" | "6614170" | "7029935" | "8274215" | "20090026908" | "20090050991" | "20080130285" | "20040183081" | "20040227465" | "20060124947" | "20070091601" | "20110147778" | "5371434" | "6717353" | "7655156" | "7686478" | "20040239242" | "20080246044" | "20120086034" | "7390437").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2013/06/07 09:37
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		"20080130285" | "20040183081" | "20040227465" | "20060124947" | "20070091601" | "20110147778" | "5371434" | "6717353" | "7655156" | "7686478" | "20040239242" | "20080246044" | "20120086034" | "7390437").PN. and blue				
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S1	1	"20090272996"	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/17 14:20
S2	2	"20070240346"	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/17 14:28
S3	356	(257/98.ccls. 438/27.ccls. 313/498,501,512,112.ccls.) and ("light emitting diode" LED.U/C.) and ((scatter$3 reflect$3) with particle with (size nanometer micrometer))	US-PGPUB; USPAT; USOCR	OR	ON	2012/09/17 14:34
S4	215	(257/98.ccls. 438/27.ccls. 313/498,501,512,112.ccls.) and ("light emitting diode" LED.U/C.) and ((scatter$3 reflect$3) with particle with (concentration weight percent$3 amount))	US-PGPUB; USPAT; USOCR	OR	ON	2012/09/17 15:37
S5	9	(257/98.ccls. 438/27.ccls. 313/498,501,512,112.ccls.) and ("light emitting diode" LED.U/C.) and (down$light) and (base near4 socket)	US-PGPUB; USPAT; USOCR	OR	ON	2012/09/17 16:20
S6	2	(257/98.ccls. 438/27.ccls. 313/498,501,512,112.ccls.) and ("light	US-PGPUB;	OR	ON	2012/09/17 16:30

		emitting diode" LED.U/C.) and (down$light) and ((housing envelope bulb) with (elongat$2 linear))	USPAT; USOCR			
S7	46	(257/98.ccls. 438/27.ccls. 313/498,501,512,112.ccls.) and ("light emitting diode" LED.U/C.) and ((housing envelope bulb) with (elongat$2 linear))	US-PGPUB; USPAT; USOCR	OR	ON	2012/09/17 16:31
S8	50	(257/98.ccls. 438/27.ccls. 313/498,501,512,112.ccls.) and ("light emitting diode" LED.U/C.) and (downlight)	US-PGPUB; USPAT; USOCR	OR	ON	2012/09/17 16:33
S9	364972	sign	US-PGPUB; USPAT; USOCR	OR	OFF	2012/10/12 21:24
S10	6	(US-20090272996-$ or US-20020180351-$ or US-20080130285-$ or US-20070120135-$).did. or (US-4191943-$ or US-6860628-$).did.	US-PGPUB; USPAT	OR	OFF	2012/10/12 21:24
S11	2	S10 and sign	US-PGPUB; USPAT; USOCR	OR	OFF	2012/10/12 21:25

EAST Search History (Interference)

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PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING TRANSMITTAL OF COPY OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (CHAPTER I OF THE PATENT COOPERATION TREATY)
(PCT Rule 44bis.1(c))

To:

ROBINSON, Ross, T.
Winstead PC
P.O. Box 131851
Dallas, TX 75313
ETATS-UNIS D'AMERIQUE

B. WINSTEAD

51626-P24WO

Date of mailing *(day/month/year)*	
18 April 2013 (18.04.2013)	
Applicant's or agent's file reference	IMPORTANT NOTICE
ITMX00307WO0	

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2011/054827	04 October 2011 (04.10.2011)	05 October 2010 (05.10.2010)

Applicant
INTEMATIX CORPORATION et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty)

DOCKETED
MAY 01 2013
By:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Yolaine Cussac

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference ITMX00307WO0	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/US2011/054827	International filing date *(day/month/year)* 04 October 2011 (04.10.2011)	Priority date *(day/month/year)* 05 October 2010 (05.10.2010)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant INTEMATIX CORPORATION		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 8 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 09 April 2013 (09.04.2013)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Yolaine Cussac e-mail: pt05.pct@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: PETER C. MEI
VISTA IP LAW GROUP, LLP
1885 LUNDY AVE., STE. 108
SAN JOSE, CA 95131

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)*	26 JAN 2012

Applicant's or agent's file reference	FOR FURTHER ACTION
ITMX00307WO0	See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US 11/54827	04 October 2011 (04.10.2011)	05 October 2010 (05.10.2010)

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - G09G 3/34 (2011.01)
USPC - 345/84

Applicant INTEMATIX CORPORATION

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1 *bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Fom PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer:
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	10 January 2012 (10.01.2012)	Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 11/54827

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed.

   ☐ a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

   a. (means)

   ☐ on paper

   ☐ in electronic form

   b. (time)

   ☐ in the international application as filed

   ☐ together with the international application in electronic form

   ☐ subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 11/54827

Box No. V **Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	2, 3 and 15	YES
	Claims	1, 4-14 and 16-24	NO
Inventive step (IS)	Claims	none	YES
	Claims	1-24	NO
Industrial applicability (IA)	Claims	1-24	YES
	Claims	none	NO

2. Citations and explanations:

Claims 1, 4-14 and 16-24 lack novelty under PCT Article 33(2) as being anticipated by US 2009/0272996 A1 to Chakraborty.

Regarding claim 1, Chakraborty discloses a light emitting device (LED device 200, para. [0027], Fig. 2) comprising: at least one solid-state light emitter operable to generate excitation light (LED chip 202 is disposed on a mount surface; LED 202 can emit light of different colors and can also emit radiation outside the visible spectrum, such as infrared or ultraviolet, para. [0027]); and a photoluminescence wavelength conversion component (conversion process takes place in the conversion layer 204 which may be loaded with phosphors; wavelength conversion layer 204 converts a portion of the emitted light to a different wavelength; Yttrium aluminum garnet (YAG) is an example of a common phosphor that may be used, para. [0028] through [0032], [0055] through [0058], [0082], [0085], [0087], [0092] through [0095]) comprising a mixture of particles of at least one photoluminescence material (phosphor comprises many different compositions and phosphor materials alone or in combination, para. [0028] through [0041]) and particles of a light reflective material (light scattering particles; light extraction efficiency and the color temperature distribution uniformity are improved by the introduction of both nanoparticles and light scattering particles proximate to the light source; light scattering particles (LSPs) 210 are disposed proximate to the LED chip 202; strikes one or more of the scattering particles 210 the index of refraction differential between the medium and the particles 210 causes the light to refract and travel in a different direction, para. [0021], [0058] through [0084]).

Regarding claim 4, Chakraborty discloses the light emitting device of claim 1, wherein the light reflective material has a particle size in a range selected from the group consisting of: 0.01u to 10un; 0.01un to 1un and 0.1um to 1um (nanoparticles and light scattering particles proximate to the light source. Nanoparticles having a high index of refraction are dispersed throughout a wavelength conversion layer to adjust the index of refraction of the layer for improved light extraction, para. [0021], [0056], [0057], [0089], [0093], [0095], [0103]).

Regarding claim 5, Chakraborty discloses the light emitting device of claim 1, wherein a weight percent loading of light reflective material (light scattering particles (LSPs) 210) to the at least one photoluminescence material (phosphor) is in a range selected from the group consisting of: .01% to 10%; 0.01% to 1%; 0.1% to 1% and 0.5% to 1% (e.g.: if the conversion layer material has a RI of 1.5 and the target effective RI is 1.7, then the conversion layer 204 should comprise approximately 20% TiO.sub.2 nanoparticles by volume; other material combinations and compositions may also be used; e.g.: some embodiments may have greater than 5% nanoparticles by volume; other embodiments may have greater than 10% nanoparticles by volume; other embodiments may include 20-40% by volume nanoparticle loading; various percentages of composition of the LSPs 210 can be used as dictated by the application; depending on the materials used, the LSPs 210 will typically be found in concentrations ranging from 0.01% to 5% by volume; other concentrations can be used; however, the loss due to absorption increases with the concentration of the scattering particles; concentrations of the LSPs should be chosen in order to maintain an acceptable loss figure, para. [0057], [0083]).

See Continuation Sheet.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 11/54827

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:
Box V, item 2. Citations and explanations.

Regarding claim 6, Chakraborty discloses the light emitting device of claim 1, wherein the light reflective material (light scattering particles (LSPs) 210, para. [0060]) is selected from the group consisting of: titanium dioxide (para. [0060], [0065]), barium sulfate (para. [0060], [0066]) and combinations thereof (para. [0060], [0079]).

Regarding claim 7, Chakraborty discloses the light emitting device of claim 1, wherein the wavelength conversion component (conversion process takes place in the conversion layer 204 which may be loaded with phosphors; wavelength conversion layer 204 converts a portion of the emitted light to a different wavelength; Yttrium aluminum garnet (YAG) is an example of a common phosphor that may be used, para. [0028] through [0032], [0055] through [0058], [0082], [0085], [0087], [0092] through [0095]) is selected from the group consisting of:
a light transmissive substrate on which the mixture of photoluminescence material and light reflective material is provided as at least one layer (LSPs 210 can be dispersed throughout various elements so long as they are proximate to the LED chip 202 such that substantially all of the emitted light has a probability of interacting with the LSPs 210; e.g. LSPs 210 are disposed throughout the binder material 206 along with the nanoparticles 208 and the phosphor; conversion layer 204 is disposed on the LED chip 202, substantially all of the emitted light travels through the conversion layer where the LSPs 210 are dispersed before being emitted from the device 200, para. [0082] and [0086]);
a light transmissive substrate configured as a light guide and wherein the mixture of photoluminescence material and light reflective material is provided on at least a part of a face of the light guide (LSPs 210 can be dispersed throughout various elements so long as they are proximate to the LED chip 202 such that substantially all of the emitted light has a probability of interacting with the LSPs 210; e.g. LSPs 210 are disposed throughout the binder material 206 along with the nanoparticles 208 and the phosphor; conversion layer 204 is disposed on the LED chip 202, substantially all of the emitted light travels through the conversion layer where the LSPs 210 are dispersed before being emitted from the device 200, para. [0082] and [0086]); and
a light reflective surface on which the mixture of the photoluminescence material and light reflective material are provided as at least one layer (textured light emission surface 214, the LED chip 202 has a reflective element 216 such as a layer of reflective material; reflective element 216 redirects some of the light generated in the LED chip 202 back towards the textured light emission surface 214; reflective element 214 may comprise a thick silver mirror, para. [0086]).

Regarding claim 8, Chakraborty discloses the light emitting device of claim 1, wherein the at least one solid-state light emitter comprises an LED that is operable to generate blue excitation light having a peak wavelength in a wavelength range 440nm to 480nm (wavelength of light emitted from the LED chip 202 e.g., about.450 nm for a blue emitter, para. [0056]).

Regarding claim 9, Chakraborty discloses the light emitting device of claim 1, wherein the mixture of the photoluminescence material and the light reflective material is distributed over an area of at least 0.8cm^2 (LED devices can be formed from a single wafer; e.g.: when fabricating LED devices having a 1 millimeter (mm) square size, up to 4500 LED devices can be fabricated on a 3 inch wafer, para. [0096], [0098]).

Regarding claim 10, Chakraborty discloses the light emitting device of claim 1, wherein the particles of the light reflective material (light scattering particles; light extraction efficiency and the color temperature distribution uniformity are improved by the introduction of both nanoparticles and light scattering particles proximate to the light source; light scattering particles (LSPs) 210 are disposed proximate to the LED chip 202; strikes one or more of the scattering particles 210 the index of refraction differential between the medium and the particles 210 causes the light to refract and travel in a different direction, para. [0021], [0058] through [0084]) corresponds to a particle size (nanoparticles and light scattering particles proximate to the light source; nanoparticles having a high index of refraction are dispersed throughout a wavelength conversion layer to adjust the index of refraction of the layer for improved light extraction, para. [0021], [0056], [0057], [0089], [0093], [0095], [0103]) such that the particles scatter excitation light relatively more than light generated by the at least one phosphor material (LSPs 210 can be dispersed throughout various elements so long as they are proximate to the LED chip 202 such that substantially all of the emitted light has a probability of interacting with the LSPs 210; e.g. LSPs 210 are disposed throughout the binder material 206 along with the nanoparticles 208 and the phosphor; conversion layer 204 is disposed on the LED chip 202, substantially all of the emitted light travels through the conversion layer where the LSPs 210 are dispersed before being emitted from the device 200, para. [0082]).

Regarding claim 11, Chakraborty discloses the light emitting device of claim 1, further comprising a light diffusing layer that is adjacent to the photoluminescence wavelength conversion component (LED chip 202 has a textured light emission surface 214 included to increase light extraction from the LED chip 202 by reducing total internal reflection (TIR), para. [0008], [0009], [0011], [0013], [0086] through [0090], [0099]).

See Continuation Sheet.

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:
Box V, item 2. Citations and explanations.

Regarding claim 12, Chakraborty discloses the light emitting device of claim 11, in which the light diffusing layer (conversion process takes place in the conversion layer 204 which may be loaded with phosphors; wavelength conversion layer 204 converts a portion of the emitted light to a different wavelength; Yttrium aluminum garnet (YAG) is an example of a common phosphor that may be used, para. [0028] through [0032], [0055] through [0058], [0082], [0085], [0087], [0092] through [0095]) comprises particles of light reflective material (light scattering particles; light extraction efficiency and the color temperature distribution uniformity are improved by the introduction of both nanoparticles and light scattering particles proximate to the light source; light scattering particles (LSPs) 210 are disposed proximate to the LED chip 202; strikes one or more of the scattering particles 210 the index of refraction differential between the medium and the particles 210 causes the light to refract and travel in a different direction, para. [0021], [0058] through [0084]) corresponding to a particle size (nanoparticles and light scattering particles proximate to the light source; nanoparticles having a high index of refraction are dispersed throughout a wavelength conversion layer to adjust the index of refraction of the layer for improved light extraction, para. [0021], [0056], [0057], [0089], [0093], [0095], [0103]) such that the particles scatter excitation light relatively more than light generated by the at least one photoluminescence material (LSPs 210 can be dispersed throughout various elements so long as they are proximate to the LED chip 202 such that substantially all of the emitted light has a probability of interacting with the LSPs 210; e.g. LSPs 210 are disposed throughout the binder material 206 along with the nanoparticles 208 and the phosphor; conversion layer 204 is disposed on the LED chip 202, substantially all of the emitted light travels through the conversion layer where the LSPs 210 are dispersed before being emitted from the device 200, para. [0082]).

Regarding claim 13, Chakraborty discloses the light emitting device of claim 12, wherein the light reflective material has a particle size in a range 100nm to 150nm (nanoparticles and light scattering particles proximate to the light source; nanoparticles having a high index of refraction are dispersed throughout a wavelength conversion layer to adjust the index of refraction of the layer for improved light extraction, para. [0021], [0056], [0057], [0089], [0093], [0095], [0103]).

Regarding claim 14, Chakraborty discloses the light emitting device of claim 1, in which the at least one photoluminescence material comprises phosphor (phosphor comprises many different compositions and phosphor materials alone or in combination, para. [0028] through [0041], [0060] through [0079]).

Regarding claim 16, Chakraborty discloses a wavelength conversion component (conversion layer 204 phosphor particles are dispersed throughout a binder material 206 such as silicone; refractive index (RI) of the phosphor particles and the RI of the binder 206 can be the same, or they can be different, para. [0041] through [0058]) for a solid-state light emitting device (LED device 200; LED chip 202 is disposed on a mount surface; LED 202 can emit light of different colors and can also emit radiation outside the visible spectrum, such as infrared or ultraviolet, para. [0027], Fig. 2) comprising a mixture of particles of at least one photoluminescence material (phosphor comprises many different compositions and phosphor materials alone or in combination, para. [0028] through [0041]) and particles of a light reflective material (light scattering particles; light extraction efficiency and the color temperature distribution uniformity are improved by the introduction of both nanoparticles and light scattering particles proximate to the light source; light scattering particles (LSPs) 210 are disposed proximate to the LED chip 202; strikes one or more of the scattering particles 210 the index of refraction differential between the medium and the particles 210 causes the light to refract and travel in a different direction, para. [0021], [0058] through [0084]).

Regarding claim 17, Chakraborty discloses the wavelength conversion component of claim 16, wherein the light reflective material has a particle size in a range selected from the group consisting of: 0.01um to 10un; 0.01un to 1um and 0.1 to 1um (nanoparticles and light scattering particles proximate to the light source. Nanoparticles having a high index of refraction are dispersed throughout a wavelength conversion layer to adjust the index of refraction of the layer for improved light extraction, para. [0021], [0056], [0057], [0089], [0093], [0095], [0103]).

Regarding claim 18, Chakraborty discloses the wavelength conversion component of claim 16, wherein a weight percent loading of light reflective material (light scattering particles (LSPs) 210) to the at least one photoluminescence material (phosphor) is in a range selected from the group consisting of: 0.01% to 10%; 0.01% to 1%; 0.1% to 1% and 0.5% to 1% (e.g.: if the conversion layer material has a RI of 1.5 and the target effective RI is 1.7, then the conversion layer 204 should comprise approximately 20% TiO.sub.2 nanoparticles by volume; other material combinations and compositions may also be used; e.g.: some embodiments may have greater than 5% nanoparticles by volume; other embodiments may have greater than 10% nanoparticles by volume; other embodiments may include 20-40% by volume nanoparticle loading; various percentages of composition of the LSPs 210 can be used as dictated by the application; depending on the materials used, the LSPs 210 will typically be found in concentrations ranging from 0.01% to 5% by volume; other concentrations can be used; however, the loss due to absorption increases with the concentration of the scattering particles; concentrations of the LSPs should be chosen in order to maintain an acceptable loss figure, para. [0057], [0083]).

See Continuation Sheet.

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US 11/54827

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Box V, item 2. Citations and explanations.

Regarding claim 19, Chakraborty discloses the wavelength conversion component of claim 16, wherein the wavelength conversion component (conversion process takes place in the conversion layer 204 which may be loaded with phosphors; wavelength conversion layer 204 converts a portion of the emitted light to a different wavelength; Yttrium aluminum garnet (YAG) is an example of a common phosphor that may be used, para. [0028] through [0032], [0055] through [0058], [0082], [0085], [0087], [0092] through [0095]) is selected from the group consisting of:
a light transmissive substrate on which the mixture of the at least one photoluminescence material and light reflective material are provided as at least one layer (LSPs 210 can be dispersed throughout various elements so long as they are proximate to the LED chip 202 such that substantially all of the emitted light has a probability of interacting with the LSPs 210; e.g. LSPs 210 are disposed throughout the binder material 206 along with the nanoparticles 208 and the phosphor; conversion layer 204 is disposed on the LED chip 202, substantially all of the emitted light travels through the conversion layer where the LSPs 210 are dispersed before being emitted from the device 200, para. [0082] and [0086]);
a light transmissive substrate configured as a light guide and wherein the mixture of photoluminescence material and light reflective material is provided on at least a part of a face of the light guide (LSPs 210 can be dispersed throughout various elements so long as they are proximate to the LED chip 202 such that substantially all of the emitted light has a probability of interacting with the LSPs 210; e.g. LSPs 210 are disposed throughout the binder material 206 along with the nanoparticles 208 and the phosphor; conversion layer 204 is disposed on the LED chip 202, substantially all of the emitted light travels through the conversion layer where the LSPs 210 are dispersed before being emitted from the device 200, para. [0082] and [0086]); and
a light reflective surface on which the mixture of the photoluminescence material and light reflective material are provided as at least one layer (textured light emission surface 214, the LED chip 202 has a reflective element 216 such as a layer of reflective material; reflective element 216 redirects some of the light generated in the LED chip 202 back towards the textured light emission surface 214; reflective element 214 may comprise a thick silver mirror, para. [0086]).

Regarding claim 20, Chakraborty discloses the wavelength conversion component of claim 16, wherein the mixture of the at least one photoluminescence material and the light reflective material are distributed over an area of at least 0.8cm^2 (LED devices can be formed from a single wafer; e.g.: when fabricating LED devices having a 1 millimeter (mm) square size, up to 4500 LED devices can be fabricated on a 3 inch wafer, para. [0096], [0098]).

Regarding claim 21, Chakraborty discloses the wavelength conversion component of claim 16, wherein the particles of the light reflective material (light scattering particles; light extraction efficiency and the color temperature distribution uniformity are improved by the introduction of both nanoparticles and light scattering particles proximate to the light source; light scattering particles (LSPs) 210 are disposed proximate to the LED chip 202; strikes one or more of the scattering particles 210 the index of refraction differential between the medium and the particles 210 causes the light to refract and travel in a different direction, para. [0021], [0058] through [0084]) corresponds to a particle size (nanoparticles and light scattering particles proximate to the light source; nanoparticles having a high index of refraction are dispersed throughout a wavelength conversion layer to adjust the index of refraction of the layer for improved light extraction, para. [0021], [0056], [0057], [0089], [0093], [0095], [0103]) such that the particles scatter excitation light relatively more than light generated by the at least one phosphor material (LSPs 210 can be dispersed throughout various elements so long as they are proximate to the LED chip 202 such that substantially all of the emitted light has a probability of interacting with the LSPs 210; e.g. LSPs 210 are disposed throughout the binder material 206 along with the nanoparticles 208 and the phosphor; conversion layer 204 is disposed on the LED chip 202, substantially all of the emitted light travels through the conversion layer where the LSPs 210 are dispersed before being emitted from the device 200, para. [0082]).

Regarding claim 22, Chakraborty discloses the wavelength conversion component of claim 21, wherein the light reflective material has a particle size in a range 100nm to 150nm (nanoparticles and light scattering particles proximate to the light source; nanoparticles having a high index of refraction are dispersed throughout a wavelength conversion layer to adjust the index of refraction of the layer for improved light extraction, para. [0021], [0056], [0057], [0089], [0093], [0095], [0103]).

Regarding claim 23, Chakraborty discloses the wavelength conversion component of claim 16, further comprising a light diffusing layer that is adjacent to the photoluminescence wavelength conversion component (LED chip 202 has a textured light emission surface 214 included to increase light extraction from the LED chip 202 by reducing total internal reflection (TIR), para. [0008], [0009], [0011], [0013], [0086] through [0090], [0099]).

See Continuation Sheet.

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:
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Regarding claim 24, Chakraborty discloses the wavelength conversion component of claim 23, in which the light reflective layer (conversion layer 204) comprises particles of light reflective material (light scattering particles; light extraction efficiency and the color temperature distribution uniformity are improved by the introduction of both nanoparticles and light scattering particles proximate to the light source; light scattering particles (LSPs) 210 are disposed proximate to the LED chip 202; strikes one or more of the scattering particles 210 the index of refraction differential between the medium and the particles 210 causes the light to refract and travel in a different direction, para. [0021], [0058] through [0084]) corresponding to a particle size (nanoparticles and light scattering particles proximate to the light source; nanoparticles having a high index of refraction are dispersed throughout a wavelength conversion layer to adjust the index of refraction of the layer for improved light extraction, para. [0021], [0056], [0057], [0089], [0093], [0095], [0103]) such that the particles scatter excitation light relatively more than light generated by the at least one phosphor material (LSPs 210 can be dispersed throughout various elements so long as they are proximate to the LED chip 202 such that substantially all of the emitted light has a probability of interacting with the LSPs 210; e.g. LSPs 210 are disposed throughout the binder material 206 along with the nanoparticles 208 and the phosphor; conversion layer 204 is disposed on the LED chip 202, substantially all of the emitted light travels through the conversion layer where the LSPs 210 are dispersed before being emitted from the device 200, para. [0082]).

Claims 2 and 3 lack an inventive step under PCT Article 33(3) as being obvious over Chakraborty.

Regarding claim 2, Chakraborty discloses the light emitting device of claim 1, wherein an area over which the mixture of photoluminescence material and light reflective material is distributed (conversion process takes place in the conversion layer 204 which may be loaded with phosphors; wavelength conversion layer 204 converts a portion of the emitted light to a different wavelength; Yttrium aluminum garnet (YAG) is an example of a common phosphor that may be used, para. [0028] through [0032]) is larger than the light emitting area of the light emitter (LED chip 202 is disposed on a mount surface; LED 202 can emit light of different colors and can also emit radiation outside the visible spectrum, such as infrared or ultraviolet, para. [0027], illustrated, Fig. 2, 5), yet fails to disclose wherein an area over which the mixture of photoluminescence material and light reflective material is distributed is at least fifty times the light emitting area of the light emitter. However, since the manufacturing methods used by Chakraborty include physical/chemical deposition techniques, electroplating, electrophoretic deposition, spin coating, spray coating, screen printing, and dispensing (para. [0101] through [0103]), it would have been obvious to one of skill in the art to size the area of distribution of the mixture of photoluminescence material and light reflective material to be least fifty times the light emitting area of the light emitter, since such a modification would have been a matter of routine experimentation. (Chakraborty: para. [0101] through [0103]).

Regarding claim 3, Chakraborty discloses the light emitting device of claim 1, wherein the wavelength conversion component (conversion process takes place in the conversion layer 204 which may be loaded with phosphors; wavelength conversion layer 204 converts a portion of the emitted light to a different wavelength; Yttrium aluminum garnet (YAG) is an example of a common phosphor that may be used, para. [0028] through [0032]) is locatable at a distance of at least 5mm from (conversion layer 708 has a thickness such that it may cover/bury the pedestal 706, para. [0103], [0104], [0105]) the at least one light emitter (LED chip 202 is disposed on a mount surface; LED 202 can emit light of different colors and can also emit radiation outside the visible spectrum, such as infrared or ultraviolet, para. [0027]), yet fails to disclose a distance of at least 5mm. However, it would have been obvious to one of skill in the art to size the distance between the wavelength conversion component and the light emitter to at least 5 mm, since such a modification would have been a matter of routine experimentation.

Claim 15 lacks an inventive step under PCT Article 33(3) as being obvious over Chakraborty in view of US 2007/0240346 A1 to Li et al. (hereinafter Li).

Regarding claim 15, Chakraborty discloses the light emitting device of claim 1, yet fails to disclose wherein the device is configured as a light emitting sign. Li discloses wherein a device configured as a light emitting sign (number of light emitting diodes (LEDs) 4 are provided within the light box 2 and are preferably blue LEDs which emit blue light in a wavelength range 410 to 470 nm; layer of phosphor material 6, photo luminescent material, is provided on an under surface, that is the surface facing the LEDs, excitable by the radiation emitted by the LEDs 4; para. [0040] through [0044], Fig. 1). Since both references are directed toward LED lighting, it would have been obvious to one of skill in the art to configure the device of Chakraborty into a light emitting sign as suggested by Li, since such a modification would result in an light emitting sign with greater color saturation. (Li: para. [0044]).

Claims 1-24 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:	Group Art Unit: 2879
Bing Dai et al.	Examiner: Bowman, Mary Ellen
Serial No.: 13/273,215	Confirmation No.: 8978
Filed: October 13, 2011	
For: WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES	

INFORMATION DISCLOSURE STATEMENT

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

Sir:

In accordance with 37 CFR §§ 1.97 and 1.98, the items identified in this Information Disclosure Statement (IDS) are being brought to the attention of the Office. The Examiner is requested to make these documents of record.

The items identified in this IDS may or may not be "material" pursuant to 37 CFR § 1.56. The submission thereof by Applicant(s) is not to be construed as an admission that any such patent, publication or other information referred to therein is material or considered to be material (37 CFR § 1.97(h)), or even qualifies as "prior art" under 35 USC § 102 with respect to this invention unless specifically designated by Applicant(s) as such.

1. Fee:

☐ Charge the fee due under 37 CFR § 1.17(p) to the deposit account referenced below.

☒ The fee due under 37 CFR § 1.17(p) is being concurrently submitted with the filing of an electronic IDS submission. Thus, no additional fee is required.

Savant Technologies EX1104, Page 364 of 485

☐ Applicant believes that no fee is required for this submission. However, if Applicant is mistaken, then please charge the fee due under 37 CFR § 1.17(p) to the deposit account referenced below.

2. Statement Under 37 CFR § 1.97(e):

☐ That each item of information contained in the information disclosure statement was first cited in any 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. See 37 CFR 1.97(e)(1); or

☐ That no item of information 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

3. Copies of the Cited Items:

☒ Copies of all of the items listed under Foreign Patent Documents and/or Non Patent Literature Documents are enclosed.

☐ Copies of the following items listed under Item Nos. ___ under Foreign Patent Documents and Item Nos. ___ under Non Patent Literature Documents are enclosed.

☐ Copies of the following documents listed under Item Nos. ___ under Foreign Patent Documents and Item Nos. ___ under Non Patent Literature Documents are not supplied because they were previously cited by the Office or submitted in Information Disclosure Statements in parent U.S. Application No. _____, of which the current application is a _____ and relied upon in this application for an earlier filing date under 35 USC § 120. See 37 CFR § 1.98(d). The Examiner is requested to make these documents of record.

4. Conclusion:

Citation of the above documents shall not be construed as:

1. an admission that the documents are necessarily prior art with respect to the instant invention;
2. a representation that a search has been made, other than as described above; and
3. an admission that the information cited herein is, or is considered to be, material to patentability as defined in § 1.56(b).

It is respectfully requested that the Examiner indicate consideration of the cited references by returning a copy of the attached form with initials or other appropriate marks. If the U.S. Patent Office determines that an extension and/or other relief is required, Applicant(s) petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 501105**, referencing **Docket No. ITMX-00318US2**. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

Respectfully submitted,

Dated: 09-16-2013

By: /Peter C. Mei/
Peter C. Mei
Registration No. 39,768

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PTO/SB/08a (07-09) (modified)
Approved for use through 07/31/2012. OMB 0651-0031

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Substitute for form 1449/PTO				***Complete if Known***	
				Application Number	13/273,215
				Filing Date	10-13-2011
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				First Named Inventor	Bing Dai
				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	4	of	6	Attorney Docket Number	ITMX-00318US2

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No.	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	6812500	11-02-2004	Reeh et al.	
	2	7029935	04-18-2006	Negley et al.	
	3	6903380	06-07-2005	Barnett et al.	
	4	20050243550	11-03-2005	Stekelenburg, Albert	
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT				First Named Inventor	Bing Dai
				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	5	of	6	Attorney Docket Number	ITMX-00318US2

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]
	1	JP 2001177153 A	06/29/2001	Sharp KK		
	2	JP 2002133910 A	05/10/2002	Toyoda Gosei KK		
	3	WO 2008019041 A2	02/14/2008	Li, Yi-Qun		
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				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	6	of	6	Attorney Docket Number	ITMX-00318US2

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	Docket No. ITMX-00116CN1; Foreign Office Action dated Mar. 19, 2013 for Chinese Appln. No. 201010525492.8	
	2	Docket No. ITMX-00307WO0; International Preliminary Report on Patentability dated Apr. 9, 2013 for PCT Application No. PCT/US11/54827	
	3	Docket No. ITMX-00116CN0; Fourth Office Action dated May 15, 2013 for Chinese Appln. No. 200780032995.8	
	4	Docket No. ITMX-00116US4; Non-Final Office Action dated May 16, 2013 for U.S. Appln. No. 13/087,615	
	5	Docket No. ITMX-00307US1; Non-Final Office Action dated Jun. 13, 2013 for U.S. Appln. No. 13/253,031	
	6	Docket No. ITMX-00318US3; Non-Final Office Action dated Jun. 13, 2013 for U.S. Appln. No. 13/273,217	
	7	Docket No. ITMX-00318US2; Non-Final Office Action dated Jun. 14, 2013 for U.S. Appln. No. 13/273,215	
	8	Docket No. ITMX-00116US6; Non-Final Office Action dated Jul. 18, 2013 for U.S. Appln. No. 13/436,471	
	9	Docket No. ITMX-00116US1; Non-Final Office Action Mailed on Jul. 25, 2013 for U.S. Application No. 11/640,533	
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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. 5Kind 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.**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:	Group Art Unit: 2879
Bing Dai et al.	Examiner: Bowman, Mary Ellen
Serial No.: 13/273,215	Confirmation No.: 8978
Filed: October 13, 2011	
For: WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES	

INFORMATION DISCLOSURE STATEMENT

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

Sir:

In accordance with 37 CFR §§ 1.97 and 1.98, the items identified in this Information Disclosure Statement (IDS) are being brought to the attention of the Office. The Examiner is requested to make these documents of record.

The items identified in this IDS may or may not be "material" pursuant to 37 CFR § 1.56. The submission thereof by Applicant(s) is not to be construed as an admission that any such patent, publication or other information referred to therein is material or considered to be material (37 CFR § 1.97(h)), or even qualifies as "prior art" under 35 USC § 102 with respect to this invention unless specifically designated by Applicant(s) as such.

1. Fee:

☐ Charge the fee due under 37 CFR § 1.17(p) to the deposit account referenced below.

☐ The fee due under 37 CFR § 1.17(p) is being concurrently submitted with the filing of an electronic IDS submission. Thus, no additional fee is required.

Savant Technologies EX1104, Page 370 of 485

☒ Applicant believes that no fee is required for this submission. However, if Applicant is mistaken, then please charge the fee due under 37 CFR § 1.17(p) to the deposit account referenced below.

2. Statement Under 37 CFR § 1.97(e):

☐ That each item of information contained in the information disclosure statement was first cited in any 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. See 37 CFR 1.97(e)(1); or

☒ That no item of information 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

3. Copies of the Cited Items:

☒ Copies of all of the items listed under Foreign Patent Documents and/or Non Patent Literature Documents are enclosed.

☐ Copies of the following items listed under Item Nos. ___ under Foreign Patent Documents and Item Nos. ___ under Non Patent Literature Documents are enclosed.

☐ Copies of the following documents listed under Item Nos. ___ under Foreign Patent Documents and Item Nos. ___ under Non Patent Literature Documents are not supplied because they were previously cited by the Office or submitted in Information Disclosure Statements in parent U.S. Application No. _____, of which the current application is a _____ and relied upon in this application for an earlier filing date under 35 USC § 120. See 37 CFR § 1.98(d). The Examiner is requested to make these documents of record.

Savant Technologies EX1104, Page 371 of 485

4. Conclusion:

Citation of the above documents shall not be construed as:

1. an admission that the documents are necessarily prior art with respect to the instant invention;
2. a representation that a search has been made, other than as described above; and
3. an admission that the information cited herein is, or is considered to be, material to patentability as defined in § 1.56(b).

It is respectfully requested that the Examiner indicate consideration of the cited references by returning a copy of the attached form with initials or other appropriate marks. If the U.S. Patent Office determines that an extension and/or other relief is required, Applicant(s) petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 501105**, referencing **Docket No. ITMX-00318US2**. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

Respectfully submitted,

Dated: 09-16-2013

By: /Peter C. Mei/
Peter C. Mei
Registration No. 39,768

Vista IP Law Group, LLP
2160 Lundy Ave., Ste. 230
San Jose, CA 95131
Telephone: (408) 321-8663 (Ext. 208)
Facsimile: (408) 877-1662

PTO/SB/08a (07-09) (modified)
Approved for use through 07/31/2012. 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				***Complete if Known***	
				Application Number	13/273,215
				Filing Date	10-13-2011
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				First Named Inventor	Bing Dai
				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	4	of	6	Attorney Docket Number	ITMX-00318US2

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No.	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				
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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. 5Kind 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.**

PTO/SB/08a (07-09) (modified)
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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	13/273,215
				Filing Date	10-13-2011
				First Named Inventor	Bing Dai
				Art Unit	2879
				Examiner Name	Bowman, Mary Ellen
Sheet	5	of	6	Attorney Docket Number	ITMX-00318US2

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]
	1					
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Examiner Signature		Date Considered	

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PTO/SB/08a (07-09) (modified)
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Substitute for form 1449/PTO				***Complete if Known***	
				Application Number	13/273,215
				Filing Date	10-13-2011
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				First Named Inventor	Bing Dai
				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	6	of	6	Attorney Docket Number	ITMX-00318US2

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	Docket No. ITMX-00318US1; Non-Final Office Action dated Jun. 17, 2013 for U.S. Appln. No. 13/273,212	
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Examiner Signature		Date Considered	

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Electronic Patent Application Fee Transmittal	
Application Number:	13273215
Filing Date:	13-Oct-2011
Title of Invention:	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES
First Named Inventor/Applicant Name:	Bing Dai
Filer:	Peter C. Mei/Tony Nguyen
Attorney Docket Number:	ITMX-00318US2
Filed as Small 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($)
Miscellaneous:				
Submission- Information Disclosure Stmt	2806	1	90	90
		Total in USD ($)		**90**

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. 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 13/273,215	Filing Date 10/13/2011	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	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 $310 ($155 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	

APPLICATION AS AMENDED – PART II

AMENDMENT **09/16/2013**

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 28	Minus	** 31	= 0	X $40 =	0
Independent (37 CFR 1.16(h))	* 5	Minus	***5	= 0	X $210 =	0
☐ Application Size Fee (37 CFR 1.16(s))						
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
					TOTAL ADD'L FEE	**0**

AMENDMENT

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

LIE
/DIANE WILLIAMS/

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

PTO/SB/06 (09-11)
Approved for use through 1/31/2014. 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 13/273,215	Filing Date 10/13/2011	☐ To be Mailed

ENTITY: ☐ LARGE ☒ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A		N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A		N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A		N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*		X $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*		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 $310 ($155 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	

APPLICATION AS AMENDED – PART II

AMENDMENT	09/16/2013	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 28	Minus	** 31	= 0	X $40 =	0
	Independent (37 CFR 1.16(h))	* 5	Minus	***5	= 0	X $210 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADD'L FEE	**0**

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

LIE
/DIANE WILLIAMS/

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

Electronic Acknowledgement Receipt	
EFS ID:	16863034
Application Number:	13273215
International Application Number:	
Confirmation Number:	8978
Title of Invention:	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES
First Named Inventor/Applicant Name:	Bing Dai
Customer Number:	101130
Filer:	Peter C. Mei/Tony Nguyen
Filer Authorized By:	Peter C. Mei
Attorney Docket Number:	ITMX-00318US2
Receipt Date:	16-SEP-2013
Filing Date:	13-OCT-2011
Time Stamp:	15:14:44
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$90
RAM confirmation Number	1913
Deposit Account	501105
Authorized User	VISTA IP LAW GR
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees) Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Information Disclosure Statement (IDS) Form (SB08)	ITMX-00318US2_IDS-sb08-transmittal.pdf	158272 0312228e76eb99586b460c58c204c1a9d480eaf9	no	6
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
2	Amendment/Req. Reconsideration-After Non-Final Reject	ITMX-00318US2_OA-Response_due_09142013.pdf	136934 8820e127828086971e38171d7121a9f61869c65f	no	13
Warnings:					
Information:					
3	Foreign Reference	JP2001177153A.pdf	376173 4858b622897b06caa852193a98fc9152d833d6d2	no	5
Warnings:					
Information:					
4	Foreign Reference	JP2002133910A.pdf	894536 bb2fc132541d731435b746c50d9abbd0f5e97aa1	no	10
Warnings:					
Information:					
5	Foreign Reference	WO2008019041A2.pdf	758416 c0e6cf3f719c07f4948036b93ac003851ee25530	no	35
Warnings:					
Information:					
6	Non Patent Literature	ITMX-00116CN1_OA_03-19-13.pdf	146411 a47e160b08ed1cae507023980f20fa72e6574acc	no	3
Warnings:					
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Information:					
7	Non Patent Literature	ITMX-00307WO0_Int-Report-on-Patentability_04-09-13.pdf	311001 f08d4e0872fe6f552668dde0d9309fc1c3769f85	no	10
Warnings:					
Information:					
8	Non Patent Literature	ITMX-00116CN0_Office-Action_05-15-2013.pdf	294533 a17460683cabe3b4b66f5f8d3e6042dc9b7c1bc0	no	7

Warnings:					
The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing					
Information:					
9	Non Patent Literature	ITMX-00116US4_Non_Final_OA_05-16-13.pdf	1612902 5d9f5ba3bc9941d01b1f41aed5a415e493c0db40	no	32
Warnings:					
Information:					
10	Non Patent Literature	ITMX-00307US1_Non_Final_OA_06-13-13.pdf	843775 0a57211b6c6696c04507dca5e270b68b78e6d423	no	22
Warnings:					
Information:					
11	Non Patent Literature	ITMX-00318US3_Non_Final_OA_06-13-13.pdf	1977777 cc68519ebda4df5f52d7ce8b79c92c6183c30895	no	41
Warnings:					
Information:					
12	Non Patent Literature	ITMX-00318US2_Non_Final_OA_06-14-13.pdf	2073736 a5db0d5093a9858a8f8076ef2f1ffcf052d389b5	no	38
Warnings:					
Information:					
13	Non Patent Literature	ITMX-00116US6_NFOA_07_18_2013.pdf	660578 89ecbc1a18141e5070f89ca8be4b891466e34956	no	18
Warnings:					
Information:					
14	Non Patent Literature	ITMX-00116US1_NFOA_07_25_2013.pdf	2425223 9e1892fc2b167c91a1b0783b54a4fcf2bec54c50	no	48
Warnings:					
Information:					
15	Fee Worksheet (SB06)	fee-info.pdf	30489 a77ada3344e2f6161eaf5d6e93d08b96c159d7c1	no	2
Warnings:					
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			Total Files Size (in bytes):	12700756	

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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.

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Electronic Acknowledgement Receipt	
EFS ID:	16863789
Application Number:	13273215
International Application Number:	
Confirmation Number:	8978
Title of Invention:	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES
First Named Inventor/Applicant Name:	Bing Dai
Customer Number:	101130
Filer:	Peter C. Mei/Tony Nguyen
Filer Authorized By:	Peter C. Mei
Attorney Docket Number:	ITMX-00318US2
Receipt Date:	16-SEP-2013
Filing Date:	13-OCT-2011
Time Stamp:	15:42:57
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	Information Disclosure Statement (IDS) Form (SB08)	ITMX-00318US2_IDS-sb08-transmittal2.pdf	156286 435601ca9cb2da828f13799d716c1167c8b65b2d	no	6

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2	Non Patent Literature	ITMX-00318US1_Non-Final-OA_06-17-13.pdf	2021993 9b10e0898d6a384725240db5bcaaad2363d8ef98	no	37
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			Total Files Size (in bytes):	2178279	

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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.

LISTING OF THE CLAIMS

Claims 1, 4-24 and 26-31 are pending. No new matter has been added. A complete listing of the pending claims is provided below and supersedes all previous claim lists.

1. (Previously Presented) A wavelength conversion component for a light emitting device comprising:

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from a radiation source relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material,

wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light having a wavelength of greater than or equal to 440 nm is emitted through the wavelength conversion component to contribute to a final visible emission product;

wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material.

2. (Canceled)

3. (Canceled)

4. (Previously Presented) The component of Claim 1, wherein the light scattering material has an average particle size that is less than about 150nm.

5. (Original) The component of Claim 1, wherein the light scattering material is selected from the group consisting of: titanium dioxide, barium sulfate, magnesium oxide, silicon dioxide and aluminum oxide.

6. (Original) The component of Claim 1 wherein the at least one photoluminescence material is located in a wavelength conversion layer and the light scattering material is located in

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a diffusing layer.

7. (Original) The component of Claim 6, wherein the wavelength conversion layer and the light diffusing layer are in direct contact with each other.

8. (Original) The component of Claim 7, wherein the wavelength conversion layer comprises a mixture of the at least one phosphor material and a light transmissive binder and the light diffusing layer comprises a mixture of the light scattering material and the light transmissive binder.

9. (Original) The component of Claim 8, wherein the light transmissive binder comprises a curable liquid polymer selected from the group consisting of: a polymer resin, a monomer resin, an acrylic, an epoxy, a silicone and a fluorinated polymer.

10. (Original) The component of Claim 8, wherein the weight loading of light scattering material to binder selected from the group consisting of: 7% to 35% and 10% to 20%.

11. (Original) The component of Claim 6, wherein the wavelength conversion and light diffusing layers are deposited using a method selected from the group consisting of: screen printing, slot die coating, spin coating, roller coating, drawdown coating and doctor blading.

12. (Original) The component of Claim 6 in which the wavelength conversion layer and the light diffusing layer comprises planar shapes.

13. (Original) The component of Claim 6 in which the light diffusing layer comprises a dome or elongated dome shape.

14. (Original) The component of claim 13 in which the wavelength conversion layer fills a volume formed beneath the dome or elongated dome shapes.

15. (Original) The component of Claim 1, wherein both the at least one photoluminescence

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material and the light scattering material are located in a wavelength conversion layer.

16. (Original) The component of Claim 1, wherein the light scattering material has an average particle size in a range selected from the group consisting of: 1μm to 50μm and 10μm to 20μm.

17. (Original) The component of Claim 1, wherein the at least one photoluminescence material is deposited onto a light transmissive substrate, and the light transmissive substrate is selected from the group consisting of: a polycarbonate, an acrylic and a glass.

18. (Original) The component of Claim 1, wherein the excitation light comprises ultraviolet light.

19. (Original) The component of Claim 18, wherein the light scattering material has an average particle size that is less than about 100nm.

20. (Previously Presented) A light emitting device, comprising:

at least one solid-state light emitter operable to generate excitation light; and

a wavelength conversion component comprising:

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from the at least one solid-state light emitter relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material,

wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light having a wavelength of greater than or equal to 440 nm is emitted through the wavelength conversion component to contribute to a final visible emission product;

wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material.

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21. (Original) The device of claim 20, wherein the light emitting device is selected from the group consisting of: downlights, light bulbs, linear lamps, lanterns, wall lamps, pendant lamps, chandeliers, recessed lights, track lights, accent lights, stage lighting, movie lighting, street lights, flood lights, beacon lights, security lights, traffic lights, headlamps, taillights, and signs.

22. (Original) The device of claim 20 in which the average particle size of the light scattering material is selected to improve an OFF state white appearance of the light emitting device.

23. (Original) The device of claim 20 in which the average particle size of the light scattering material is selected to obtain substantially uniform color for emitted light from the light emitting device for emission angles over a $\pm 60^{o}$ range from an emission axis.

24. (Original) The device of claim 23, wherein a weight loading of the light scattering material to a binder selected from the group consisting of: 7% to 35% and 10% to 20%.

25. (Canceled)

26. (Original) The device of Claim 25, wherein the light scattering material has an average particle size that is less than about 150nm.

27. (Original) The device of Claim 20 in which the wavelength conversion layer and the light diffusing layer comprises planar shapes.

28. (Original) The device of Claim 20 in which the light diffusing layer comprises a dome or elongated dome shape.

29. (Previously Presented) A linear lamp comprising:

an elongate housing;

a plurality of solid-state light emitters housed within the housing and configured along the length of the housing; and

an elongate wavelength conversion component remote to the plurality of solid-state light

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emitters and configured to in part at least define a light mixing chamber,

wherein the elongate wavelength conversion component comprises

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from the plurality of solid-state light emitters relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material,

wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light having a wavelength of greater than or equal to 440 nm is emitted through the wavelength conversion component to contribute to a final visible emission product;

wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material.

30. (Previously Presented) A downlight comprising:

a body comprising one or more solid-state light emitters, wherein the body is configured to be positioned within a downlighting fixture such that the downlight emits light in a downward direction; and

a wavelength conversion component remote to the one or more solid-state light emitters and configured to in part at least define a light mixing chamber,

wherein the wavelength conversion component comprises

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from the one or more solid-state light emitters relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material,

wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light having a wavelength of greater than or equal

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to 440 nm is emitted through the wavelength conversion component to contribute to a final visible emission product;

wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material.

31. (Previously Presented) A light bulb comprising:

a connector base configured to be inserted in a socket to form an electrical connection for the light bulb;

a body comprising one or more solid-state light emitters;

a wavelength conversion component having a three dimensional shape that is configured to enclose the one or more solid-state light emitters and to in part at least define a light mixing chamber,

wherein the wavelength conversion component comprises

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from the one or more solid-state light emitters relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material,

wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light having a wavelength of greater than or equal to 440 nm is emitted through the wavelength conversion component to contribute to a final visible emission product;

wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material.

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REMARKS

Claims 1, 4-24 and 26-31 are currently pending in the application. No new matter has been added.

I. Interview Summary

Applicants first wish to thank the Examiner of record, Ms. Mary Ellen Bowman, for granting and conducting a telephonic interview on September 11, 2013. During the telephonic interview, claim 1 and the McNulty reference were specifically discussed. Applicants and Examiner agreed that the McNulty reference cannot be combined to disclose the claimed limitation "wherein the wavelength conversion component is configured such that in operation a portion of excitation light comprising blue light having a wavelength of greater than or equal to 440 nm is emitted through the wavelength conversion component to contribute to a final visible emission product."

II. Claim Rejections under 35 U.S.C. §103

Claims 1, 4-9, 11-15, 18-20, 22, 23 and 26-28 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Publication No. 2001/0000622(Reeh) in view of U.S. Patent Pub. No. 2002/0180351 (McNulty). Applicants respectfully traverse.

Claim 1 currently recites the following limitation. Claim 20 currently recites similar limitations.

> wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light having a wavelength of greater than or equal to 440 nm is emitted through the wavelength conversion component to contribute to a final visible emission product

A. MPEP requires that the proposed modification cannot change the principle of operation of a reference, and that the suggested combination may not require a change in the basic principle under which the [primary reference] construction was designed to operate." MPEP §2143.01 citing *In re Ratti*, 270 F. 2d 810, 813, 123 USPQ 349, 352 (CCPA 1959) (emphasis added).

Applicants respectfully submit that permitting a modification of McNulty to possess the claimed aspect "wherein the wavelength conversion component is configured such that in operation a portion of excitation light comprising blue light having a wavelength of greater than or equal to 440 nm is emitted through the wavelength conversion component to contribute to a final visible emission product" would frustrate the principle of operation in McNulty.

McNulty discloses UV reflectors incorporated in a UV LED-based light source to reduce the amount of UV excitation radiation emission into the surroundings and increase the efficiency of such light sources. *See abstract*. Figure 2 of McNulty illustrates an embodiment of a UV LED-based light source wherein a layer of phosphor material is applied to a surface of the UV LED and a layer of scattering material is applied on top of the phosphor layer. *See paragraph 22*. McNulty discloses that the scattering layer serves the purpose of reflecting UV excitation radiation of the UV LED light source back into the layer of phosphor material for further absorption such that the amount of unconverted UV excitation radiation is minimized and light output by the phosphor material is maximized. *See paragraphs 21-22*. This in turn allows for the significant reduction of UV radiation leakage to the surroundings. *See paragraph 22*.

Thus, the principle of operation in McNulty is to configure a layer of scattering material to maximize the reflection of excitation radiation back into the phosphor material in order to maximize the light output from the phosphor material, rather than allowing for a portion of excitation light to be emitted through to contribute to a final visible emission product. Nonetheless, claim 1 recites "wherein the wavelength conversion component is configured such that in operation a portion of excitation light comprising blue light having a wavelength of greater than or equal to 440 nm is emitted through the wavelength conversion component to contribute to a final visible emission product".

It would therefore frustrate the principle of operation of McNulty to permit a modification of the scattering material to possess the claimed aspect "wherein the wavelength conversion component is configured such that in operation a portion of excitation light comprising blue light having a wavelength of greater than or equal to 440 nm is emitted through the wavelength conversion component to contribute to a final visible emission product".

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Therefore, Applicants respectfully submit that McNulty cannot be combined with other references to support claim rejections under 35 U.S.C. §103(a) as mandated by MPEP §2143.01 and the current 35 U.S.C. §103 jurisdprudence.

B. MPEP requires that "[a] prior art reference must be considered **in its entirety**, i.e., as a whole, including portions that would lead away from the claimed invention." MPEP §2141.03 citing *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F. 2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984) (emphasis added). The U.S. Court of Appeals for the Federal Circuit held that "[t]he Supreme Court went on to state that 'when a patent simply arranges old elements…the combination is obvious' (citation omitted)", and that "[t]he opposite conclusion would follow, however, if the prior art indicated that the invention would not have worked for its intended purpose or otherwise taught away from the invention. (Citation omitted.)" *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.* 567 F. 3d 1314, ____ (Fed. Cir. 2009) (emphasis added).

Claim 1 recites at least the limitation "wherein the wavelength conversion component is configured such that in operation a portion of excitation light comprising blue light having a wavelength of greater than or equal to 440 nm is emitted through the wavelength conversion component to contribute to a final visible emission product".

Applicants respectfully submit that McNulty in fact teaches away from at least the claimed limitation "wherein the wavelength conversion component is configured such that in operation a portion of excitation light comprising blue light having a wavelength of greater than or equal to 440 nm is emitted through the wavelength conversion component to contribute to a final visible emission product".

In contrast, McNulty discloses a component of a UV LED-based light source having a scattering layer and phosphor material, wherein the scattering layer is configured to reflect UV excitation radiation of the UV LED-based light source back into the layer of phosphor material for further absorption such that the amount of unconverted UV radiation is minimized and light output by the phosphor material is maximized. *See paragraphs 21-22.*

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Thus, the layer of scattering material in McNulty is configured to maximize the reflection of excitation radiation back into the phosphor material in order to maximize the light output from the phosphor material, rather than being configured to allow for a portion of excitation light to be emitted through to contribute to a final visible emission product. As such, McNulty clearly teaches away from allowing a portion of excitation light generated to be emitted through a wavelength conversion component to contribute to a final visible emission product.

Therefore, Applicants respectfully submit that McNulty cannot be combined with other references to support claim rejections under 35 U.S.C. §103(a) as mandated by MPEP §2143.01 and the current 35 U.S.C. §103 jurisprudence.

For at least these foregoing reasons, claim 1 and its dependent claims should be allowable over Reeh, McNulty and their combination. For at least these same reasons, claim 20 and its dependent claims should also be allowable over Reeh, McNulty and their combination.

III. Claim Rejections under 35 U.S.C. §103

Claims 10 and 24 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Reeh and McNulty in view of U.S. Patent No. 4,191,943 (Cairns). These claims are allowable for at least the same reason that their respective base claims are allowable.

IV. Claim Rejections under 35 U.S.C. §103

Claims 16 and 17 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Reeh and McNulty in view of U.S. Publication No. 2009/0272996 (Chakraborty). These claims are allowable for at least the same reason that their respective base claims are allowable.

V. Claim Rejections under 35 U.S.C. §103

Claims 21 and 29 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Reeh and McNulty in view of U.S. Patent No. 6,860,628 (Robertson). These claims are allowable for at least the same reason that their respective base claims are allowable.

VI. Claim Rejections under 35 U.S.C. §103

Claim 30 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Reeh and McNulty in view of U.S. Publication No. 2007/0120135 (Soules). Applicants respectfully traverse.

This claim is allowable for at least the same reasons that claim 1 is allowable.

VII. Claim Rejections under 35 U.S.C. §103

Claim 31 stands rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Reeh and McNulty in view of U.S. Publication No. 2008/0130285 (Negley). Applicants respectfully traverse.

This claim is allowable for at least the same reasons that claim 1 is allowable.

CONCLUSION

Based on the foregoing, all claims are believed allowable, and an allowance of the claims is respectfully requested. If the Examiner has any questions or comments, the Examiner is respectfully requested to contact the undersigned at the number listed below.

Applicant(s) hereby explicitly retracts and rescinds any and all of the arguments and disclaimers presented to distinguish the prior art of record during the prosecution of all parent and related application(s)/patent(s), and respectfully requests that the Examiner re-visit the prior art that such arguments and disclaimers were made to avoid.

The Commissioner is authorized to charge any fees due in connection with the filing of this document to Vista IP Law Group's Deposit Account No. 50-1105, referencing billing number ITMX-00318US2. The Commissioner is authorized to credit any overpayment or to charge any underpayment to Vista IP Law Group's Deposit Account No. 50-1105, referencing billing number ITMX-00318US2.

Respectfully submitted,

Dated: September 13, 2013

By: /Frederick Hsu /
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Savant Technologies EX1104, Page 397 of 485

PATENT
Attorney Docket No.: ITMX-00318US2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:	Group Art Unit: 2879
Bing Dai et al.	Examiner: Bowman, Mary Ellen
Serial No.: 13/273,215	Confirmation No.: 8978
Filed: October 13, 2011	
For: WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES	

RESPONSE TO OFFICE ACTION

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

Dear Sir:

In response to the Office action dated June 14, 2013, Applicants request that this application be amended in accordance with the following sheets.

Listing of the Claims begins on page 2.

Remarks begin on page 8.

Savant Technologies EX1104, Page 398 of 485

Search Notes	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13273215	DAI ET AL.
	Examiner	Art Unit
	313MARY ELLEN BOWMAN	2879

CPC- SEARCHED		
Symbol	Date	Examiner

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
313	112, 498, 501, 512	9/18/12	MB
257	98	9/18/12	MB
438	27	9/18/12	MB

SEARCH NOTES		
Search Notes	Date	Examiner
inventor search in eDan	9/18/12	MB

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
	same	9/21/13	MB

/MARY ELLEN BOWMAN/ Examiner.Art Unit 2879	/MARY ELLEN BOWMAN/ Primary Examiner.Art Unit 2879

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101130 7590 09/30/2013

Vista IP Law Group, LLP (Intematix)
2160 Lundy Avenue, Suite 230
San Jose, CA 95131

EXAMINER
BOWMAN, MARY ELLEN

ART UNIT	PAPER NUMBER
2879	

DATE MAILED: 09/30/2013

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/273,215	10/13/2011	Bing Dai	ITMX-00318US2	8978

TITLE OF INVENTION: WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$890	$300	$0	$1190	12/30/2013

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PTOL-85 (Rev. 02/11)

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PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
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INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

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(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/273,215	10/13/2011	Bing Dai	ITMX-00318US2	8978

TITLE OF INVENTION: WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$890	$300	$0	$1190	12/30/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
BOWMAN, MARY ELLEN	2879	313-112000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ❑ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ❑ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1_____
2_____
3_____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ❑ Individual ❑ Corporation or other private group entity ❑ Government

4a. The following fee(s) are submitted:
- ❑ Issue Fee
- ❑ Publication Fee (No small entity discount permitted)
- ❑ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ❑ A check is enclosed.
- ❑ Payment by credit card. Form PTO-2038 is attached.
- ❑ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

PTOL-85 (Rev. 02/11)

Savant Technologies EX1104, Page 401 of 485

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29	NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
❑ Applicant asserting small entity status. See 37 CFR 1.27	NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
❑ Applicant changing to regular undiscounted fee status.	NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. 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, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/273,215	10/13/2011	Bing Dai	ITMX-00318US2	8978

101130 7590 09/30/2013

Vista IP Law Group, LLP (Intematix)
2160 Lundy Avenue, Suite 230
San Jose, CA 95131

EXAMINER	
BOWMAN, MARY ELLEN	

ART UNIT	PAPER NUMBER
2879	

DATE MAILED: 09/30/2013

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 0 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 0 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

PTOL-85 (Rev. 02/11)

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 13/273,215	Applicant(s) DAI ET AL.	
	Examiner MARY ELLEN BOWMAN	Art Unit 2879	AIA (First Inventor to File) Status No

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

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *Amendment filed 9/16/13*.
   ☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on_____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are *1,4-24 and 26-31*. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov .
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

   Certified copies:

   a) ☐ All b) ☐ Some *c) ☐ None of the:
   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)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date 9/16/13, 9/16/13
3. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
5. ☐ Examiner's Amendment/Comment
6. ☒ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____.

/MARY ELLEN BOWMAN/
Primary Examiner, Art Unit 2879

The present application is being examined under the pre-AIA first to invent provisions.

Allowable Subject Matter

Claims 1, 4-24 and 26-31 are allowed.

The following is an examiner's statement of reasons for allowance: The prior art fails to teach the presently claimed invention comprising the claimed wavelength conversion component and scattering particles. The reasons for allowance are clearly set forth in Applicant's remarks, filed September 13, 2013, and are therefore not herein repeated.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MARY ELLEN BOWMAN whose telephone number is (571)270-5383. The examiner can normally be reached on Monday-Friday, 5:30-8:30a.m. and 12:00-5:00 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (571) 272-2457. 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.

/MARY ELLEN BOWMAN/
Primary Examiner, Art Unit 2879

PTO/SB/08a (07-09) (modified)
Approved for use through 07/31/2012. OMB 0651-0031

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Substitute for form 1449/PTO				Complete if Known	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use as many sheets as necessary)				Application Number	13/273,215
				Filing Date	10-13-2011
				First Named Inventor	Bing Dai
				Art Unit	2879
				Examiner Name	Bowman, Mary Ellen
Sheet	4	of	6	Attorney Docket Number	ITMX-00318US2

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	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
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Examiner Signature	/Mary Ellen Bowman/	Date Considered	09/21/2013

*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. 5Kind 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.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.B./

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Examiner Signature	/Mary Ellen Bowman/	Date Considered	09/21/2013

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(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	6	of	6	Attorney Docket Number	ITMX-00318US2

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	Docket No. ITMX-00318US1; Non-Final Office Action dated Jun. 17, 2013 for U.S. Appln. No. 13/273,212	
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Examiner Signature	/Mary Ellen Bowman/	Date Considered	09/21/2013

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	1	6812500	11-02-2004	Reeh et al.	
	2	7029935	04-18-2006	Negley et al.	
	3	6903380	06-07-2005	Barnett et al.	
	4	20050243550	11-03-2005	Stekelenburg, Albert	
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	1	JP 2001177153 A	06/29/2001	Sharp KK		
	2	JP 2002133910 A	05/10/2002	Toyoda Gosei KK		
	3	WO 2008019041 A2	02/14/2008	Li, Yi-Qun		
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PTO/SB/08a (07-09) (modified)
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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 6 of 6

Complete if Known	
Application Number	13/273,215
Filing Date	10-13-2011
First Named Inventor	Bing Dai
Art Unit	2879
Examiner Name	Bowman, Mary Ellen
Attorney Docket Number	ITMX-00318US2

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	Docket No. ITMX-00116CN1; Foreign Office Action dated Mar. 19, 2013 for Chinese Appln. No. 201010525492.8	
	2	Docket No. ITMX-00307WO0; International Preliminary Report on Patentability dated Apr. 9, 2013 for PCT Application No. PCT/US11/54827	
	3	Docket No. ITMX-00116CN0; Fourth Office Action dated May 15, 2013 for Chinese Appln. No. 200780032995.8	
	4	Docket No. ITMX-00116US4; Non-Final Office Action dated May 16, 2013 for U.S. Appln. No. 13/087,615	
	5	Docket No. ITMX-00307US1; Non-Final Office Action dated Jun. 13, 2013 for U.S. Appln. No. 13/253,031	
	6	Docket No. ITMX-00318US3; Non-Final Office Action dated Jun. 13, 2013 for U.S. Appln. No. 13/273,217	
	7	Docket No. ITMX-00318US2; Non-Final Office Action dated Jun. 14, 2013 for U.S. Appln. No. 13/273,215	
	8	Docket No. ITMX-00116US6; Non-Final Office Action dated Jul. 18, 2013 for U.S. Appln. No. 13/436,471	
	9	Docket No. ITMX-00116US1; Non-Final Office Action Mailed on Jul. 25, 2013 for U.S. Application No. 11/640,533	
	10		
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	15		
	16		

Examiner Signature	/Mary Ellen Bowman/	Date Considered	09/21/2013

*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. 5Kind 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.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.B./

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13273215	DAI ET AL.
	Examiner	**Art Unit**
	MARY ELLEN BOWMAN	2879

CPC		
Symbol	**Type**	**Version**
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CPC Combination Sets				
Symbol	**Type**	**Set**	**Ranking**	**Version**
/				
/				

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	28	
/MARY ELLEN BOWMAN/ Primary Examiner.Art Unit 2879	09/21/2013	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13273215	DAI ET AL.
	Examiner	**Art Unit**
	MARY ELLEN BOWMAN	2879

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
313	112	H	0	1	J	5 / 16						

CROSS REFERENCE(S)					
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)				
438	27				
257	98				
313	498				

NONE		Total Claims Allowed:	
(Assistant Examiner)	(Date)	28	
/MARY ELLEN BOWMAN/ Primary Examiner.Art Unit 2879	09/21/2013	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13273215	DAI ET AL.
	Examiner	**Art Unit**
	MARY ELLEN BOWMAN	2879

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original	Final	Original
1	1	15	17												
	2	16	18												
	3	17	19												
2	4	18	20												
3	5	19	21												
4	6	20	22												
5	7	21	23												
6	8	22	24												
7	9		25												
8	10	23	26												
9	11	24	27												
10	12	25	28												
11	13	26	29												
12	14	27	30												
13	15	28	31												
14	16														

NONE		**Total Claims Allowed:**	
(Assistant Examiner)	(Date)	28	
/MARY ELLEN BOWMAN/ Primary Examiner.Art Unit 2879	09/21/2013	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	1

U.S. Patent and Trademark Office Part of Paper No. 20130921

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	13273215	DAI ET AL.
	Examiner	Art Unit
	MARY ELLEN BOWMAN	2879

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	09/18/2012	02/25/2013	06/07/2013	09/21/2013					
	1	✓	✓	✓	=					
	2	✓	-	-	-					
	3	✓	-	-	-					
	4	✓	✓	✓	=					
	5	✓	✓	✓	=					
	6	✓	✓	✓	=					
	7	✓	✓	✓	=					
	8	✓	✓	✓	=					
	9	✓	✓	✓	=					
	10	✓	✓	✓	=					
	11	✓	✓	✓	=					
	12	✓	✓	✓	=					
	13	✓	✓	✓	=					
	14	✓	✓	✓	=					
	15	✓	✓	✓	=					
	16	✓	✓	✓	=					
	17	✓	✓	✓	=					
	18	✓	✓	✓	=					
	19	✓	✓	✓	=					
	20	✓	✓	✓	=					
	21	✓	✓	✓	=					
	22	✓	✓	✓	=					
	23	✓	✓	✓	=					
	24	✓	✓	✓	=					
	25	✓	-	-	-					
	26	✓	✓	✓	=					
	27	✓	✓	✓	=					
	28	✓	✓	✓	=					
	29	✓	✓	✓	=					
	30	✓	✓	✓	=					
	31	✓	✓	✓	=					

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S1	1	"20090272996"	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/17 14:20
S2	2	"20070240346"	US-PGPUB; USPAT; USOCR	OR	OFF	2012/09/17 14:28
S3	356	(257/98.ccls. 438/27.ccls. 313/498,501,512,112.ccls.) and ("light emitting diode" LED.U/C.) and ((scatter$3 reflect$3) with particle with (size nanometer micrometer))	US-PGPUB; USPAT; USOCR	OR	ON	2012/09/17 14:34
S4	215	(257/98.ccls. 438/27.ccls. 313/498,501,512,112.ccls.) and ("light emitting diode" LED.U/C.) and ((scatter$3 reflect$3) with particle with (concentration weight percent$3 amount))	US-PGPUB; USPAT; USOCR	OR	ON	2012/09/17 15:37
S5	9	(257/98.ccls. 438/27.ccls. 313/498,501,512,112.ccls.) and ("light emitting diode" LED.U/C.) and (down$light) and (base near4 socket)	US-PGPUB; USPAT; USOCR	OR	ON	2012/09/17 16:20
S6	2	(257/98.ccls. 438/27.ccls. 313/498,501,512,112.ccls.) and ("light emitting diode" LED.U/C.) and (down$light) and ((housing envelope bulb) with (elongat$2 linear))	US-PGPUB; USPAT; USOCR	OR	ON	2012/09/17 16:30
S7	46	(257/98.ccls. 438/27.ccls. 313/498,501,512,112.ccls.) and ("light emitting diode" LED.U/C.) and ((housing envelope bulb) with (elongat$2 linear))	US-PGPUB; USPAT; USOCR	OR	ON	2012/09/17 16:31
S8	50	(257/98.ccls. 438/27.ccls. 313/498,501,512,112.ccls.) and ("light emitting diode" LED.U/C.) and (downlight)	US-PGPUB; USPAT; USOCR	OR	ON	2012/09/17 16:33
S9	968	(257/98.ccls. 438/27.ccls. 313/498,501,512,112.ccls.) and ("light emitting diode" LED.U/C.) and ((scatter$3 reflect$3) with particle) and blue	US-PGPUB; USPAT; USOCR	OR	ON	2013/02/21 10:28
S10	896	(257/98.ccls. 438/27.ccls. 313/498,501,512,112.ccls.) and ("light emitting diode" LED.U/C.) and ((scatter$3 reflect$3) with particle) and blue and (phosphor fluorescent)	US-PGPUB; USPAT; USOCR	OR	ON	2013/02/21 10:29

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp

L1	408	(257/98.ccls. 438/27.ccls. 313/498,501,512,112.ccls.) and ("light emitting diode" LED.U/C.) and ((scatter$3 reflect$3) with particle) and blue and (phosphor fluorescent)	USPAT; UPAD	OR	ON	2013/09/18 18:14

9/18/2013 6:15:14 PM
C:\Users\mbowman\Documents\EAST\Workspaces\13273217.wsp

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
ROBINSON ROSS T.

WINSTEAD PC P.O. BOX 131851 DALLAS TX 75313 USA

RECEIVED ON
OCT 10 2013
BY WINSTEAD

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference ITMX-00116WO1 51026-P286WO	Date of mailing *(day/month/year)* 27 September 2013 (27.09.2013) **FOR FURTHER ACTION** See paragraphs 1 and 4 below
International application No. **PCT/US2013/048354**	International filing date *(day/month/year)* **27 June 2013 (27.06.2013)**
Applicant **INTEMATIX CORPORATION**	

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:

   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

   For more detailed instructions, see *PCT Applicant's Guide*, International Phase, paragraphs 9.004 . 9.011.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. ☐ **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

   ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. Following the expiration of 30 months from the priority date, these comments will also be made available to the public.

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90bis.1 and 90bis.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.
In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19months.

For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the PCT Applicant's Guide, National Chapters.

Name and mailing address of the ISA/KR Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea Facsimile No. 82-42-472-7140	Authorized officer COMMISSIONER Telephone No. 82-42-481-8755

DOCKETED ON
OCT 10 2013

Form PCT/ISA/220 (July 2010)

By:

* Attention

Copies of the documents cited in the international search report can be searched in the following Korean Intellectual Property Office English website for three months from the date of mailing of the international search report.

http://www.kipo.go.kr/en/ => PCT Services => PCT Services

ID : PCT international application number
PW : **7LMA2ADG**

Inquiries related to PCT International Search Report or Written Opinion prepared by KIPO as an International Searching Authority can be answered not only by KIPO but also through IPKC (Intellectual Property Korea Center), located in Vienna, VA, which functions as a PCT Help Desk for PCT applicants.

Homepage: http://www.ipkcenter.com

Email: ipkc@ipkcenter.com

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference ITMX-00116WO1	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. **PCT/US2013/048354**	International filing date *(day/month/year)* **27 June 2013 (27.06.2013)**	(Earliest) Priority Date *(day/month/year)* 28 June 2012 (28.06.2012)
Applicant **INTEMATIX CORPORATION**		

This International search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language**, the international search was carried out on the basis of :
      ☒ the international application in the language in which it was filed
      ☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. ☐ This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).
   c. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.
2. ☐ **Certain claims were found unsearchable** (See Box No. II)
3. ☐ **Unity of invention is lacking** (See Box No. III)
4. With regard to the **title,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established by this Authority to read as follows:
5. With regard to the **abstract,**
   ☒ the text is approved as submitted by the applicant.
   ☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
6. With regard to the drawings,
   a. the figure of the **drawings** to be published with the abstract is Figure No. 8
      ☒ as suggested by the applicant.
      ☐ as selected by this Authority, because the applicant failed to suggest a figure.
      ☐ as selected by this Authority, because this figure better characterizes the invention.
   b. ☐ none of the figure is to be published with the abstract.

DOCKETED ON
OCT 10 2013
By:

Form PCT/ISA/210 (first sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2013/048354

A. CLASSIFICATION OF SUBJECT MATTER

F21S 2/00(2006.01)i, F21V 5/00(2006.01)i

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)
F21S 2/00; F21V 29/00; H01J 1/62; F21V 9/16; F21V 5/00; F21Y 101/02; H01J 9/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & keywords: elongate lens, phosphor, solid-state light emitter, lamp, diffusing

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005-0093430 A1 (JAMES IBBETSON et al.) 05 May 2005 See paragraphs [0005]-[0072]; and figures 1-18.	18-25
Y		1-17
Y	US 2011-0149548 A1 (HAITAO YANG et al.) 23 June 2011 See paragraphs [0039]-[0057]; and figures 2-12.	1-17
A	JP 2011-192793 A (NIIYAMA HEIJI) 29 September 2011 See paragraphs [0016]-[0045]; and figures 1-8.	1-25
A	US 2008-0062672 A1 (SIEW IT PENG et al.) 13 March 2008 See paragraphs [0008]-[0026]; and figures 1-5.	1-25
A	US 2009-0219713 A1 (DENNIS SIEMIET et al.) 03 September 2009 See paragraphs [0013]-[0032]; and figures 1-3.	1-25

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 September 2013 (27.09.2013)	**27 September 2013 (27.09.2013)**
Name and mailing address of the ISA/KR Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea Facsimile No. +82-42-472-7140	Authorized officer KIM Do Weon Telephone No. +82-42-481-5560

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/US2013/048354

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005-0093430 A1	05/05/2005	CA 2517009 A1	10/09/2004
		CN 1777999 A	24/05/2006
		CN 1777999 B	26/05/2010
		EP 1597777 A2	23/11/2005
		EP 1597777 B1	24/04/2013
		EP 2262006 A2	15/12/2010
		EP 2262006 A3	21/03/2012
		JP 2006-519500 A	24/08/2006
		JP 2011-061230 A	24/03/2011
		JP 2013-093595 A	16/05/2013
		KR 10-2005-0113200 A	01/12/2005
		KR 10-2011-0137403 A	22/12/2011
		MY 142684 A	31/12/2010
		TW 201225339 A	16/06/2012
		WO 2004-077580 A2	10/09/2004
		WO 2004-077580 A3	10/03/2005
US 2011-0149548 A1	23/06/2011	None	
JP 2011-192793 A	29/09/2011	JP 4792531 B2	12/10/2011
US 2008-0062672 A1	13/03/2008	US 2005-0248271 A1	10/11/2005
		US 2008-0064287 A1	13/03/2008
		US 7315119 B2	01/01/2008
		US 7727041 B2	01/06/2010
		US 7733021 B2	08/06/2010
US 2009-0219713 A1	03/09/2009	US 7815338 B2	19/10/2010
		WO 2009-111098 A2	11/09/2009
		WO 2009-111098 A3	29/10/2009

Savant Technologies EX1104, Page 424 of 485

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
ROBINSON ROSS T.

WINSTEAD PC P.O. BOX 131851 DALLAS TX 75313 USA

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing *(day/month/year)*	**27 September 2013 (27.09.2013)**
Applicant's or agent's file reference ITMX-00116WO1	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/US2013/048354	**27 June 2013 (27.06.2013)**	28 June 2012 (28.06.2012)

International Patent Classification (IPC) or both national classification and IPC
F21S 2/00(2006.01)i, F21V 5/00(2006.01)i

Applicant
INTEMATIX CORPORATION

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.
For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/KR	Date of completion of this opinion	Authorized officer
Korean Intellectual Property Office 189 Cheongsa-ro, Seo-gu, Daejeon Metropolitan City, 302-701, Republic of Korea Facsimile No. +82-42-472-7140	27 September 2013 (27.09.2013)	KIM Do Weon Telephone No. +82-42-481-5560

DOCKETED ON
OCT 17 2013
By:

Form PCT/ISA/237 (cover sheet) (July 2011)

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2013/048354

Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of :

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into _____ , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a))

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of:

   a. a sequence listing filed or furnished
      ☐ on paper
      ☐ in electronic form

   b. time of filing or furnishing
      ☐ contained in the international application as filed.
      ☐ filed together with the international application in electronic form.
      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additioanl copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

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WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2013/048354

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-25	YES
	Claims	NONE	NO
Inventive step (IS)	Claims	NONE	YES
	Claims	1-25	NO
Industrial applicability (IA)	Claims	1-25	YES
	Claims	NONE	NO

2. Citations and explanations :

Reference is made to the following documents:

D1: US 2005-0093430 A1
D2: US 2011-0149548 A1
D3: JP 2011-192793 A
D4: US 2008-0062672 A1
D5: US 2009-0219713 A1

1. Novelty and Inventive Step

1.1. Independent Claim 1

D1, which is considered to be the closest prior art to the subject matter of claim 1, discloses a lamp (an emitter 30; see paragraph [0049] and figure 4).

When comparison is made between claim 1 and D1, the following features of claim 1 differ from D1, but the features can be easily derived from the features of D1 or D2 as follows:

a co-extruded component, the co-extruded component comprising an elongate lens and a layer of a photoluminescent material, wherein the elongate lens and the layer of the photoluminescent material are co-extruded together to form the co-extruded component (a lens 36 includes an inside layer 38 with conversion particles 22 and an outside layer 40, where the layers 38 and 40 preferably have uniform thicknesses throughout in D1; see paragraph [0050] and figure 4);
the elongate lens for shaping light emitted from the lamp (a lens and caps can

Continued on Supplemental Box

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Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of: Box No. V

be shaped to adapt to the particular application and can be shaped to focus the emitted light in D1; see paragraph [0072]),
wherein the elongate lens comprises an elongate interior cavity (a filler material 19 can be positioned on a surface 11 to surround a light source 12 in D1; see paragraph [0050] and figures 1-4);
the layer of a photoluminescent material on an interior wall of the elongate interior cavity (an inside layer 38 with conversion particles 22 in D1; see paragraph [0050] and figure 4); and
an array of solid-state light emitters configured to emit light into the elongate interior cavity (linear array of LEDs 116 in D2; see paragraph [0054] and figure 11).

Accordingly, it would be obvious to a person skilled in the art to combine the disclosures of D1 and D2, thereby arriving at the claim. Therefore, claim 1 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3).

1.2. Dependent Claims 2-17

Claims 2-17 are directly or indirectly dependent on claim 1.

1.2.1. The additional features of claims 2 and 3 can be easily derived from the feature of D1 (a dome shaped lens 76; see paragraph [0055] and figure 8). Therefore, claims 2 and 3 are novel under PCT Article 33(2) but lack an inventive step under PCT Article 33(3).

1.2.2. The additional feature of claim 4 can be easily derived from the feature of D1 (a filler material 19 can be positioned on a surface 11 to surround a light source 12; see paragraph [0050] and figures 1-4). Therefore, claim 4 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3).

1.2.3. The additional feature of claim 5 is merely a matter of design option in view of the feature of D1 (a lens 36 includes an inside layer 38 with conversion particles 22 and an outside layer 40, and the lens 36 is dome shaped; see paragraph [0050] and figure 3). Therefore, claim 5 is novel under PCT Article

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In case **the space in any of the preceding boxes is not sufficient.**
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33(2) but lacks an inventive step under PCT Article 33(3).

1.2.4. The additional feature of claim 6 can be easily derived from the feature of D1 (a lens 36 includes an inside layer 38 with conversion particles 22 and an outside layer 40, and the lens 36 is dome shaped; see paragraph [0050] and figure 3). Therefore, claim 6 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3).

1.2.5. The additional feature of claim 7 can be easily derived from the feature of D2 (a cooperating portion 226 on the lens; see paragraph [0055] and figure 12). Therefore, claim 7 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3).

1.2.6. The additional feature of claim 8 can be easily derived from the feature of D1 (a layer 98 includes scattering particles 100 for redirecting some of the light; see paragraph [0057] and figure 10). Therefore, claim 8 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3).

1.2.7. The additional feature of claim 9 is merely a matter of design option in view of the feature of D1 (a layer 98 includes scattering particles 100 for redirecting some of the light; see paragraph [0057] and figure 10). Therefore, claim 9 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3).

1.2.8. The additional feature of claim 10 can be easily derived from the feature of D1 (a layer 98 includes scattering particles 100 for redirecting some of the light; see paragraph [0057] and figure 10). Therefore, claim 10 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3).

1.2.9. The additional features of claims 11 and 12 are merely a matter of design option in view of the feature of D1 (phosphor particles are generally too large to effectively scatter light; see paragraph [0062] and figures 11, 12). Therefore, claims 11 and 12 are novel under PCT Article 33(2) but lack an inventive step under PCT Article 33(3).

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Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of : Previous Page

1.2.10. The additional feature of claim 13 is merely a matter of design option in view of the feature of D1 (surfaces 101 and 115 are shaped, so light directed along a layer 118 reflects off surfaces 101 and/or 117 and is combined with the light emitted from a light source 12 that flows through the layer 118 to a surface 105; see paragraph [0062] and figure 12). Therefore, claim 13 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3).

1.2.11. The additional feature of claim 14 can be easily derived from the feature of D2 (a bi-pin connector cap 220; see paragraph [0054] and figure 11). Therefore, claim 14 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3).

1.2.12. The additional features of claims 15 and 16 can be easily derived from the feature of D1 (a filler material 19 is positioned on a surface 11 and surrounds a light source 12 so that a filler material 19 fills the volume within the cup; see paragraph [0033] and figure 2). Therefore, claims 15 and 16 are novel under PCT Article 33(2) but lack an inventive step under PCT Article 33(3).

1.2.13. The additional feature of claim 17 can be easily derived from the feature of D1 (a lens and caps can be shaped to adapt to the particular application and can be shaped to focus the emitted light; see paragraph [0072]). Therefore, claim 17 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3).

1.3. Independent Claim 18

D1, which is considered to be the closest prior art to the subject matter of claim 18, discloses a method of fabricating an optical component (an emitter fabrication method; see paragraph [0068]).

Claim 18 differs from D1 in that the claim comprises "co-extruding an elongated solid body having a wavelength conversion layer and an optical component layer, the wavelength conversion layer in contact with the optical component layer".

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Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of: Previous Page

However, it can be easily derived by a person skilled in the art from the feature of D1 (a lens 36 includes an inside layer 38 with conversion particles 22 and an outside layer 40, where the layers 38 and 40 preferably have uniform thicknesses throughout; see paragraph [0050]; and figure 4). Therefore, claim 18 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3).

1.4. Dependent Claims 19-25

Claims 19-25 are directly or indirectly dependent on claim 18.

1.4.1. The additional feature of claim 19 is merely a matter of design option in view of the feature of D1 (a material can be used to mass produce lenses using known methods such as injection molding or the conventional syringe manufacturing process; see paragraph [0041]). Therefore, claim 19 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3).

1.4.2. The additional feature of claim 20 is merely a matter of design option in view of the feature of D1 (a syringe mechanism is filled with an optically clear and curable material (e.g., epoxy, silicon, sol gel, etc.) with the conversion material mixed in the material, where the conversion material typically includes phosphor particles; see paragraph [0007]). Therefore, claim 20 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3).

1.4.3. The additional feature of claim 21 is merely a matter of design option in view of the feature of D1 (a layer 98 includes scattering particles 100 for redirecting some of the light; see paragraph [0057] and figure 10). Therefore, claim 21 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3).

1.4.4. The additional features of claims 22 and 23 can be easily derived from the feature of D1 (a dome shaped lens 76; see paragraph [0055], and figure 8). Therefore, claims 22 and 23 are novel under PCT Article 33(2) but lack an inventive step under PCT Article 33(3).

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Supplemental Box

In case **the space in any of the preceding boxes is not sufficient.**
Continuation of : Previous Page

1.4.5. The additional feature of claim 24 can be easily derived from the feature of D1 (a color emitted by a particular emitter 10 can change by using a lens which includes a different type of conversion particles to produce different light combinations; see paragraph [0043]). Therefore, claim 24 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3).

1.4.6. The additional feature of claim 25 can be easily derived from the feature of D1 (testing can be repeated until the emitter emits light at a sufficient color and intensity over a range of viewing angles before the cap is bonded to the LED; see paragraph [0071]). Therefore, claim 25 is novel under PCT Article 33(2) but lacks an inventive step under PCT Article 33(3).

2. Industrial Applicability

Claims 1-25 are industrially applicable under PCT Article 33(4).

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:	Group Art Unit: 2879
Bing Dai et al.	Examiner: Bowman, Mary Ellen
Serial No.: 13/273,215	Confirmation No.: 8978
Filed: October 13, 2011	
For: WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES	

COMMENTS ON STATEMENT OF REASONS FOR ALLOWANCE

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

Dear Sirs / Madams:

Applicants first wish to thank the Examiner of record, Ms. Mary Ellen Bowman, for allowing the above-identified application.

The October 2, 2013 Notice of Allowance provides that "*the prior art fails to teach the presently claimed invention comprising the claimed wavelength conversion component and scattering particles*". Examiner's Reasons for Allowance, p. 2, October 2, 2013 Notice of Allowability (Italics added.)

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Applicants first respectfully submit that Applicants submitted the response to Office action to selectively respond to some of the basis for rejections. To the extent that Applicants did not respond to certain basis for rejections, Applicants respectfully submit that Applicants' silence on such certain basis for rejections does not explicitly or implicitly indicate Applicants' acquiescence in such certain basis for rejections.

Applicants further respectfully submit that the U.S. Patent Law jurisprudence requires that each of the currently pending claims is to be considered in its entirety. The application includes independent claims, where each independent claim may recite limitations that are different from or not present in other claims, and that the application includes more than just the independent claims but also numerous dependent claims, each of which recites one or more different claimed limitations. Therefore, Applicants respectfully submit that the independent claims and their respective dependent claims are allowable for what they respectively and actually recite rather than the alleged Reasons for Allowance stating that "*the prior art fails to teach the presently claimed invention comprising*" some but not all of the claimed limitations of an independent claim as purported by the Notice of Allowance on page 3.

Moreover, Applicants respectfully submit that the U.S. patent law jurisprudence does not find claims allowable merely because "*the prior art fails to teach the presently claimed invention comprising*" some but not all of the claimed limitations of an independent claim.

Rather, the U.S. patent law jurisprudence requires that the each of the pending claims and the prior art references are to be considered in their respective entireties, and that the claims are allowable over the prior art references if the prior art references, either alone or in combination, fail to anticipate and render obvious each of the claims that is considered as a whole, and that the

claims and all the other parts of the application meet various requirements of Title 35 of the U.S. Code together with the controlling case law and Title 37 of the Code of Federal Regulations before the application may be considered allowable. The Manual of Patent Examining Procedure (MPEP) similar requires the application to meet certain additional requirements other than those required by Title 35 of the U.S. Code and Title 37 of the Code of Federal Regulations.

As such, Applicants respectfully submit that the independent claims and their respective dependent claims are allowable for what they respectively and actually recite rather than "*the prior art fails to teach the presently claimed invention comprising*" some but not all of the claimed limitations of an independent claim as purported by the Notice of Allowance, and that the application is allowed by meeting all of the requirements of Title 35 of the U.S. Code together with the controlling case law, Title 37 of the Code of Federal Regulations, and the MPEP.

If the Examiner has any questions or comments, the Examiner is respectfully requested to contact the undersigned at the number listed below.

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CONCLUSION

If the Examiner has any questions or comments, the Examiner is respectfully requested to contact the undersigned at the number listed below.

The Commissioner is authorized to charge any fees due in connection with the filing of this document to Vista IP Law Group's Deposit Account No. 50-1105, referencing billing number ITMX-00318US2. The Commissioner is authorized to credit any overpayment or to charge any underpayment to Vista IP Law Group's Deposit Account No. 50-1105, referencing billing number ITMX-00318US2.

Respectfully submitted,

Dated: October 25, 2013 By: /Eric Zhou/
Eric Zhou
Reg. No. 68,842

Vista IP Law Group LLP
2160 Lundy Avenue, Suite 230
San Jose, CA 95131-1887
Telephone: (408) 321-8663 Ext. 206
Facsimile: (408) 877-1662

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PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

101130 7590 09/30/2013
Vista IP Law Group, LLP (Intematix)
2160 Lundy Avenue, Suite 230
San Jose, CA 95131

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/273,215	10/13/2011	Bing Dai	ITMX-00318US2	8978

TITLE OF INVENTION: WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	SMALL	$890	$300	$0	$1190	12/30/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
BOWMAN, MARY ELLEN	2879	313-112000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list
(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Vista IP Law Group, LLP
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Intematix Corporation

(B) RESIDENCE: (CITY and STATE OR COUNTRY): Fremont, California

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
- ☒ Issue Fee
- ☒ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): **(Please first reapply any previously paid issue fee shown above)**
- ☐ A check is enclosed.
- ☒ Payment by credit card. Form PTO-2038 is attached.
- ☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

PTOL-85 (Rev. 02/11)

Savant Technologies EX1104, Page 437 of 485

5. **Change in Entity Status** (from status indicated above)

❑ Applicant certifying micro entity status. See 37 CFR 1.29	NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.
❑ Applicant asserting small entity status. See 37 CFR 1.27	NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.
❑ Applicant changing to regular undiscounted fee status.	NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature /Eric Zhou/ Date 10-28-2013

Typed or printed name Eric Zhou Registration No. 68,842

This collection of information is required by 37 CFR 1.311. 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, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:	Group Art Unit: 2879
Bing Dai et al.	Examiner: Bowman, Mary Ellen
Serial No.: 13/273,215	Confirmation No.: 8978
Filed: October 13, 2011	
For: WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES	

INFORMATION DISCLOSURE STATEMENT

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

Sir:

In accordance with 37 CFR §§ 1.97 and 1.98, the items identified in this Information Disclosure Statement (IDS) are being brought to the attention of the Office. The Examiner is requested to make these documents of record.

The items identified in this IDS may or may not be "material" pursuant to 37 CFR § 1.56. The submission thereof by Applicant(s) is not to be construed as an admission that any such patent, publication or other information referred to therein is material or considered to be material (37 CFR § 1.97(h)), or even qualifies as "prior art" under 35 USC § 102 with respect to this invention unless specifically designated by Applicant(s) as such.

1. Fee:

☐ Charge the fee due under 37 CFR § 1.17(p) to the deposit account referenced below.

☒ The fee due under 37 CFR § 1.17(p) is being concurrently submitted with the filing of an electronic IDS submission. Thus, no additional fee is required.

☐ Applicant believes that no fee is required for this submission. However, if Applicant is mistaken, then please charge the fee due under 37 CFR § 1.17(p) to the deposit account referenced below.

2. Statement Under 37 CFR § 1.97(e):

☐ That each item of information contained in the information disclosure statement was first cited in any 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. See 37 CFR 1.97(e)(1); or

☒ That no item of information 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

3. Copies of the Cited Items:

☒ Copies of all of the items listed under Foreign Patent Documents and/or Non Patent Literature Documents are enclosed.

☐ Copies of the following items listed under Item Nos. ___ under Foreign Patent Documents and Item Nos. ___ under Non Patent Literature Documents are enclosed.

☐ Copies of the following documents listed under Item Nos. ___ under Foreign Patent Documents and Item Nos. ___ under Non Patent Literature Documents are not supplied because they were previously cited by the Office or submitted in Information Disclosure Statements in parent U.S. Application No. _____, of which the current application is a _____ and relied upon in this application for an earlier filing date under 35 USC § 120. See 37 CFR § 1.98(d). The Examiner is requested to make these documents of record.

Savant Technologies EX1104, Page 440 of 485

4. Conclusion:

Citation of the above documents shall not be construed as:

1. an admission that the documents are necessarily prior art with respect to the instant invention;
2. a representation that a search has been made, other than as described above; and
3. an admission that the information cited herein is, or is considered to be, material to patentability as defined in § 1.56(b).

It is respectfully requested that the Examiner indicate consideration of the cited references by returning a copy of the attached form with initials or other appropriate marks. If the U.S. Patent Office determines that an extension and/or other relief is required, Applicant(s) petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 501105**, referencing **Docket No. ITMX-00318US2**. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

Respectfully submitted,

Dated: 10-28-2013

By: /Peter C. Mei/
Peter C. Mei
Registration No. 39,768

Vista IP Law Group, LLP
2160 Lundy Ave., Ste. 230
San Jose, CA 95131
Telephone: (408) 321-8663 (Ext. 208)
Facsimile: (408) 877-1662

PTO/SB/08a (07-09) (modified)
Approved for use through 07/31/2012. OMB 0651-0031

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Substitute for form 1449/PTO				***Complete if Known***	
				Application Number	13/273,215
				Filing Date	10-13-2011
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				First Named Inventor	Bing Dai
				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	4	of	6	Attorney Docket Number	ITMX-00318US2

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No.	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
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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. 5Kind 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.**

PTO/SB/08a (07-09) (modified)
Approved for use through 07/31/2012. OMB 0651-0031

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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	13/273,215
				Filing Date	10-13-2011
				First Named Inventor	Bing Dai
				Art Unit	2879
				Examiner Name	Bowman, Mary Ellen
Sheet	5	of	6	Attorney Docket Number	ITMX-00318US2

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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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. 5Kind 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.**

PTO/SB/08a (07-09) (modified)
Approved for use through 07/31/2012. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Substitute for form 1449/PTO				***Complete if Known***	
				Application Number	13/273,215
				Filing Date	10-13-2011
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				First Named Inventor	Bing Dai
				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	6	of	6	Attorney Docket Number	ITMX-00318US2

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	Docket No. ITMX-00318US1; Notice of Allowance dated 09-24-2013 for U.S. Appln. No. 13/273,212	
	2	Docket No. ITMX-00318US3; Notice of Allowance dated 09-24-2013 for U.S. Appln. No. 13/273,217	
	3	Docket No. ITMX-00116US3; Non-Final Office Action dated 09-27-2013 for U.S. Appln. No. 12/624,900	
	4	Docket No. ITMX-00307US1; Notice of Allowance dated 10-02-2013 for U.S. Appln. No.13/253,031	
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Examiner Signature		Date Considered	

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:	Group Art Unit: 2879
Bing Dai et al.	Examiner: Bowman, Mary Ellen
Serial No.: 13/273,215	Confirmation No.: 8978
Filed: October 13, 2011	
For: WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES	

INFORMATION DISCLOSURE STATEMENT

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

Sir:

In accordance with 37 CFR §§ 1.97 and 1.98, the items identified in this Information Disclosure Statement (IDS) are being brought to the attention of the Office. The Examiner is requested to make these documents of record.

The items identified in this IDS may or may not be "material" pursuant to 37 CFR § 1.56. The submission thereof by Applicant(s) is not to be construed as an admission that any such patent, publication or other information referred to therein is material or considered to be material (37 CFR § 1.97(h)), or even qualifies as "prior art" under 35 USC § 102 with respect to this invention unless specifically designated by Applicant(s) as such.

1. Fee:

☐ Charge the fee due under 37 CFR § 1.17(p) to the deposit account referenced below.

☒ The fee due under 37 CFR § 1.17(p) is being concurrently submitted with the filing of an electronic IDS submission. Thus, no additional fee is required.

☐ Applicant believes that no fee is required for this submission. However, if Applicant is mistaken, then please charge the fee due under 37 CFR § 1.17(p) to the deposit account referenced below.

2. Statement Under 37 CFR § 1.97(e):

☒ That each item of information contained in the information disclosure statement was first cited in any 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. See 37 CFR 1.97(e)(1); or

☐ That no item of information 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 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

3. Copies of the Cited Items:

☒ Copies of all of the items listed under Foreign Patent Documents and/or Non Patent Literature Documents are enclosed.

☐ Copies of the following items listed under Item Nos. ___ under Foreign Patent Documents and Item Nos. ___ under Non Patent Literature Documents are enclosed.

☐ Copies of the following documents listed under Item Nos. ___ under Foreign Patent Documents and Item Nos. ___ under Non Patent Literature Documents are not supplied because they were previously cited by the Office or submitted in Information Disclosure Statements in parent U.S. Application No. _____, of which the current application is a _____ and relied upon in this application for an earlier filing date under 35 USC § 120. See 37 CFR § 1.98(d). The Examiner is requested to make these documents of record.

Savant Technologies EX1104, Page 446 of 485

4. Conclusion:

Citation of the above documents shall not be construed as:

1. an admission that the documents are necessarily prior art with respect to the instant invention;
2. a representation that a search has been made, other than as described above; and
3. an admission that the information cited herein is, or is considered to be, material to patentability as defined in § 1.56(b).

It is respectfully requested that the Examiner indicate consideration of the cited references by returning a copy of the attached form with initials or other appropriate marks. If the U.S. Patent Office determines that an extension and/or other relief is required, Applicant(s) petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to **Deposit Account No. 501105**, referencing **Docket No. ITMX-00318US2**. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

Respectfully submitted,

Dated: 10-28-2013

By: /Peter C. Mei/
Peter C. Mei
Registration No. 39,768

Vista IP Law Group, LLP
2160 Lundy Ave., Ste. 230
San Jose, CA 95131
Telephone: (408) 321-8663 (Ext. 208)
Facsimile: (408) 877-1662

Savant Technologies EX1104, Page 447 of 485

PTO/SB/08a (07-09) (modified)
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Substitute for form 1449/PTO				***Complete if Known***	
				Application Number	13/273,215
				Filing Date	10-13-2011
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				First Named Inventor	Bing Dai
				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	4	of	6	Attorney Docket Number	ITMX-00318US2

U.S. PATENT DOCUMENTS					
Examiner Initials*	Cite No.	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
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Examiner Signature		Date Considered	

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PTO/SB/08a (07-09) (modified)
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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	13/273,215
				Filing Date	10-13-2011
				First Named Inventor	Bing Dai
				Art Unit	2879
				Examiner Name	Bowman, Mary Ellen
Sheet	5	of	6	Attorney Docket Number	ITMX-00318US2

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]
	1					
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PTO/SB/08a (07-09) (modified)
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				Application Number	13/273,215
				Filing Date	10-13-2011
INFORMATION DISCLOSURE STATEMENT BY APPLICANT				First Named Inventor	Bing Dai
				Art Unit	2879
(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	6	of	6	Attorney Docket Number	ITMX-00318US2

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	Docket No. ITMX-00116WO1; International Search Report and Written Opinion dated 09-27-2013 for PCT Appln. No. PCT/US13/48354	
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Electronic Patent Application Fee Transmittal

Application Number:	13273215
Filing Date:	13-Oct-2011
Title of Invention:	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES
First Named Inventor/Applicant Name:	Bing Dai
Filer:	Eric Zhou/Tony Nguyen
Attorney Docket Number:	ITMX-00318US2

Filed as Small 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:				
Utility Appl Issue Fee	2501	1	890	890
Publ. Fee- Early, Voluntary, or Normal	1504	1	300	300

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
Submission- Information Disclosure Stmt	2806	1	90	90
		Total in USD ($)		**1280**

Electronic Acknowledgement Receipt	
EFS ID:	17237186
Application Number:	13273215
International Application Number:	
Confirmation Number:	8978
Title of Invention:	WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES
First Named Inventor/Applicant Name:	Bing Dai
Customer Number:	101130
Filer:	Eric Zhou/Tony Nguyen
Filer Authorized By:	Eric Zhou
Attorney Docket Number:	ITMX-00318US2
Receipt Date:	28-OCT-2013
Filing Date:	13-OCT-2011
Time Stamp:	04:31:03
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$1280
RAM confirmation Number	7937
Deposit Account	501105
Authorized User	VISTA IP LAW GR
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees) Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)	

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)					
File Listing:					
Document Number	**Document Description**	**File Name**	**File Size(Bytes)/ Message Digest**	**Multi Part /.zip**	**Pages (if appl.)**
1	Amendment after Notice of Allowance (Rule 312)	00318US2_Amendment-sec-312.pdf	91128 f9038ffff1968b0751e136fcd98b4b9d4f8e9c37	no	9
Warnings:					
Information:					
2	Miscellaneous Incoming Letter	00318US2_comments-SRFA.pdf	79550 bd5e9ba605fee5c91efeeb296c90299c6bf6aebd	no	4
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	00318US2_IDS-sb08-transmittal.pdf	156527 4a65950885cffdd649c5b79d3248beac9d8358cd	no	6
Warnings:					
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4	Information Disclosure Statement (IDS) Form (SB08)	00318US2_IDS-sb08-transmittal-2.pdf	156596 891a036fa4fe69f56f92728e943a66fbd4b1bf4f	no	6
Warnings:					
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5	Non Patent Literature	00116WO1_ISR-WO_09-27-13.pdf	235347 e8d9fa35444dfb4258d3214413b740d5b9651b49	no	13
Warnings:					
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6	Non Patent Literature	00307US1_NOA_10-02-13.pdf	555935 02c9bb34ee04dea9ac7fb0ce83ddd631277dfdbd	no	11
Warnings:					
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7	Non Patent Literature	00116US3_NFOA_09-27-13.pdf	1047964 53c8267c233aaab32b740ea6ab4f647fd54feeb5	no	27
Warnings:					
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8	Non Patent Literature	00318US3_NOA_09-24-13.pdf	553283 d1277ee2ca7a41b1a1be50a0091c4765ab0c4b1d	no	11

Warnings:					
Information:					
9	Non Patent Literature	00318US1_NOA_09-24-13.pdf	551770 eed62e2c8e81a6490a88738bd3995def1c50874d	no	11
Warnings:					
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10	Issue Fee Payment (PTO-85B)	00318US2_Issue-fee-payment.pdf	982152 e3f98f9abfaea5770ab6cbb60eadc843596b4323	no	2
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11	Fee Worksheet (SB06)	fee-info.pdf	33942 6dbbfe7029eaf838ada7ef3648322518e0615fc7	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	4444194		

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.

AMENDMENT TO THE CLAIMS

Claims 1, 4-24, and 26-31 are currently pending in the Application. Claims 8 and 26 are currently amended to correct claim dependencies. A complete listing of the current pending claims is provided below and supersedes all previous claims listing(s). No new matter has been added.

Allowed Claims

1. (Previously Presented) A wavelength conversion component for a light emitting device comprising:

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from a radiation source relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material,

wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light having a wavelength of greater than or equal to 440 nm is emitted through the wavelength conversion component to contribute to a final visible emission product;

wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material.

4. (Previously Presented) The component of Claim 1, wherein the light scattering material has an average particle size that is less than about 150nm.

5. (Previously Presented) The component of Claim 1, wherein the light scattering material is selected from the group consisting of: titanium dioxide, barium sulfate, magnesium oxide, silicon dioxide and aluminum oxide.

6. (Previously Presented) The component of Claim 1 wherein the at least one photoluminescence material is located in a wavelength conversion layer and the light scattering

Savant Technologies EX1104, Page 456 of 485

material is located in a diffusing layer.

7. (Previously Presented) The component of Claim 6, wherein the wavelength conversion layer and the light diffusing layer are in direct contact with each other.

8. (Currently Amended) The component of Claim [[7]]6, wherein the wavelength conversion layer comprises a mixture of the at least one phosphor material and a light transmissive binder and the light diffusing layer comprises a mixture of the light scattering material and the light transmissive binder.

9. (Previously Presented) The component of Claim 8, wherein the light transmissive binder comprises a curable liquid polymer selected from the group consisting of: a polymer resin, a monomer resin, an acrylic, an epoxy, a silicone and a fluorinated polymer.

10. (Previously Presented) The component of Claim 8, wherein the weight loading of light scattering material to binder selected from the group consisting of: 7% to 35% and 10% to 20%.

11. (Previously Presented) The component of Claim 6, wherein the wavelength conversion and light diffusing layers are deposited using a method selected from the group consisting of: screen printing, slot die coating, spin coating, roller coating, drawdown coating and doctor blading.

12. (Previously Presented) The component of Claim 6 in which the wavelength conversion layer and the light diffusing layer comprises planar shapes.

13. (Previously Presented) The component of Claim 6 in which the light diffusing layer comprises a dome or elongated dome shape.

14. (Previously Presented) The component of claim 13 in which the wavelength conversion layer fills a volume formed beneath the dome or elongated dome shapes.

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15. (Previously Presented) The component of Claim 1, wherein both the at least one photoluminescence material and the light scattering material are located in a wavelength conversion layer.

16. (Previously Presented) The component of Claim 1, wherein the light scattering material has an average particle size in a range selected from the group consisting of: 1μm to 50μm and 10μm to 20μm.

17. (Previously Presented) The component of Claim 1, wherein the at least one photoluminescence material is deposited onto a light transmissive substrate, and the light transmissive substrate is selected from the group consisting of: a polycarbonate, an acrylic and a glass.

18. (Previously Presented) The component of Claim 1, wherein the excitation light comprises ultraviolet light.

19. (Previously Presented) The component of Claim 18, wherein the light scattering material has an average particle size that is less than about 100nm.

20. (Previously Presented) A light emitting device, comprising:

at least one solid-state light emitter operable to generate excitation light; and

a wavelength conversion component comprising:

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from the at least one solid-state light emitter relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material,

wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light having a wavelength of greater than or equal to 440 nm is emitted through the wavelength conversion component to contribute to a final visible emission product;

Savant Technologies EX1104, Page 458 of 485

wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material.

21. (Previously Presented) The device of claim 20, wherein the light emitting device is selected from the group consisting of: downlights, light bulbs, linear lamps, lanterns, wall lamps, pendant lamps, chandeliers, recessed lights, track lights, accent lights, stage lighting, movie lighting, street lights, flood lights, beacon lights, security lights, traffic lights, headlamps, taillights, and signs.

22. (Previously Presented) The device of claim 20 in which the average particle size of the light scattering material is selected to improve an OFF state white appearance of the light emitting device.

23. (Previously Presented) The device of claim 20 in which the average particle size of the light scattering material is selected to obtain substantially uniform color for emitted light from the light emitting device for emission angles over a $\pm 60^{o}$ range from an emission axis.

24. (Previously Presented) The device of claim 23, wherein a weight loading of the light scattering material to a binder selected from the group consisting of: 7% to 35% and 10% to 20%.

26. (Currently Amended) The device of Claim [[25]]20, wherein the light scattering material has an average particle size that is less than about 150nm.

27. (Previously Presented) The device of Claim 20 in which the wavelength conversion layer and the light diffusing layer comprises planar shapes.

28. (Previously Presented) The device of Claim 20 in which the light diffusing layer comprises a dome or elongated dome shape.

29. (Previously Presented) A linear lamp comprising:

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an elongate housing;

a plurality of solid-state light emitters housed within the housing and configured along the length of the housing; and

an elongate wavelength conversion component remote to the plurality of solid-state light emitters and configured to in part at least define a light mixing chamber,

wherein the elongate wavelength conversion component comprises

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from the plurality of solid-state light emitters relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material,

wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light having a wavelength of greater than or equal to 440 nm is emitted through the wavelength conversion component to contribute to a final visible emission product;

wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material.

30. (Previously Presented) A downlight comprising:

a body comprising one or more solid-state light emitters, wherein the body is configured to be positioned within a downlighting fixture such that the downlight emits light in a downward direction; and

a wavelength conversion component remote to the one or more solid-state light emitters and configured to in part at least define a light mixing chamber,

wherein the wavelength conversion component comprises

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from the one or more solid-state light emitters relatively

Savant Technologies EX1104, Page 460 of 485

more than the light scattering material will scatter light generated by the at least one photoluminescence material,

wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light having a wavelength of greater than or equal to 440 nm is emitted through the wavelength conversion component to contribute to a final visible emission product;

wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material.

31. (Previously Presented) A light bulb comprising:

a connector base configured to be inserted in a socket to form an electrical connection for the light bulb;

a body comprising one or more solid-state light emitters;

a wavelength conversion component having a three dimensional shape that is configured to enclose the one or more solid-state light emitters and to in part at least define a light mixing chamber,

wherein the wavelength conversion component comprises

at least one photoluminescence material; and

a light scattering material, wherein the light scattering material has an average particle size that is selected such that the light scattering material will scatter excitation light from the one or more solid-state light emitters relatively more than the light scattering material will scatter light generated by the at least one photoluminescence material,

wherein the wavelength conversion component is configured such that in operation a portion of the excitation light comprising blue light having a wavelength of greater than or equal to 440 nm is emitted through the wavelength conversion component to contribute to a final visible emission product;

wherein the light scattering material scatters the blue light at least twice as much as light generated by the at least one photoluminescence material.

REMARKS

Claims 1, 4-24, and 26-31 are currently pending in the Application.

I. Amendment to the Claims

Claims 8 and 26 are currently amended to correct claim dependencies. Applicants respectfully submit that the current amendment introduces no new matter.

Therefore, Applicants respectfully submit that the current amendment to the claims introduces no new matter and necessitates no new search. Applicants thus respectfully request entry of the after-allowance amendment pursuant to 37 C.F.R. § 1.312.

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CONCLUSION

Based on the foregoing, all claims are believed allowable, and an allowance of the claims is respectfully requested. If the Examiner has any questions or comments, the Examiner is respectfully requested to contact the undersigned at the number listed below.

Applicant(s) hereby explicitly retracts and rescinds any and all of the arguments and disclaimers presented to distinguish the prior art of record during the prosecution of all parent and related application(s)/patent(s), and respectfully requests that the Examiner re-visit the prior art that such arguments and disclaimers were made to avoid.

The Commissioner is authorized to charge any fees due in connection with the filing of this document to Vista IP Law Group's Deposit Account No. 50-1105, referencing billing number ITMX-00318US2. The Commissioner is authorized to credit any overpayment or to charge any underpayment to Vista IP Law Group's Deposit Account No. 50-1105, referencing billing number ITMX-00318US2.

Respectfully submitted,

Date: October 25, 2013

By: /Eric Zhou/
Eric Zhou
Reg. No. 68,842

VISTA IP LAW GROUP LLP
2160 Lundy Ave., Suite 230
San Jose, CA 95131
Telephone: (408) 321-8663 x. 206
Facsimile: (408) 877-1662

Savant Technologies EX1104, Page 463 of 485

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of:	Group Art Unit: 2879
Bing Dai et al.	Examiner: Bowman, Mary Ellen
Serial No.: 13/273,215	Confirmation No.: 8978
Filed: October 13, 2011	
For: WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES	

AFTER ALLOWANCE AMENDMENT PURSUANT TO 37 C.F.R. § 1.312

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

Dear Sirs and Madams:

Applicants first wish to thank the Examiner for allowing the application. In the meantime, Applicants respectfully submit the after allowance amendment in response to the Examiner's amendment as listed in the Notice of Allowance dated October 2, 2013 pursuant to 37 C.F.R. §1.312 in accordance with the following sheets:

Amendment to the Claims begins on page 2 of this paper.

Remarks begin on page 8 of this paper.

Savant Technologies EX1104, Page 464 of 485

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/273,215	10/13/2011	Bing Dai	ITMX-00318US2	8978

101130 7590 11/14/2013

Vista IP Law Group, LLP (Intematix)
2160 Lundy Avenue, Suite 230
San Jose, CA 95131

EXAMINER	
BOWMAN, MARY ELLEN	
ART UNIT	**PAPER NUMBER**
2879	

NOTIFICATION DATE	DELIVERY MODE
11/14/2013	ELECTRONICELECTRONIC

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):

docketing@viplawgroup.com
ttn@viplawgroup.com

UNITED STATES DEPARTMENT OF COMMERCE
U.S. Patent and Trademark Office
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APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
13/273,215	13 October, 2011	DAI ET AL.	ITMX-00318US2

	EXAMINER	
Vista IP Law Group, LLP (Intematix) 2160 Lundy Avenue, Suite 230 San Jose, CA 95131	MARY ELLEN BOWMAN	
	ART UNIT	PAPER
	2879	20131108

DATE MAILED:

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

Commissioner for Patents

The two IDSs filed 10/28/2013 have been considered. The reasons for allowance remain the same.

/MARY ELLEN BOWMAN/
Primary Examiner, Art Unit 2879

PTO-90C (Rev.04-03)

Response to Rule 312 Communication	Application No.	Applicant(s)
	13/273,215	DAI ET AL.
	Examiner	Art Unit
	MARY ELLEN BOWMAN	2879

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

1. ☒ The amendment filed on *28 October 2013* under 37 CFR 1.312 has been considered, and has been:

a) ☒ entered.

b) ☐ entered as directed to matters of form not affecting the scope of the invention.

c) ☐ disapproved because the amendment was filed after the payment of the issue fee.
Any amendment filed after the date the issue fee is paid must be accompanied by a petition under 37 CFR 1.313(c)(1) and the required fee to withdraw the application from issue.

d) ☐ disapproved. See explanation below.

e) ☐ entered in part. See explanation below.

/MARY ELLEN BOWMAN/
Primary Examiner, Art Unit 2879

PTO/SB/08a (07-09) (modified)
Approved for use through 07/31/2012. OMB 0651-0031

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 4 of 6

Complete if Known	
Application Number	13/273,215
Filing Date	10-13-2011
First Named Inventor	Bing Dai
Art Unit	2879
Examiner Name	Bowman, Mary Ellen
Attorney Docket Number	ITMX-00318US2

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	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
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Examiner Signature	/Mary Ellen Bowman/	Date Considered	11/08/2013

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Art Unit	2879
Examiner Name	Bowman, Mary Ellen
Attorney Docket Number	ITMX-00318US2

FOREIGN PATENT DOCUMENTS

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				Examiner Name	Bowman, Mary Ellen
Sheet	6	of	6	Attorney Docket Number	ITMX-00318US2

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	Docket No. ITMX-00116WO1; International Search Report and Written Opinion dated 09-27-2013 for PCT Appln. No. PCT/US13/48354	
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Sheet	4	of	6	Attorney Docket Number	ITMX-00318US2

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(Use as many sheets as necessary)				Examiner Name	Bowman, Mary Ellen
Sheet	5	of	6	Attorney Docket Number	ITMX-00318US2

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	1	Docket No. ITMX-00318US1; Notice of Allowance dated 09-24-2013 for U.S. Appln. No. 13/273,212	
	2	Docket No. ITMX-00318US3; Notice of Allowance dated 09-24-2013 for U.S. Appln. No. 13/273,217	
	3	Docket No. ITMX-00116US3; Non-Final Office Action dated 09-27-2013 for U.S. Appln. No. 12/624,900	
	4	Docket No. ITMX-00307US1; Notice of Allowance dated 10-02-2013 for U.S. Appln. No.13/253,031	
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OK TO ENTER: /M.B./ 11/08/2013

PATENT
Atty. Dkt. No(s).: ITMX-00318US2

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Bing Dai et al.	Examiner: Bowman, Mary Ellen
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Savant Technologies EX1104, Page 474 of 485

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Sheet 4 of 18

Complete if Known	
Application Number	13/273,215
Filing Date	10-13-2011
First Named Inventor	Bing Dai
Art Unit	2879
Examiner Name	Bowman, Mary Ellen
Attorney Docket Number	ITMX-00318US2

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.	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	3290255	12-06-1966	Smith, I.	
	2	3593055	07-13-1971	Geusic, Joseph E., et al.	
	3	3670193	06-13-1972	Thorington, L., et al.	
	4	3676668	07-11-1972	Collins, N., et al.	
	5	3691482	09-01-1972	Pinnow et al.	
	6	3709685	01-09-1973	Hercock, R., et al.	
	7	3743833	07-01-1973	Martie et al.	
	8	3763405	10-02-1973	Mitsuhata, Teruhisa	
	9	3793046	02-01-1974	Wanmaker et al.	
	10	3819973	06-25-1974	Hosford, A.	
	11	3819974	06-25-1974	Stevenson, David A., et al.	
	12	3849707	11-19-1974	Braslau, N., et al.	
	13	3875456	04-01-1975	Kana, Tsuyoshi, et al.	
	14	3932881	01-13-1976	Mita, Yah, et al.	
	15	3937998	02-10-1976	Verstegen, J., et al.	
Change(s) applied to document, /L.K.H./ 11/25/2013	16	3972717	08-03-1976	Wiedemann, W.	
	17	4047075	09-06-1977	~~Schober!, W.~~ Schoberl	
	18	4081764	03-28-1978	Christmann, M.H., et al.	

Examiner Signature	/Mary Ellen Bowman/	Date Considered	06/07/2013

*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. 5Kind 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.**

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /M.B./

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.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
13/273,215	12/24/2013	8614539	ITMX-00318US2	8978

101130 7590 12/04/2013

Vista IP Law Group, LLP (Intematix)
2160 Lundy Avenue, Suite 230
San Jose, CA 95131

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants):

Bing Dai, Fremont, CA;
Xianglong Yuan, Fremont, CA;
Gang Wang, Milpitas, CA;
Charles Edwards, Pleasanton, CA;
James Caruso, Albuquerque, NM;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY.DOCKET NO./TITLE	REQUEST ID
13/273,215	10/13/2011	Bing Dai	ITMX-00318US2	94703

Acknowledgement of Loss of Entitlement to Entity Status Discount

The entity status change request below filed through Private PAIR on 08/28/2019 has been accepted.

CERTIFICATIONS:

Change of Entity Status:

X Applicant changing to regular undiscounted fee status.
NOTE: Checking this box will be taken to be notification of loss of entitlement to small or micro entity status, as applicable.

This portion must be completed by the signatory or signatories making the entity status change in accordance with 37 CFR 1.4(d)(4).

Signature:	/Peter C. Mei/
Name:	Peter C. Mei
Registration Number:	39768

PTO/AIA/80 (07-12)
Approved for use through 11/30/2014. OMB 0651-0035
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.

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

■ Practitioners associated with Customer Number: 00826

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

☐ The address associated with Customer Number:

OR

☐	Firm or Individual Name		
	Address		
	City	State	Zip
	Country		
	Telephone	Email	

Assignee Name and Address: FEIT ELECTRIC COMPANY, INC.
4901 Gregg Road
Pico Rivera, California 90660-2108

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record
The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature	[signature]	Date	7/17/2017
Name	ALAN FEIT	Telephone	562.463.2852
Title	EVP, of Feit Electric Company, Inc.		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. 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 3 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.

UNITED STATES
PATENT AND TRADEMARK OFFICE

P.O. Box 1450
Alexandria, VA 22313 - 1450
www.uspto.gov

ELECTRONIC ACKNOWLEDGEMENT RECEIPT

APPLICATION #	RECEIPT DATE / TIME	ATTORNEY DOCKET #
13/273,215	**07/05/2022 05:04:39 PM ET**	**ITMX-00318US2**

Title of Invention

WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES

Application Information

APPLICATION TYPE	Utility - Nonprovisional Application under 35 USC 111(a)	PATENT #	8614539
CONFIRMATION #	8978	FILED BY	Lisa Rone
PATENT CENTER #	60761069	FILING DATE	10/13/2011
CUSTOMER #	101130	FIRST NAMED INVENTOR	Bing Dai
CORRESPONDENCE ADDRESS	-	AUTHORIZED BY	Chris Lightner

Documents

TOTAL DOCUMENTS: 2

DOCUMENT		PAGES	DESCRIPTION	SIZE (KB)
581183-POA-8978.pdf		3	-	122 KB
581183-POA-8978-R3.73.pdf	(1-2)	2	Assignee showing of ownership per 37 CFR 3.73	85 KB
581183-POA-8978-PA...pdf	(3-3)	1	Power of Attorney	46 KB

Digest

DOCUMENT	MESSAGE DIGEST(SHA-512)
581183-POA-8978.pdf	8DE8DEE97D325486E01509D433E07587B6A4FC08D13CDE4F

	C9C3F2046AA773BC83652C21D6F3A62BDF2015AF08421A822 38C665D142E40821605B82187D47301
581183-POA-8978-R3.73.pdf	78CAFB1FA824FC3E46F460500EF0BF0F0D35464AA4A10438C 1EB1939C317852EB1F3A01B054BA4F4C54059B78675FEF8D33 624FF096B5FD260712C994AE0A6BD
581183-POA-8978-PA...pdf	A27DE79E25BBA0EEFCFB402F0047B89963D1546E1D040D60B 5F727D2AAD7000FFA225E5366A5C6F09F3B2E4C4FC7264717 659439CA060F5B42DBDA37389680CA

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 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/AIA/96 (08-12)
Approved for use through 11/30/2020. 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.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Feit Electric Company, Inc.

Application No./Patent No.: 8,614,539 Filed/Issue Date: 12/24/2013

Titled: WAVELENGTH CONVERSION COMPONENT WITH SCATTERING PARTICLES

Feit Electric Company, Inc., a corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☑ The assignee of the entire right, title, and interest.

2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):

   ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.

   ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

   Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (*e.g.*, bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

B. ☑ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Inventors To: Intematix Corporation

   The document was recorded in the United States Patent and Trademark Office at
   Reel 027448, Frame 0650, or for which a copy thereof is attached.

2. From: Intematix Corporation To: East West Bank

   The document was recorded in the United States Patent and Trademark Office at
   Reel 036967, Frame 0623, or for which a copy thereof is attached.

This collection of information is required by 37 CFR 3.73(b). 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: 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/AIA/96 (08-12)
Approved for use through 11/30/2020. OMB 0651-0031
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STATEMENT UNDER 37 CFR 3.73(c)

3. From: East West Bank To: Intematix Corporation

The document was recorded in the United States Patent and Trademark Office at
Reel 059910, Frame 0304, or for which a copy thereof is attached.

4. From: Intematix Corporation To: Feit Electric Company, Inc.

The document was recorded in the United States Patent and Trademark Office at
Reel 060078, Frame 0465, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☑ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Christopher P. Lightner/	2022-07-05
Signature	Date
Christopher P. Lightner	62156
Printed or Typed Name	Title or Registration Number

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/273,215	10/13/2011	Bing Dai	ITMX-00318US2

CONFIRMATION NO. 8978

101130
Vista IP Law Group, LLP (Intematix)
2160 Lundy Avenue, Suite 230
San Jose, CA 95131

POWER OF ATTORNEY NOTICE

OC000000135015166

Date Mailed: 07/08/2022

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 07/05/2022.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/nrhayden/

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
13/273,215	10/13/2011	Bing Dai	

CONFIRMATION NO. 8978

POA ACCEPTANCE LETTER

826
ALSTON & BIRD LLP
ONE SOUTH AT THE PLAZA
101 SOUTH TRYON STREET
SUITE 4000
CHARLOTTE, NC 28280-4000

OC000000135015223

Date Mailed: 07/08/2022

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 07/05/2022.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

Questions about the contents of this notice and the requirements it sets forth should be directed to the Office of Data Management, Application Assistance Unit, at **(571) 272-4000** or **(571) 272-4200** or **1-888-786-0101**.

/nrhayden/

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United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY.DOCKET NO./TITLE	REQUEST ID
13/273,215	10/13/2011	Bing Dai	060196/581183	170086

Acknowledgement of Change to Small Entity Status

The entity status change request below filed through Private PAIR on 07/13/2022 has been accepted.

CERTIFICATIONS:

Change of Entity Status:

X Applicant asserting small entity status. See 37 CFR 1.27.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

This portion must be completed by the signatory or signatories making the entity status change in accordance with 37 CFR 1.4(d)(4).

Signature:	/Christopher P. Lightner/
Name:	Christopher P. Lightner
Registration Number:	62156