

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO. LTD.,
SAMSUNG ELECTRONICS AMERICA, INC.,
SAMSUNG SEMICONDUCTOR, INC., and
SAMSUNG AUSTIN SEMICONDUCTOR, LLC,

Petitioners

v.

CHIEN-MIN SUNG,

Patent Owner

IPR2024-00534
U.S. Patent No. 9,138,862

PATENT OWNER'S DEMONSTRATIVES

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Patent Trial and Appeal Board
U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Submitted Electronically via PTACTS

Samsung v. Chien-Min Sung, IPR2024-0534 U.S. Patent No. 9,138,862

Oral Argument

June 20, 2025

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- II. The Institution Decision
- III. Grounds 1A (Anticipation) & 1B (Obviousness)
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Background

DEMONSTRATIVE EXHIBIT - NOT EVIDENCE

Important Considerations

- “[T]he burden of persuasion is on the petitioner to prove ‘unpatentability by a preponderance of the evidence,’ 35 U.S.C. § 316(e), and that burden never shifts to the patentee.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1375 (Fed. Cir. 2016).
- Petitioner’s arguments must adhere to the evidence and invalidity theories identified in the Petition “with particularity.”
- Anticipation requires disclosure of the limitation “arranged or combined as recited in the claim” and ambiguous references cannot anticipate. That dooms [1A] and [1D].
- Obviousness was only argued for [1C] and thus doesn’t solve gaps for other elements. It was only argued in conclusory fashion supported by an unqualified expert.

The Petition and the Institution Decision

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The Institution Decision

- The Board split original Ground 1 (“‘anticipated or obvious’ based on the disclosure in Sung ’026”):

This asserted Ground presents two separate and distinct grounds. We re-label them as Ground 1A, Anticipation, and Ground 1B, Obviousness.
- These are “separate conditions of patentability” that have different tests and different elements of proof.
- But the Petition did not address anticipation or obviousness separately.

Institution is not a Final Decision on the Merits

The Institution Decision Is Not Final

- Only “reasonable likelihood of success” is required to institute review. 35 U.S.C. § 314
- The burden required to prove invalidity is preponderance of the evidence, a higher standard. 35 U.S.C. § 316.
- The Board “is free to change its view of the merits after further development of the record, and should do so if convinced its initial inclinations were wrong.” *TriVascular, Inc. v. Samuels*, 812 F.3d 1056, 1068 (Fed. Cir. 2016).

V. CONCLUSION

For the above reasons, we determine the information presented in the record establishes there is a reasonable likelihood that Petitioner would prevail with respect to at least one claim of the '862 patent challenged in the Petition. Therefore, we institute an *inter partes* review of all challenged claims 1–20 on all grounds presented in the Petition. See 35 U.S.C. § 314(a); 37 C.F.R. § 42.108(a).

At this preliminary stage, the Board has not made a final determination with respect to the patentability of the challenged claims or any underlying factual or legal issue. The Board’s final determination will be based on the record as developed during the *inter partes* review. Any

In the Petition, Petitioner argued only that Sung '026 *disclosed* Limitations [1A] & [1D].

The Petition *did not* argue in that Limitations [1A] & [1D]:

- were inherently disclosed in Sung '026;
- were obvious over the disclosure of Sung '026; or
- would have been “at once envisioned” by a POSITA upon reading Sung '026

Petitioner also argued that the requirements of Limitation [1C] was requirements were disclosed in Sung '026.

And only for Limitation [1C] in Ground 1 did Petitioner advance an obviousness argument.

Even there, the obviousness theory advanced was only that it would have been “obvious to try” to level the superabrasive tips as recited.

No other obviousness argument was marshalled in Ground 1 for Claim 1.

The Petition's Ground 1 - “anticipated or obvious” fails both tests

Why does this matter? Because...

- The Board must assess what the Petition *actually presents*; it is *not* “free to adopt arguments on behalf of petitioners that could have been, but were not, raised by the petitioner.” *See Magnum Oil*, 829 F.3d at 1381.
- The Board cannot “deviate from the grounds in the petition and raise its own” theories of invalidity. *Sirona Dental Sys. GmbH v. Institut Straumann AG*, 892 F.3d 1349, 1356 (Fed. Cir. 2018).

The Petition's invalidity argument for Ground 1 failed to show either anticipation or obviousness.

Because the obviousness argument was limited to [1C], and only a narrow “obvious to try” theory in the alternative, the gaps in Sung '026 for [1A] and [1D] remain unaddressed, and are fatal.

Ground 1A: Sung'026 does not anticipate claims 1-6, 9-12 and 20.

Claim 1

- 1.[pre] A method of conditioning a CMP pad, comprising:
 - [1A] pressing a CMP pad dresser against a CMP pad,
 - [1B] the dresser including a monolayer of a plurality of superabrasive particles protruding from a matrix layer,
 - [1C] wherein the difference in protrusion distance between the highest protruding tip and the second highest protruding tip of the monolayer of superabrasive particles is less than or equal to about 10 microns and the difference in protrusion distance between the highest 10 protruding tips of the monolayer of superabrasive particles are within about 20 microns or less; and
 - [1D] rotating the dresser against the CMP pad such that asperities are cut into the CMP pad having a maximum cutting depth of about 60 microns.

(Ex. 1001 at 20:17-30)

Claim 1 - [1.pre] & [1.B] are not at issue

~~1.[pre] A method of conditioning a CMP pad, comprising:~~
[1A] pressing a CMP pad dresser against a CMP pad,
~~[1B] the dresser including a monolayer of a plurality of superabrasive particles protruding from a matrix layer,~~
[1C] wherein the difference in protrusion distance between the highest protruding tip and the second highest protruding tip of the monolayer of superabrasive particles is less than or equal to about 10 microns and the difference in protrusion distance between the highest 10 protruding tips of the monolayer of superabrasive particles are within about 20 microns or less; and
[1D] rotating the dresser against the CMP pad such that asperities are cut into the CMP pad having a maximum cutting depth of about 60 microns.

(Ex. 1001 at 20:17-30)

Anticipation Standard

For anticipation under 35 U.S.C. § 102, a reference must “disclose[] within the four corners of the document . . . all of the limitations claimed,” and that disclosure must be “arranged or combined in the same way as recited in the claim.”

Net MoneyIN, Inc. v. VeriSign, Inc., 545 F.3d 1359, 1371 (Fed. Cir. 2008).

It is improper in an anticipation analysis to combine different embodiments in a single prior art or supplement missing limitations—no matter how minor—in proving anticipation.

See id.

“[A]nticipation requires that a single reference describe the claimed invention ***with sufficient precision and detail*** to establish that the subject matter existed in the prior art. For this reason, it has long been understood that ambiguous references do not, ***as a matter of law***, anticipate a claim.”

Wasica Fin. GmbH v. Cont'l Auto. Sys., 853 F.3d 1272, 1286-87 (Fed. Cir. 2017) (cleaned up; first emphasis in *Wasica*)

Anticipation Standard - Inherency

Anticipation can also be established via inherency, which requires showing that the allegedly anticipatory feature is consistent, ***necessary***, and inevitable, not simply possible or probable—and it should be clear that it would be so recognized by persons of ordinary skill.

Atofina v. Great Lakes Chemical Corp., 441 F.3d 991, 1000 (Fed. Cir. 2006); *In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999).

Inherency “may not be established by probabilities or possibilities,” and “the mere fact that a certain thing ***may*** result from a given set of circumstances is not sufficient” to show inherency.

In re Robertson at 745.

But the Petition never argued that the purported disclosure was inherent in Sung '026 for any limitation of Claim 1.

[1A] pressing a CMP pad dresser against a CMP pad

Petitioner argues that Sung '026 “discloses” this Limitation. Not so.

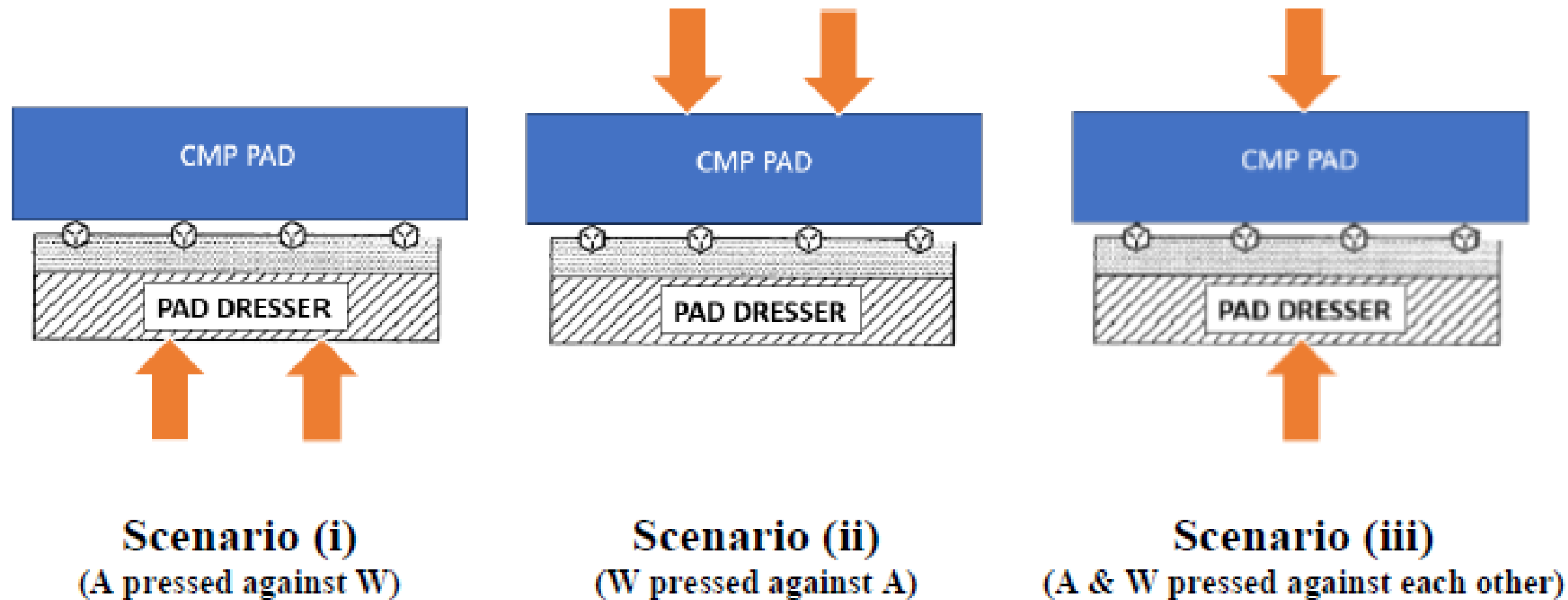
Petitioner does not argue inherency; nor does the Petition contend that a POSITA would have “at once envisioned” [1A] upon reading Sung '026. So there must be express disclosure. But there is none.

The Portions of Sung '026 cited in the Petition merely disclose (at most) that the CMP pad and dresser are in contact in some fashion, such that friction results and the pad is conditioned. And ambiguous references *cannot* anticipate as a matter of law.

It is simply silent as to *how* they are maintained in contact, but that is the precise focus of this Limitation [1A].

[1A] pressing a CMP pad dresser against a CMP pad

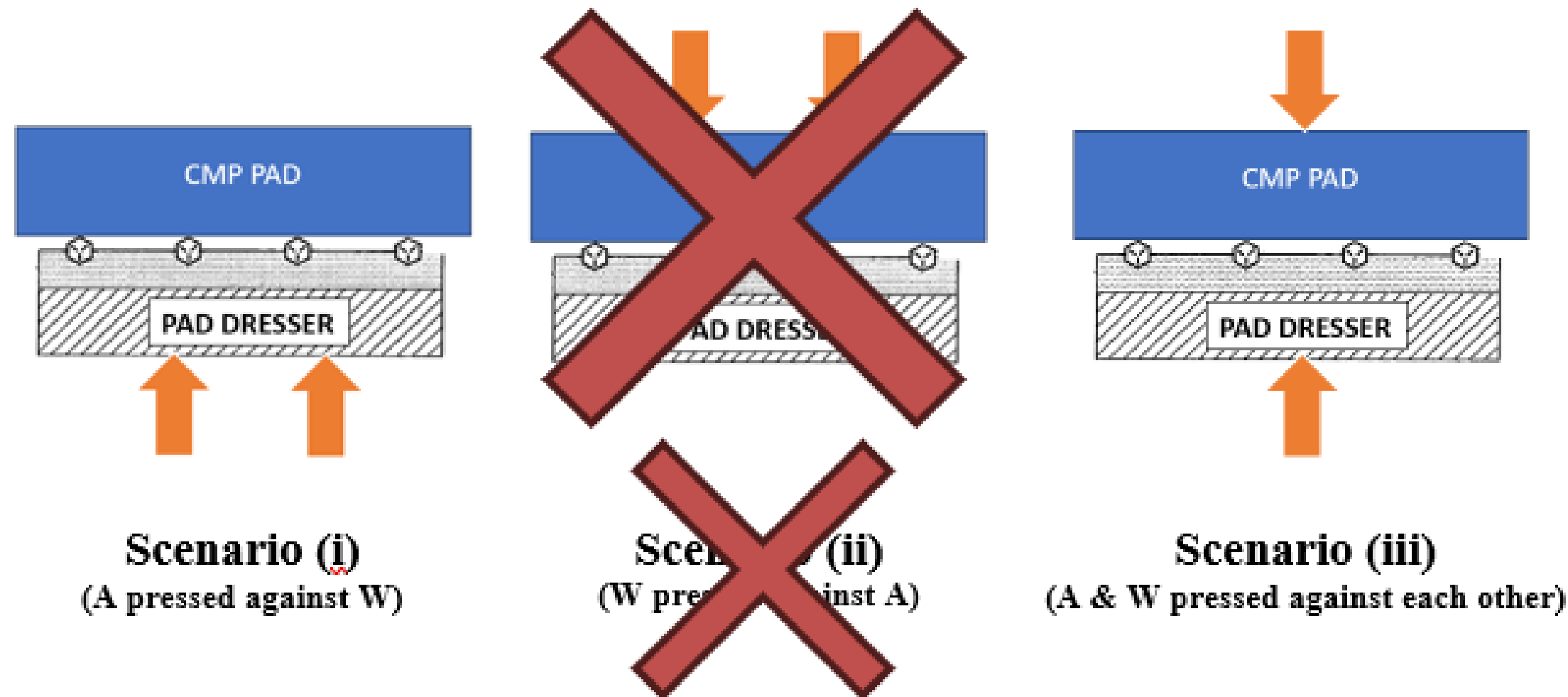
There are three scenarios in which two objects are pressed together:



There is also a fourth scenario in which the objects are maintained in contact without external pressing, i.e., by gravity.

[1A] pressing a CMP pad dresser against a CMP pad

Sung '026 does not describe any of the 4 possible scenarios.



But the recitation of [1A] expressly *excludes* Scenario (ii) (where the pad is pressed against the dresser) and Scenario (iv) (held by gravity)

[1A] pressing a CMP pad dresser against a CMP pad

This ambiguity in Sung '026 cannot anticipate *as a matter of law* because it fails to disclose the specific subsets of methods required by Limitation [1A] only those in Scenarios (i) and (iii) where pressure is applied to the dresser.

Petitioners did not argue inherency, and even if they had, inherency would fail because the described contact can occur by gravity or by pressing the pad alone - which would not satisfy [1A]'s requirement.

Petitioners did not argue that it would have been obvious to have pressed the dresser; their untimely “at once envisage” argument is just obviousness trying to masquerade as anticipation.

[1C] wherein the difference in protrusion distance between the highest protruding tip and the second highest protruding tip of the monolayer of superabrasive particles is less than or equal to about 10 microns and the difference in protrusion distance between the highest 10 protruding tips of the monolayer of superabrasive particles are within about 20 microns or less;

Sung '026 *never* discloses this in a single embodiment (or “aspect”). Instead, Petitioners and Dr. Shanfield have to cobble it together from distinct portions of Sung '026.

That is why Dr. Shanfield had to create an image to explain his theory: because in Sung '026, it was not disclosed in any one embodiment, i.e., arranged or combined *as recited*.

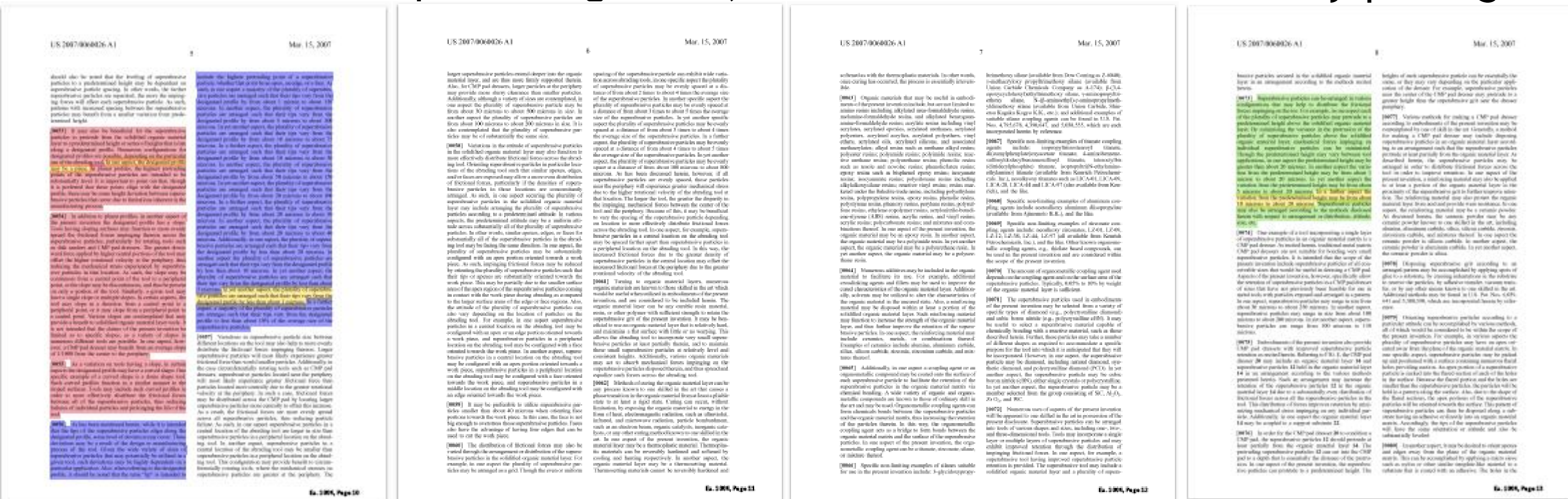
Petitioner’s reliance on open-ended boilerplate in Sung '026 is at most ambiguous (and thus cannot anticipate as a matter of law).

More importantly, it is legally ineffective to satisfy the purported disclosure of [1C] because it lacks the specificity and fails to “address the inventive features in any detail” - it “is not sufficient to show adequate disclosure of the actual combinations” that are recited in [1C].

Petitioner’s effort to elicit a “gotcha” response from Dr. Tsai using this ineffective boilerplate language - after making much of Dr. Tsai’s lack of expertise with the substance of patent law - should be rejected.

Sung '026 Does Not Disclose [1C] “arranged or combined” as recited

Petitioners pull various distinct aspects of Sung '026 together to try to make an anticipation argument, but this is an exercise in cherry-picking.



The above shows (in yellow) the particular parameters picked from among the various profile aspects (pink), protrusion aspects (blue), and deviation aspects (green), among the various aspects described in those 4 pages, but the various aspects of and examples disclosed in Sung '026 span approximately 3.5 more pages

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POR at 21-23; Paper 25 at 13-15

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Petitioner’s efforts to identify any “one embodiment” in the claims is likewise ineffective.

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

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

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

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

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

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

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

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

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

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

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

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

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

Claims 12 and 41 (specifying particular variation aspects) depend from, respectively claims 7 (a generic profile aspect) and 31 (a generic protrusion height aspect).

To succeed, Petitioner’s argument would require them to depend from claim 8 (a planar profile), and 37 (a particular protrusion height), respectively. ***But they do not.***

This also applies to the height variation aspect, which is only recited in claim 35 (depending from claim 31).

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

a solidified organic material layer; and

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

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

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

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

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

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

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

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

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

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

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

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

For Petitioner’s argument to succeed, claim 35 would have to have some dependency on or reference to claims referencing variance from or protrusion to a predetermined profile, if not both. ***But it does not.***

Nor would a POSITA have “at once envisaged” the particular specified parameters in [1C] from among the infinite potential combinations of the distinct aspects disclosed in Sung '026. That is pure hindsight.

Dr. Tsai’s deposition testimony is not to the contrary; Petitioner’s counsel did not elicit responses on the correct legal standard, i.e., what *a POSITA* would have done ***at the time of the '862 patent***:

- Dr. Tsai is not a mere a mere POSITA, but rather one of ***extraordinary*** skill in the art; his answers were from his own personal perspective, not from that of a POSITA.
- Dr. Tsai’s answers were also phrased in the present tense, and thus based on his current knowledge; they did not purport to opine on what anyone (let alone a POSITA) would have done at the time.

[1D] rotating the dresser against the CMP pad such that asperities are cut into the CMP pad having a maximum cutting depth of about 60 microns.

- This does not encompass producing the recited cutting depth by merely rotating *some* dresser against the CMP pad, but rather, requires rotating *a dresser specifically satisfying [1B] & [1C]*.
- Petitioners again did not argue inherency or obviousness” [1D]
- Petitioners have not identified *any* disclosure in Sung '026 that connects any particular cutting depth to any such dresser

[1D] rotating the dresser against the CMP pad such that asperities are cut into the CMP pad having a maximum cutting depth of about 60 microns.

- All Sung '026 discloses about the dresser that produces the cutting depth “from about 10 microns to about 20 microns” when used is that it is caused by *some unspecified* “predetermined height” of protruding superabrasive particles.
- Sung '026 does not disclose anything about what that predetermined height or profile is and teaches away from any specifics, encompassing “any predetermined height that would be useful in an abrading tool” in what it sought to claim.

Sung '026 Does Not Connect Cutting Depth to a Specific Structure

[1D] rotating the dresser against the CMP pad such that asperities are cut into the CMP pad having a maximum cutting depth of about 60 microns.

- Sung '026 does not disclose any thing about what cutting depth would result from using a dresser that satisfies the structural requirements of [1B] & [1C], as [1D] requires.
- Sung '026 does not disclose what structure would produce either a 60-micron maximum cutting range recited in [1D] or the 10-20 micron cutting range described in Sung '026.
- Sung '026 describes the resulting cutting depth as one “aspect” and the various components of the structure as various other “aspects” of its invention.

[1D] rotating the dresser against the CMP pad such that asperities are cut into the CMP pad having a maximum cutting depth of about 60 microns.

- The only relationship disclosed in Sung '026 between tip heights and cutting depth at all is a critique of the limited performance of *a prior art* pad dresser in [0006].
- But that prior art pad dresser is identified as using a “traditional metal matrix” to retain its superabrasive particles; that lacks the solidified organic material layer of the invention of Sung '026 and required by [1B] so that is facially inapplicable to [1D].

Sung '026 Does Not Connect Cutting Depth to a Specific Structure

[1D] rotating the dresser against the CMP pad such that asperities are cut into the CMP pad having a maximum cutting depth of about 60 microns.

- Nor would a POSITA have “at once envisioned” [1D] upon reading Sung '026 circa 2011.
- Dr. Tsai has testified that circa 2011, Sung '026 would not have taught a POSITA how to select any particular height profile to produce any particular cutting depth when used, because the cutting depth (or range) provides insufficient information to determine the height profile or tip structure that produced it.
- The actual performance of a dresser is highly dependent on its usage conditions, which includes a substantial number of factors that were not well-characterized circa 2011.

UNREBUTTED

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Sung '026 Does Not Disclose [1D] “arranged or combined” as recited

Petitioner’s efforts in Reply to identify any “one embodiment” in the claims is likewise ineffective for [1D] because Sung '026 never discloses the details of the superabrasive tips in the particular cutting tool that is alleged to produce the recited cutting depth in claim 6:

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

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

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

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

To succeed, Petitioner’s argument would require some dependency on or reference to what that predetermined height is, among other things, as discussed for [1C]. ***But none exists.***

Ground 1B: Claims 1-6, 9-12 and 20 are not obvious in view of Sung '026

Identical to Ground 1A other than arguing that [1C] would have been “obvious to try”

Ground 1B - Claim 1 - Obviousness only argued for [1C]

- ~~1.[pre] A method of conditioning a CMP pad, comprising:~~
~~[1A, “disclosed”] pressing a CMP pad dresser against a CMP pad,~~
~~[1B] the dresser including a monolayer of a plurality of superabrasive particles protruding from a matrix layer,~~
[1C] wherein the difference in protrusion distance between the highest protruding tip and the second highest protruding tip of the monolayer of superabrasive particles is less than or equal to about 10 microns and the difference in protrusion distance between the highest 10 protruding tips of the monolayer of superabrasive particles are within about 20 microns or less; and
~~[1D, “disclosed”] rotating the dresser against the CMP pad such that asperities are cut into the CMP pad having a maximum cutting depth of about 60 microns (Ex. 1001 at 20:17-30)~~

Obviousness Standard

“Obviousness requires more than a mere showing that the prior art includes separate references covering each separate limitation in a claim.”

Unigene Labs., Inc. v. Apotex, Inc., 655 F.3d 1352, 1360 (Fed. Cir. 2011).

It also requires showing that a POSITA at the time of the invention would have:

- “been motivated to combine the teachings of the prior art references to achieve the claimed invention,” (*Intelligent Bio-Sys*);
- “selected and combined those prior art elements in the normal courses of research and development to yield the claimed invention,” (*Unigene Labs.*); and
- “had a reasonable expectation of success in doing so,” (*Intelligent Bio-Sys*);

These showing cannot be met by conclusory statements; “there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.”

Obviousness Standard - “obvious to try” is a higher bar

“Evidence of obviousness, *especially when that evidence is proffered in support of an ‘obvious-to-try’ theory*, is insufficient unless it indicates that the possible options skilled artisans would have encountered were ‘finite,’ ‘small,’ or ‘easily traversed,’ *and* that skilled artisans would have had a reason to select the route that produced the claimed invention.”

Eurand, Inc. v. Mylan Pharms., Inc., 676 F.3d 1063, 1072 (Fed. Cir. 2012).

“Where the prior art at best gives only general guidance as to the particular form of the claimed invention or how to achieve it, relying on an obvious-to-try theory to support an obviousness finding *is impermissible*.”

Leo Pharm. Prods. v. Rea, 726 F.3d 1346, 1356 (Fed. Cir. 2018) (cleaned up)

The Petition only advanced an obviousness argument for Limitation [1C], and only did so under an “obvious to try” theory:

“a POSITA would have found it obvious to try to obtain a leveled diamond particles [*sic.*] that control the difference in protrusion distance between the highest set of protruding tips, including the highest, second highest, and the highest 10 protruding tips to be within the claimed range.”

The Petition never argued (let alone supported) that a POSITA would have had a reasonable expectation of success in so trying. That is fatal to Petitioner’s obviousness argument.

REoS for [1C] was only in Reply and Conclusory Attorney Argument

Only in Reply did Petitioner attempt to argue, belatedly, that a POSITA would have had a reasonable expectation of success (“REoS”) to modify Sung ’026 to achieve Limitation [1C].

Even then, Petitioner offered only a single paragraph of pure attorney argument with conclusory assertions (Reply at 13); it cited no evidence. No supplemental or rebuttal declaration was provided.

The Reply failed to identify where the REO argument was made or supporting evidence was identified in the Petition, because none exists. Thus, Petitioner waived the ability to argue REoS.

Without argument and evidence in support of REoS, Petitioner cannot satisfy the showing required for obviousness.

The only *evidence* of record shows no REoS

The only evidence of record shows that there would *not* have been a REoS in modifying the disclosure of Sung '026 to meet Limitation [1C]:

99. In particular, the claimed ranges would not necessarily result from following the teachings of Sung '026; in fact, Sung '026 discloses in paragraph [0056] no fewer than thirteen different ranges of permissible tip-height variation. Likewise, Sung '026 discloses in paragraph [0073] no fewer than three different tip height variance ranges from a large protrusion height range. And only certain combinations of these within the teachings of Sung '026 would result in the overall tip height variance ranges recited by Claim Limitation [1C].

100. Moreover, Sung '026 explains repeatedly that there may be height deviations (of an unspecified amount) due to limitations in the manufacturing process, and that deviations may also be the result of the result of a design, because they “may be highly dependent on a particular application.” (Ex. 1004 at [0053], [0056].)

101. These deviations in height resulting from intentional design, limitations in the manufacturing process, and/or the needs of a particular CMP pad dressing application as taught by Sung '026 confirm that the 10 µm maximum variation between the two-highest-protruding tips and the 20 µm maximum variation among the ten-highest-protruding tips need not occur merely by trying to follow the teachings of Sung '026.

UNREBUTTED

DEMONSTRATIVE EXHIBIT - NOT EVIDENCE

Petitioner's Obviousness Argument is Impermissible Hindsight

As discussed for anticipation, Petitioner's argument for [1C] cobbles together distinct permutations of carefully-chosen values from among three or four different “aspects” (i.e., embodiments) of Sung '026 that are *not* “arranged or combined as recited.”

Even for obviousness, Petitioner fails to explain why these particular aspects were chosen with these particular parameters, other than a conclusory assertion by Dr. Shanfield that a POSITA would have been motivated to level the tip heights as precisely as possible.

This is pure hindsight bias. It fails to explain why a POSITA “would have had a reason to select the route that produced the claimed invention.”

And it contradicts Sung '026's express statements that its invention *is not* limited to the narrowest tolerances in tip height variance.

DEMONSTRATIVE EXHIBIT - NOT EVIDENCE

Petitioner's Obviousness Argument is Impermissible Hindsight

Dr. Shanfield's particular chosen values (which he does not explain) were hardly "finite," "small," or "easily traversed" in the universe:

13 deviation aspects

- 1) 1–150 µm
- 2) 5–100 µm
- 3) 10–75 µm
- 4) 10–50 µm
- 5) 50–150 µm
- 6) 20–100 µm
- 7) 20–50 µm
- 8) 20–40 µm
- 9) less than about 20 µm
- 10) less than about 10 µm
- 11) less than about 5 µm
- 12) less than about 1 µm
- 13) less than about 10% of the average superabrasive particle size



3 protrusion aspects

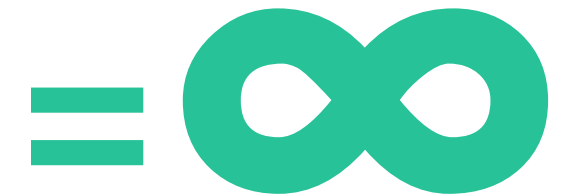
- 1) about 1 µm to about 20 µm
- 2) about 5 µm to about 20 µm
- 3) about 10 µm to about 20 µm



Multiple profile aspects in [0053]

[0053] It may also be beneficial for the superabrasive particles to protrude from the solidified organic material layer to a predetermined height or series of heights that is/are along a designated profile. Numerous configurations for designated profiles are possible, depending on the particular use of the abrading tool. In one aspect, the designated profile may be a plane. In planar profiles, the highest protruding points of the superabrasive particles are intended to be substantially level. It is important to point out that, though it is preferred that these points align with the designated profile, there may be some height deviation between superabrasive particles that occur due to limitations inherent in the manufacturing process.

([0054] and [0055] identify potentially infinite subsets of various sloped profiles and various curved profiles, respectively)



Claims 2-6, 9-12, 20

DEMONSTRATIVE EXHIBIT - NOT EVIDENCE

[6] The method of claim 5, wherein the peripheral location extends from an outer edge of the dresser inwardly toward a center point of the dresser for up to about 90% of the dresser radius.

[9] The method of claim 1, wherein substantially all of the superabrasive particles are located at a peripheral location of the dresser.

[10] The method of claim 1, wherein substantially all of the superabrasive particles are arranged in uniform predetermined pattern at a peripheral location of the dresser.

- Claims 6 and 9-10 all depend from claim 1, and therefore Sung '026 does not anticipate these claims for all of the reasons it does not anticipate claim 1.
- For claims 9-10, Petitioners' argument that in an aspect of Sung '026 "the region from the center of the disk to about 20% of the radius is devoid of superabrasive particles" is also *ipse dixit*.
 - Petitioners cannot meet their burden to show that "substantially all" of the superabrasive particles are located at a peripheral location on the dresser based on the assumption that there are no superabrasive particles in this unnamed region of one aspect of Sung '026.
 - Petitioners again improperly cobble together the different aspects of Sung '026 to make a simulacrum of an anticipating disclosure.

[2] The method of claim 1, wherein at least 100 tips of the plurality of superabrasive particles cut asperities into the CMP pad as the dresser is rotated.

[3] The method of claim 1, wherein at least 50 tips of the plurality of superabrasive particles cut asperities into the CMP pad as the dresser is rotated.

[4] The method of claim 1, wherein at least 25 tips of the plurality of superabrasive particles cut asperities into the CMP pad as the dresser is rotated.

[5] The method of claim 1, wherein substantially all of the asperities are cut in the CMP pad by superabrasive particles located at a peripheral location of the dresser.

- Claims 2-5 all depend from claim 1, and therefore Sung '026 does not anticipate these claims for all of the reasons it does not anticipate claim 1.
- Petitioners also fails to show that Sung '026 discloses *any* number of tips cutting asperities into the CMP pad as the dresser is rotated.
- As Dr. Tsai testified, a POSITA would have known that which particles actually cut during use can only be determined by examining a dresser post use. (Ex. 2001 at ¶¶ 26-29, 31.)

- Petitioner relies on the outdated and erroneous assumption that “substantially all the superabrasive particles are contributing to cutting asperities.” (Pet. at 38.)
- That is contradicted by the '862 patent, which teaches that explains that “only a small percentage of superabrasive particles in a typical CMP pad dresser are positioned so as to penetrate or cut into a CMP pad.” (Ex. 1001 at 7:21-23.)
- Moreover, a POSITA would have known that it could not be determined from pad design or even a manufactured pad how many superabrasive particles of any aspect of Sung '026 would cut asperities.

[11A] The method of claim 1, further comprising: rotating the CMP pad;

[11B] applying a slurry to a polishing surface of the rotating CMP pad;

[11C] applying a workpiece to the polishing surface such that the workpiece is polished by the asperities in combination with the slurry.

Claim 11

- Claims 11 depends from claim 1, and therefore Sung '026 does not anticipate claim 11 for all of the reasons it does not anticipate claim 1.
- Petitioners again attempts to cobble together various aspects of Sung '026.
 - Sung '026 does not disclose that *the* CMP pad *of claim 1* rotated. The only support cited comes from the background of the invention section.
 - Sung '026's description of prior art usage in the background section cannot be combined with the various “aspects” of its invention

[12.pre 20.pre] The method of claim 11, wherein

[12] the workpiece is a semiconductor device.

[20] the CMP pad is polyurethane.

- Claims 12 and 20 depend from claim 1, and therefore Sung '026 does not anticipate those claims for all of the reasons it does not anticipate claim 1.
- The only support cited comes from the background of the invention section.
- Where Petitioners have failed to argue inherency, their reliance on the prior art in the background section of Sung '026 cannot show that disclosure within the embodiment described in Sung '026.

**Grounds 2-6 fail on the same grounds...
... and also suffer from additional deficiencies**

Claims 5-10 all recite additional limitations relating to “superabrasive particles . . . at a peripheral location of the dresser.”

Petitioner incorrectly infers from a *lack of information* about the contents of the area that there are no superabrasive particles there.

Absence of evidence is not evidence of absence, and it cannot satisfy Petitioner’s burden of proof here.

As a non-POSITA with no experience in the area, Dr. Shanfield’s guesswork to the contrary is unsupported, and contradicted by both the ’862 patent’s subsequent development and the experience of Dr. Tsai, someone with substantial experience in the field.

Grounds 2-6 - Failure to Support Obviousness Combinations

The Board should reject Petitioner's boilerplate obviousness arguments.

- These are argued in parallel fashion, and simply identify in the respective secondary reference a disclosure of what is additionally recited but was missing from Sung '026.
- Petitioner never argues that anything in these references fills the gaps in Claim 1 for that are fatal to grounds 1A & 1B; they are relied upon only for the additional recitation of the dependent claims.
- Thus, the same gaps for limitations [1A], [1C], and [1D] remain.

The Testimony of Samsung's Expert Dr. Shanfield Is Inadmissible for POSITA Analysis

The Institution Decision

- The Board adopted Petitioner's initial POSITA definition only *for the purposes of the Institution Decision*
- That definition was just *ipse dixit* and only cited Dr. Shanfield's Declaration for support.
- In that Declaration, Dr. Shanfield "merely repeats Petitioner's conclusory statement, without any explanation or analysis as to how or why he reached this conclusion."
- Even in the Institution Decision, "minimal probative weight" was given to "Petitioner's conclusory argument and Dr. Shanfield's conclusory testimony" regarding the appropriate level of skill in the art.

The Institution Decision

- Patent Owner did not dispute Petitioner's definition *for Institution*, but expressly contended that Dr. Shanfield was not qualified as a POSITA for the purposes of trial.
- The Board expressly recognized that “[t]he specific level of skill is important in determining the patentability issues.”
- The Board quoted *Kyocera*, 22 F.4th at 1375-78 (Fed Cir. 2022) (even when the proffered expert had advanced degrees and extensive general experience in the broad area, it was an abuse of discretion to admit his testimony on any issues analyzed through the lens of a POSITA because he lacked the specific experience required for the level of skill in the art)

The Institution's Level of Skill in the Art was *NOT* Final

The Board expressly noted that the Institution Decision was made at a “preliminary stage” and that the Board “has not made a final determination with respect to . . . *any* underlying factual issue.” (emphasis added)

“The Board’s final determination will be based on the record as developed during the *inter partes* review.”

But Petitioner utterly failed to develop the record for a POSITA or the level of skill in the art beyond the “conclusory” statements “accorded minimal weight” in the Institution Decision.

In contrast, Patent Owner *did* develop the factual record.

The Level of Skill In the Art was developed on the record by Dr. Tsai

- A POSITA for purposes of the '862 patent includes at least two years of experience in developing CMP technology including experience with the design and development of CMP pad dressers.
- Specific experience with CMP pad conditioners is necessary due to the particularized context of this distinct technical field which requires knowledge of:
 - abrasive materials,
 - mechanical wear mechanisms,
 - pad/wafer interaction physics
 - performance optimization of pad conditioners.
- ***General expertise in semiconductor manufacturing is insufficient.***

Dr. Shanfield's Experience

Stanley Shanfield



Curriculum Vitae for Stanley Shanfield

Education:

Massachusetts Institute of Technology, Ph.D., Physics, 1981

University of California, Irvine, B.S. Cum Laude, Physics, 1977

Educational Awards:

Outstanding Research Project, U.C. Regents Award, 1977

Phi Beta Kappa, 1977

Four Year Scholarship, Tuition & Research, ERDA/DOE, 1977-1981

Hands-On Professional Expertise:

Semiconductor Physics & Chemistry
Semiconductor Fabrication: Silicon and III-V Materials
Semiconductor Device & Integrated Circuit Engineering
Semiconductor Equipment: Front & Back End
Semiconductor Packaging Design and Manufacturing
Passive Component Design and Manufacturing
RF Design and Fabrication
Digital Design & Fabrication
Semiconductor Manufacturing in Silicon and III-V Materials
MEMS Design and Fabrication: Electrical, Optical, & Sensing Devices
Fiber Optic Device Design and Fabrication
Integrated Optics & Electro-Optical Devices
Plasma Physics

Specialized Training:

Global Positioning Electronics, Systems and Components
Six Sigma Semiconductor Manufacturing
Microwave Engineering
US Patent Law in Technology
Patent Application and Prosecution
Semiconductor Plasma Processing
Thin Film Physics and Technology
MEMS-based Gyroscopes and Accelerometers
Thermoelectric Materials & Technology
Phased Array Radar Engineering
Antennas and Electromagnetic Propagation
Solid State Optical Devices
Fiber Optic Communication System Operation
HALT and HAST Reliability Testing Methods

Hands-On Professional Expertise:

Semiconductor Physics & Chemistry
Semiconductor Fabrication: Silicon and III-V Materials
Semiconductor Device & Integrated Circuit Engineering
Semiconductor Equipment: Front & Back End
Semiconductor Packaging Design and Manufacturing
Passive Component Design and Manufacturing
RF Design and Fabrication
Digital Design & Fabrication
Semiconductor Manufacturing in Silicon and III-V Materials
MEMS Design and Fabrication: Electrical, Optical, & Sensing Devices
Fiber Optic Device Design and Fabrication
Integrated Optics & Electro-Optical Devices
Plasma Physics

Dr. Shanfield's Experience

Stanley Shanfield



Curriculum Vitae for Stanley Shanfield

Education:

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University of California, Irvine, B.S. Cum Laude, Physics, 1977

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Passive Component Design and Manufacturing
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Digital Design & Fabrication
Semiconductor Manufacturing in Silicon and III-V Materials
MEMS Design and Fabrication: Electrical, Optical, & Sensing Devices
Fiber Optic Device Design and Fabrication
Integrated Optics & Electro-Optical Devices
Plasma Physics

Specialized Training:

Global Positioning Electronics, Systems and Components
Six Sigma Semiconductor Manufacturing
Microwave Engineering
US Patent Law in Technology
Patent Application and Prosecution
Semiconductor Plasma Processing
Thin Film Physics and Technology
MEMS-based Gyroscopes and Accelerometers
Thermoelectric Materials & Technology
Phased Array Radar Engineering
Antennas and Electromagnetic Propagation
Solid State Optical Devices
Fiber Optic Communication System Operation
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Phased Array Radar Engineering
Antennas and Electromagnetic Propagation
Solid State Optical Devices
Fiber Optic Communication System Operation
HALT and HAST Reliability Testing Methods

DEMONSTRATIVE EXHIBIT - NOT EVIDENCE

Dr. Shanfield Lacks Any Experience with CMP Pad Conditioning

- Dr. Shanfield lacks experience in CMP pad conditioning, which is the technical field of the '862 patent.
- At best, Dr. Shanfield has worked in a lab where CMP equipment was present.
- His general experience with semiconductor fabrication and IC processing where CMP pads were used does not apply to CMP pad dressers or their use; Petitioner has not attempted to explain how that general experience would apply to this specific field.

Dr. Shanfield's experience is insufficient

Dr. Tsai provided un rebutted testimony, with sufficient explanation, of why Dr. Shanfield's general experience in fabrication and working in facilities where CMP was performed does not suffice to qualify him as an expert in this subfield:

10 BY MR. CHAN:

11 Q. Now, you testified, and I will quote you, a
12 phrase called "CMP operating experience."

13 Do you remember that phrase?

14 A. I do.

15 Q. Is CMP operating experience the same or
16 different than your definition of a POSITA for the '862
17 patents?

18 A. We are doing researches. When we say we
19 should have the operational experiences, that represents
20 that, in this field, we should also have the capability
21 of designing, manufacturing and knowledges. So, in
22 effect, if we use it, you push the button, that's also
23 operational experience, but that's not enough
24 capability. You need to understand how to use diamond
25 disk. You should have the diamond knowledges, and then

1 you can have the clear capability to make that
2 determination.

3 THE CHECK INTERPRETER: "Well, as long as you
4 can operate, you know how to operate, it just means that
5 you have knowledge, you know things about the design,
6 manufacturer and also the knowledge. And this is how it
7 is defined when research is performed.

8 "But if we're talking about operating
9 experience like an operator working in a fab, the worker
10 only has to touch buttons in order to operate, then that
11 operator may not necessarily have that kind of
12 capability."

DEMONSTRATIVE EXHIBIT - NOT EVIDENCE

End of Slides

Backup Slides

***Dr. Tsai Identified Numerous Flaws in Dr. Shanfield's Analysis

- Dr. Shanfield's contention that Tsai's ODD "designates a flat profile" based on a partial image of a pad conditioner.
- Dr. Shanfield's speculation as to the exact number of particles on Tsai's ODD by multiplying the number of diamond tips shown on single section of the ODD.
- Dr. Shanfield's assertion that all diamond particles are cutters without performing any research or measurement.
- Dr. Shanfield's unreliable calculation of a total number of grits on a pad conditioner from on approximate numbers.
- Dr. Shanfield's erroneous contention that all diamond particles that experience frictional forces are working particles.

Case IPR2024-00534
Patent No. 9,138,862
Patent Owner's Demonstratives

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), the undersigned certifies that on June 16, 2025, the foregoing document is being served via electronic mail upon the following counsel of record for Petitioners:

LEAD COUNSEL	BACKUP COUNSEL
Yung-Hoon Ha (Reg. No. 56,368) Desmarais LLP 230 Park Ave New York, NY 10169 Telephone: (212) 351-3400 Email: yha@desmaraisllp.com	Laura Avena (Reg. No. 78,920) Desmarais LLP 230 Park Ave New York, NY 10169 Telephone: (212) 351-3400 Email: lavena@desmaraisllp.com Taeg Sang Cho (Reg. No. 69,618) Desmarais LLP 230 Park Ave New York, NY 10169 Telephone: (212) 351-3400 Email: tcho@desmaraisllp.com Bridget Belcher (Reg. No. 82,861) Desmarais LLP 101 California Street San Francisco, CA 94111 Telephone: (415) 573-1900 Email: bbelcher@desmaraisllp.com
Additional email for service: SamsungSungIPRService@desmaraisllp.com	

/ Alex Chan /
Alex Chan
Reg. No. 52,713