

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,

Petitioner

v.

CHIEN-MIN SUNG,

Patent Owner

IPR2024-00533
U.S. Patent No. 8,974,270

PATENT OWNER'S SUR-REPLY

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Submitted Electronically via PTACTS

TABLE OF EXHIBITS

Exhibit	Description
2001	Motion to Stay Statistics
2002	Declaration of Stanley Shanfield
2003	Depo Transcript- Vol 2 – Stanley Shanfield
2004	Declaration of Prof. Ming-Yi Tsai
2005	Sung, et al “The Organic Diamond Disk (ODD) for dressing of Polishing Pads of Chemical Mechanical Planarization,” International Conference on Planarization / CMP Technology, 25-27 October 2007
2006	M. Y. Tsai & Y. S. Liao (2009) Dressing Characteristics of Oriented Single Diamond on CMP Polyurethane Pad, Machining Science and Technology, 13:1, 92-105
2007	M. Y. Tsai et al., “Novel Diamond Conditioner Dressing Characteristics of CMP Polishing Pad”, International Journal of Machine Tools & Manufacture 49 (2009) 722–729
2008	Kuen-Ren Chen & Hong-Tsu Young, “Estimation of Dressing Effects in Chemical Mechanical Polishing with Sorts of Diamond Dressers”, Advanced Materials Research Online: 2009-06-24 ISSN: 1662-8985, Vols. 76-78, pp 175-180
2009	Hsiu-Ming Yeh & Kuo-Shen Chen, “Development of a pad conditioning simulation module with a diamond dresser for CMP applications”, Int J Adv Manuf Technol (2010) 50:1–12
2010	Pysher et al. “Design, Characteristics and Performance of Diamond Pad Conditioners”, Materials Research Society Symposium Procedures, Vol. 1249, 2010 (“Pysher”)
2011	US Patent No. 8,777,699

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<i>Keysight Technologies, Inc. v. Centripetal Networks, Inc.</i> , IPR2023-00446, Paper 30 (PTAB August 5, 2024)	8
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<i>TriVascular, Inc. v. Samuels</i> , 812 F.3d 1056 (Fed. Cir. 2016)	6, 17, 18, 20
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I. INTRODUCTION

Petitioners' Reply (Paper 25) fails to refute Patent Owner's ("PO's") arguments, and testimony from PO's expert Dr. Tsai remains unrebutted because Petitioners chose not to submit a supplemental declaration from its expert.

PO presented more than enough evidence rebutting enablement of Sung'479. Instead of presenting expert testimony on this point, Petitioners rely on unrelated IPR proceedings and Dr. Tsai's alleged lack of legal knowledge despite his not being an attorney.

Dr. Tsai's testimony regarding the inability to combine Sung'479 with Chou and lack of motivation to do so with or without hindsight bias remain unrebutted. Though Petitioners allege that the Board has "already considered and rejected" PO's arguments in the Institution Decision (Reply, 1), the burdens of proof in the pre-Institution stage—where the Board has not yet benefitted from the POR and PO's expert testimony, after which the Board can update its views—are different from the merits phase. *See TriVascular, Inc. v. Samuels*, 812 F.3d 1056, 1068 (Fed. Cir. 2016).

While Petitioners attempt to discredit Dr. Tsai fails, Dr. Shanfield is clearly unqualified as a POSITA because he lacks necessary experience, which both

Petitioner and Dr. Shanfield do not deny, and Petitioners did not submit any supplemental information to support his testimony.

Because Petitioners have failed to show the unpatentability of any of the claims challenged in the Petition by a preponderance of the evidence, each of the three Grounds in this Proceeding should be rejected in its entirety.

II. CLAIM CONSTRUCTION

Petitioners wrongly allege that PO “does not dispute that certain claim terms . . . have been expressly defined in the '270 Patent.” (Reply, 2.) PO *expressly* indicated that PO “contends that no construction is necessary for the '270 patent’s claim terms.” (POR, 5.)

III. PERSON OF ORDINARY SKILL IN THE ART (“POSITA”)

Petitioners admit that their expert, Dr. Shanfield, “does not have personal experience in designing and developing CMP pad dressers” (Reply, 2), despite the technology of this proceeding requiring knowledge of the design and development of CMP pad dressers. Instead of attempting to rehabilitate their expert’s qualifications, Petitioners attack the credibility of PO’s expert, Dr. Tsai. (Reply, 2-4.) Petitioners state that PO should have cross-examined Dr. Shanfield to “probe his qualifications as an expert and credibility” (Reply, 2), but Petitioners bear the burden of proving Dr. Shanfield’s qualifications—not PO. *Daubert v. Merrell Dow Pharms., Inc.*, 509 U.S. 579, 590-91, 592 n.10 (1993). Tellingly, Petitioners

claim that Dr. Shanfield is qualified, but Petitioners failed to submit *any* evidence from Dr. Shanfield to rebut Dr. Tsai's testimony regarding Dr. Shanfield's lack of qualification.

IV. COLLATERAL ESTOPPEL DOES NOT APPLY

Petitioners allege that "POR concedes that Chou discloses [1Pre] and [1D], because PO only argues against [1B] of claim 1." (Reply, 5.) That is incorrect. The POR did not concede that collateral estoppel applies and specifically indicated that "Petitioners are incorrect" regarding collateral estoppel. (POR, 18.) PO identified specific reasons why the patentability issues were *not* identical for collateral estoppel to attach. (POR, 17-20.)

Petitioners cite to a non-precedential decision, *Keysight Technologies, Inc. v. Centripetal Networks, Inc.*, IPR2023-00446, Paper 30 at 21 (PTAB August 5, 2024), which they claim "rul[es] that Patent Owner was estopped from asserting that certain limitations of independent claim were not taught or suggested by a prior art reference." However, the facts here are distinguishable because (1) in *Keysight*, the latter patent was a continuation of the previously-invalidated patent and shared the same disclosure, whereas here the '270 patent and previously-invalidated '699 patent are unrelated and have different disclosures (*compare* EX1001 *with* EX2011), and (2) unlike the patent owner in *Keysight*, PO challenged

Petitioner's collateral estoppel argument and showed that the question of patentability has been materially altered for the claims at issue (POR, 18-20).

V. RESPONSE TO PETITIONERS' SPECIFIC GROUNDS FOR CHALLENGE

A. Ground 1: The Combination of Chou and Sung'479 Does Not Render Obvious Claims 1 and 3-8

Petitioners claim that PO focuses only on claim element [1B]. (Reply, 5.)

Not so. PO also attacks Petitioners' combination of references against the claims *as a whole*, including, e.g., context of the art surrounding the creation of Sung'479 and Chou as opposed to the context surrounding the '270 patent (POR, 8-17), application of collateral estoppel (POR, 17-20), and any supposed motivation to combine the cited references (POR, 29-33).

1. Sung'479 Is Not Enabling to Teach the Claim Language

Petitioners avoid discussing enablement by alleging that the Petition "relied on the combination of Chou and Sung'479" instead of exclusively on Sung'479 to disclose claim element [1B]. (Reply, 5.) However, the Petition speaks for itself: "Chou, however, *does not explicitly teach* that the difference in protrusion distance between the two highest protruding tips is less than or equal to about 50 microns." (Pet., 28-29 (emphasis added)). Sung'479 stands alone for claim element [1B] and is not enabling as required under *Raytheon Techs. Corp. v. GE*, 993 F.3d 1374 (Fed. Cir. 2021). (POR, Section VII.A.2 at 20-26.)

Petitioners then claim that the “POR never argues that the combination of Chou and Sung’479, taken *as a whole*, do not enable a POSITA—arguing solely against Sung’479,” apparently ignoring the entirety of Section VII of the POR. (Reply, 6 (original emphasis); *see* POR, 17-33.) The POR shows that a POSITA could not have combined Chou and Sung’479 to arrive at the claimed invention. (*See* POR, 17-33.)

Petitioners argue that Sung’479 is presumptively enabling and that “it is Patent Owner’s burden to rebut this presumption.” (Reply, 6-7.) PO has done just that. PO presented convincing evidence, including an expert declaration, rebutting that presumption. (POR, Section VII.A.2; EX2004, Section VII.) By Petitioners’ own cited caselaw, “[i]f a patentee presents evidence of nonenablement that a trial court finds persuasive, the trial court must then exclude that particular prior art patent in any anticipation inquiry, for then the presumption has been overcome.” *Amgen Inc. v. Hoechst Marion Roussel*, 314 F.3d 1313, 1355 (Fed. Cir. 2003); *see also In re Antor Media Corp.*, 689 F.3d 1282, 1288 (Fed. Cir. 2012) (extending to prior art printed publications); *Apple Inc. v. Corephotonics, Ltd.*, 861 F. App’x 443, 450 (Fed. Cir. 2021) (extending to AIA proceedings).

Unlike *Apple*, Petitioners here failed to provide any evidence supporting enablement. Instead, Petitioners merely provided attorney argument that Sung’479

is enabling; tellingly, these arguments are not based on the disclosure itself, but on a presumption of enablement and alleged inconsistent positions PO has taken amongst the three pending IPRs. (Reply, 5-11.) Petitioner concedes that attorney argument is not evidence. (Reply, 18 (citing *Icon Health & Fitness, Inc. v. Strava, Inc.*, 849 F.3d 1034, 1043 (Fed. Cir. 2017)).) As Petitioners decided not to submit any rebuttal opinion from their expert, Dr. Tsai's testimony regarding lack of enablement remains unrebutted.

The facts in this case are more like *Raytheon* where the petitioner's expert never asserted that a skilled artisan could have actually constructed the advanced engine described in the prior art. In contrast, the patent owner there submitted unrebutted expert declarations demonstrating that the necessary composite materials were unavailable and that the cited temperature and pressure conditions had not been achieved as of the priority date, which undermined the petitioner's enablement theory and stands unchallenged as the only record evidence on whether a skilled artisan could have achieved the claimed power density. *Raytheon*, 993 F.3d at 1382. Likewise, PO here presented "extensive, unrebutted evidence of non-enablement" through an expert declaration.

Petitioner next criticizes Dr. Tsai for "not even know[ing] what RA values refer to in the context of Sung'479." (Reply, 7.) But this only adds to the evidence

of non-enablement. In fact, “RA value” is not defined anywhere in Sung’479. (*See generally* EX1005.) Further, Petitioner never challenges Dr. Tsai’s status as a POSITA, yet Dr. Tsai is “not sure” what “RA value” means in Sung’479. (EX1051, 221:4-14.) But that is not at issue here, because “RA value” is not alleged to be the same as “protrusion distance,” the term in element [1B]. It is unclear why Petitioners attempt to equate the two. (Reply, 7-8.) Indeed, nowhere in Sung’479 defines the relationship between a protrusion distance and a surface roughness, leaving a POSITA to guess the extent and scope of this relationship. Without this information, which is so fundamental to understanding Sung’479, Sung’479 is not enabling.

Petitioners next focus on co-pending case IPR2024-00535, concerning U.S. Patent No. 9,724,802 (“’802 Patent”) to accuse PO of taking contradictory positions between the two proceedings. (Reply, 9.) Specifically, Petitioners assert that Sung’479 must be enabling because [0072] in Sung’479 is “nearly identical” to portions of U.S. Patent Application No. 11/223,786 (“’786 Application”), which PO relies upon for priority of element [1E] of the ’802 Patent. (Reply, 9-10.) Not so.

First, Petitioners claim that “Patent Owner cannot argue that the nearly identical passages in the ’786 Application provide an enabling disclosure for the identical limitation but at the same time argue that Sung’479 is not enabling as a matter of law.” (Reply, 10-11.) Petitioners elide several flaws in their argument.

Most glaringly, the '786 Application is titled “Methods Of Bonding Superabrasive Particles In An *Organic Matrix*” (emphasis added), while Sung'479 discloses only the use of a *brazed matrix* (see generally EX1005; e.g., POR, 21, 30-32; EX2004 ¶¶50-52, 64; Pet. at 17-18). As detailed in the POR, organic diamond disks (“ODDs”) (focus of '786 Application) and brazed diamond disks (“BDDs”) (focus of Sung'479) require vastly different manufacturing processes and have vastly differing results, to the point that, circa 2005-2007 when Sung'479 was filed, ODDs could be manufactured such that diamond tips could be leveled to a height variation within 20µm (POR, 11-12; EX2005, 1:30-2:3). Also, it was not practically achievable to consistently and predictably manufacture a BDD CMP pad dresser having superabrasive particle tip height variation less than 50µm. (POR, 23; EX2004, ¶32.) This alone defeats Petitioners' argument for at least the reasons set forth in the POR.

Further, despite sharing certain sentences, Sung'479 and the '786 Application are different applications, have different disclosures, and are members of different patent families. For example, a text search indicates that the disclosure of the '786 Application has 38 mentions of “designated profile,” while that of Sung'479 includes only 25, 15 of which are in the paragraph Petitioner relies upon for its alleged anticipatory particle height ranges. (Compare EX1005 to EX1053.) So it is

unsurprising that the '786 Application has a more robust enabling description of “designated profile” than does Sung'479. Additionally, the '786 Application is a direct ancestor and priority patent application to the '802 patent, the enablement of which is uncontested. Indeed, claim 1 of the '802 patent includes the term “designated profile,” which is wholly absent from the '270 patent.

To that extent, Petitioners also take the contrary position in IPR2024-00535 that the '786 Application does not provide sufficient written support to the '802 patent. Petitioners cannot have their cake and eat it too—either the '786 Application does provide written support to the '802 patent (which would disqualify several prior art references cited in IPR2024-00535) or it does not (which would further reinforce the non-enabling nature of Sung'479 as a prior art in this case). Petitioners cannot have both ways.

Also, Petitioners argue that PO “cannot simultaneously claim that the '786 Application, filed on September 9, 2005—over a year prior to the filing date of Sung'479—contains an enabling disclosure, while also asserting that Sung'479 requires undue experimentation” because “[b]oth the '786 Application and Sung'479 teach that the CMP pad dresser can be produced using the same reverse casting methods.” (Reply, 11.) But, as above, this argument overlooks that *organic matrix* pad dressers and *braze matrix* pad dressers are subject to vastly different

manufacturing processes. Additionally, the passages cited by Petitioners differ in an important aspect because Sung'479 indicates that "[v]arious reverse casting methods may be utilized to manufacture the superabrasive tools, and particularly the CMP pad dressers *according to aspects* of the present invention," while the '786 Application states, "[v]arious reverse casting methods may be utilized to manufacture *the CMP pad dresser of the present invention.*" Petitioners overlook that "aspects" of "the invention" of Sung'479 may not include those of "the CMP pad dresser of the present invention" of the '786 Application.

Finally, Petitioners fail to rebut many of PO's arguments in the POR regarding Sung'479's lack of enablement, including:

- Sung'479 lacks crucial details for implementing the described "leveling process" (POR, 22; EX2004, ¶63);
- Sung'479 fails to instruct a POSITA how to achieve alignment along a so-called "designated profile" (POR, 22-23; EX2004, ¶64);
- When Sung'479 was filed, it was not practically achievable to consistently and predictably manufacture a BDD CMP pad dresser having superabrasive particle tip height variation less than 50um, let alone 2um (POR, 23; EX2004, ¶32);
- Sung'479 fails to instruct a POSITA how to remove the "spacer layer"

and “temporary spacer layer” from the low-melting point braze matrix (POR, 23-24; EX2004, ¶65);

- Sung’479 also fails to instruct a POSITA how to level particles on a double-sided CMP pad dresser (POR, 24-25; EX2004, ¶66);
- Sung’479 lacks any disclosure of working examples or prototypes to validate its leveling processes (POR, 25; EX2004, ¶67); and
- Undue experimentation would have been required to achieve any of these ends.

2. Chou and Sung’479 Do Not Disclose the Claim Language

Petitioners allege that the Board already ruled against PO’s obviousness arguments made in the POR. (Reply, 12-14.) Not so. Petitioners overlook that the burden required to institute trial (reasonable likelihood of success) is lower than the burden to prove invalidity (preponderance of the evidence). *Compare* 35 U.S.C. § 314 *with* § 316. Further, 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*, 812 F.3d at 1068 (original emphasis). Here, the Board did not have the benefit of the arguments made in the POR or the expert testimony of PO’s expert, Dr. Tsai, when it instituted trial. Indeed, the Institution Decision specifically “encouraged” the parties “to further develop the record” after

institution. (*E.g.*, Paper 16 at 20-22.)

Petitioners also make a vague waiver argument in a footnote of their Reply, seemingly attempting to exclude arguments made in the POR. (Reply, 12 n.2.) To be clear, PO does not waive any arguments made in the POPR and made again in the POR, regardless of whether the Institution Decision addressed them. Again, the differing burdens allow the Board to “change its view of the merits after further development of the record.” *TriVascular*, 812 F.3d at 1068.

Petitioners allege that PO “misapprehended” the arguments in the Petition, proceeding to rehash the crux of their obviousness argument regarding the combination of Chou and Sung’479. (Reply, 12-13.) The POR squarely addressed these arguments in Section VII.A.3. (POR, 26-29.) Chou states that “protrusion distance between the particles should be small,” but there is no indication of *how small* or any indication that a micron level of measurement is contemplated. (Reply, 12-13; POR, 27-28.) Indeed, Petitioners rely only a drawing for their arguments regarding Chou (Reply, 12-13), and drawings by themselves “may not be relied on to show particular sizes if the specification is completely silent on the issue.” *Hockerson-Halberstadt, Inc. v. Avia Group Int’l*, 222 F.3d 951, 956 (Fed. Cir. 2000); *see* POR, 27-28.

Petitioners also fault PO’s reliance on Dr. Tsai to support PO’s arguments.

(Reply, 13.) But Petitioners also relied on Dr. Shanfield to support their arguments. Petitioners allege that Dr. Tsai's opinions are conclusory because "Dr. Tsai provides no objective evidence" (Reply, 13), but Dr. Tsai's opinions use his experience and the prior art, just as Dr. Shanfield's opinions do. (*Compare* EX1002 *with* EX2004.) Dr. Tsai reviewed relevant portions of the Petition (EX1004, ¶10), Chou (*e.g.*, EX1004, ¶70), Sung (*e.g.*, EX1004, ¶49), and other documents related to his opinions (*e.g.*, EX1004, ¶¶36-39). Petitioners' argument for more "objective evidence" is simply without merit.

Finally, Petitioners fail to rebut that methods for consistently achieving the miniscule tip variation in Sung'479 of "less than about 1 microns" as a general matter were not known in BDD CMP pad dressers at the time Sung'479 was published. (*E.g.*, POR, 28-29; EX2004, ¶32.) This alone indicates that Sung'479 is not enabling for Petitioners' purpose.

Petitioners also do not rebut the circumstances surrounding CMP pad dresser development at the time Sung'479 and Chou were published, which were infected with assumptions that were later found to be incorrect, leading to a different technological context for the '270 patent. (POR, Section VI at 8-17; *see* EX2004, ¶¶31-47, 53, 55-59.) Thus, it is un rebutted that those incorrect assumptions underlying Sung'479 and Chou, "that relatively low height deviations . . . would

result in shared work across the overwhelming majority of the diamond grit because the bulk of the diamond grits were involved in pad dressing,” would not have been applied by a POSITA because the subsequent development of the art, as reflected in the '270 patent, expressly taught to the contrary. (POR, 17, 26; *see* EX2004, ¶¶34-36, 45-47, 57-59.)

3. There Is No Motivation to Combine Chou and Sung'479 to Obviate the Claim Language

a. Dr. Shanfield Is Not Qualified to Opine as a POSITA

First, Petitioners claim that PO's "attempts to discredit Dr. Shanfield is [sic] without merit." (Reply, 14.) To be clear, PO is discrediting Dr. Shanfield's lack of relevant experience in designing and developing pad conditioners. Petitioners admit that Dr. Shanfield "does not have personal experience in designing and developing CMP pad dressers." (Reply, 14.) The opinion of someone who neither designed nor developed CMP pad dressers shouldn't be credited when he opines on both the design and development of CMP pad dressers.

b. Dr. Tsai Is Credible and Unrebutted

Second, Petitioners claim that Dr. Tsai, is not credible because of (1) alleged his lack of understanding of the law, (2) his alleged lack of requisite diligence, and (3) his asserted bias towards Dr. Sung. (Reply, 15.) As explained below and further in Section VII, none of these supposed issues discredit Dr. Tsai's opinions or

declaration.

Petitioners attack Dr. Tsai's legal knowledge (Reply, 15), but his purported lack of understanding of the law is not dispositive of his credibility as a technical expert. As explained in his declaration, Dr. Tsai is not an attorney and was provided with legal principles by counsel. (EX2004, ¶12.)

Petitioners take issue with Dr. Tsai's alleged lack of review of all of the claim language of the '270 patent. (Reply, 15.) As further detailed below in Section VII, intense scrutiny of claim language was not warranted beyond the focused topics at issue, as directed by counsel. Tellingly, Petitioners never once argued that Dr. Sung was unprepared during his three-day deposition.

Petitioners also take issue with Dr. Tsai not reviewing a full copy of the Petition. (Reply, 15-16.) But Dr. Tsai didn't need to read the entire Petition for his opinions; he needed to review only those areas on which he provided his technical opinions. Only relevant portions of the Petition needed to be provided to him by counsel. To suggest otherwise would in effect require every technical expert to review, consider and opine on even issues not relevant to technical opinions, including those issues that are beyond the scope of expert testimony.

Finally, Petitioners paint Dr. Tsai as biased because he worked with Dr. Sung previously. (Reply, 16-17.) Petitioners imply that Dr. Sung directly advanced Dr.

Tsai's career via funding Dr. Tsai's research, and therefore Dr. Tsai must be biased. (*Id.*) But it was Kinik, not Dr. Sung, who provided such funding. Coupled with Dr. Tsai's testimony that he never worked with or for Dr. Sung and has had no professional relationship with Dr. Sung, no more bias is present between Dr. Tsai and Dr. Sung than is present between Dr. Shanfield and Petitioners.

Though Petitioners attempt to attack Dr. Tsai's credibility, they fail to rebut *any* of Dr. Tsai's opinions. Dr. Tsai's declaration is thus unrebutted by anything except bare attorney argument, which Petitioners concede is not evidence. (*See* Reply, 18, citing *Icon Health & Fitness*, 849 F.3d at 1043.)

c. Petitioners Are Using Impermissible Hindsight

Third, Petitioners claim that PO "does not explain why Dr. Shanfield is utilizing impermissible hindsight other than Dr. Tsai's conclusory say-so" (Reply, 17), but this is incorrect. The POR plainly indicates that (1) "Sung'479's numeric values were not achievable," (2) "Petitioners do not explain why any such purportedly 'trivial modification' [of leveling the heights of Chou's particle to micro precision] would have given a POSITA motivation to combine those two references *in that particular fashion*" (original emphasis), and (3) "Petitioners give no indication how a POSITA would have combined the 'designated profile' aspects of

Sung'479 with Chou's two-sided grinding tool or why the results of the combination would be predictable." (POR, 32-33.)

The POR's arguments are surrounded by examples and additional information concerning Petitioners' unconvincing motivation to combine position. (POR, 29-33.) In addition, Petitioners do not rebut Dr. Tsai's testimony that "only through hindsight would a POSITA have been able to have selected from among the potentially infinite combinations of parameters relating to the distinct embodiments described in Sung'479 . . . to form the one particular combination that is purported to satisfy claim element [1B]." (EX2004, ¶72.) Thus, the POR and Dr. Tsai indicated explicitly how Petitioners and Dr. Shanfield used impermissible hindsight as part of their motivation to combine, which is why Petitioners relegated "hindsight" to only a single sentence in the Reply when Petitioners had roughly 1,200 words of room to spare. (Reply, 17.)

d. Braze Temperature Destroys Petitioners' Position

Fourth, Petitioners allege, without more, (1) that "Patent Owner is attempting to read in a limitation into the claims that simply does not exist," with respect to the brazing temperature differences between the prior art and the '270 patent, and (2) that "the proposed Ground is the combination of Chou with Sung'479—not Sung'479 with the '270 patent." (Reply, 17.) But Petitioners ignore that such a

combination must teach the claimed subject matter under 35 U.S.C. § 103.

Petitioners used Sung'479 for the sole purpose of teaching "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 50 microns." (Pet. at 28-29.) If Sung'479 expressly uses a completely different brazing method under a completely different set of circumstances than those of the '270 patent to achieve this purpose, then its teachings are inapplicable, as set forth in the POR. (*E.g.*, POR, 21, 30-31.)

Also, Sung'479 focuses on using bonding diamonds with a molten braze with a melting temperature of 700 degrees. [0061.] In doing so, Sung'479 does not require the particles to be evenly distributed in order to equalize any resulting warpage. [0050.] By contrast, Chou claims to have solved the warping problem itself. [0024.] Modifying Chou in the manner suggested in Sung'479 would render Chou's grinding tool inoperable for its intended purpose, as additional temperatures would impact warpage (as taught in Sung'479) of Chou's grinding tool. Further, Petitioners fail to explain why a POSITA would have looked to the teachings of Sung'479 to solve problems that Chou claimed to have already solved and how Sung'479's brazes that are expressly limited to under 700 degrees could be used for aspects of the '270 patent using brazes with temperatures of 700-1200 degrees. (POR

at 30-31.)

Additionally, Sung'479 and Chou are not compatible to combine based on their dissimilar brazing methods alone for two-sided pad conditioners. (*E.g.*, POR, 32-33.) Chou shows particles in separate braze layers on opposite sides of a substrate, whereas Sung '479 at best shows particles on opposite sides of a single braze. (*E.g.*, POR, 32-33.)

Indeed, they use different solutions where Chou chooses a grinding plate thickness to reduce warping (*E.g.*, EX1004, [0007]-[0010]), while Sung'479 opts for low temperatures without using a grinding plate at all. This grinding plate is critical because it removes the need for any rigid support or a metal support layer that is required in claim 1 of the '270 patent and the support matrix in Sung'479. Chou is also substantively different in that it uses epoxy for bonding diamonds whereas Sung'479 relies on the support matrix or substrate—neither of which is epoxy—for particle or diamond bonding. With their vastly different manufacturing processes, there is no motivation to combine Chou and Sung'479.

Lastly, it is worth emphasizing that Sung'479 uses a “spacer layer” (which is non-enabling (POR, 23-24)) with its braze matrix for particles bonding. [0083]. This spacer layer is made from “any soft deformable material with a relatively uniform thickness” such as “rubbers, plastics, waxes, graphites, clays, tapes,

grafaills, metals, powders, and combinations thereof.” [0084]. Chou, however, does not require any spacer layer for diamond bonding because Chou’s particles are affixed onto the epoxy resin without any metal support. [0035].

For at least the reasons submitted in the POR, Petitioners’ arguments regarding brazing fail, and Sung’479 isn’t enabling for Petitioners’ purposes. Once again, this is why Petitioners’ arguments are confined to a single bullet point of a single sentence in the Reply though Petitioners had roughly 1,200 words to spare. (Reply, 17.)

e. Additional Unrebutted Issues

Petitioners do not rebut that Sung’479’s numeric values for protrusion heights were not achievable, nor do Petitioners explain how the precision of such heights would be achievable in combination with Chou given that Chou uses a different brazing method. (POR, 32; *see* EX2004, ¶¶32, 63-64.)

Petitioners do not rebut PO’s evidence that Petitioners failed to show how Chou and Sung’479 could be combined with a reasonable expectation of success in view of the two different brazing methods each employs. (POR, 32-33; *see* EX2004, ¶62.) Nor do they rebut that they lack evidence as to how a POSITA would have combined the “designated profile” aspects of Sung’479 with Chou’s two-sided grinding tool or why the results of the combination would be predictable. (POR, 33;

see EX2004, ¶¶71-72.)

B. Ground 2: Chou in view of Sung'479 and SungECS Does Not Render Obvious Claims 6 and 7

Petitioners allege that the POR “makes these conclusory attorney arguments [regarding what is shown in SungECS] without providing any reasoned explanation to support its arguments” (Reply, 18), but this is incorrect. The Petition alleges that “tens of thousands of diamond particles” would fall within the “designated profile” of Sung'479 (Pet., 50-52), but Sung'479 is not enabling with respect to the protrusion heights associated with its “designated profile.” (*E.g.*, POR, 22-23.) SungECS does not remedy the deficiencies of the Sung'479-Chou combination that fails to teach the claimed subject matter of the '270 patent, and Petitioners do not claim otherwise. (*See* POR, 34; *see also* Reply, 18.) This holds true for claims 6 and 7, which depend from independent claim 1.

C. Ground 3: Chou in view of Sung'479 and Goers Does Not Render Obvious Claim 2

Petitioners also allege that the POR “makes these conclusory attorney arguments [regarding what is shown in Goers] without providing any reasoned explanation to support its arguments” (Reply, 18), but this is also incorrect. The Petition alleges that Goers shows that CMP pad dressers were known to have central, particle-free areas. (Pet. at 53-54.) But Goers does not remedy the deficiencies of the Sung'479-Chou combination that fails to teach the claimed subject matter of the

'270 patent, and Petitioners do not claim otherwise. (*See* POR, 35; *see also* Reply, 18.) This holds true for claim 2, which depends from independent claim 1.

VI. PETITIONERS FAIL TO REHABILITATE THEIR EXPERT'S QUALIFICATIONS

Instead of addressing their expert's qualifications, Petitioners focus on Dr. Tsai's testimony regarding what the adequate level of experience for a POSITA should be. (Reply, 2-4.) Petitioners miss the point; Dr. Tsai identified reasons why Dr. Shanfield's lack of experience in designing or developing CMP pad conditioning renders him unqualified as a POSITA. (*See* EX1051, 171:7-172:3, 214:17-215:21.) Indeed, under Dr. Shanfield's overinclusive definition, any engineers with general experience in semiconductor manufacturing—including PO's lead counsel who has used and operated numerous CMP equipment as part of his bachelor and master studies in semiconductor manufacturing and fabrication during the relevant time frame—would be equally qualified as a POSITA to opine on the structural characteristics of pad conditioners in the context of the '270 patent.

Petitioners' cherry-picked phrases referring to CMP in general, stripped from any context as to why they were cited in prosecution (Reply, 3-4), unwittingly makes PO's point. But while there is no dispute that CMP is ubiquitous in semiconductor manufacturing, the statements cited by Petitioners do not establish that generic semiconductor manufacturing experience offers any Dr. Shanfield qualification to

opine on CMP pad dresser design, development, or manufacturing. That is because it logically does not; mere experience using a multi-component CMP tool does not qualify someone as an expert in designing or developing a component within that multi-component CMP tool. (*See* EX1051 at 171:7-172:3.) Something more must be required.

This is particularly true where, as here, Petitioners' expert, Dr. Shanfield, is a "professional" expert who has served as an expert on a wide spectrum of technologies that have no bearing on CMP. His declaration (EX1002) confirms this lack of qualification—never once did Dr. Shanfield opine that he designed or developed CMP pad conditioners. And when he does mention the use of CMP equipment, it is either that the laboratory where he worked acquired such systems without him declaring that he actually used such equipment (*id.*, ¶5) or that he "worked directly with engineers" who used such equipment (again, without him declaring that he actually used such equipment personally) (*id.*, ¶3). Dr. Shanfield's CV is equally illuminating—never once does he identify *any* experience in the use of CMP equipment (*id.*, 71-73).

VII. PETITIONERS' UNWARRANTED ATTACKS ON DR. TSAI'S CREDIBILITY ARE IRRELEVANT TO THE ISSUES IN DISPUTE

Dr. Tsai was appropriately circumspect about his lack of expertise with legal principles, consistent with his role as a technical expert. His statement that "I don't

have *much* understanding about them” (Reply, 15 (quoting EX1050, 18:14-18) (emphasis added)), does not mean that he was uninformed, only that his understanding of those legal concepts was appropriately limited to what had been provided to him by counsel and as explicitly set forth in his declaration. (See EX2004, Section II.) Tellingly, Petitioners *do not argue* that any of the legal principles upon which Dr. Tsai relied were in fact incorrect as he explained them.

Petitioners’ distortions of other aspects of Dr. Tsai’s testimony are similarly flagrant. For example, his statement that he “generally” reviewed the claims of the ’270 patent (Reply, 15) is unsurprising given that his declaration does not address every claim of the patent in detail. And, Dr. Tsai explained this answer on redirect:

Q: . . . Let me show you '270. Counsel for petitioner asked you whether you have reviewed columns 17 and 18, and I believe you should have a copy of the '270 patent. . . . Now, when counsel for petitioner asked you whether you have reviewed these two columns, you testified that you reviewed them generally. What does that mean?

. . .

THE WITNESS: As a research -- let me rephrase that. As a researcher, generally, we intend to look at a lot of papers, and for that purpose, we do not look at the entirety of each paper. We would look at the key points of them and to see that what kind of contribution this paper gives and where are the key points on this paper. And then we would keep those key points. Then we would carry on to look further. That's our tradition and our habits. So that is - - if that's the habit, I would look at the most valuable place of the claims of a patent, and then we will just generally look at other places of the patent.

Q. Did counsel for petitioner point you to which part of columns 17 or 18 you did or did not review?

A. What I mean was that the important claims, I reviewed them. Others, I was just generally look at them.

Q. There are eight claims. Did you review them in rendering your opinion?

A. Yes.

(EX1051, 209:21-211:11.)

Finally, Petitioners grossly mischaracterize Dr. Tsai's relationship with Kinik and Dr. Sung. It should not be cause for scandal that Dr. Tsai, as a well-renowned professor having published over one hundred technical papers (EX1051, 194:15-25), collaborated with other scientists and engineers in the highly specialized field in which he works, or that he received financial and material support for his research from a company involved in developing pad conditioners. Such an entirely ordinary type of exchange does not support Petitioners' argument that Dr. Tsai's opinions are biased and not credible. (Reply, 16.) In fact, Dr. Tsai testified that he never worked for or with Dr. Sung directly (EX1051, 206:20-207:10) and that Dr. Sung never provided him with any direct financial support (*id.*, 209:18-20.)

VIII. CONCLUSION

In view of the above, PO respectfully requests that the Board determine that all of the challenged claims of the '270 patent are valid.

Case IPR2024-00533
Patent No. 8,974,270
Patent Owner's Sur-Reply

Dated: April 23, 2025

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME LIMITS

This Patent Owner Sur-Reply consists of 5,507 words, excluding cover page, table of contents, table of authorities, certificate of service, this certificate, or table of exhibits. The Sur-Reply complies with the type-volume limitation of 5,600 words as mandated in 37 C.F.R. §42.24. In preparing this certificate, counsel has relied on the word count of the word-processing system used to prepare the paper (Microsoft Word).

Dated: April 23, 2025

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), the undersigned certifies that on April 23, 2025, the foregoing document and accompanying exhibits are being served via electronic mail upon the following counsel of record for Petitioner:

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