

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

CHIEN-MIN SUNG,  
Patent Owner.

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IPR2024-00533  
Patent 8,974,270 B2

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Before BARRY L. GROSSMAN, GEORGE R. HOSKINS, and  
FRANCES L. IPPOLITO, *Administrative Patent Judges*.

IPPOLITO, *Administrative Patent Judge*.

DECISION  
Final Written Decision  
Determining All Challenged Claims Unpatentable  
*35 U.S.C. § 318(a)*

ORDER  
Denying Patent Owner's Motion to Exclude  
*37 C.F.R. § 42.64(c)*

## I. INTRODUCTION

Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., Samsung Semiconductor, Inc., and Samsung Austin Semiconductor, LLC, (“Petitioner”) filed a Petition (Paper 5, “Pet.”) requesting *inter partes* review of claims 1–8 (“Challenged Claims”) of U.S. Patent No. 8,974,270 B2 (Ex. 1001, “the ’270 patent”). Chien-Min Sung (“Patent Owner”) filed a Preliminary Response (Paper 9) and a Corrected Preliminary Response (Paper 13).

Applying the standard set forth in 35 U.S.C. § 314(a), we instituted an *inter partes* review as to all claims and grounds set forth in the Petition. Paper 16 (“Inst. Dec.”).

After institution, Patent Owner filed a Patent Owner Response (Paper 20, “PO Resp.”), and Petitioner filed a Reply (Paper 25, “Pet. Reply”). Patent Owner filed a Sur-reply (Paper 28, “PO Sur-reply”)<sup>1</sup>. An oral hearing was held on June 20, 2025. Paper 38 (“Tr.”).

Patent Owner also filed a motion to exclude (Paper 32, “Mot. Exclude”), to which Petitioner filed an opposition (Paper 33, “Pet. Opp. Exclude”). Patent Owner filed a reply to Petitioner’s opposition (Paper 34, “Pet. Reply Exclude”).

We have jurisdiction pursuant to 35 U.S.C. § 6. This Decision is a Final Written Decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73 as to the patentability of the Challenged Claims. Petitioner bears the burden of proving unpatentability of the Challenged Claims. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). To prevail, Petitioner must prove unpatentability by a preponderance of the

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<sup>1</sup> Our citations herein are to the Corrected Patent Owner Sur-reply.

evidence. *See* 35 U.S.C. § 316(e) (2018); 37 C.F.R. § 42.1(d) (2021). Having reviewed the arguments and the supporting evidence, we determine that Petitioner has shown, by a preponderance of the evidence, that claims 1–8 of the '270 patent are unpatentable.

We further deny Patent Owner's Motion to Exclude.

*A. Real Parties in Interest*

Petitioner identifies Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., Samsung Semiconductor, Inc., and Samsung Austin Semiconductor, LLC as real parties-in-interest. Pet. 1.

Patent Owner identifies himself as the real party-in-interest. *See* Paper 6, 1.

*B. Related Matters*

Petitioner indicates that the '270 patent has been asserted in the following district court litigation: *Sung v. Samsung Electronics Co., et al.*, No. 4:23-cv-00752 (E.D. Tx.). Pet. 1. Patent Owner identifies *Sung v. Kinik Co.*, No. 1:20-cv-00247-RGA (D. Del.) and *Sung v. Texas Instruments, Inc.*, No. 4:23-cv-00753 (E.D. Tex.) as related matters.

Petitioner has also filed IPR proceedings to challenge two other patents owned by Patent Owner that are related to the '270 patent. *See* Pet. 1. They are: IPR2024-00534 (U.S. Patent No. 9,138,862 B2) and IPR2024-00535 (U.S. Patent No. 9,724,802 B2).

*C. The '270 Patent*

According to the '270 patent, a common technique for manufacturing even-surfaced silicon wafers is known as Chemical Mechanical Polishing (CMP), and includes the use of a polishing pad in combination with an abrasive slurry. Ex. 1001, 1:15–20. The '270 patent discloses CMP pad

dressers that “include a layer of superabrasive particles having substantially leveled tips across the working surface of the finished CMP pad dresser.” *Id.* at 7:1–3. According the ’270 patent, “[a]s used herein, ‘superabrasive’ may be used to refer to any crystalline, or polycrystalline material, or mixture of such materials which has a Mohr’s hardness of about 8 or greater.” *Id.* at 4:9–11. Figure 1, reproduced below, illustrates a CMP pad dresser 10 that includes a monolayer of a plurality of superabrasive particles 12 embedded in matrix layer 14. *Id.* at 7:8–10.

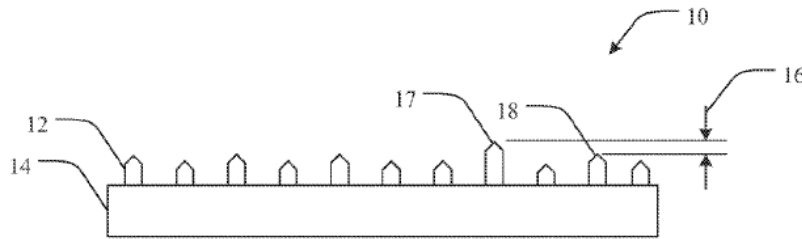


FIG. 1

As shown in Figure 1, each superabrasive particle in the monolayer protrudes from the matrix layer and the difference in protrusion distance 16 between the highest protruding tip 17 and the next highest protruding tip 18 of the monolayer of superabrasive particles is less than or equal to about 50 microns. *Id.* at 7:10–16. Additionally, with reference to Figure 2, the ’270 patent teaches first monolayer of superabrasive particles 22 arranged on a surface of metal support layer 24 and second monolayer of superabrasive particles 26 arranged on the metal support layer on a side that is opposite to the first monolayer. *Id.* at 10:22–25.

#### *D. Challenged Claims*

Petitioner challenges claims 1–8. Pet. 1. Claim 1 is the sole independent claim and is reproduced below with, in brackets, the Petitioner’s identifiers:

1. [1Pre] A CMP pad dresser, comprising:
  - [1A] a first monolayer of superabrasive particles disposed on and protruding from one side of a metal support layer,
  - [1B] 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 50 microns;
  - [1C] a second monolayer of superabrasive particles disposed on the metal support layer on an opposite side from the first monolayer,
  - [1D] wherein the superabrasive particles of the second monolayer are positioned to have substantially the same distribution as the superabrasive particles of the first monolayer; and
  - [1E] a rigid support coupled to the second monolayer of superabrasive particles opposite the first monolayer.

Ex. 1001, 17:35–18:10.

*E. Prior Art and Asserted Grounds*

Petitioner asserts that claims 1–8 would have been unpatentable on the following grounds (Pet. 6):

| <b>Claim(s) Challenged</b> | <b>35 U.S.C. §<sup>2</sup></b> | <b>Reference(s)/Basis</b>                 |
|----------------------------|--------------------------------|-------------------------------------------|
| 1, 3–8                     | 103                            | Chou, <sup>3</sup> Sung '479 <sup>4</sup> |
| 6, 7                       | 103                            | Chou, Sung '479, SungECS <sup>5</sup>     |

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<sup>2</sup> Amendments to 35 U.S.C. §§ 102 and 103 enacted by the Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”) took effect on March 16, 2013. The '270 patent issued from an application filed in May 2012. See Ex. 1001, codes (22), (60). We apply the pre-AIA versions of §§ 102 and 103 here.

<sup>3</sup> U.S. Patent Application Publication No. 2010/0022174 A1, published Jan. 28, 2010 (Ex. 1004) (“Chou”).

<sup>4</sup> U.S. Patent Application Publication No. 2008/0096479 A1, published Apr. 24, 2008 (Ex. 1005) (“Sung '479”).

<sup>5</sup> Sung et al. “Polycrystalline Diamond (PCD) Shaving Dresser: The Ultimate Diamond Disk (UDD) for CMP Pad Conditioning,” ECS

| Claim(s) Challenged | 35 U.S.C. § <sup>2</sup> | Reference(s)/Basis                  |
|---------------------|--------------------------|-------------------------------------|
| 2                   | 103                      | Chou, Sung '479, Goers <sup>6</sup> |

Petitioner also relies on the Declaration of Stanley Shanfield, Ph.D. Ex. 1002. Patent Owner relies on the Declaration of Ming-Yi Tsai, Ph.D. Ex. 2004.

## II. ANALYSIS

### A. *Principles of Law*

In *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1 (1966), the Supreme Court set out a framework for assessing obviousness under § 103 that requires consideration of four factors: (1) the “level of ordinary skill in the pertinent art,” (2) the “scope and content of the prior art,” (3) the “differences between the prior art and the claims at issue,” and (4) “secondary considerations” of non-obviousness such as “commercial success, long-felt but unsolved needs, failure of others, etc.” *Id.* at 17–18. “While the sequence of these questions might be reordered in any particular case,” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 407 (2007), the Federal Circuit has “repeatedly emphasized that an obviousness inquiry requires examination of all four *Graham* factors and that an obviousness determination can be made only after consideration of each factor.” *Nike, Inc. v. Adidas AG*, 812 F.3d 1326, 1335 (Fed. Cir. 2016).

We note that, with respect to the fourth *Graham* factor, the record in this proceeding does not include any argument or evidence directed to secondary considerations of nonobviousness. The analysis below addresses the first three *Graham* factors.

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Transactions, 18 (1) 523–528 (2009) (Ex. 1007) (“SungECS”).

<sup>6</sup> U.S. Patent Application Publication No. 2008/0004743 A1, published Jan. 3, 2008 (Ex. 1006) (“Goers”).

*B. Level of Ordinary Skill in the Art and Patent Owner's Motion to Exclude Dr. Shanfield's Testimony*

The parties dispute the formulation of a person of ordinary skill in the art (“POSITA”) pertaining to the ’270 patent and, relatedly, whether Petitioner’s proffered expert witness Dr. Shanfield is qualified to testify from the perspective of a POSITA.

*1. Person of Ordinary Skill in the Art Pertaining to the ’270 Patent*

The level of ordinary skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1354–55 (Fed. Cir. 2001) (citing *Al-Site Corp. v. VSI Int’l, Inc.*, 174 F.3d 1308, 1324 (Fed. Cir. 1999)). “This reference point prevents . . . factfinders from using their own insight or, worse yet, hindsight, to gauge obviousness.” *Id.* at 1355. “The person of ordinary skill in the art is a hypothetical person who is presumed to know the relevant prior art” at the time of the invention. *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995).

In determining the level of ordinary skill in the art, we may consider various factors, including: “(1) the educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of active workers in the field.” *Best Med. Int’l, Inc. v. Elekta Inc.*, 46 F.4th 1346, 1353 (Fed. Cir. 2022) (citations omitted). “The patent’s purpose can also be informative.” *Id.*

Petitioner contends that a POSITA at the time of the invention of the ’270 patent would have had “a bachelor’s degree in an engineering related field, such as material science, mechanical engineering, electrical

engineering, or physics, and a minimum of two to three years of experience in the field of integrated circuit processing and fabrication techniques.” Pet. 19. Further, “[a] higher level of education or specific skill might make up for less experience, and vice versa.” Pet. 19; Ex. 1002 ¶ 63.

Patent Owner contends that Petitioner’s definition is “overly broad as it merely requires experience ‘in the field of integrated circuit processing and fabrication techniques,’ as opposed to any specific experience with the design and development of CMP pad dressers.” PO Resp. 3 (citing Ex. 2004 ¶ 28). Patent Owner asserts:

[a] POSITA for purposes of the ’270 patent would have had at least a bachelor’s degree in mechanical engineering or other related field of engineering and at least two years of experience in developing CMP technology including some specific experience with the design and development of CMP pad dressers.

PO Resp. 3 (citing Ex. 2004 ¶ 29). Patent Owner contends that a POSITA would have necessarily had the specific experience with the design and development of CMP pad dressers, e.g., background and progression of CMP design. *Id.* (citing Ex. 1001, 1:28–29).

Petitioner replies that Patent Owner and Dr. Tsai “articulate[] no objective rationale why the requisite experience must be so limited” to designing and developing CMP technology including CMP pad dressers. Pet. Reply 3–4 (citing Ex. 2004 ¶ 29). Petitioner cites Dinh-Ngoc<sup>7</sup>, a reference at issue during prosecution of the ’270 patent, as “explain[ing] how CMP technology is relevant in the field of integrated circuit processing and fabrication, supporting Petitioner’s broader definition of POSITA.” *Id.* at 4 (citing Ex. 1003, 207–213; Ex. 1052 ¶ 5). Petitioner further attacks

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<sup>7</sup> Ex. 1052 (US 2010/0248595 A1).

Dr. Tsai's credibility concerning the POSITA experience component, based on Dr. Tsai's alleged inability to determine the POSITA educational component. *See id.* at 3–4 (citing Ex. 1050, 107:18–25, 109:2–8).

Upon consideration, we firstly adopt Petitioner's contention that a POSITA pertaining to the '270 patent would have had at least a bachelor's degree in an engineering related field such as material science, mechanical engineering, electrical engineering, or physics. That contention is not disputed by Patent Owner. *See, generally* PO Resp. 3–4. Therefore, we need not delve into the line of questioning posed to Dr. Tsai during his deposition on an undisputed issue. Ex. 1050, 107:18–25, 109:2–8.

We secondly conclude a POSITA would have had at least two years of experience designing and/or developing CMP technology per Patent Owner's formulation, but we reject Patent Owner's additional contention that this experience must include designing and/or developing *pad dressers* specifically. The '270 patent claims are directed to the structure of a pad dresser, not to a method of making a pad dresser. *See* Ex. 1001, 17:35–18:38. According to the '270 patent specification, the claimed pad dresser structure is designed to condition a polishing pad so the pad may be used to attain “high performance levels in aspects such as uniformity of polished wafer, smoothness of the IC circuitry, removal rate for productivity, longevity of consumables for CMP economics, etc.” during a CMP process. *Id.* at 1:20–24 (Background of the Invention). Thus, the '270 patent's invention generally focuses on optimizing a pad dresser structure to achieve desired results in a CMP process, not necessarily on how to manufacture a pad dresser.

As such, we reject Petitioner's POSITA formulation requiring “experience in the field of integrated circuit processing and fabrication

techniques” (Pet. 19) as too generic in the context of the ’270 patent’s claimed invention. We also conclude, in view of the ’270 patent disclosures discussed above, that Dr. Tsai’s opinion that ordinary skill requires experience with manufacturing pad dressers (*see* Ex. 2011 ¶ 28) is too conclusory and lacking in evidentiary support to be persuasive. *See Best Med. v. Elekta*, 46 F.4th at 1353 (“The patent’s purpose can also be informative.”).

We acknowledge that the ’270 patent specification discusses methods of making a CMP pad in addition to the structure of CMP pads. *See* Ex. 1001, 2:11–55. However, the ’270 patent is not limited to that disclosure, as discussed, and further provides that “[a] variety of techniques can be utilized to maintain tip leveling” in “[t]he present CMP pad dressers,” and “any such technique is considered to be within the present scope.” *Id.* at 7:3–5. Furthermore, we reiterate that the claims of the ’270 patent are not limited to any particular method of manufacture. Ex. 1001, 17:35–18:38.

Thus, we conclude a POSITA pertaining to the ’270 patent would have had at least a bachelor’s degree in an engineering related field such as material science, mechanical engineering, electrical engineering, or physics, and at least two years of experience designing and/or developing CMP technology. Further, a higher level of education or specific skill might make up for less experience, and vice versa.

## 2. *Patent Owner’s Motion to Exclude Dr. Shanfield’s Declaration*

Patent Owner has moved to exclude Dr. Shanfield’s declaration testimony (Exhibit 1002) from evidence. *See* Mot. Exclude 2–10. Patent Owner asserts Dr. Shanfield lacks “qualification in offering his opinions in chemical-mechanical planarization (CMP) pad conditioning,” including the

requisite “expertise and experience to qualify as a POSITA.” *Id.* at 2. Patent Owner particularly asserts “Dr. Shanfield’s only experience is working in a lab that used ‘semiconductor-grade CMP systems’; he does not identify any experience in designing, manufacturing, or testing CMP pad conditioners.” *Id.* at 3 (citing Ex. 1002 ¶ 5; Ex. 2003, 91:23–92:10, 93:10–20).

Petitioner argues Patent Owner’s motion to exclude should be denied because it relies on Patent Owner’s POSITA formulation, which we have partially rejected above in Section II.B.1. *See* Pet. Opp. Exclude 3 (“Patent Owner’s basis for requesting exclusion of the entirety of Dr. Shanfield’s opening declaration erroneously assumes that the Board will adopt the definition of a POSITA proffered by Patent Owner.”). Petitioner further contends “Dr. Shanfield’s qualifications are more than sufficient” because an expert witness “need not be a person of ordinary skill in the art, but rather [must be] ‘qualified in the pertinent art.’” *Id.* at 5–7 (citing PTAB Consolidated Trial Practice Guide (Nov. 2019) (“Practice Guide”)<sup>8</sup>, 34; Fed. R. Evid. 702; *A.C. Dispensing Equip., Inc., v. Prince Castle LLC*, IPR2014-00511, Paper 33 at 9–11 (PTAB Aug. 4, 2015) (citing *Sundance, Inc. v. DeMonte Fabricating Ltd.*, 550 F.3d 1356, 1363–64 (Fed. Cir. 2008); *SEB S.A. v. Montgomery Ward & Co.*, 594 F.3d 1360, 1372–73 (Fed. Cir. 2010); *Mytee Prods., Inc. v. Harris Rsch., Inc.*, 439 Fed. App’x 882, 886-87 (Fed. Cir. 2011)).

Petitioner alleges Dr. Shanfield has “extensive experience in integrated circuit processing and manufacturing” spanning over nearly 40 years. Pet. Opp. Exclude 4 (citing Ex. 1002 ¶¶ 2–12, App. A). Petitioner

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<sup>8</sup> Available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>.

further asserts Dr. Shanfield: (1) “is personally familiar with the design of CMP equipment”; (2) “has personally worked with CMP pad dressers”; (3) “was personally involved in the manufacture of CMP pad dressers”; and (4) “has particularized knowledge about both the use and design of CMP pad dressers.” *Id.* at 4–6 (citing Ex. 1002 ¶¶ 2–12, App. A; Ex. 2003, 18:5–12, 19:8–12, 19:8–20:9).

Patent Owner disputes Petitioner’s descriptions of Dr. Shanfield’s experience, and particularly contends that Dr. Shanfield has generally worked with CMP systems but does not “profess any experience related to the design and development of pad dressers.” PO Exclude Reply 2. Patent Owner adds that “Dr. Shanfield’s general experience in integrated circuit processing and manufacturing does not qualify him to opine on the specific sub-field of CMP pad conditioning.” *Id.* at 3.

The Federal Circuit has held: “To offer expert testimony from the perspective of a skilled artisan in a patent case — like for claim construction, validity, or infringement — a witness must at least have ordinary skill in the art.”<sup>9</sup> *Kyocera Senco Indus. Tools Inc. v. Int’l Trade Commission*, 22 F.4th 1369, 1375–77 (Fed. Cir. 2022); *see also Osseo Imaging, LLC v. Planmeca USA Inc.*, 116 F.4th 1335, 1340–41 (Fed. Cir. 2024) (holding that the proffered expert does not need to have acquired the

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<sup>9</sup> Petitioner cites the Practice Guide’s statements that there is “no requirement of a perfect match between the expert’s experience and the relevant field” and “[a] person may not need to be a person of ordinary skill in the art in order to testify as an expert under Rule 702, but rather must be ‘qualified in the pertinent art.’” Practice Guide 34 (citing *SEB v. Montgomery Ward*, 594 F.3d at 1373; *Sundance v. DeMonte*, 550 F.3d at 1363–64). To the extent there is any tension between the Practice Guide (issued in 2019) and the *Kyocera* holding (issued in 2022), we apply the latter here.

requisite ordinary skill experience prior to the time of the patent's invention).

We determine Dr. Shanfield has sufficient education and experience to qualify as a person of ordinary skill in the art pertaining to the '270 patent. Dr. Shanfield's Ph.D. in physics satisfies the educational prerequisite of at least a bachelor's degree in an engineering related field such as physics. See Ex. 1002 ¶ 2, App. A. Furthermore, his advanced degree (Ph.D. in physics) versus ordinary skill (a bachelor's degree in an engineering related field) provides considerable leeway when turning to the experiential component for ordinary skill. Nonetheless, Dr. Shanfield also has at least two years of experience with designing and developing CMP technology per the experience prerequisite, as follows.

Dr. Shanfield worked at Raytheon Corporation for over 10 years, during which he “worked directly with engineers in the selection, installation, and *optimization* of several chemo-mechanical polishing systems (CMP), including analysis of operational maintenance and performance monitoring,” and he “directly participated in establishing the required metrology (optical thickness monitoring) for maintaining polishing uniformity standards.” Ex. 1002 ¶ 3 (emphasis added). He later joined Draper Laboratory in 2003, where he currently is the Division Leader of Advanced Hardware Development. See *id.* ¶ 5. During Dr. Shanfield's time at Draper, the laboratory “acquired several semiconductor-grade CMP systems for the purpose of fabricating multi-chip modules and for planarization operations in MEMS devices,” and he was “involved in their operation and *optimization.*” *Id.* (emphasis added).

When asked during a deposition whether he is “an expert in CMP equipment design,” Dr. Shanfield stated he is “very familiar with the design

of CMP equipment” because he has “seen many systems” and “installed or supervised the installation of systems.” Ex. 2003, 17:22–19:3. He testified he has “designed apparatus that worked with CMP equipment” although he has not “designed the CMP equipment itself.” *Id.* at 18:13–19. As an example of being “involved in the manufacture of CMP pad dressers” specifically, Dr. Shanfield stated that during his time at Raytheon, he worked with other professionals “to use the CMP system to process MEMS, M-E-M-S, devices” which “needed a certain kind of planarization process [that] required constant conditioning,” so the team “had to try to fabricate something that would provide conditioning that would last longer.” *Id.* at 19:4–20:9.

Thus, we conclude Dr. Shanfield qualifies as a POSITA pertaining to the ’270 patent per the POSITA formulation we have adopted above, based on his advanced degree of education and his relevant experience designing and/or developing CMP technology. As a result, we deny Patent Owner’s motion to exclude Dr. Shanfield’s declaration testimony (Exhibit 1002).

### 3. *Weight of Dr. Shanfield’s Testimony*

Patent Owner further contends that Dr. Shanfield’s testimony should be given little weight, if any, because he “has generally worked with CMP systems at facilities where he worked” but “does not profess any experience related to the design and development of pad dressers.” PO Resp. 4.

As discussed above, we determine Dr. Shanfield qualifies as a POSITA pertaining to the ’270 patent and decline to afford no weight to Dr. Shanfield’s testimony for the reasons Patent Owner urges. As such, we weigh Dr. Shanfield’s testimony, accordingly, where applicable, as detailed in this Decision.

### C. Claim Construction

For petitions such as this one, filed after November 13, 2018, we apply the same claim construction standard “used in the federal courts, in other words, the claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b),” which is articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). 83 Fed. Reg. 51,340, 51,358 (Oct. 11, 2018) (amending 37 C.F.R. § 42.100(b) effective November 13, 2018) (now codified at 37 C.F.R. § 42.100(b) (2019)). Under the *Phillips* standard, the “words of a claim are generally given their ordinary and customary meaning,” which is “the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application.” *Phillips*, 415 F.3d at 1312–13.

Petitioner proposes constructions for terms: “superabrasive,” “protrusion,” “sharp portion,” and “attitude.” Pet. 20–21. Patent Owner does not propose constructions for any claim term. *See generally*, PO Resp.

We discern constructions of these claim phrases or others are not required for the purposes of this Decision. *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms that . . . are in controversy, and only to the extent necessary to resolve the controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

### D. Ground 1: Claims 1 and 3–8 as Obvious over Chou in View of Sung ’479

#### 1. Chou (Ex. 1004)

Chou is a U.S. Patent Application Publication that is directed generally “to a grinding tool and a method for fabricating the same that can

improve the precision and lifetime of products, reduce the cost of production, and enhance machining efficiency.” Ex. 1004 ¶ 2.

Figure 5D of Chou is provided below:

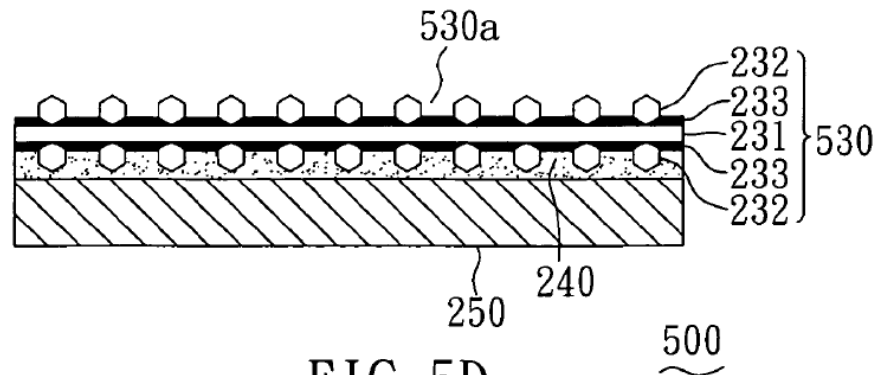


FIG. 5D

Ex. 1004, Fig. 5D. Figure 5D discloses grinding tool 500 with grinding plate 530, working surface 530a, abrasive particles 232, combining layer 233, and soft substrate 231. *Id.* ¶ 54. “[T]he abrasive particles can be directly formed on the surface of the soft substrate by brazing, sintering, or electroplating.” *Id.* ¶ 9. Backplane 250 is retained on a non-working surface of grinding plate 530 via adhesive layer 240. *Id.* ¶ 56.

## 2. Sung ’479 (Ex. 1005)

Sung ’479 is a U.S. Patent Application Publication that generally describes methods “for making a low-melting point superabrasive tool having a plurality of superabrasive particles.” Ex. 1005, code (57) (Abstract). For these methods, Sung ’479 further discloses that

[i]t may also be beneficial for the superabrasive particles to protrude from the solidified braze 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 superabrasive 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.

*Id.* ¶ 69 (emphasis added). Sung ’479 teaches that “the plurality of superabrasive particles [may be] . . . arranged such that their tips vary from the designated profile by from about 1 microns.” *Id.* ¶ 72.

### 3. *Analysis of Independent Claim 1*

Petitioner contends that Chou in view of Sung ’479 renders obvious claim 1. Pet. 21–45.

#### a) *[1Pre] A CMP pad dresser, comprising:*

To the extent the preamble is limiting, Petitioner contends that “Chou teaches grinding or polishing tools that a POSITA would have recognized to be used as a CMP pad dresser.” Pet. 22–23 (citing Ex. 1004 ¶¶ 4, 7–9; Ex. 1002 ¶¶ 87, 91–92).

Patent Owner does not specifically contest Petitioner’s contentions with respect to the preamble. *See, generally* PO Resp.

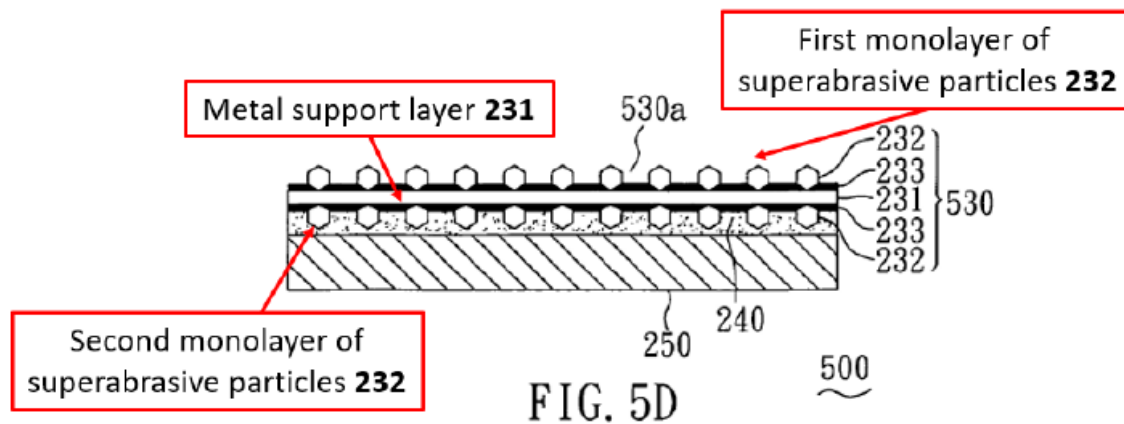
Based on our review of the complete record, we agree with and adopt Petitioner’s arguments as our own. Pet. 22–23. Petitioner has provided sufficient explanation and supporting evidence that Chou teaches or suggests “a CMP pad dresser.”<sup>10</sup> *See* Pet. 22–23.

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<sup>10</sup> We have not made a determination as to whether the preamble is or is not limiting.

b) [1A] a first monolayer of superabrasive particles disposed on and protruding from one side of a metal support layer,

For these limitations, Petitioner relies on Chou and provides an annotated version of Chou's Figure 5D, reproduced below.



Pet. 25. Petitioner's annotated Figure 5D marks portions of grinding tool 500 with "Metal support layer 231," "First monolayer of superabrasive particles 232," and "Second monolayer of superabrasive particles 232." *Id.* Referring to Chou's Figure 5D, Petitioner contends that Chou discloses a CMP pad dresser with a monolayer of superabrasive particles 232 (e.g., diamond particles) disposed on and protruding from the working surface 530a side of metal substrate 231. Pet. 23–25 (citing Ex. 1004 ¶¶ 9, 22, 38–44, 51, 54–58; Ex. 1002 ¶¶ 96, 100). Petitioner also argues that Sung '479 teaches reverse casting methods for CMP pad dressers that form a monolayer of superabrasive particles. Pet. 25 (citing Ex. 1005 ¶ 82, Figs 7–10).

Patent Owner does not specifically contest Petitioner's contentions with respect to this limitation. *See, generally* PO Resp.

Based on our review of the complete record, we agree with and adopt Petitioner's arguments as our own. Pet. 23–28. Petitioner has explained

sufficiently with reference to Chou alone, or in combination with Sung '479 how these references each teach or suggest this limitation. For example, we observe that Chou teaches grinding plate 530 includes a plurality of abrasive particles 232 “formed on the surface of the combining layer 233 (in the present embodiment, the combining layer 233 is a metal layer) by brazing of metals.” Ex. 1004 ¶ 54. Further, as shown in Figure 5D, abrasive particles 232 form a layer and protrude from combining layer 233. *See In re Aslanian*, 590 F.2d 911, 914 (CCPA 1979) (“[A] drawing in a utility patent can be cited against the claims of a utility patent application even though the feature shown in the drawing was unintended or unexplained in the specification of the reference patent.”).

c) *[1B] 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 50 microns*

(1) *Petitioner’s Contentions*

For this limitation, Petitioner acknowledges that Chou “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. Petitioner, however, contends Chou teaches that “the first monolayer of particles 232 are designed to participate in the grinding action, which a POSITA would have recognized to be achievable by reducing the protrusion distance differences between the particles.” *Id.* at 28. Petitioner adds that “[a] POSITA would have readily understood that for all of the abrasive particles to be performing the machining action, the difference in the protrusion distance between the particles should be small.” *Id.* at 30 (citing Ex. 1002 ¶ 109).

Petitioner asserts that Sung '479 teaches tip height variations of only 2 microns or less across all superabrasive particles. Pet. 30–31; Ex. 1002 ¶¶ 105–125. Petitioner argues this is because Sung '479 discloses superabrasive particles may vary in tip height from a “designated profile” by less than about 1 micron (i.e., 2 microns tip-to-tip). *Id.* (citing Ex. 1005 ¶ 72). According to Petitioner, Sung '479’s “designated profile” refers to a predetermined height for the superabrasive particles to protrude from the solidified braze layer. *Id.* at 31 n.8 (citing Ex. 1005 ¶ 69). Applying Sung '479’s teachings to Chou, Petitioner argues that “a POSITA would have been motivated to achieve tip height variations in superabrasive tools that are as small as possible (*e.g.*, to be within 2 microns) to improve the tool’s performance.” Pet. 33 (citing Ex. 1002 ¶ 115). Petitioner adds that

[a] POSITA would have readily found it obvious that the two highest protruding points have as precisely leveled protrusion distances, based on the well-recognized benefits of a precisely leveled surface. And a POSITA would have been able to achieve such precisely leveled CMP pad dressers with a reasonable expectation of success.

*Id.* at 33–34 (citing Ex. 1002 ¶ 115).

## (2) *Patent Owner’s Contentions*

### Enablement

Patent Owner argues that Sung '479 is not an enabling reference for claim 1 because it describes operation in different and non-overlapping brazing conditions than those of the '270 patent. PO Resp. 21; PO Sur-reply 7–14. Patent Owner further contends that Sung '479 is expressly limited to brazes having melting point temperatures of under 700 degrees, while the '270 patent uses brazes having melting point temperatures of 700–1200

degrees. PO Resp. 21 (citing Ex. 1005, (52), ¶¶ 9, 13, 51, 61, 63, claim 1; Ex. 1001, 11:64–12:2). Because of this, Patent Owner contends that a POSITA would not have been able to apply the low temperature teachings of Sung '479 to the higher-temperature brazes of the '270 patent without undue experimentation. *Id.* at 22.

Additionally, Patent Owner contends Sung '479 is non-enabling because it lacks “crucial” details for the “leveling process” to align particle tips along the designated profile. PO Resp. 22 (citing Ex. 2004 ¶ 63). Patent Owner argues that Sung '479 does not describe the composition or properties of the “leveling surface” used to level the particle tips such that it allows for the plurality of superabrasive particles to have RA<sup>11</sup> values of “less than about 40 µm,” “less than about 30 µm,” “less than about 20 µm,” or “less than about 10 µm.” *Id.* (citing Ex. 1005 ¶ 67; Ex. 2004 ¶ 63). Patent Owner further asserts a “POSITA would not have known how to achieve these various results without extensive trial-and-error experimentation.” *Id.*

Patent Owner also contends that Sung '479 further does not instruct a POSITA how to achieve alignment along a “designated profile”; what constitutes a “leveling surface”; or how to use a leveling surface to create a brazed diamond disk CMP pad dresser with tips varying from a designated profile by less than about 1 micron. PO Resp. 22–23 (citing Ex. 1005 ¶¶ 69, 72; Ex. 2004 ¶ 64). Relying on the testimony of Dr. Tsai, Patent Owner further contends that “at the time Sung '479 was filed, it was not practically achievable to consistently and predictably manufacture a BDD CMP pad

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<sup>11</sup> It is not clear from the record what “RA” stands for in Sung '479, however, the definition of “RA” does not affect the result of this decision.

dresser having superabrasive particle tip height variation less than 50 microns, let alone 2 microns.” *Id.* at 23 (citing Ex. 2004 ¶ 32). Patent Owner adds that Sung ’479 does not indicate how to remove layers and retain particle alignment without undue experimentation. *Id.* at 24 (citing Ex. 1005 ¶ 86; Ex. 2004 ¶ 65), 25 (“Sung ’479 lacks any disclosure of working examples or prototypes to validate its leveling processes.”) (citing Ex. 2004 ¶ 67).

*Chou and Sung ’479 Do Not Disclose Claim Element*

Separately, Patent Owner contends that Chou and Sung ’479 are both “subject to . . . incorrect assumptions underlying CMP pad dressing,” and a POSITA would not have applied Chou’s teachings by the time of the ’270 patent. PO Resp. 26. Patent Owner specifically contends that

Chou does not explain how reducing particle tip height variation (or any particular range of particle tip heights) in its apparatus correlates to performance in dressing CMP pads. (Ex. 2004 at ¶70.) *It simply assumes that reducing particle tip variation post-manufacturing would result in superior performance in operation, consistent with the then-prevailing thinking—now recognized to be incorrect—about how dressers actually functioned.*

*Id.* (citing Ex. 2004 ¶¶ 34–36, 69, 70) (emphases added). Patent Owner adds that the Petition’s reliance on an annotated version of Chou’s Figure 5D is problematic because Chou’s figure is not to scale and is silent as to dimensions. *Id.* at 27–28. Patent Owner further contends that Sung ’479 does not describe how to arrange superabrasive particles such that their tips vary from the designated profile by less than about 1 micron. *Id.* at 28.

Motivation to Combine & Reasonable Expectation of Success

Patent Owner argues that Petitioner has failed to meet its burden to show why and how a POSITA would have combined Chou with Sung '479, or that there was a reasonable expectation of success to do so. PO Resp. 29–31. For example, Patent Owner contends: (1) Petitioner has not shown a POSITA would have combined Chou and Sung '479 for the benefits of having leveled height of abrasive particles; (2) a POSITA understood that Chou already solved warpage without combination with Sung '479; (3) Petitioner provides no reasoning as to why a POSITA would have combined references simply because Chou and Sung '479 teach attaching a monolayer of diamond particles to both sides of the substrate; (4) Petitioner has not shown that it would have been a trivial modification by a POSITA to level the heights of Chou's tool because Sung '479's numeric values were not achievable; (5) Petitioner has not explained how the different brazing methods from Chou and Sung '479 would have been combined with a reasonable expectation of success; and (6) Petitioner gives no indication how a POSITA would have combined the “designated profile” of Sung '479 with Chou's two-sided tool “or why the results of the combination would be predictable.” *Id.*

(3) *Discussion*

Based on the complete record, we determine Petitioner's position is better supported and address Patent Owner's arguments below.

Enablement

The enablement requirement, like the written description requirement, is set forth in 35 U.S.C. § 112 ¶ 1. “Whether making and using an invention would have required undue experimentation, and thus whether a disclosure

is enabling under 35 U.S.C. § 112, ¶ 1 (1994), is a legal conclusion based upon underlying factual inquiries.” *Johns Hopkins Univ. v. CellPro, Inc.*, 152 F.3d 1342, 1354 (Fed. Cir. 1998).

With regard to allegations of obviousness, “[e]ven if a reference discloses an inoperative device, it is prior art for all that it teaches.” *Beckman Instruments, Inc. v. LKB Produkter AB*, 892 F.2d 1547, 1551 (Fed. Cir. 1989); *see also Raytheon Technologies Corp. v. General Electric Co.*, 993 F.3d 1374, 1381 (Fed. Cir. 2021) (stating that “[i]n the absence of such other supporting evidence to enable a skilled artisan to make the claimed invention, a standalone § 103 reference must enable the portions of its disclosure being relied upon”).

The touchstone of enablement is whether undue experimentation would have been required to practice the claimed invention. *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988). A reference is enabled “even if a ‘reasonable’ amount of routine experimentation is required in order to practice a claimed invention.” *Enzo Biochem, Inc. v. Calgene, Inc.*, 188 F.3d 1362, 1371 (Fed. Cir. 1999). Factors relevant to a determination of undue experimentation include: (1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims. *Wands*, 858 F.2d at 737.

“Regardless of the forum . . . *the patentee/applicant has the burden to prove nonenablement* for such prior art.” *Apple Inc. v. Corephotonics, Ltd.*, 861 F. App’x 443, 450 (Fed. Cir. 2021) (emphases added). “Prior art disclosures are presumed enabling.” *Agilent Techs., Inc. v. Synthego Corp.*,

139 F.4th 1319, 1327 (Fed. Cir. 2025); *Impax Labs., Inc. v. Aventis Pharms., Inc.*, 545 F.3d 1312, 1316 (Fed. Cir. 2008) (reaffirming that an anticipating prior art patent is presumptively enabled); *In re Antor Media Corp.*, 689 F.3d 1282, 1288 (Fed. Cir. 2012) (extending the presumption to printed publications).

Here, we determine Patent Owner’s nonenablement arguments are too limited, do not adequately address the *Wands* factors, or overcome the presumption that Sung ’479 is enabled. In fact, much of Patent Owner’s arguments cite to Dr. Tsai’s declaration testimony for the proposition that undue experimentation is required for Sung ’479. See PO Resp. 20–25. Yet, Dr. Tsai’s testimony during cross-examination contradicts or fails to support Patent Owner’s arguments as discussed below.

To start, we disagree with Patent Owner that Sung ’479 is not an enabling reference because Sung ’479 describes brazing conditions different than those in the ’270 patent. See PO Resp. 21. Patent Owner contends Sung ’479 is expressly limited to brazes having melting point temperatures of under 700 degrees, while the ’270 patent uses brazes having melting point temperatures of 700–1200 degrees. *Id.* (citing Ex. 1005, code (57), ¶¶ 9, 13, 51, 61, 63, claim 1; Ex. 1001, 11:64–12:2). The ’270 patent, however, does not limit brazing to specific melting point temperatures or conditions. The ’270 patent states generally that “[m]etal brazing techniques are known in the art” and that “[t]he metal braze can be applied in any know configuration, including braze sheets, powders, pastes, sprays, and the like, including combinations thereof.” Ex. 1001, 11:59–60, 11:62–64. Moreover, the ’270 patent expressly states that “[t]he heating temperature can vary depending on the braze material used, but in one aspect can be from about 700° C. to about 1200° C.” *Id.* at 11:67–12:2 (emphasis added). As such,

Patent Owner's characterization of the '270 patent is not consistent with or supported by the express disclosure in the '270 patent itself. In other words, the brazing conditions of Sung '479 and the '270 patent may overlap and may in fact be the same because the '270 patent contemplates "the heating temperature can vary depending on the braze material used." *Id.* Also, the '270 patent claims are not limited to any particular brazing temperature(s). *See id.* at 17:35–18:38.

Further, Patent Owner does not contest that Sung '479 discloses and enables brazing techniques and conditions for melting point temperatures under 700 degrees C. PO Resp. 21. We observe Sung '479's Table I provides approximate melting temperatures for several metal braze materials, and Sung '479 further discloses that

*[t]he components and exact ratios of the braze alloy may be selected to provide an alloy that has a melting point within a desired range for a particular superabrasive tool being constructed. In practice, at least two braze materials may be selected and combined in proper amounts to reduce the melting temperature of both materials and yield a braze alloy having a melting temperature of less than about 700°C.*

Ex. 1005 ¶¶ 62–63 (emphases added). More generally, Sung '479 also teaches that

*[a]s will be recognized by those of ordinary skill in the art, numerous combinations of specific braze materials may be alloyed in different ratios or amounts to achieve an alloy that bonds to the reactive element coating of the superabrasive particle, and that has a suitable melting point.*

*Id.* ¶ 64 (emphases added). We understand Sung '479 to disclose more generally that the selection of alloys, e.g., ratios and amounts, allows a POSITA to achieve brazing at suitable melting points, including temperatures less than about 700°C. *Id.* In this manner, Sung '479 does not

expressly limit its disclosure to only brazing techniques for “low” melting point conditions, but more generally describes brazing techniques that can be tailored to “low” melting point conditions. *Id.*

Dr. Tsai testifies that “[a] POSITA would not have been able to apply the low-temperature teachings of Sung ’479 to the higher-temperature brazes of the ’270 patent without undue experimentation.” Ex. 2004 ¶ 62.

Nonetheless, as we have discussed, the disclosures of both Sung ’479 and the ’270 patent are not so limited and do not support Dr. Tsai’s conclusion that undue experimentation is required. *See* Ex. 1005 ¶ 64; Ex. 1001, 11:67–12:2. As discussed, the ’270 patent provides an example where the brazing temperature is between 700–1200 degrees C, but does not exclude brazing conditions out of this temperature range. Ex. 1001, 11:59–60, 11:62–64, 11:67–12:2. Thus, we are not persuaded that Dr. Tsai’s testimony undermines the clear disclosures in Sung ’479 and the ’270 patent.

Additionally, Patent Owner contends Sung ’479 is non-enabling because it lacks “crucial” details for the “leveling process” to align particle tips along the designated profile. PO Resp. 22 (citing Ex. 2004 ¶ 63). Patent Owner argues that Sung ’479 does not describe the composition or properties of the “leveling surface” used to level the particle tips such that it allows for the plurality of superabrasive particles to have RA values of “less than about 40  $\mu\text{m}$ ,” “less than about 30  $\mu\text{m}$ ,” “less than about 20  $\mu\text{m}$ ,” or “less than about 10  $\mu\text{m}$ .” *Id.* (citing Ex. 1005 ¶ 67; Ex. 2004 ¶ 63). Because of Sung ’479’s lack of disclosure, Patent Owner concludes that a “POSITA would not have known how to achieve these various results without extensive trial-and-error experimentation.” *Id.* Patent Owner adds that Sung ’479 does not indicate how to remove layers and retain particle alignment without undue experimentation. *Id.* at 24 (citing Ex. 1005 ¶ 86; Ex. 2004

¶ 65), 25 (“Sung ’479 lacks any disclosure of working examples or prototypes to validate its leveling processes.”) (citing Ex. 2004 ¶ 67).

Sung ’479’s purported silence is not sufficient by itself to show undue experimentation. There is no enablement requirement that Sung ’479 must explicitly describe in detail what is already known by a POSITA. As the Federal Circuit has explained:

The enablement requirement is often more indulgent than the written description requirement. *The specification need not explicitly teach those in the art to make and use the invention; the requirement is satisfied if, given what they already know, the specification teaches those in the art enough that they can make and use the invention without “undue experimentation.”*

*Amgen, Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1334 (Fed. Cir. 2003) (emphases added).

Dr. Tsai’s testimony is not helpful in this regard. In his declaration, Dr. Tsai testifies that

Sung ’479 discloses . . . different RA values are possible but does not indicate how to achieve these differing results using the ambiguous “leveling surface” or why the results would differ using this “leveling surface.” A POSITA would not have known how to achieve these various results without extensive trial-and-error experimentation.

Ex. 2004 ¶ 63. In paragraph 64 of his declaration, Dr. Tsai further testifies:

Sung ’479 states that “[i]t may also be beneficial for the superabrasive particles to protrude from the solidified braze layer to a predetermined height or series of heights that is/are along a designated profile.” (Ex. 1005 at [0069].) But no direction is given as to how to align the particles in such a way on a plane, let alone in “multiple slopes” or a “curved shape.” (*Id.* at [0070]–[0071].) At best, Sung ’479 states that “the superabrasive particles may be arranged along a leveling surface that has a shape corresponding to a particular designated profile.” (*Id.* at [0071].) But again, it provides no direction as to what constitutes such a “leveling surface” or how such a “leveling surface” could

be used to, or would be able to, create a BDD CMP pad dresser with superabrasive particles “arranged such that their tips vary from the designated profile by less than about 1 microns.” (*Id.* at [0072].)

*Id.* ¶ 64. We further note Dr. Tsai testifies that during “circa 2005–2007, it was not *practically achievable* to consistently and predictably manufacture a BDD CMP pad dresser having superabrasive particle tip height variation less than 50 microns.” *Id.* ¶ 32 (emphasis added). Dr. Tsai adds that *one of extraordinary skill* “in the art circa 2011 [would not] have been able to readily predict or otherwise determine a maximum cutting depth from the use of such a CMP pad dresser with any particular level of variation in superabrasive particle tip height.” *Id.* ¶ 41 (emphasis added); *see also id.* ¶ 43.

Considered as a whole, we understand Dr. Tsai’s testimony in his declaration to be that there was a lack of understanding regarding the relationship between tip height variation and CMP pad dresser performance, and that, because of this, a POSITA would not have been able to measure or make the tip heights as taught by Sung ’479. *See* Ex. 2004 ¶¶ 43, 63–64. For example, Dr. Tsai states in his declaration that it would have required substantial and extensive experimentation, such as detailed surface measurements of CMP pad dressers post-manufacture and post-use, for one of even extraordinary skill in the art to understand a relationship between “a particular variation in particle tip height and a particular cutting depth produced on a particular CMP pad.” *Id.* ¶ 43.

Nevertheless, Dr. Tsai’s testimony during cross-examination undercuts that which was provided in his declaration. At cross-examination, Dr. Tsai clarified his testimony regarding paragraph 63 of his declaration and explained that experimentation based on Sung ’479’s disclosure could

have enabled “results,” but that Dr. Tsai did not want to comment on whether Sung ’479 was enabling. An exchange from the cross-examination with Petitioner’s counsel is provided below:

Q. So it’s your opinion that the subject matter discussed in paragraph 63 is enabled now, based on some more experiments?

...

THE WITNESS: Well, in doing the researches, I would say that there are opportunities to reach the result, but I cannot guarantee that it will reach that result.

Q. So you just don’t know one way or the other if it is enabled or not enabled, is that right? . . .

THE WITNESS: Personally, I still like to stress that as a researcher, we must do experiments to do the verification in order to reach the results. *Whether Dr. Sung can enable that or not, which I don’t want to make any comment.* But for me, *if I do the experiments, I would say that probably I have chances to get the results I want*, but it may not be necessarily so. *So I only want to say it’s possible there are chances.*

Ex. 1050, 135:9–136:6 (emphases added). Further, when asked about claim 28 in Sung ’479, Dr. Tsai, again, did not testify one way or the other as to whether Sung ’479 lacked enablement.

Q. You defined what qualifies as a POSITA, correct?

A. Yes.

Q. And with that definition in your mind, I’m going to ask the question one more time. Not anybody, not some random person, a POSITA. Okay? Would a POSITA be able to practice what’s claimed in Claim 28 of Sung ’479 with some experiments?

THE WITNESS: (In English) *Maybe yes, maybe not.*

(In Chinese) *Maybe yes, maybe no.*

Ex. 1050, 136:7–137:25 (emphases added).

Given Dr. Tsai’s conflicting, or, at the very least, inconsistent testimonies in his declaration and cross-examination, we do not find that

Patent Owner has provided sufficient evidence to rebut the presumption of enablement on this basis. A reference is enabled “even if a ‘reasonable’ amount of routine experimentation is required in order to practice a claimed invention.” *Enzo Biochem, Inc. v. Calgene, Inc.*, 188 F.3d 1362, 1371 (Fed. Cir. 1999). Patent Owner, however, has not explained whether routine or undue experimentation is necessary by, for example, discussing the *Wands* factors sufficiently with reliance on evidence in the record, e.g., Dr. Tsai’s testimony. See PO Resp. 22. Even assuming that Sung ’479 does not provide working examples or explicit disclosure regarding “the composition or properties of the ‘leveling surface’ used to level the particle tips” or how to achieve alignment along a designed profile etc. (PO Resp. 22–26), Dr. Tsai, nonetheless, has testified in cross-examination that experimentation is necessary, but that “there are opportunities to reach the result.” Ex. 1050, 135:14–16. Thus, based on the complete record, Patent Owner has not explained through citation to the record and reasoning whether routine or undue experimentation is needed to carry out the methods in Sung ’479. At best, Dr. Tsai has testified “maybe yes, maybe not,” but has not otherwise provided sufficient explanation for what is required to evaluate enablement and the *Wands* factors.

*Chou and Sung ’479 Do Not Disclose Claim Element*

Next, Patent Owner contends that Chou and Sung ’479 do not teach or suggest:

a first monolayer of superabrasive particles disposed on and protruding from one side of a metal support layer, 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 50 microns.

Ex. 1001, 17:35–18:2. Patent Owner contends that Chou does not describe the protrusion distances of its particles and Chou’s figures cannot teach dimensions or measurements. PO Resp. 26–28. Further, Patent Owner and Dr. Tsai assert that Sung ’479 does not describe how “the plurality of superabrasive particles is arranged such that their tips vary from the designated profile by less than about 1 microns” is possible. PO Resp. 28–29 (“[M]ethods for consistently achieving the miniscule tip variation of ‘less than about 1 microns’ as a general matter in BDD CMP pad dressers were not known at the time Sung ’479 was published.”); Ex. 2003 ¶¶ 32, 63–64.

As Petitioner points out, we observe Chou teaches expressly the importance of adjusting the height of the abrasive particles to ensure performance of all abrasive particles in machining. Ex. 1004 ¶ 17. As Petitioner observes, Chou does not disclose explicitly the difference in protrusion distance between the two highest protruding tips is less than or equal to about 50 microns. Pet. 28.

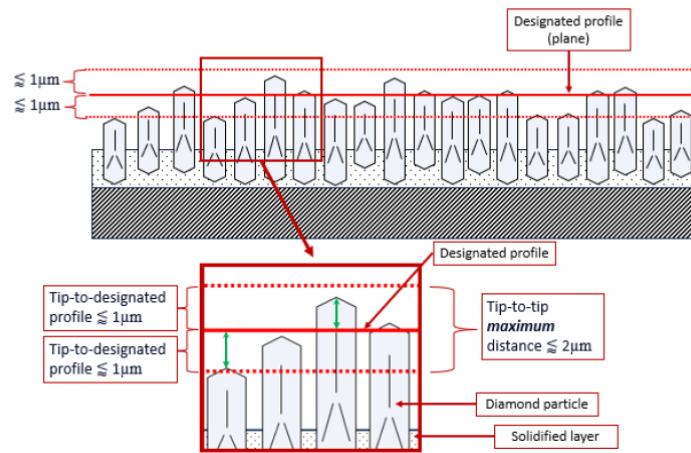
Turning to Sung ’479, we discern that Sung ’479 teaches the plurality of superabrasive particles may be configured to uniformly distribute frictional forces across substantially all superabrasive particles. . . . *One potentially useful parameter may include the height that the superabrasive particles protrude above the solidified braze layer.* A superabrasive particle that protrudes to a significantly greater height as compared to other superabrasive particles will experience a greater proportion of the impinging mechanical forces, and is thus more prone to pull out of the solidified braze layer. Thus an even height distribution of superabrasive particles may function to more effectively preserve the integrity of the superabrasive tool as compared to tools lacking such an even height distribution. Accordingly, *the superabrasive particle tips may be leveled to spread the mechanical forces impinging on the tool across substantially all of the particles.*

Ex. 1005 ¶¶ 66–67 (emphases added). Sung ’479 further teaches that “[i]t may also be beneficial for the superabrasive particles to protrude from the solidified braze layer to a predetermined height or series of heights that is/are along a *designated profile*.” *Id.* ¶ 69 (emphasis added). For “designated profiles,” Sung ’479 teaches that “[n]umerous configurations . . . are possible, depending on the particular use of the superabrasive tool . . . [but] *[i]n planar profiles, the highest protruding points of the superabrasive particles are intended to be substantially level.*” *Id.* (emphasis added).

Sung ’479 further discloses “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.” *Id.* Sung ’479 teaches that “when referring to the designated profile, it should be noted that the term ‘tip’ is intended to include the highest protruding point of a superabrasive particle, whether that point be an apex, an edge, or a face.” *Id.* ¶ 72. Sung ’479 adds that in one aspect “the plurality of superabrasive particles are arranged such that their tips vary from the designated profile by from about 1 micron to about 150 microns,” and further that “the plurality of superabrasive particles is arranged such that their tips vary from the designated profile by less than about 1 microns.” *Id.*

To Patent Owner’s point, Sung ’479 does not expressly disclose a difference in protrusion distance between the highest protruding tips is less than or equal to about 50 microns, as required by claim 1 of the ’270 patent. Nonetheless, Petitioner’s expert, Dr. Shanfield explains that Sung ’479 teaches that “the designated profile may be a plane.” Ex. 1002 ¶ 113 (citing Ex. 1005 ¶ 69). Indeed, Dr. Shanfield provides an example of the tip-to-tip

distance based on a plane as the designated profile. Dr. Shanfield's figure from paragraph 113 of his declaration is reproduced below:



The figure above includes diamond particles protruding from a solidified layer, and a designated profile as a red line parallel to the solidified layer. Ex. 1002 ¶ 113. Dr. Shanfield testifies the figure further shows “a number of diamond particles in a CMP pad dresser, where each diamond particle protrudes to a height within 1 micron above or below the designated profile.” *Id.* As shown, two green arrows indicate the tip distance of 1 micron from two tips as measured from the designated profile plane. *Id.* Based on these distances, Dr. Shanfield testifies that Sung ’479 teaches a “maximum tip-to-tip distance is less than about 2 microns.” *Id.* (citing Ex. 1005 ¶¶ 9, 72).

Furthermore, Sung ’479’s disclosure sufficiently supports Dr. Shanfield’s testimony. Specifically, Sung ’479 teaches a designated profile may be a *plane* and “[i]n planar profiles, the highest protruding points of the superabrasive particles are intended to be *substantially level*.” Ex. 1005 ¶ 69 (emphasis added). Sung ’479 further expressly teaches that the distance from the tip of a superabrasive particle to the planar profile may be less than 1 micron. *Id.* ¶ 72. Dr. Shanfield relies upon this express

disclosure to provide an example of a planar profile with superabrasive particles with tips varying from the designated planar profile by 1 micron above and below the profile.

Additionally, we have not excluded Dr. Shanfield's testimony. *See supra Sect. II.B.2.* Based on the complete record, we credit Dr. Shanfield's testimony as sufficiently well-reasoned and supported by Sung '479 in this regard.

Further, we disagree with Patent Owner, as discussed above, that Sung '479 is non-enabling, and further disagree that Sung '479 teachings are categorically not possible. *See* PO Resp. 28–29 (“[M]ethods for consistently achieving the miniscule tip variation of ‘less than about 1 microns’ as a general matter in BDD CMP pad dressers were not known at the time Sung '479 was published.”); Ex. 2003 ¶¶ 32, 63–64. Dr. Tsai testified at his cross-examination that while experimentation was necessary, there were “opportunities” to achieve the tip heights described in Sung '479. Ex. 1050, 135:14–16.

*Motivation to Combine & Reasonable Expectation of Success*

Regarding the reasons to combine Chou and Sung '479, Petitioner explains that a “POSITA would have been motivated to combine references that recognize benefits of having leveled height of abrasive particles.” Pet. 34–35 (citing Ex. 1004 ¶ 17; Ex. 1005 ¶¶ 3, 66–67, 72; Ex. 1002 ¶¶ 119–120).

Patent Owner contends Petitioner is incorrect that it would have been obvious to a POSITA to have “precisely leveled protrusion distances,” and that a POSITA “would have been able to achieve such precisely leveled CMP pad dressers.” PO Resp. 29 (citing Pet. 32–34). Patent Owner further contends that “Petitioners fail to explain how such ‘level[ing]’ would have

been achieved or even if the claimed ‘difference in protrusion distance’ being ‘less than or equal to about 50 microns’ would have been considered ‘level.’” *Id.* at 30. Patent Owner asserts that Dr. Tsai has explained why Petitioner’s proposed reasoning for the combination of these references is incorrect. *Id.* (citing Ex. 2004 ¶¶ 34–38, 40–46). Patent Owner argues that “Dr. Shanfield’s conclusory assertions to the contrary (e.g., Ex. 1002 at ¶115) is simply not credible given his lack of expertise in the precise technology at issue here.” *Id.* at 29–30.

As discussed, we determined that Dr. Shanfield has sufficient education and experience to qualify as a person of ordinary skill in the art pertaining to the ’270 patent. Moreover, we have not excluded Dr. Shanfield’s testimony on the basis of his lack expertise. *See supra* Sect. II.B.2.

Moreover, we note that the disclosures of Chou and Sung ’479 better support Dr. Shanfield’s testimony and expressly disclose motivations for the combination as proposed by Petitioner. Chou teaches that

the precision of the grinding plate can be controlled well and *the height of the abrasive particles can be adjusted so as to ensure the performance of all abrasive particles in machining*. Thereby, *the machining efficiency of the working surface and precision can be significantly enhanced*, so that the grinding tool according to the present invention is especially suitable for precision machining.

Ex. 1004 ¶ 17 (emphasis added). Sung ’479 also discloses that particle height affects function:

[A]n even height distribution of superabrasive particles may function to more effectively preserve the integrity of the superabrasive tool as compared to tools lacking such an even height distribution. Accordingly, the superabrasive particle tips

may be leveled to spread the mechanical forces impinging on the tool across substantially all of the particles.

Ex. 1005 ¶ 67. Sung '479 further teaches:

It may also be beneficial for the superabrasive particles to protrude from the solidified braze 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 superabrasive 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.

*Id.* ¶ 69. Sung '479 expressly teaches specific parameters for the tip height level of superabrasive particles that provide improved machining, which Petitioner and Dr. Shanfield explain Chou does not expressly disclose.

Ex. 1005 ¶¶ 66–67, 69, 72; *see* Ex. 1002 ¶¶ 119–120. Thus, the disclosures in Chou and Sung '479, and Dr. Shanfield's testimony, support Petitioner's position that a "POSITA would have considered leveling the height of the superabrasive particles to the level taught by the prior art references, such as a tip-to-tip variation that is less than about 2 microns." Pet. 35.

Patent Owner and Dr. Tsai contend that Chou and Sung '479 reflect an incorrect understanding of CMP pad dresser operation. PO Resp. 8–14. According to Patent Owner, "as of 2009, Sung '479's assumptions that the mechanical stress was substantially equally distributed among the bulk of the superabrasive particles remained an 'inference [that] still need[s] to be experimentally verified.' It turned out to be incorrect." *Id.* at 13 (citing Ex. 2008, 5; Ex. 2004 ¶¶ 34–36, 40–47). Patent Owner adds that

[a]ctually controlling the height variation of the superabrasive particles to the extent that more than just a handful of them were able to cut the CMP pad during usage remained elusive and was not practically achievable . . . . *Only shortly before the invention of the '270 patent was it recognized that understanding how particular CMP pad dresser designs worked in practice required post-use analysis of the dresser itself.*

PO Resp. 14 (emphases added); Ex. 2004 ¶¶ 37–45.

Patent Owner’s arguments are unpersuasive. The obviousness inquiry does not look only to the problem the patentee was trying to solve, but to any need or problem known in the field of endeavor at the time of the invention and addressed by the prior art, for providing a reason for combining the elements in the manner claimed. *KSR*, 550 US at 402; *see also In re Kemps*, 97 F.3d 1427, 1430 (Fed. Cir. 1996); *In re Dillon*, 919 F.2d 688, 693 (Fed. Cir. 1990) (en banc) (the motivation to combine the prior art references need not be identical to that of Applicants). As discussed above, Petitioner’s contentions are supported by the express disclosure of the prior art references and by Dr. Shanfield’s testimony that we have not excluded.

Additionally, we are not persuaded that Petitioner has failed to show reasonable expectation of success. For example, Patent Owner contends that “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.” PO Resp. 33. Petitioner, however, relies on the testimony of Dr. Shanfield, who testifies that

Chou and Sung’479 use a similar brazing method for attaching abrasive particles to the metal substrate. Therefore, *a POSITA would have been able to combine the disclosures with a reasonable expectation of success.* EX1004, [0039] (“Herein, the

grinding plate 330 comprises: a soft substrate 231 having a working surface 231a and a non-working surface 231b and a plurality of abrasive particles 232 formed on the working surface 231a and the non-working surface 231b of the soft substrate 231 by brazing.”); EX1005, [0013] (“The superabrasive tool may include a plurality of superabrasive particles coated with an intermediate layer and bonded together with a braze...”).

Ex. 1002 ¶ 124 (emphasis added). Sung ’479 further teaches that “precisely leveling the tips of the plurality of superabrasive particles in the tool reduces the mechanical stress impinging on any individual superabrasive particle, thus counteracting the relatively lower retention strength of many low-melting point brazes as compared to traditional braze alloys.” Ex. 1005 ¶ 50. As such, we determine Dr. Shanfield’s testimony regarding reasonable expectation of success is supported by the cited disclosures in Chou and Sung ’479. Ex. 1002 ¶ 124; Ex. 1004 ¶ 39; Ex. 1005 ¶¶ 50, 63–64.

Moreover, we are not persuaded by Dr. Tsai’s testimony that Sung ’479’s numeric values were not achievable. See PO Resp. 32 (citing Ex. 2004 ¶¶ 32, 63–64). As discussed, Dr. Tsai clarified at his cross-examination deposition that experimentation may be needed, but that what is disclosed in Sung ’479 may be achieved. See Ex. 1050, 136:14–17 (“Well, in doing the researches, I would say that there are opportunities to reach the result, but I cannot guarantee that it will reach that result.”).

Based on the complete record, we determine that Petitioner has not engaged in impermissible hindsight and has sufficiently explained through evidence and reasoning how the proposed combination of Chou and Sung ’479 teach limitation [1B].

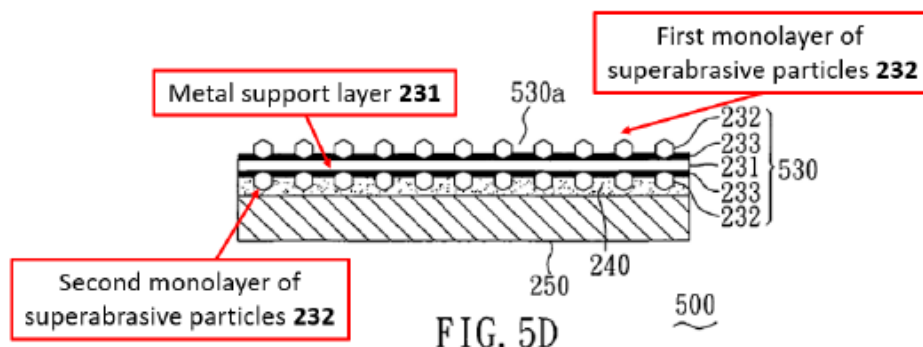
d) [1C] a second monolayer of superabrasive particles disposed on the metal support layer on an opposite side from the first monolayer

Referring to Chou’s Figure 5D, Petitioner asserts that “a single layer of particles 232 is disposed on the side of the non-working surface 530b of the metal substrate 231 that is opposite the working surface 530a.” Pet. 39–40 (citing Ex. 1004 ¶¶ 9, 38–44, 51, 54–58; Ex. 1002 ¶ 128). Petitioner adds that “the second monolayer of superabrasive particles 232 is illustrated as a single layer . . . [and] meets the claimed ‘monolayer.’” *Id.*

Patent Owner does not specifically contest Petitioner’s contentions with respect to this limitation. Based on the complete record, we agree with and adopt Petitioner’s arguments as our own. Pet. 39–41. Petitioner has explained sufficiently with reference to Chou alone, or in combination with Sung ’479, how these references each teach or suggest this limitation.

e) [1D] wherein the superabrasive particles of the second monolayer are positioned to have substantially the same distribution as the superabrasive particles of the first monolayer

For this limitation, Petitioner refers to an annotated version of Chou's Figure 5D, reproduced below.



Pet. 42. Petitioner’s annotated Figure 5D marks portions of grinding tool 500 with “Metal support layer 231,” “First monolayer of superabrasive

particles 232,” and “Second monolayer of superabrasive particles 232” in Chou’s figure. *Id.* Referring to Chou’s Figure 5D, Petitioner contends that Chou discloses “the superabrasive particles of the first and the second monolayers are positioned to have substantially the same distribution.” *Id.* (citing Ex. 1004 ¶¶ 38–40, 54–59, Figs. 3A–3D, 5A–5D). Petitioner further relies on the testimony of Dr. Shanfield, who testifies that

a POSITA would have known from Chou that the deformation of the abrasive tool could be reduced by having superabrasive particles with substantially the same distribution on both the working and non-working surfaces and a POSITA would have been motivated to make such an arrangement.

Ex. 1002 ¶ 137. Dr. Shanfield explains that “Chou teaches that the benefit of providing the diamond particles on the working surface 530a and the non-working surface 530b is to reduce the warpage of the substrate caused by uneven shrinkage of each surface.” *Id.* ¶ 135 (citing Ex. 1004 ¶¶ 9, 39, 54).

Patent Owner does not specifically contest Petitioner’s contentions with respect to this limitation. We agree with and adopt Petitioner’s arguments as our own. Pet. 42–44. Petitioner has explained sufficiently with reference to Chou alone, or in combination with Sung ’479, how these references each teach or suggest this limitation.

f) *[1E] a rigid support coupled to the second monolayer of superabrasive particles opposite the first monolayer.*

For this limitation, Petitioner contends Chou teaches that epoxy resin 240 and/or stainless steel rigid support 250 may be coupled to the second monolayer of superabrasive particles 232 opposite the first monolayer of superabrasive particles 232. Pet. 44–45 (citing Ex. 1004 ¶¶ 12–16, 41–43, 49–52, 58, Figs. 3A–3D, 5A–5D).

Patent Owner does not specifically contest Petitioner's contentions with respect to this limitation.

We agree with and adopt Petitioner's arguments as our own. Pet. 44–45. Petitioner has explained sufficiently with reference to Chou alone, or in combination with Sung '479, how these references each teach or suggest this limitation.

*g) Conclusion*<sup>12</sup>

After review of the arguments and evidence, we determine that Petitioner has demonstrated by a preponderance of the evidence that Chou in combination with Sung '479 renders claim 1 obvious.

*4. Analysis of Dependent Claims 3–8*

Dependent claims 3–8 depend, directly or indirectly, from independent claim 1. Ex. 1001, 18:15–38. Petitioner contends Chou in combination with Sung '479 discloses the limitations recited in each of claims 3–8. Pet. 45–48; *see id.* at 47.

Patent Owner does not address any of Petitioner's arguments regarding these specific limitations beyond what it has presented for claim 1. PO Resp. 33.

After review of the arguments and evidence, we determine that Petitioner has demonstrated by a preponderance of the evidence that Chou in

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<sup>12</sup> In addition to the arguments and evidence discussed above, Petitioner also presents arguments based on collateral estoppel for claim 1. *See* Pet. 14–15 (“[T]he Board found on November 4, 2015 that ‘claims 1-3, 5, 6, 8-12, and 17-19 [of the ’699 Patent] are anticipated by Chou’ . . . . The instant Petition relies on Chou for the limitations that are substantially identical to claim 1 of the ’699 Patent.”). Nevertheless, we make our determinations based on the complete record presented here that Petitioner has shown by a preponderance of the evidence that the challenged claims are unpatentable.

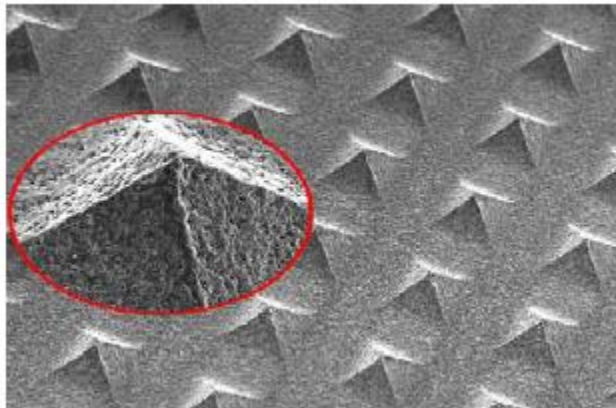
combination with Sung '479 renders claims 3–8 obvious. We agree with and adopt Petitioner's arguments as our own. Pet. 45–48.

*E. Ground 2: Claims 6 and 7 as Obvious over Chou in View of Sung '479 and SungECS*

*1. SungECS (Ex. 1007)*

SungECS is a journal article titled “Polycrystalline Diamond (PCD) Shaving Dresser: The Ultimate Diamond Disk (UDD) for CMP Pad Conditioning.” Ex. 1007, 1. SungECS discloses that “[i]nstead of penetrating the pad surface with a brutal force of diamond grits, advanced diamond disk (ADD) is made by carving a disk of sintered polycrystalline diamond (PCD) layer to form cutting tips of predetermined shape and distribution.” *Id.*

Figure 1 of SungECS, reproduced below, depicts ADD cutting tips bonded monolithically in PCD matrix material. *Id.*



According to SungECS, “[t]he tailor made cutting tips with sharper angle can be formed with higher regularity than conventional diamond disks.” *Id.*

*2. Discussion*

Claim 6 recites:

The dresser of claim 5, wherein the difference in protrusion distance between the highest protruding tip and the 10th highest

protruding tip of the first monolayer of superabrasive particles is less than or equal to about 20 microns.

Ex. 1001, 18:27–30.

Claim 7 recites:

The dresser of claim 6, wherein the difference in protrusion distance between the highest protruding tip and the 100th highest protruding tip of the first monolayer of superabrasive particles is less than or equal to about 40 microns.

Ex. 1001, 18:31–33.

Petitioner contends the combination of Chou, Sung ’479, and SungECS renders obvious dependent claims 6 and 7. Pet. 48–53.

In response, Patent Owner relies on the arguments presented for claim 1. PO Resp. 34 (“Petitioner relies upon SungECS to allegedly show that a CMP pad dresser has ‘tens of thousands of diamond particles.’ (Pet. at 50-52.) Petitioner’s conclusory statements that it would have been obvious that protruding tips of ‘tens of thousands of diamond particles,’ as allegedly shown in SungECS, would fall within a designated profile does not remedy the deficiencies of Chou and Sung ’479 with respect to claim 1 discussed above.”).

Based on the complete record, we determine that Petitioner has demonstrated by a preponderance of the evidence that the combination of asserted teachings in Chou, Sung ’479, and SungECS renders these claims obvious. See Pet. 48–53. Petitioner explains that “to the extent Patent Owner argues neither Chou nor Sung ’479 explicitly discloses the actual number of protruding tips, it was common knowledge that CMP pad dressers typically have tens of thousands of superabrasive particles distributed thereon.” Pet. 48 (citing Ex. 1002 ¶¶ 146–148). Petitioner adds that

in light of (1) the large number of superabrasive particles that were known to be present on a CMP pad dresser as taught by

SungECS and (2) the fact that each one of Sung'479's diamond particles contact the CMP pad surface, the combination of Chou, Sung'479, and SungECS render obvious a CMP pad conditioner having the 10th highest protruding tip and the 100th highest protruding tip to be less than about 2 microns [apart] and meet the claimed "less than or equal to about 40 microns."

*Id.* at 51–52 (citing Ex. 1002 ¶¶ 146–151). Petitioner provides several reasons a POSITA would have combined the teachings of Chou, Sung '479, and SungECS. *Id.* at 52–53. We agree with and adopt Petitioner's arguments as our own. Pet. 48–53.

*F. Ground 3: Claim 2 as Obvious over Chou in View of Sung '479 and Goers*

*1. Goers (Ex. 1006)*

Goers is a U.S. Patent Application Publication titled "Abrasive Articles, CMP Monitoring System and Method." Ex. 1006, code (54). Goers "relates to abrasive articles useful in chemical-mechanical polishing (CMP)." *Id.* ¶ 1. Figure 1A of Goers, reproduced below, illustrates an abrasive article in the form of a CMP pad conditioning disk 2. *Id.* ¶ 23.

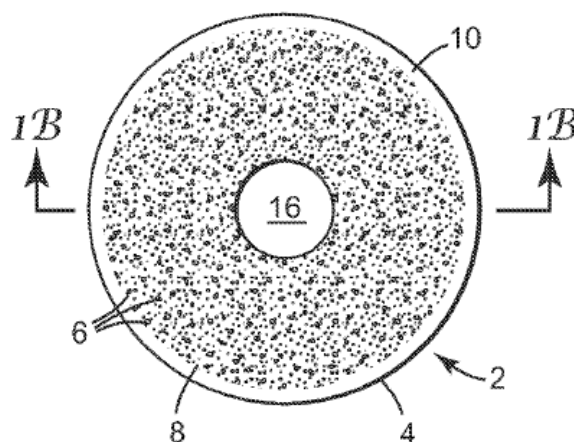


*FIG. 1A*

As shown in Figure 1A, abrasive article 2 includes substrate 4. *Id.* ¶ 24. The major surfaces of the article are overlaid with abrasive material 6. Abrasive material 6 may be affixed to one or both sides of the substrate using a matrix material 8. *Id.* ¶ 25.

## 2. Discussion

Claim 2 depends from claim 1, and further recites: “wherein the plurality of superabrasive particles are arranged in at least one annular configuration having a central region devoid of superabrasive particles.” Ex. 1001, 18:12–15.

Petitioner contends that claim 2 would have been obvious over the combination of Chou, Sung ’479, and Goers. Pet. 53–57. Among other things, Petitioner argues that “[r]ather than utilizing different sized superabrasive particles as Sung ’479 teaches, another known way—as Goers teaches—was to utilize a particle free zone in the central region.” Pet. 56 (citing Ex. 1006 ¶ 30).

For claim 2, Patent Owner relies on arguments and evidence presented for independent claim 1. PO Resp. 35 (“Petitioner’s conclusory statements that it would have been obvious to combine Goers with Chou and Sung ’479 to create a CMP pad dresser with a central, particle-free zone does not remedy the deficiencies of Chou and Sung ’479 with respect to claim 1 discussed above[.]”).

Based on the complete record, we determine that Petitioner has demonstrated by a preponderance of the evidence that the asserted teachings in Chou, Sung ’479, and Goers renders claim 2 obvious. We agree with and adopt Petitioner’s arguments as our own. Pet. 53–56; Ex. 1006 ¶ 30, Fig. 1A.

### III. MOTION TO EXCLUDE

Patent Owner's Motion to Exclude seeks to exclude Exhibits 1002, 1042–1049, 1052, and 1053.

#### Exhibit 1002

Exhibit 1002 is Dr. Shanfield's Declaration. We deny Patent Owner's motion as discussed in Section II.B.2.

#### Exhibits 1042–1049

Patent Owner seeks to exclude Exhibits 1042–1049, which are publications by Dr. Tsai. Mot. Exclude 10–11. Patent Owner contends these publications were available at the time the Petition was filed “and therefore there is no excuse for its belated filing of these exhibits.” *Id.* at 11 (citing 37 C.F.R. § 42.123(b)). Patent Owner adds these exhibits are “needlessly cumulative and should be excluded Fed. R. Evid. 403.” *Id.*

We are not persuaded. First, this is not an *evidentiary* issue that can be raised via a Motion to Exclude Evidence. Second, Petitioner's submission of Exhibits 1042–1049 was not improper. A petitioner “may submit rebuttal evidence in support of its reply.” Practice Guide, 73 (citing *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1077–78 (Fed. Cir. 2015)); see Pet. Reply 16. That is what occurred here, where Petitioner filed Exhibits 1042–1049 to respond to Dr. Tsai's testimony submitted with the Patent Owner Response. Exhibits 1042–1049 were not required to make out a *prima facie* case of unpatentability. See Practice Guide 73; *Belden*, 805 F.3d at 1078–79.

Patent Owner's Motion to Exclude also seeks to exclude Exhibits 1042–1049 from evidence as being needlessly cumulative of Dr. Tsai's testimony on his working methods and relationships with Dr. Sung and Kinik. Mot. Exclude 11; PO Sur-reply 28. We disagree. Exhibits 1042–

1049 are relevant and not needlessly cumulative of Dr. Tsai's testimony regarding any financial, personal, or professional relationships etc. that may affect Dr. Tsai's testimony in this proceeding. While Dr. Tsai may have also testified to the same, the exhibits themselves each indicate the degree and scope of Dr. Tsai's collaboration with Dr. Sung. Thus, we deny Patent Owner's Motion to Exclude Exhibits 1042–1049.

Exhibits 1052 and 1053

Patent Owner moves to exclude Exhibits 1052 and 1053, which are US patent applications. Mot. Exclude 11–12. Patent Owner contends Exhibit 1052 was filed belatedly with Petitioner's reply to "bolster Petitioners' broader definition of a POSITA." *Id.* at 11 (citing Reply 4); 37 C.F.R. § 42.123(b). Patent Owner adds Exhibit 1052 is irrelevant because "no party disputes that CMP is a common technique for fabricating electronic devices." *Id.*

For Exhibit 1053, Patent Owner contends the US patent application was publicly available at the time the Petition was filed and the Petitioner should have submitted it then. Mot. Exclude 12 (citing 37 C.F.R. § 42.123(b)).

We are not persuaded by Patent Owner. Again, a petitioner "may submit rebuttal evidence in support of its reply." Practice Guide, 73 (citing *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1077–78 (Fed. Cir. 2015)). Petitioner filed Exhibit 1052 to respond to Patent Owner's definition of a POSITA that appeared in the Patent Owner Response. Moreover, Exhibit 1052 is relevant to the issue of the level of ordinary skill in the art. See Reply 3–4. Exhibit 1053 was also filed by Petitioner as reply evidence to address Patent Owner's enablement arguments in the Patent Owner Response. Pet. Opp Exclude 14–15.

Thus, we deny Patent Owner's Motion to Exclude Exhibits 1052 and 1053.

#### IV. CONCLUSION<sup>13</sup>

For the reasons we have explained, we conclude that Petitioner has demonstrated by a preponderance of the evidence, that challenged claims 1–8 of the '270 patent are unpatentable as follows:

| <b>Claim(s)<br/>Challenged</b> | <b>35<br/>U.S.C.<br/>§</b> | <b>Reference(s)/Basis</b>   | <b>Claim(s)<br/>Shown<br/>Unpatentable</b> | <b>Claim(s)<br/>Not Shown<br/>Unpatentable</b> |
|--------------------------------|----------------------------|-----------------------------|--------------------------------------------|------------------------------------------------|
| 1, 3–8                         | 103                        | Chou, Sung '479             | 1, 3–8                                     |                                                |
| 6, 7                           | 103                        | Chou, Sung '479,<br>SungECS | 6, 7                                       |                                                |
| 2                              | 103                        | Chou, Sung '479,<br>Goers   | 2                                          |                                                |

Furthermore, Patent Owner's Motion to Exclude is denied.

#### V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that based on a preponderance of the evidence, claims 1–8 of the '270 patent are unpatentable;

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<sup>13</sup> Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

FURTHER ORDERED that Patent Owner's Motion to Exclude is denied; and

FURTHER ORDERED that because this is a final written decision, the parties to this proceeding seeking judicial review of our Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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