

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.

IPR2024-00534
Patent 9,138,862 B2

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

GROSSMAN, *Administrative Patent Judge*.

JUDGMENT

Final Written Decision

Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

Denying Patent Owner's Motion to Exclude Evidence

I. INTRODUCTION

A. *Background and Summary*

Petitioner Samsung¹ filed a Petition (Paper 5, “Pet.”) pursuant to 35 U.S.C. §§ 311–319 to institute an *inter partes* review of U.S. Patent No. 9,138,862 B2 (Ex. 1001, “the ’862 patent”), claims 1–20. Patent Owner Chien-Min Sung filed a Preliminary Response (Paper 9, “Prelim. Resp.”) opposing institution of review.

We authorized additional briefing to address whether we should deny institution under 35 U.S.C. § 314(a) and *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential) (“*Fintiv*”). See Paper 11, 3–5. Accordingly, Petitioner filed a Preliminary Reply (Paper 12, “Prelim. Reply”), and Patent Owner filed a Preliminary Sur-reply (Paper 13, “Prelim. Sur-reply”). We decided not to exercise our discretion to deny institution. Paper 14 (“Decision to Institute” or “Dec. Inst.”).

On behalf of the Director (37 C.F.R. § 42.4(a)), we entered a Decision granting institution of an *inter partes* review of claims 1–20 based on all grounds asserted in the Petition. See *generally*, Dec. Inst.

¹ Petitioner, collectively, is a group of four entities: Samsung Electronics Co., Ltd.; Samsung Electronics America, Inc.; Samsung Semiconductor, Inc.; and Samsung Austin Semiconductor, LLC. See Pet. 1. See also *Cradlepoint, Inc. et al. v. 3G Licensing S.A.*, IPR2021-00639, Paper 12, 2 (PTAB May 13, 2021) (“[F]or each ‘petition’ there is but a single party filing the petition, no matter how many companies are listed as petitioner or petitioners and how many companies are identified as real parties-in-interest. . . . Even though the separate sub-entities regard and identify themselves as ‘Petitioners,’ before the Board they constitute and stand in the shoes of a single ‘Petitioner’ . . . they must speak with a single voice, in both written and oral representation.”).

Following institution of this proceeding, Patent Owner filed a Response. Paper 17 (“Response” or “PO Resp.”). Petitioner filed a Reply. Paper 23 (“Reply” or “Pet. Reply”). Patent Owner filed a Sur-reply. Paper 25 (“Sur-reply”).

Petitioner submitted sixty exhibits. *See* Exs. 1001–1059, 1070²; *see also* Paper 34 (Petitioner’s Updated Exhibit List, including descriptions of each exhibit). Petitioner relies on the Declaration testimony of Dr. Stanley Shanfield, Ph.D. *See* Ex. 1002.

Patent Owner submitted seven exhibits. *See* Exs. 2001–2006, 2011 (there are no exhibits numbered 2007–2010); *see also* Paper 32 (Patent Owner’s Demonstrative slides used at the final hearing)³. Patent Owner relies on the Declaration testimony of Professor Ming-Yi Tsai, Ph.D. *See* Exs. 2001, 2011.

The Board added seven exhibits to the record. *See* Exs. 3001, 3002, 3004–3008. There is no Exhibit 3003.

Patent Owner filed a Motion to Exclude (Paper 29, “PO Mot. Excl.”). Petitioner filed an Opposition to the Motion to Exclude (Paper 30, “Pet. Opp. Mot. Excl.”). Patent Owner filed a Reply (Paper 31, “PO Reply Mot. Excl.”).

² Exhibit 1003 includes Volumes 1–3. Exhibit 1070 is a series of slides used as a demonstrative exhibit at the final hearing. Exhibit 1070 is not an evidentiary exhibit. *See* PTAB Consolidated Trial Practice Guide, 84 (Nov. 2019 (“CTPG”) (“Demonstrative exhibits used at the final hearing are aids to oral argument and not evidence.”)).

³ Paper 32 is a series of slides used as an aid by Patent Owner at the oral argument. These slides are not evidence in this proceeding. *See id.*

A hearing was held June 20, 2025. See Paper 35 (“Transcript” or “Tr.”).

We have jurisdiction under 35 U.S.C. § 6. We enter this Final Written Decision pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73.

Petitioner has the burden of proving unpatentability of a claim by a preponderance of the evidence. 35 U.S.C. § 316(e).

As discussed below, we deny Patent Owner’s Motion to Exclude evidence.

Based on the findings and conclusions below, we determine that Petitioner has established by a preponderance of the evidence that claims 1–20 are unpatentable.

B. Real Parties-in-Interest

Petitioner identifies itself (i.e., the four Samsung entities identified above) as the real party-in-interest. See Pet. 1.

Patent Owner identifies himself, an individual and “owner of the patent under review,” as the real party-in-interest. See Paper 18, 1.

C. Related Proceedings

The parties identify three district court litigations involving the ’862 patent as related proceedings. See Pet. 1; Paper 18, 1.

The first related litigation proceeding is *Sung v. Kinik Co.*, No. 1:20-cv-00247 (D. Del.) (“the Kinik Litigation”). The Kinik Litigation has been dismissed based upon a settlement. See Ex. 3007.

The second related litigation proceeding is *Sung v. Samsung Electronics Co. Ltd., et al.*, No. 4:23-cv-00752 (E.D. Tex.) (“the Samsung Litigation”). See Ex. 3004 (the Complaint filed in the Samsung Litigation).

On July 26, 2024, the Court *sua sponte* stayed the parallel, District Court Samsung Litigation pending the Court’s resolution of Samsung’s motion for transfer from the Eastern District of Texas to the Northern District of California. *See* Ex. 1028 (“It is therefore ORDERED that all proceedings in this case are STAYED pending the Court’s resolution Defendants’ Motion for Inter-District Transfer to the Northern District of California.”). As of the date of mailing this Decision, this stay is still in effect. We have not been informed otherwise by the parties.

The third related litigation proceeding is *Sung v. Texas Instruments, Inc.*, No. 4:23-cv-00753 (E.D. Tex.) (“the TI Litigation”). *See* Ex. 3002 (the Complaint filed in the TI Litigation). The Samsung and TI Litigations were filed on the same day, and are pending before the same Judge in the Eastern District of Texas. *See* Exs. 3002, 3004. In the TI Litigation, the Court granted TI’s Motion to Stay the Case Pending Resolution of TI’s Motion for Summary Judgment of Invalidity of the Asserted Patents. Ex. 1031, 2 (“The Court concludes that this core question is ripe for adjudication and can be resolved without the need for further discovery or claim construction.”). As of the date of mailing this Decision, this stay is still in effect. We have not been informed otherwise by the parties.

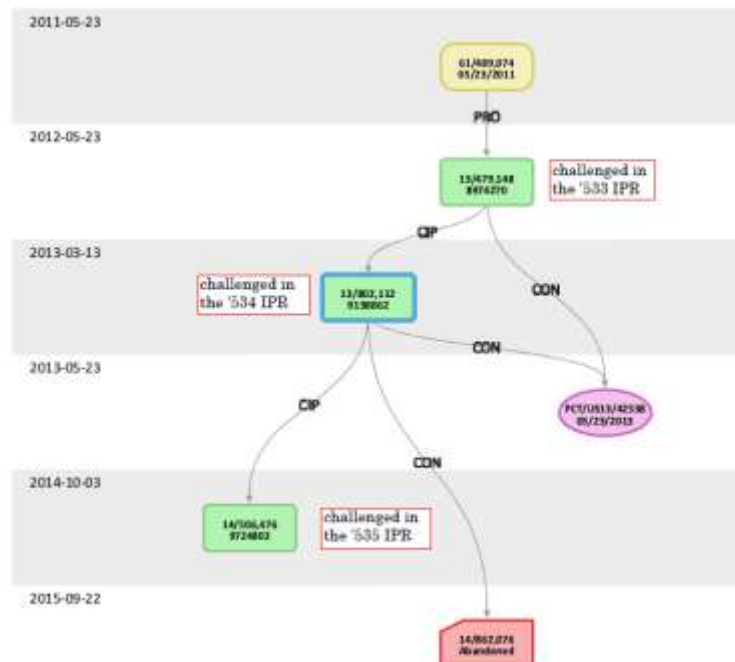
Petitioner also filed IPR proceedings to challenge two other patents owned by Patent Owner that are related to the ’862 patent. *See* Pet. 1. They are IPR2024-00533 (challenging claims in U.S. Patent No. 8,974,270 B2) and IPR2024-00535 (challenging claims in U.S. Patent No. 9,724,802 B2). These two patents also are alleged to be infringed in each of the Samsung and TI Litigations. *See* Exs. 3002 ¶¶ 19–25; 3004 ¶¶ 23–29. Decisions in

each of these two related IPR proceedings are being entered simultaneously with this Decision.

D. The '862 Patent

The '862 patent is a continuation-in-part of U.S. Patent Application No. 13/479,148, filed on May 23, 2012, which in turn claims priority to U.S. Provisional Application No. 61/489,074, filed on May 23, 2011. Ex. 1001, codes [63], [60]. “For the purposes of this IPR only, Petitioner applies the earliest claimed priority date of May 23, 2011.” Pet. 13; *see also* Ex. 1001, 1:6–10 (claiming a priority date of May 23, 2011). Patent Owner does not contest, nor comment on, the priority date asserted by Petitioner or asserted in the '862 patent. *See generally*, PO Resp.

Moreover, as shown below in the abbreviated, annotated family tree for the '862 patent, the '862 patent also is directly related to the two patents challenged in the related, pending '533 and '535 IPRs.



Annotated excerpt of '862 patent family tree.

The '862 patent discloses and claims a “method of conditioning a CMP [Chemical Mechanical Polishing] pad.” *See, e.g.*, Ex. 1001, 20:17– 30 (independent claim 1); *id.* at 1:18–21 (defining the acronym CMP); 1:29–30. As disclosed in the written description,

The semiconductor industry currently spends in excess of one billion U.S. dollars each year manufacturing silicon wafers that must exhibit very flat and smooth surfaces. Known techniques to manufacture smooth and even-surfaced silicon wafers are plentiful. The most common of these involves the process known as Chemical Mechanical Polishing (CMP) which includes the use of a polishing pad in combination with an abrasive slurry. Of central importance in all CMP processes is the attainment of 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.

Ex. 1001, 1:14–25.

Petitioner’s expert, Dr. Stanley Shanfield, Ph.D.,⁴ testifies that CMP “is a common, widely-used process that has been around since the late 1980s/early 1990s.” Ex. 1002 ¶ 37 (citing Ex. 1011). According to Dr. Shanfield, a typical setup for this process is shown in the Figures below.⁵ *Id.*

⁴ Patent Owner moves to exclude Dr. Shanfield’s testimony. We deny this Motion, which is discussed in Section III of this Decision.

⁵ Dr. Shanfield’s testimony includes only the top figure from Figure 2 in Exhibit 1011. Figure 2, however, includes two views, as shown. We have included for completeness both views that are included in the cited Figure 2. *See also* Pet. 7–8 providing a similar description of CMP procedures.

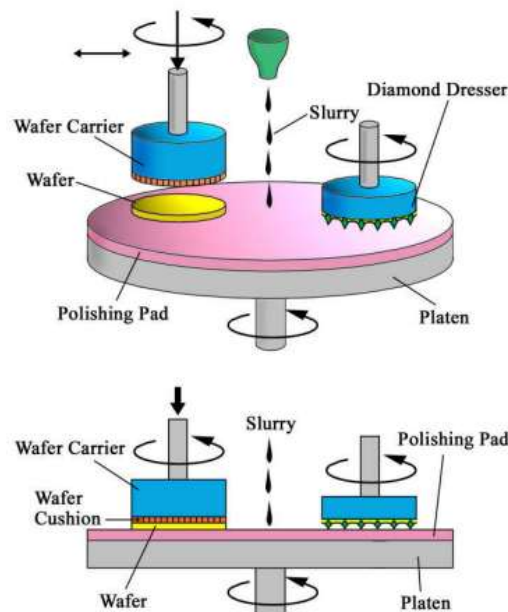


Fig. 2: The CMP layout includes a rotating pad, a feeding slurry, and a rotating pad conditioner.

Figure 2 from Ex. 1011 shows two views of a conventional CMP machinery

Dr. Shanfield testifies that the “semiconductor wafer (labeled ‘wafer’ in the Figure) is pressed against a rotating polishing pad, also known as a CMP pad.” Ex. 1002 ¶ 37. “Additionally, a chemical slurry is introduced onto the polishing pad.” *Id.* (citations omitted). The chemical slurry typically includes abrasive particles that assist in polishing the wafer surface. *Id.* ¶ 38 (citations omitted). As further explained in Exhibit 1011,

In addition to the elimination of contaminants deposited on the pad top, pressure must be increased locally on the pad asperities to cause the abrasion at the contact points between wafer and pad. In order to create the pressurized points, the contact area must be reduced. Hence, the same diamond pad conditioner must groove the pad top to create asperities. The size and distribution of these asperities actually determine the efficiency of the polishing and the quality of the polished wafer (Fig.2).

Ex. 1011, 1.

The challenged claims in the '862 patent define a method of “conditioning,” or reconditioning, a CMP polishing pad (shown in pink in the figures above) using a “diamond dresser,” also as shown in the figures above.

The disclosed method includes pressing a CMP pad *dresser* against a CMP *pad*, where the dresser includes a monolayer of a plurality of superabrasive particles protruding from a matrix layer. Ex. 1001, 1:30–33. Superabrasive particles suitable for use in a CMP pad dresser include diamonds and other materials. Ex. 1001, 3:32–45. Thus, in the context of the '862 patent, a “dresser” is a “a tool used to condition or dress a pad, such as a CMP pad.” *Id.* at 3:9–11. The method can further include rotating the dresser against the CMP pad such that “asperities,”⁶ providing a rough surface, are cut into the CMP pad “having a maximum cutting depth of about 60 microns.” *Id.* at 1:39–42.

As explained by Dr. Shanfield,

CMP pad dressers, which are also commonly called “pad conditioners,” “diamond dressers,” or “diamond conditioners,” condition CMP pads. CMP pad dressers contain superabrasive particles (most commonly diamond particles) that protrude from the surface, and can cut the surface of the CMP pad as the pad dresser is rotated against the pad to generate new asperities.

Ex. 1002 ¶ 40 (citing Ex. 1004)⁷.

⁶ “Asperity” (plural “asperities”) is a noun that means “roughness of surface; unevenness.” See <https://www.dictionary.com/browse/asperity> (definition No. 3, Sept. 7, 2025).

⁷ Ex. 1004 is a published U.S. patent application, publication number US 2007/0060026 A1. The named inventor in this published application is

Use of the CMP pad for polishing significantly decreases the the pad's overall polishing performance. Ex. 1004 ¶ 4. For example, the pores used to hold the slurry become clogged, and the overall asperity of the pad's polishing surface becomes “depressed and matted.” *Id.* This is where the CMP pad *dresser* can be used to revive the pad surface by “combing” or “cutting” it. *Id.* This process is known as “dressing” or “conditioning” the CMP pad. *Id.* Many types of devices and processes have been used for this purpose. “One such device is a disk with a plurality of superhard crystalline particles attached to a metal-matrix surface.” *Id.*

In the challenged '862 patent, specific embodiments are disclosed that relate to the protrusion distance of the abrasive particles, the number of abrasive particles, and other details of the disclosed method.

Figure 1 of the '862 patent is reproduced below.

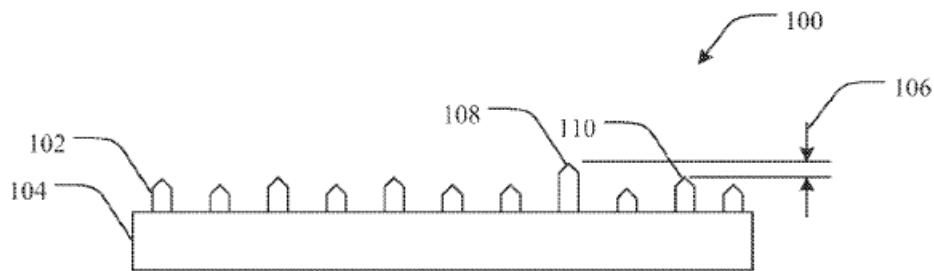


FIG. 1
Figure 1 is a schematic side view
of a CMP pad dresser. Ex. 1001, 2:29–30.

As shown in Figure 1, CMP pad dresser 100 includes a monolayer of superabrasive particles 102 embedded in matrix layer 104 such that each superabrasive particle in the monolayer protrudes from matrix layer 104. Ex. 1001, 8:33–37. The difference in protrusion distance 106 between

the same person named as the inventor in the '862 patent at issue in this IPR proceeding.

the highest protruding tip 108 and the next highest protruding tip 110 of the monolayer of superabrasive particles is the “protrusion difference.”

Id. at 8:37–40. Various specific embodiments are disclosed. For example, in one embodiment, the protrusion difference can be less than or equal to about 50 microns.⁸ *Id.* at 8:40–42. In another embodiment, the protrusion difference can be less than or equal to about 20 microns. *Id.* at 8:42–43. In another embodiment, the protrusion difference can be less than or equal to about 10 microns. *Id.* at 8:43–45. The written description states the term “protrusion difference” can also be used to describe “the difference in protrusion distance between any two or more superabrasive particles.” *Id.* at 8:45–47.

The ’862 patent includes twenty claims, all of which are challenged in the Petition. *See* Ex. 1001, 20:17–21:20; Pet. 3 (“Petitioner requests *inter partes* review and cancellation of claims 1–20 of the ’862 Patent.”).

E. Illustrative Claim

Claim 1 is the sole independent claim, and is reproduced below.

A method of conditioning a CMP pad, comprising:

pressing a CMP pad dresser against a CMP pad, the dresser including a monolayer of a plurality of superabrasive particles protruding from a matrix 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 10 microns and the

⁸ To provide context for the dimensions used in the ’862 patent, a micron is a unit of measurement in the metric system equal to one-millionth of a meter or 10^{-6} m. It is also referred to as a micrometer or its abbreviation μm . One micron equals 0.001 millimeters or 0.000039 inches. *See, e.g.*, <https://www.britannica.com/science/International-System-of-Units> (definition of “micrometre,” Sept. 12, 2025).

difference in protrusion distance between the highest 10 protruding tips of the monolayer of superabrasive particles are within about 20 microns or less; and

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

Ex. 1001, 20:17–30.

In the '862 patent before us, the claims are all directed to a “method of conditioning a CMP pad.” *Id.* The specific steps stated in the method claims are “pressing a CMP pad dresser against a CMP pad” and “rotating the dresser against the CMP pad such that asperities are cut into the CMP pad.” *Id.* The substantive limitations in the challenged claims, however, are directed to the difference in protrusion distance between the protruding tips of a monolayer of superabrasive particles on the dresser.

The claims in the two related IPR proceedings identified in Section I.C of this Decision, IPR2024-00533 and IPR2024-00535, are directed to the structure of a “CMP pad dresser.” We note that the challenged claims in these two related proceedings, however, also focus on protrusion distance differences between the protruding tips of a monolayer of superabrasive particles on the dresser.

F. Prior Art and Asserted Grounds

Petitioner asserts that the Challenged Claims are unpatentable based on following grounds (Pet. 6):

	Claim(s) Challenged	35 U.S.C. §⁹	References/Basis
1	1–6, 9–12, 20	102/103	Sung '026 ¹⁰ (2 grounds)
2	5–10	103	Sung '026, Sung ICPT ¹¹
3	13, 17–19	103	Sung '026, Nishioka ¹²
4	14	103	Sung '026, Lin ¹³
5	15	103	Sung '026, Kim ¹⁴
6	16	103	Sung '026, Koyama ¹⁵

Petitioner also relies on the declaration testimony of Dr. Shanfield (Ex. 1002) in support of these grounds.

⁹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 296–07 (2011), took effect on September 16, 2011. The changes to 35 U.S.C. §§ 102 and 103 in the AIA do not apply to any patent application filed before March 16, 2013. Because the application for the patent at issue in this proceeding has an effective filing date before March 16, 2013, we refer to the pre-AIA version of the statutes.

¹⁰ US 2007/0060026 A1 (Ex. 1004, “Sung '026”).

¹¹ “The Organic Diamond Disk (ODD) for dressing of Polishing Pads of Chemical Mechanical Planarization,” International Conference on Planarization / CMP Technology, 25-27 October 2007 (Ex. 1005 “SungICPT”).

¹² US 2008/0087644 A1 (Ex. 1006 “Nishioka”).

¹³ WO 2008/049019 A2 (Ex. 1007 “Lin”).

¹⁴ US 2009/0001581 A1 (Ex. 1008 “Kim”).

¹⁵ US 2009/0117692 A1 (Ex. 1009 “Koyama”).

II. PETITIONER’S GROUNDS OF UNPATENTABILITY

A. *Legal Standards*

1. *Petitioner’s Burden*

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden of persuasion never shifts to the patent owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

2. *Anticipation*

“To anticipate a claim, a prior art reference must disclose each and every element of the claim, either explicitly or inherently.” *Adasa Inc. v. Avery Dennison Corp.*, 55 F.4th 900, 910 (Fed. Cir. 2022) (citing *Eli Lilly & Co. v. Zenith Goldline Pharms., Inc.*, 471 F.3d 1369, 1375 (Fed. Cir. 2006)). “While those elements must be arranged or combined in the same way as in the claim, the reference need not disclose the elements in the very same terms used by the patent.” *Id.* (citing *In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009) (“[T]he reference need not satisfy an *ipsissimis verbis* test.” (citing *In re Bond*, 910 F.2d 831, 832–33 (Fed. Cir. 1990)))). “And ‘[e]ven if a reference’s teachings are insufficient to find anticipation, that same reference’s teachings may be used to find obviousness’ *where it suggests some reason to modify the prior art to obtain the claimed limitations.*” *Id.* (citing *CRFD Rsch., Inc. v. Matal*, 876 F.3d 1330, 1345 (Fed. Cir. 2017)

(emphasis added)). “The question of what a reference teaches and whether it describes every element of a claim is a question for the finder of fact.” *Id.* (citing *Med. Instrumentation & Diagnostics Corp. v. Elekta AB*, 344 F.3d 1205, 1221 (Fed. Cir. 2003)). In an *inter partes* review, the Board is the finder of facts.

Also, as explained in *Net MoneyIN*,
unless a reference discloses within the four corners of the document not only all of the limitations claimed but also all of the limitations arranged or combined in the same way as recited in the claim, it cannot be said to prove prior invention of the thing claimed and, thus, cannot anticipate under 35 U.S.C. § 102.
Net MoneyIN, Inc. v. VeriSign, Inc., 545 F.3d 1359, 1371 (Fed. Cir. 2008).
“The requirement that the prior art elements themselves be arranged as in the claim means that claims cannot be treated . . . as mere catalogs of separate parts, in disregard of the part-to-part relationships set forth in the claims and that give the claims their meaning.” *VirnetX Inc. v. Mangrove Partners Master Fund, Ltd.*, No. 2020-2272, slip op. at 14 (Fed. Cir. Mar. 30, 2023) (citing *Therasense, Inc. v. Becton, Dickinson & Co.*, 593 F.3d 1325, 1332 (Fed. Cir. 2010) (internal quotation marks omitted)).

3. Obviousness

Whether the challenged claims would have been obvious over the cited references also is at issue in this proceeding. Section 103 forbids issuance of a patent when “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of

obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when available, evidence such as commercial success, long felt but unsolved needs, and failure of others.¹⁶ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966); see *KSR*, 550 U.S. at 407 (“While the sequence of these questions might be reordered in any particular case, the [*Graham*] factors continue to define the inquiry that controls.”). The Court in *Graham* explained that these factual inquiries promote “uniformity and definiteness,” for “[w]hat is obvious is not a question upon which there is likely to be uniformity of thought in every given factual context.” 383 U.S. at 18.

The Supreme Court made clear that we apply “an expansive and flexible approach” to the question of obviousness. *KSR*, 550 U.S. at 415. Whether a patent claiming the combination of prior art elements would have been obvious is determined by whether the improvement is more than the predictable use of prior art elements according to their established functions. *Id.* at 417. To support this conclusion, however, it is not enough to show merely that the prior art includes separate references covering each separate limitation in a challenged claim. *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011). Rather, obviousness additionally requires that a person of ordinary skill at the time of the invention “would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention.” *Id.*

¹⁶ Patent Owner does not direct us to any persuasive objective evidence of non-obviousness.

In determining whether there would have been a motivation to combine prior art references to arrive at the claimed invention, it is insufficient to simply conclude the combination would have been obvious without identifying any reason *why* a person of skill in the art would have made the combination. *Metalcraft of Mayville, Inc. v. Toro Co.*, 848 F.3d 1358, 1366 (Fed. Cir. 2017).

Moreover, in determining the differences between the prior art and the claims, the question under 35 U.S.C. § 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 164 (Fed. Cir. 1985) (“It is elementary that the claimed invention must be considered as a whole in deciding the question of obviousness.”); *see also Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1537 (Fed. Cir. 1983) (“[T]he question under 35 U.S.C. § 103 is not whether the differences *themselves* would have been obvious. Consideration of differences, like each of the findings set forth in *Graham*, is but an aid in reaching the ultimate determination of whether the claimed invention as a whole would have been obvious.”).

As a factfinder, we also must be aware “of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning.” *KSR*, 550 U.S. at 421.

Applying these general principles, we consider the evidence and arguments of the parties.

B. Level of Ordinary Skill in the Art

The level of 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, 1355 (Fed. Cir. 2001). “This reference point prevents . . . factfinders from using their own insight or, worse yet, hindsight, to gauge obviousness.” *Id.*

“The *Graham* analysis includes a factual determination of the level of ordinary skill in the art. Without that information, a . . . court cannot properly assess obviousness because the critical question is whether a claimed invention would have been obvious at the time it was made to one with ordinary skill in the art.” *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986); *see also Ruiz v. A.B. Chance*, 234 F.3d 654, 666 (Fed. Cir. 2000) (“The determination of the level of skill in the art is an integral part of the *Graham* analysis.”).

Factors pertinent to a determination of the level of ordinary skill in the art include: (1) 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 workers active in the field. *Best Med. Int’l, Inc. v. Elekta Inc.*, 46 F.4th 1346, 1353 (Fed. Cir. 2022) (citing *Daiichi Sankyo Co. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007) (quoting *Env’t Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696 (Fed. Cir. 1983))). These factors are not exhaustive but merely are a guide to determining the level of ordinary skill in the art. *Daiichi Sankyo*, 501 F.3d at 1256. In determining a level of ordinary skill, we also may look to the prior art, which may reflect an appropriate skill level. *Okajima*, 261 F.3d at 1355.

Petitioner contends a person having ordinary skill in the art pertaining to the '862 patent, as of May 23, 2011, would have had a bachelor's degree "in 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. 22 (citing Ex. 1002 ¶¶ 60–62). The cited Declaration testimony from Dr. Shanfield merely repeats Petitioner's conclusory statement, without any explanation or analysis as to why or how he reached this conclusion. Dr. Shanfield adds the additional caveat to his testimony that "a higher level of education or specific skills in the industry may make up for less experience and vice versa." Ex. 1002 ¶ 60.

We give Petitioner's conclusory argument and Dr. Shanfield's conclusory testimony minimal probative weight. *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9, at 15–17 (PTAB Aug. 24, 2022) (precedential) (holding an expert's declaration testimony is entitled to little weight when it "is conclusory and unsupported, [and] adds little to the conclusory assertion for which it is offered to support"); *see also* 37 C.F.R. § 42.65(a) ("Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.").

Patent Owner states "[a] POSITA¹⁷ for purposes of the '862 patent would have at least two years of experience in developing CMP technology

¹⁷ "POSITA" is an acronym commonly used in patent law to represent the phrase "a person of ordinary skill in the art." *See, e.g.*, 35 U.S.C. § 103 (pre-AIA) (stating that a patent may not be obtained "if the differences between the subject matter sought to be patented and the prior art are such that the

including some specific experience with the design and development of CMP pad dressers.” PO Resp. 3 (citing Ex. 2011 ¶ 21 [sic]). The correct citation for Dr. Tsai’s second declaration testimony concerning the level of ordinary skill in the art is Exhibit 2011 ¶¶ 26–30. Thus, we look to these paragraphs.

In Paragraph 29 of his Second Declaration, Dr. Tsai states:

It is my opinion that Dr. Shanfield’s definition of a POSITA is deficient because [it] lacks any specific reference to CMP technology, which is a specialized branch of semiconductor manufacturing. Accordingly, I believe a POSITA for purposes of the ’862 patent would have at least two years of experience in developing CMP technology, including experience with the design and development of CMP pad dressers.

Ex. 2011 ¶ 29. Dr. Tsai’s opinion testimony does not mention anything about education level. His testimony goes only to the level of experience. Similar to our analysis of Dr. Shanfield’s testimony, we note that Dr. Tsai also just states his conclusory opinion about the level of ordinary skill and does not provide any explanation or analysis of the facts or data supporting his testimony. “Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”

37 C.F.R. § 42.65(a).

In its Reply, Petitioner also notes that Dr. Tsai did not offer a specific opinion on the educational component of a person of ordinary skill.

Reply 1–3.

subject matter as a whole would have been obvious at the time the invention was made to *a person having ordinary skill in the art* to which said subject matter pertains.” (emphasis added)).

Petitioner cites Dinh-Ngoc¹⁸, a reference at issue during prosecution of the '862 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.” Reply 3 (citing Ex. 1003, 892; Ex. 1058 ¶ 5 (“A wafer surface that is not sufficiently planar will result in structures that are poorly defined, with the circuits being nonfunctional or exhibiting less than optimum performance. Chemical mechanical planarization (CMP) is a common technique used to planarize or polish workpieces such as semiconductor wafers.”)). Petitioner further questions 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 1–3 (citing Ex. 1047, 107:18–25, 109:2–8).

Upon consideration, we firstly adopt Petitioner’s contention that a person of ordinary skill pertaining to the '862 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. Pet. 22. That contention is not disputed by Patent Owner. *See generally* PO Resp. 3 (commenting only on the level of experience, not education). Therefore, we need not delve into the line of questioning posed to Dr. Tsai during his deposition on an undisputed issue. Ex. 1047, 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*

¹⁸ Ex. 1058 (US 2010/0248595 A1).

specifically. The '862 patent claims are directed to a “method of conditioning a CMP pad,” and using a pad dresser, not to a method of making a pad dresser. See independent claim 1 (Ex. 1001, 20:17–30). According to the '862 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 1:21–25 (Background of the Invention). Thus, the 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 level of ordinary skill formulation requiring “experience in the field of integrated circuit processing and fabrication techniques” (Pet. 22) as too generic in the context of the '862 patent’s claimed invention.

We also conclude, in view of the '862 patent disclosures discussed above, that Dr. Tsai’s opinion that ordinary skill requires experience with manufacturing pad dressers (*see* Ex. 2011 ¶ 29, “I believe a POSITA for purposes of the '862 patent would have at least two years of experience in developing CMP technology, including experience with the design and development of CMP pad dressers”) 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.”). Here, the patent’s purpose is to provide “efficient methods of conditioning a CMP pad.” Ex. 1001, 1:29–30. As also stated in the '862 patent, “[o]f central importance in all CMP processes is the attainment of 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.” *Id.* at 1:21–25; *see also id.* at 6:61–64 (stating “[t]he present disclosure generally provides CMP pad dressers, methods associated with pad conditioning (e.g., smoothing, polishing, dressing), and the CMP polishing of a work piece”).

We acknowledge that the ’862 patent specification discusses methods of making a CMP pad dresser in addition to the structure of CMP pad dressers. *See id.* at 8:26–31, stating:

The present CMP pad dressers include a layer of superabrasive particles having substantially leveled tips across the working surface of the finished CMP pad dresser. A variety of techniques can be utilized to maintain tip leveling, and any such technique is considered to be within the present scope. A few non-limiting examples of such techniques are described.

However, the ’862 patent is *not* limited to that disclosure, as stated in the Specification quoted above. “A variety of techniques can be utilized to maintain tip leveling” and “any such technique is considered to be within the present scope.” *Id.* As discussed above, the claims of the ’862 patent are *not* limited to any particular method of manufacture. Ex. 1001, 20:17–30.

Thus, based on the evidence before us, we conclude a person of ordinary skill pertaining to the ’862 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.

C. *Claim Construction*

We interpret the '862 patent claims “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b). This “includ[es] construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” *Id.*

The '862 patent has an extensive section of the written description devoted to “Definitions.” *See* Ex. 1001, 3:4–6:59. This Definition section includes more than twenty-five definitions of terms. Some of these terms are *not* specific, scientific terms unique to the '862 patent. For example, among the listed “definitions” are the words “transverse” (*id.* at 5:7–10), “substantially” (*id.* at 6:9–18), and “about” (*id.* at 6:29–31). Thus, these may not be lexicographic definitions. *Thorner v. Sony Computer Ent. Am. LLC*, 669 F.3d 1362, 1365–66 (Fed. Cir. 2012) (“a patentee sets out a definition and acts as his own lexicographer” by “clearly set[ting] forth a definition of the disputed claim term’ *other than its plain and ordinary meaning*” and “clearly express[ing] an intent’ to *redefine the term*”) (emphases added).

Petitioner does not propose any specific terms to be construed. Pet. 22–23. Petitioner notes, however, that the '862 patent provides several lexicographic definitions of terms found in the '862 patent claims. *See* Pet. 23–25.

Patent Owner also does not propose any specific terms to be construed. PO Resp. 3 (“Patent Owner contends that no construction is necessary for the '862 patent’s claim terms.”).

Claims must be construed “only to the extent necessary to resolve the controversy.” *AstraZeneca AB v. Mylan Pharms. Inc.*, 19 F.4th 1325, 1345 (Fed. Cir. 2021) (quoting *Vivid Techs., Inc. v. American Science & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)); *see also Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“we need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’” (citations omitted)). We determine that a specific construction of the claims is not necessary to reach a decision in this proceeding.

III. MOTION TO EXCLUDE

Before turning to the merits of Petitioner’s asserted Grounds of unpatentability, we address Patent Owner’s Motion to Exclude Exhibits 1002 and 1050-59 in this proceeding.

Patent Owner filed a Motion to Exclude Exhibits 1002 and 1050–1059 as “inadmissible under 37 C.F.R. § 42.62.” PO Mot. Excl. 2.¹⁹ Our Rule 62 states that generally the Federal Rules of Evidence apply to IPR proceedings. 37 C.F.R. § 42.62(a) (“Except as otherwise provided in this subpart, the Federal Rules of Evidence shall apply to a proceeding.”).

¹⁹ We note that Patent Owner also filed Motions to Exclude evidence in the related IPR proceedings. *See* IPR2024-00533 (Paper 32) seeking to exclude Exhibits 1002, 1042–49, 1052 and 1053; IPR2024-00535 (Paper 30) seeking to exclude Exhibits 1002, 1059, and 1060. There is minimal overlap between the exhibits Patent Owner seeks to exclude, and the exhibit numbering, in these three related proceedings. For example, Exhibit 1050 in IPR2024-00534 is *not* the same document as Exhibit 1050 in IPR2024-00535.

A. Exhibit 1002
Dr. Shanfield's Declaration Testimony

Exhibit 1002 is an 81-page Declaration from Dr. Shanfield stating his opinion testimony on a number of issues. Dr. Shanfield's Declaration includes 204 numbered paragraphs. Appendix A to his Declaration is a "Curriculum Vitae" summarizing his education and experience.

In our view, Patent Owner's Motion to Exclude is inconsistent in asserting whether it seeks to exclude the entirety of Exhibit 1002 or whether it seeks to exclude only selected paragraphs of Exhibit 1002.

For example, on page 1 of the Motion to Exclude, Patent Owner states that it "moves to exclude Exhibits 1002 and 1050–59 submitted by Petitioners." PO Mot. Excl. 1. This one quoted statement suggests that the Motion seeks to exclude the *entirety* of these exhibits.

When later referring to Exhibits 1050–1059, Patent Owner makes clear that it seeks to exclude the entirety of Exhibits 1050–1059. *See id.* at 12 (stating, in the "Conclusion" section of its Motion to Exclude, that "the Board should . . . exclude Exhibits 1050–59 in their *entirety*." (emphasis added)). This same section of the Motion, and the same sentence, however, also state that Patent Owner is seeking to exclude only selected paragraphs of Exhibit 1002. *Id.* (stating "the Board should exclude *paragraphs 87–91, 97–108, 109–11, and 149–53* of the Shanfield Declaration (Ex. 1002)" (emphasis added)).

In heading III of its Motion, Patent Owner states "**EXHIBITS 1002 AND 1050–59 SHOULD BE EXCLUDED AS INADMISSIBLE UNDER 37 C.F.R. § 42.62.**" This statement suggests that the Motion seeks to exclude the *entirety* of these exhibits. Yet, the very next sentence, under

sub-heading “III.A,” directed to a discussion of “Exhibit 1002,” Patent Owner states that only the “*offending portions* of the Shanfield Declaration should be excluded.” PO Mot. Excl. 2 (emphasis added). This reference to “offending portions” is consistent with the relief requested in sub-heading III.A that “Dr. Shanfield’s opinions set forth in *paragraphs 87–91, 97–108, 109–11, and 149–53* of the Shanfield Declaration should be excluded as inadmissible under Fed. R. Evid. 702 and 703, or in the alternative, be afforded no weight.” *Id.* at 10 (emphasis added). The paragraphs of Ex. 1002 identified in section III.A (*id.* at 10) that Patent Owner seeks to exclude are identical to the paragraphs identified in Section IV (“Conclusion”) (*id.* at 12).

In its Reply, Patent Owner again stated that its Motion to Exclude sought to exclude only *certain portions* of Dr. Shanfield’s testimony. PO Reply Mot. Excl. 1 (stating in heading I that “**CERTAIN PORTIONS OF DR. SHANFIELD’S DECLARATION (EX. 1002) SHOULD BE EXCLUDED**”).

We also note that when Patent Owner intended to include the “entirety” of an exhibit, Patent Owner specifically used the word “entirety.” See PO Reply Mot. Excl. 5 (headings II and III stating that exhibits 1050–1059 should be excluded in their “entirety”) (bold, capitalized font deleted); see also PO Mot. Excl. 12 (requesting the Board to “exclude Exhibits 1050–59 in their entirety”).

We think it is clear Patent Owner seeks to exclude “paragraphs 87–91, 97–108, 109–11, and 149–53 of the Shanfield Declaration (Ex. 1002)” (PO Mot. Excl. 12). Based on the evidence before us, our conclusion denying the

Motion to Exclude, however, would be the same for Exhibit 1002 if Patent Owner is seeking to exclude the entirety of Exhibit 1002.

Patent Owner asserts:

The offending portions of the Shanfield Declaration should be excluded because of Dr. Shanfield's lack of qualification in offering his opinions in chemical-mechanical planarization (CMP) pad conditioning, the subject matter of U.S. Patent No. 9,138,862 (the "'862 Patent"), and the lack of sufficient facts or data underlying his opinions in his declaration (which renders his opinions self-serving and wholly unreliable). See Fed. R. Evid. 702 & 703.

Id. at 2.

"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." *Kyocera Senco Indus. Tools Inc. v. Int'l Trade Comm'n*, 22 F.4th 1369, 1376–77 (Fed. Cir. 2022). All that is required "to be qualified to offer expert testimony on issues from the vantage point of an ordinarily skilled artisan in a patent case" is that "an expert must at a minimum possess ordinary skill in the art." *Id.* at 1377. Federal Circuit precedent "is clear [on this issue]—nothing more is required." *Osseo Imaging, LLC v. Planmeca USA Inc.*, 116 F.4th 1335, 1340 (Fed. Cir. 2024).

Patent Owner asserts "Dr. Shanfield lacks sufficient expertise and experience to qualify as a POSITA in the design of CMP pad conditioners." PO Mot. Excl. 2. Additionally, Patent Owner asserts "Dr. Shanfield's opinions are inadmissible because they are derived from unreliable principles and methods." *Id.*

We first consider whether Dr. Shanfield, at a minimum, possess ordinary skill in the art.

Patent Owner asserts “Dr. Shanfield’s only experience is working in a lab that merely **used** ‘semiconductor-grade CMP systems.’” PO Mot. Excl. 3 (citing Ex. 1002 ¶ 5). Patent Owner also asserts that Dr. Shanfield “does not identify any experience in designing, manufacturing, or testing the conditioners for those CMP pads.” *Id.* Patent Owner fails to consider the totality of Dr. Shanfield’s experience, and does not consider the level of ordinary skill applicable in this proceeding.

As discussed in Section II.B of this Decision, the parties asserted different levels of ordinary skill in this proceeding. The parties had an opportunity to fully develop their respective positions in their briefs and in cross-examination of witnesses. As stated in Section II.B, based on the evidence before us, we conclude a person of ordinary skill pertaining to the ’862 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, our adopted level of ordinary skill recognized that a higher level of education could make up for less experience, and vice versa. This is the level of ordinary skill Dr. Shanfield must possess to be qualified to offer expert opinion testimony. *See Osseo Imaging*, 116 F.4th at 1340.

Based on the evidence before us, we determine Dr. Shanfield has the combination of education and experience to qualify as a person of ordinary skill in the art pertaining to the ’862 patent. Dr. Shanfield’s Ph.D. in physics satisfies, and exceeds, the educational prerequisite of at least a bachelor’s

degree in an engineering related field such as physics. See Ex. 1002 ¶ 2, App. A. His advanced degree (Ph.D. in physics) is far above the “ordinary” education level (a bachelor’s degree in an engineering related field) and provides considerable leeway when turning to the experiential component for ordinary skill. Nonetheless, Dr. Shanfield also has at least two years of experience with “optimizing” the performance of CMP technology as required by the experience prerequisite for a person of ordinary skill.

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). Dr. Shanfield’s high degree of education, and his experience in optimizing CMP systems, which we construe as designing and developing the CMP systems to optimize their performance qualifies him to provide his opinion testimony in this case.

Based on the evidence before us, we conclude Dr. Shanfield qualifies as a person of ordinary skill pertaining to the ’862 patent because he meets and exceeds the level of ordinary skill adopted in this IPR proceeding, based

on his advanced degree of education and his relevant experience optimizing and otherwise developing CMP technology. “[N]othing more is required.” *Osseo Imaging*, 116 F.4th at 1340. As a result, we deny Patent Owner’s motion to exclude any portions of Dr. Shanfield’s declaration testimony.

B. Exhibits 1050–1059

Patent Owner also moves to exclude Exhibits 1050–1059. PO Mot. Excl. 10–12.

1. Exhibits 1050–1057

Regarding Exhibits 1050–57, Patent Owner states that these are “publications by Dr. Tsai [Patent Owner’s proposed expert witness] submitted by Petitioners in support of their erroneous argument that Dr. Tsai worked closely with Dr. Sung ‘over many years.’” PO Mot. Excl. 10–11 (citing Reply at 24). Patent Owner also asserts “[a]ll of these publications were available to Petitioners at the time the Petition was filed, and therefore there is no excuse for their belated filing.” *Id.* at 10 (citing 37 C.F.R. § 42.123(b)). We note that at the time of filing the Petition there is no evidence that Dr. Tsai would be, or had been identified as, an expert witness on behalf of Patent Owner.

Patent Owner also asserts these exhibits are “needlessly cumulative” in light of Dr. Tsai’s “extensive testimony” about his “relationships with Dr. Sung,” the named inventor in the ’862 patent. *Id.* at 10–11.

The Federal Circuit has held that “the very nature of the reply and sur-reply briefs are to respond (whether to refute, rebut, explain, discredit, and so on) to prior raised arguments within the confines of 37 C.F.R. § 42.23(b).” *Rembrandt Diagnostics, LP v. Alere, Inc.*, 76 F.4th 1376, 1384

(Fed. Cir. 2023). In the context of the proceeding before us, Exhibits 1050–1057 meet this fundamental purpose of a reply.

Moreover, our general approach for considering challenges to the admissibility of evidence was outlined in *Corning Inc. v. DSM IP Assets B.V.*, IPR2013-00053, Paper 66 at 19 (PTAB May 1, 2014). As stated in *Corning*, similar to a district court in a bench trial, the Board, sitting as a non-jury tribunal with administrative expertise, is well-positioned to determine and assign appropriate weight to evidence presented. *Id.* (citing *Donnelly Garment Co. v. NLRB*, 123 F.2d 215, 224 (8th Cir. 1941) (stating, in the context of reviewing an administrative determination of the National Labor Relations Board based on findings by a Trial Examiner, “We think that experience has demonstrated that in a trial or hearing where no jury is present, more time is ordinarily lost in listening to arguments as to the admissibility of evidence and in considering offers of proof than would be consumed in taking the evidence proffered . . . One who is capable of ruling accurately upon the admissibility of evidence is equally capable of sifting it accurately after it has been received”)).

Moreover, “there is a strong public policy for making all information filed in an administrative proceeding available to the public.” *Liberty Mut. Ins. Co. v. Progressive Cas. Ins. Co.*, CBM2012-00010, Paper 59 at 40 (PTAB February 24, 2014). Rather than excluding evidence that is allegedly hearsay, confusing, misleading, untimely, and/or irrelevant, we will simply not rely on it or give it little or no probative weight, as appropriate, in our analysis. “In an *inter partes* review, we regard it as the better course to have a complete record of the evidence to facilitate public access, as well as appellate review.” *Sony Computer Entm’t Am. LLC v. Game Controller*

Tech. LLC, IPR2013-00634, Paper 32 at 31 (PTAB Apr. 14, 2015); *see also Gnosis S.p.A. v. S. Alabama Med. Sci. Found.*, IPR2013-00118, Paper 64 at 43 (PTAB June 20, 2014) (citing *Donnelly*, 123 F.2d at 224 (“If the record on review contains not only all evidence which was clearly admissible, but also all evidence of doubtful admissibility, the court which is called upon to review the case can usually make an end of it, whereas if evidence was excluded which that court regards as having been admissible, a new trial or rehearing cannot be avoided.”))).

Accordingly, for the reasons identified above, we deny Petitioner’s Motion to Exclude Exhibits 1050–1057.

2. *Exhibit 1058*

Patent Owner asserts we should “exclude Exhibit 1058, U.S. Patent Application Publication No. 2010/0248595 (‘Dinh-Ngoc’)” because “this exhibit was submitted by Petitioners only with their Reply to bolster Petitioners’ broader definition of a POSITA.” PO Mot. Excl. 11 (citing Reply at 3). We note that Patent Owner did not raise any issue with respect to the level of ordinary skill in this case until its Patent Owner Response.

Petitioner’s submission of Exhibit 1058 with its Reply, as acknowledged by Patent Owner, was “to bolster” its definition of a person of ordinary skill as newly challenged by Patent Owner. This is fully consistent with the purpose of a reply, which is to “respond (whether to refute, rebut, explain, discredit, and so on) to prior raised arguments within the confines of 37 C.F.R. § 42.23(b).” *Rembrandt Diagnostics*, 76 F.4th at 1384.

Accordingly, for the reasons and case law identified above in the context of our analysis of Exhibits 1050–1057, we deny Patent Owner’s Motion to Exclude Exhibit 1058.

3. *Exhibit 1059*

Exhibit 1059 is a letter from counsel for the inventor forwarding a patent application to the U.S. Patent and Trademark Office. The forwarding letter is dated September 9, 2005. Based on markings on the first page of this exhibit, this letter was received by the PTO, and the enclosed application was assigned Application No. 11/223,786.

Patent Owner asserts that Exhibit 1059 became “U.S. Application No. 11/223,786 (’786 Application).” PO Mot. Excl. 11. According to Patent Owner, the ’786 Application “was publicly available and known to Petitioners at the time of the filing of the Petition, and to the extent it viewed it as necessary to meet its burden of proof, it could and should have submitted it at that time.” *Id.* at 11–12. Patent Owner also states that this submitted application was later published as the Sung ’026 reference, which is Exhibit 1004 in this proceeding. Patent Owner has not directed us to any evidence establishing the relationship between Exhibits 1059 and 1004. We note, however, that the Sung ’026 reference in this case states it is based on “Application 11/223,786,” which was filed on September 9, 2005. *See* Ex. 1004, codes 21, 22.

Patent Owner asserts that Exhibit 1059 “is needlessly cumulative and should be excluded under Fed. R. Evid. 403.” PO Mot. Excl. 12.

For the reasons and case law identified above in the context of our analysis of Exhibits 1050–1057, we deny Patent Owner’s Motion to Exclude Exhibit 1059.

C. Exclusion Under Rule 703

Patent Owner asserts Dr. Shanfield’s opinions are inadmissible because they are “not based on sufficient facts or data.” PO Mot. Excl. 7 (citing Fed. R. Evid. 703). In providing his opinions on structural features in the claims, Patent Owner asserts that “Dr. Shanfield relies entirely on his non-expert speculation and guesswork to cover the gaps between the actual disclosures of Sung ’026 and SungICPT and the claims of the ’862 Patent.” *Id.* at 8. We disagree.

As Petitioner asserts in its opposition to the Motion to Exclude, “Dr. Shanfield cited multiple disclosures in both Sung ’026 and SungICPT and explained why these disclosures supported his opinion.” Pet Opp. Mot. Excl. 8. Petitioner cites examples of Dr. Shanfield’s reliance on, and reference to, specific disclosures in the Sung references to support his opinion testimony. *Id.* at 8–9. Patent Owner may disagree with Dr. Shanfield’s analysis of the facts and data on which he relies, but disagreement is not a basis for exclusion of evidence.

For the reasons and case law identified above in the context of our analysis of Exhibits 1050–1057, we deny Patent Owner’s Motion to Exclude Dr. Shanfield’s testimony under Rule 703 of the Federal Rules of Evidence.

IV. ASSERTED GROUNDS

A. Grounds 1A and 1B: Claims 1–6, 9–12, and 20 Anticipation or Obviousness Based on Sung '026

Petitioner asserts claims 1–6, 9–12, and 20 of the '862 patent are unpatentable as anticipated by Sung '026, or alternatively, that these claims would have been obvious in view of Sung '026. *See* Pet. 25–37.

This asserted Ground presents two separate and distinct grounds. We re-label them as Ground 1A, Anticipation, and Ground 1B, Obviousness.

Novelty under 35 U.S.C. § 102 and nonobviousness under 35 U.S.C. § 103 are separate conditions of patentability. *Cohesive Techs., Inc. v. Waters Corp.*, 543 F.3d 1351, 1363 (Fed. Cir. 2008). The tests for anticipation and obviousness are different. *Id.* at 1364. The elements of proof for anticipation and obviousness are different. *Duro-Last, Inc. v. Custom Seal, Inc.*, 321 F.3d 1098, 1107–08 (Fed. Cir.2003).

1. Summary of Sung '026

We make the following findings regarding Sung '026.

Sung '026 is a published US patent application titled “Methods of Bonding Superabrasive Particles in an Organic Matrix.” Ex. 1004, code (54). It is our understanding that the sole named inventor in Sung '026, Chien-Min Sung (*id.* at code (76)), is also the sole named inventor of the '862 patent (Ex. 1001, code (72)).

The Sung '026 disclosure, like the disclosure of the '826 patent, relates generally to tools having superabrasive particles embedded in an organic material matrix and associated methods. Ex. 1004, ¶ [0001]. Sung '026 discloses a method for improving retention of superabrasive particles held in a solidified organic material layer of an abrading tool, where a

portion of each of the superabrasive particles protrudes out of the solidified organic material layer. *Id.* at ¶ [0009]. Sung '026 teaches that “reverse casting methods may be utilized to manufacture the CMP pad dresser.” *Id.* at ¶ [0083]. Use of this same “reverse casting” method also is disclosed in the '862 patent. Ex. 1001, 17:8–15 (“so-called ‘reverse casting’ methods can be used to accurately orient and attach the dressing segments to the rigid support”).

Petitioner provides the following annotated figures from Sung '026. *See* Pet, 19.

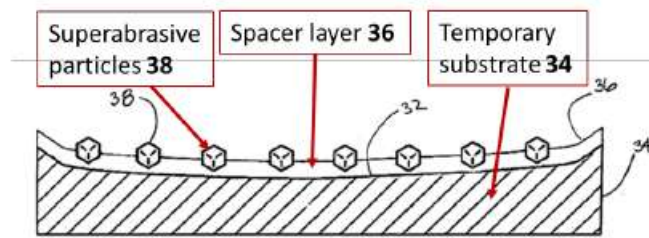


**Figure 2 from Sung '026
annotated by Petitioner.**

Figure 2 from Sung '026 “is a cross-sectional view of superabrasive particles disposed on a temporary substrate.” Ex. 1004 ¶ [0020]. As shown in Figure 2 and in Petitioner’s annotated Figure 2, spacer layer 36 may be applied to working surface 32 of temporary substrate 34. *Id.* at ¶ [0083]. Spacer layer 36 has superabrasive particles 38 “at least partially disposed therein, which protrude at least partially from the spacer layer 36” opposite working surface 32 of temporary substrate 34. *Id.* As further disclosed in Sung '026, any method of disposing superabrasive particles 38 into spacer layer 36 “such that the superabrasive particles protrude to a predetermined height may be utilized.” *Id.* Then, as shown in Figure 5, organic material layer 62 is applied on top of spacer layer 36 and cured to bond at least a

portion of each superabrasive particle 38, and permanent substrate 68 is added as well. *Id.* at ¶ [0083]. Temporary substrate 34 and spacer layer 36 are then removed, to leave behind a CMP pad dresser (i.e., permanent substrate 68, organic material layer 62, and superabrasive particles 38). *Id.* at Fig. 6, ¶¶ [0024], [0084].

In order to improve the retention of a superabrasive particle in an organic material layer, Sung '026 also discloses rearranging the superabrasive particles in the organic material layer such that mechanical stress impinging on any individual superabrasive particle is minimized. *Id.* at ¶¶ [0050], [0051].

Sung '026 also discloses that “unequal sizes of superabrasive particles” may be used. *Id.* at ¶ [0084]. Sung '026 further discloses that “while it is intended that the tips of the superabrasive particles align along the designated profile, some level of deviation may occur.” *Id.* at ¶ [0056].

Additionally, Sung '026 discloses 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. Ex. 1004 ¶ [0056]. Sung '026 then discloses numerous variations and embodiments of where the tips of the superabrasive particles vary among numerous specific ranges. *Id.*

For example, Sung '026 discloses “a majority of the plurality of superabrasive particles are arranged such that their tips vary from the designated profile by from about 1 micron to about 150 microns.” Ex. 1004 ¶ [0056]. Other disclosed configurations include tip variations from about 5 microns to about 100 microns; from about 10 microns to about 75 microns; from about 10 microns to about 50 microns; and several other variations of the range of variations for the tip height. *Id.*

Sung '026 also discloses a benefit of varying particle sizes. For example, variations in superabrasive particle size between different locations on the tool may help to more evenly distribute the frictional forces. *Id.* at ¶ [0057]. Additionally, Sung '026 discloses benefits and detriments of “variance in the protrusion of the plurality of superabrasive particles above the solidified organic material layer.” *E.g., see id.* at ¶ [0073].

2. Analysis of Independent Claim 1

Petitioner provides a clause-by-clause analysis of independent claim 1, asserting where Sung '026 discloses or suggests each step or limitation of independent claim 1. Petitioner cites throughout its analysis to both Sung '026 (Ex. 1004) and the Declaration testimony of Dr. Shanfield (Ex. 1002). *See* Pet. 25–37.

Patent Owner takes a different view. According to Patent Owner, “Petitioner has failed to establish that claim 1 is anticipated by Sung '026 because Sung '026 does not disclose ‘all of the limitations claimed . . . arranged or combined in the same way as recited in the claim.’” PO Resp. 15 (citing *Net MoneyIN*, 545 F.3d at 1371). Patent Owner states that this argument applies to each of claim limitations “[1A], [1C], and [1D].” *Id.*

We address the parties’ competing contentions on a limitation-by-limitation analysis of Independent Claim 1. We also note, however, that Patent Owner states that dependent claims 2–6, 9–12, and 20 are “likewise not anticipated by Sung '026 at least because they all depend from claim 1, which is not anticipated.” *Id.*, fn 4.

(i) [1Pre] — “A method of conditioning a CMP pad, comprising”

Petitioner argues that, assuming the claim preamble [1Pre] is limiting, Sung ’026 discloses “superabrasive tools and methods that are, without limitation, suitable to groom the CMP pads used for the delicate polishing applications.” Pet. 25–26 (citing Ex. 1004, ¶ [0009]). Petitioner asserts that Sung ’026 “teaches that . . . CMP pad dressers or conditioners, are used to revive the CMP pad surface.” *Id.* (citing Ex. 1004, ¶ [0004] (“A CMP pad dresser can be used to revive the pad surface by ‘combing’ or ‘cutting’ it. This process is known as ‘dressing’ or ‘conditioning’ the CMP pad.”)); Ex. 1002, ¶¶ 85–86.

Patent Owner does not specifically address the preamble.

It is beyond reasonable dispute that Sung ’026 discloses a method of conditioning a CMP pad. Indeed, Patent Owner does not take specific issue with the preamble clause.

Accordingly, based on a preponderance of the evidence before us, we determine that Sung ’026 discloses the elements and limitations, if any, of the preamble of claim 1.

(ii) [1A] — “*pressing a CMP pad dresser against a CMP pad*”

Petitioner asserts Sung ’026 discloses “superabrasive tools and methods that are, without limitation, suitable to groom the CMP pads used for the delicate polishing applications.” Pet. 26 (citing Ex. 1004 ¶ [0009]). As disclosed in Sung ’026, these tools are used to “abrade a work piece.” *Id.* at 27 (emphasis omitted) (citing Ex. 1004 ¶ [0051]). Petitioner also relies on the Declaration testimony of Dr. Shanfield. *Id.* at 28 (citing Ex. 1002 ¶¶ 90–91).

Dr. Shanfield testifies that the CMP pad dresser in Sung '026 “is used to condition the CMP pad.” Ex. 1002 ¶ 90 (citing Ex. 1004 ¶ [0004] (“A CMP pad dresser can be used to revive the pad surface by ‘combing’ or ‘cutting’ it. This process is known as ‘dressing’ or ‘conditioning’ the CMP pad.”). Dr. Shanfield further testifies that “[t]his conditioning process includes physical contact between the CMP pad dresser and the CMP pad.” *Id.* Dr. Shanfield concludes and opines that because “frictional forces on the CMP pad dresser described by Sung '026 can only be the result of the CMP pad being pressed against another object (e.g., a CMP pad dresser), Sung '026 discloses pressing a CMP pad dresser against a CMP pad.” Ex. 1002 ¶¶ 90, 91.

Patent Owner asserts that “Sung '026 fail[s] to disclose the precise scenario that Claim Limitation [1A] recites,” which is pressing a CMP pad dresser against a CMP pad. PO Resp. 16. Patent Owner also contends that this clause in claim 1 “specifically excludes scenarios in which the contact is maintained by applying pressure to the CMP pad alone.” *Id.* at 18 (citing Ex. 2011 ¶ 50). The named inventor of the '862 patent, Mr. Sung, also is the named inventor of the Sung '026 reference. Patent Owner’s argument is that Sung '026 is “ambiguous” as to how contact is retained between the dresser and pad in Sung '026. Sur-reply 8. Patent Owner concludes that there is no clear disclosure that the dresser in Sung '026 is pressed against the pad. We disagree.

It is beyond reasonable dispute that Sung '026 discloses CMP pad dressers including methods for their use and manufacture. *E.g., see* Ex. 1004 ¶ [0050]. Sung '026 also discloses a plurality of superabrasive particles “configured to uniformly distribute frictional forces across

substantially each superabrasive particle.” *Id.* at ¶ [0051]. This frictional force is considered a “mechanical force.” *Id.* at [0043]. Sung ’026 also refers to a “designated profile” for the superabrasive particles in a CMP pad dresser, and notes that a sloped profile may provide a “greater downward force.” *Id.* at [0054]. This “greater downward force” supports Dr. Shanfield’s testimony that Sung ’026 “discloses pressing a CMP pad dresser against a CMP pad.” Ex. 1002 ¶¶ 90, 91.

Moreover, Dr. Tsai, Patent Owner’s expert witness, agrees with Dr. Shanfield’s analysis. When asked whether a “load” was required “to polish a sanding pad using a dresser,” Dr. Tsai testified at his deposition that “[t]here are several ways to do it. Of course, the *frequently used way* is to use a load. But then, again, the second way is to use its own weight to press down.” Ex. 1049, 70:8–14 (emphasis added).²⁰ Dr. Tsai further amplified his response and stated:

The first way is that if you add a load or a weight *and press it down*, and to allow these two objects to rotate to each other, then it will also reach the outcome of dressing. And second way is to use its own weight, and that takes a holder to hold it. There’s another force to push this holder so that it can do the dressing.

Id. at 71:1–7.

When asked if you were to rest a CMP dresser on the CMP pad *without pressing* against each other, “can you still perform CMP polishing,” Dr. Tsai, Patent Owner’s expert witness, replied “I’m not quite sure because I have not done such an experiment.” *Id.* at 71:8–12. Thus, Dr. Tsai acknowledges that the only known and commonly used procedure of which

²⁰ We note that this line of questions was asked by counsel for Patent Owner, Mr. Chan, not counsel for Petitioner.

he is aware for using a CMP pad dresser for conditioning a CMP pad is pressing a CMP pad dresser against a CMP pad. Thus, Dr. Tsai does not dispute or otherwise challenge Dr. Shanfield's testimony discussed above that "Sung '026 discloses pressing a CMP pad dresser against a CMP pad." See Ex. 1002 ¶¶ 90, 91.

(iii) [1B] — *"the dresser including a monolayer of a plurality of superabrasive particles protruding from a matrix layer"*

Petitioner asserts Sung '026 discloses CMP pad dressers having a single layer of superabrasive particles, which meets the claimed "monolayer of a plurality of superabrasive particles." Pet. 28 (citing Ex. 1004 ¶ [0074] ("One example of a tool incorporating a single layer of superabrasive particles in an organic material matrix is a CMP pad dresser.")).

Figure 1 from Sung '026 is reproduced below.

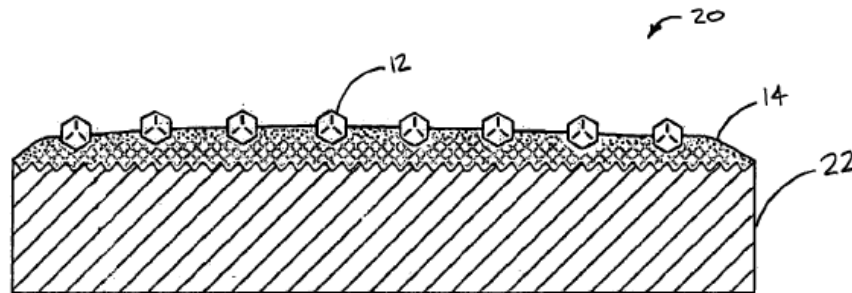


Figure 1 from Sung '026 is a cross-sectional view of a CMP pad dresser made in accordance with one embodiment of the disclosed invention.

As shown in Figure 1, CMP pad dresser 20 may include an organic material layer 14 and superabrasive particles 12 held in organic material layer 14. Ex. 1004 ¶ [0075].

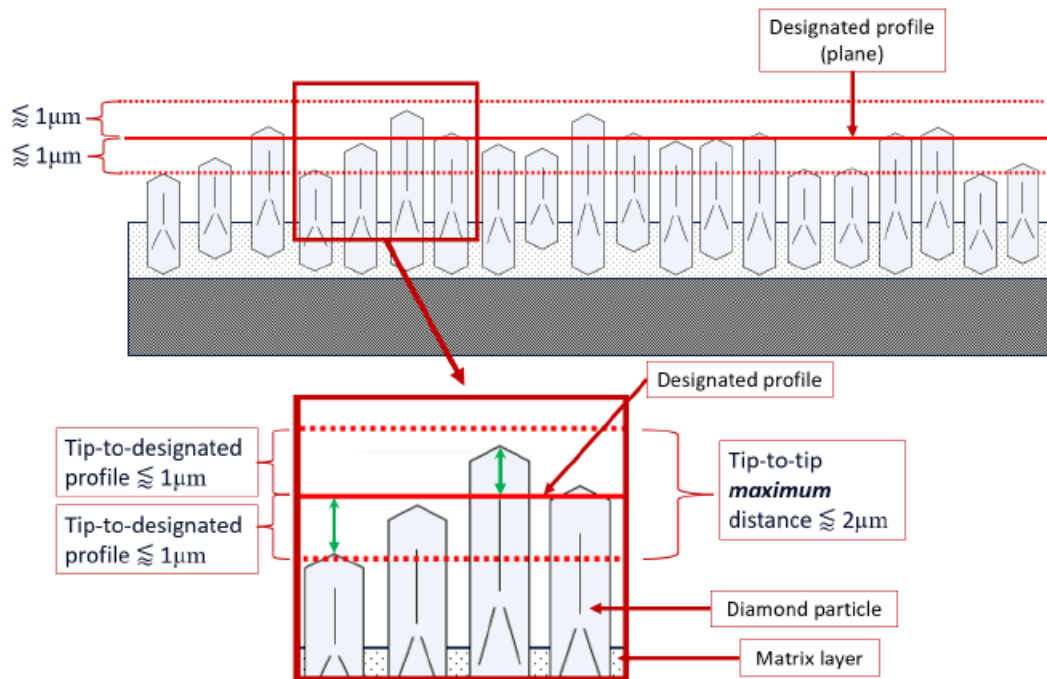
Patent Owner does not address this clause in its Response.

We find Figure 1 of Sung '026 demonstrates that pad dresser 20 including a monolayer of a plurality of superabrasive particles 12 protruding from a matrix layer, as recited in claim 1.

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

Petitioner asserts that Sung '026 discloses that “**each** of the plurality of superabrasive particles protrudes to a predetermined height above the solidified organic material layer.” Pet. 30 (citing Ex. 1004 ¶ [0073]; *id.* at claim 31). Petitioner also asserts that Sung '026 discloses that the particles protrude “along a designated profile,” where “the designated profile is a plane.” *Id.* (citing Ex. 1004, claims 36 and 37; ¶ [0053]).

Petitioner provides the following schematic drawings to illustrate the disclosure of Sung '026. Pet. 31; *see also* Ex. 1002 ¶ 100 (Dr. Shanfield stating “I have provided a schematic that illustrates this further.”).



**Petitioner's schematic annotated drawing
of the planar designated profile above a matrix layer.**

Dr. Shanfield testifies that “[t]he diamond particles all protrude to a predetermined height as measured from the designated profile.” Ex. 1002

¶ 100. As Dr. Shanfield further explains,

I show that the diamond particles do not all protrude to the same height. Sung’026 teaches that in instances where the designated profile is a plane, it is intended that “the highest protruding points of the superabrasive particles are ... level”). EX1004, [0053]. Nevertheless, Sung’026 admits that some height deviation may occur due to limitations inherent in the manufacturing process. EX1004, [0053].

Ex. 1002 ¶ 101.

Additionally, Dr. Shanfield testifies “Sung’026 provides further details about the deviation from the designated profile.” *Id.* at ¶ 102.

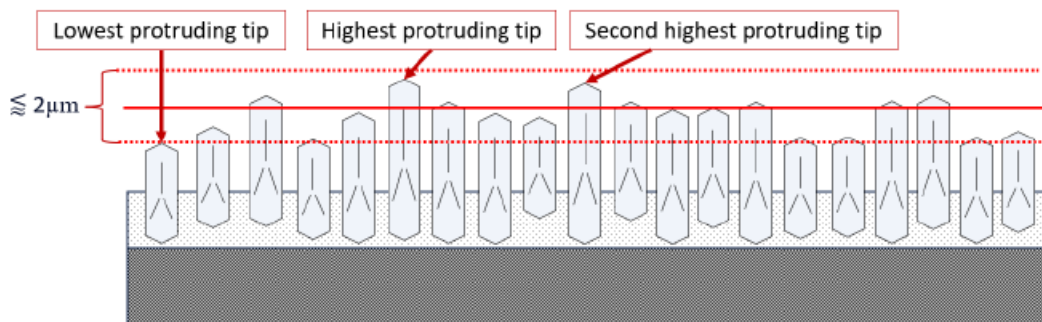
According to Dr. Shanfield, Sung ’026 “provides an embodiment where ‘*the plurality of superabrasive particles is arranged such that their tips vary*

from the designated profile by less than about 1 microns.” Ex. 1002 ¶ 102 (citing Ex. 1004 ¶¶ [0056], [0073]). Dr. Shanfield testifies that in the maximum tip-to-tip variation of about 1 micron below or within less than about 1 micron above the designated profile, “a maximum tip-to-tip variation (i.e., the difference in protrusion distance between the highest protruding tip and the lowest protruding tip) [is] less than about 2 microns.” *Id.* at ¶ 103.

Dr. Shanfield concludes:

because the maximum tip-to-tip variation between all tips is within 2 microns, the difference in protrusion distance between the highest protruding tip and the second highest protruding tip of the monolayer of superabrasive particles must also be less than about 2 microns, which is within the claimed “less than or equal to about 10 microns.”

Id. at ¶ 104. Dr. Shanfield illustrates this conclusion in the figure below.

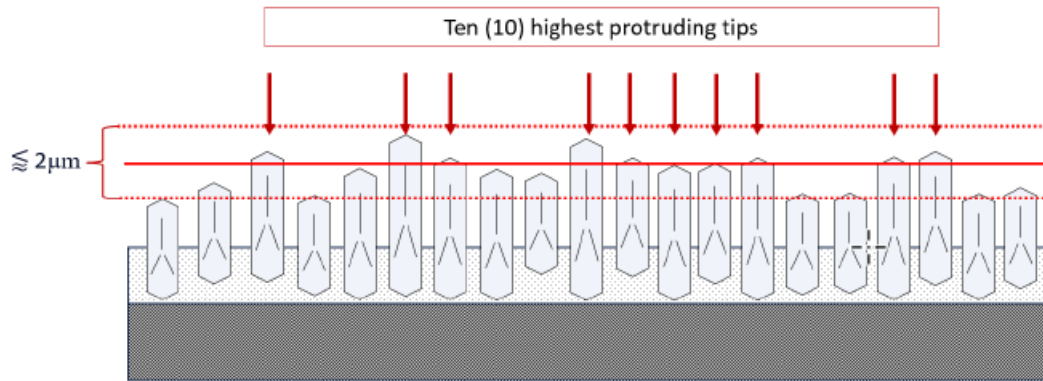


Dr. Shanfield’s illustration of maximum tip-to-tip variation in Sung ’026. Ex. 1002 ¶ 104.

Dr. Shanfield also concludes that because

the maximum tip-to-tip variation for all superabrasive diamond particles is less than about 2 microns, the difference in protrusion distance between the highest 10 protruding tips of the monolayer of superabrasive particles must also be less than about 2 microns. This is within the claimed “about 20 microns or less.”

Id. at ¶ 105. Dr. Shanfield also illustrates this conclusion in the figure below.



Dr. Shanfield’s illustration of maximum tip-to-tip variation in Sung ’026. Ex. 1002 ¶ 105.

Dr. Shanfield also testifies that if not disclosed to anticipate the ’862 patent, it would have been obvious to a person of ordinary skill to modify Sung ’026 to precisely level the particle tips as claimed. The motivation to do this modification, and the reason why a person of ordinary skill would have done this modification is because Sung ’026 recognizes that “the particle tip height must be precisely leveled in order to uniformly dress the pad.” Ex. 1002 ¶ 107 (citing Ex. 1004 ¶ [0006]). Sung ’026 also discloses that the “traditional” pad dressers with particle tip height variations of more than 50 μm are unsuitable for applications where the asperity depth of 20 μm or less is desired. *Id.* (citing Ex. 1004 ¶ [0006]).

In its Reply, Petitioner also asserts a reference can anticipate a claim even if it does not “expressly spell out” all the limitations arranged or combined as in the claim, if a person of skill in the art, reading the reference, would “at once envisage” the claimed arrangement or combination.

Pet. Reply 8 (citing *Kennametal, Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376, 1381 (Fed. Cir. 2015)).

Patent Owner disagrees with Petitioner’s analysis. PO Resp. 20–23. According to Patent Owner, Petitioner’s argument is that “several distinct portions of Sung ’026 purportedly, ***when viewed together***, disclose an embodiment that satisfies the recitation of Claim Limitation [1C].” *Id.* at 20. Patent Owner asserts, however, that “these individual embodiments of Sung ’026—which it describes in separate portions of the reference as discrete ‘aspects’ of the invention of Sung ’026—*cannot not be used collectively to satisfy the anticipation standard.*” *Id.* (citing *Net MoneyIN*, 545 F.3d at 1371). Simply put, it is Patent Owner’s position that because Sung ’026 fails to disclose these various aspects in a single embodiment as Claim Limitation [1C] recites, Sung ’026 cannot anticipate claim 1.

It is Petitioner’s position that Dr. Tsai’s deposition testimony supports Petitioner’s assertions that Sung ’026 anticipates independent claim 1 because the various alleged “individual embodiments” are part of a unified whole that overcome the circumstances discussed in *Net MoneyIN*.

In his deposition testimony, Dr. Tsai testifies that the Sung ’026 patent application publication “intends to make a diamond disk that has all the protrusion[s] with identical heights and with the same orientation.” Ex. 1049, 50:2–4. Dr. Tsai also testified that “[i]n addition, [Sung ’026] also intends to control the depths of penetrating into the pad. For example, if I want to penetrate 10 micron into the pad, then the protrusion height should be at least 10 micron.” *Id.* at 50:10–13. So, contrary to Dr. Tsai’s *Declaration* testimony in Ex. 2011 ¶ 69, Dr. Tsai clarifies in his *deposition* testimony that Sung ’026 intends to combine three distinct aspects or embodiments. He testifies that “first one is that you need to have the same orientation, same shape so you can have the consistency; and No. 2, you

would like to have the same height; and No. 3, you would like to control the penetration depths.” Ex. 1049, 51:2–6. Dr. Tsai was then asked “[s]o Sung ’026 is trying to combine all three of those together, correct?” *Id.* at 51:9–10. His answer was “[t]hat’s correct, because if you can have a very good control of those, then -- and that time period back then, then you can make a very perfect diamond disk.” *Id.* at 51:11–13.

Based on the evidence as discussed above, we determine that Sung ’026 discloses the elements and limitations in clause 1[C]. In particular, we credit Dr. Shanfield’s testimony (as summarized above) over Dr. Tsai’s declaration testimony, because Dr. Tsai’s deposition testimony essentially agreed with Dr. Shanfield that Sung ’026 discloses all the aspects recited in claim 1 together in a single embodiment.

Regarding Petitioner’s alternative Ground 1B, asserting that claim 1 would have been obvious based on Sung ’026, Petitioner asserts that “[t]o the extent Patent Owner asserts that Sung’026 does not explicitly disclose limitation [1C], a POSITA would have found it obvious to control the difference in protrusion distances in the manner claimed in limitation [1C] in light of the teachings of Sung’026.” Pet. 34. Petitioner also asserts a person of ordinary skill “would have found it obvious to try to obtain a leveled diamond particles that control the difference in protrusion distance between the highest set of protruding tips, including the highest, second highest, and the highest 10 protruding tips to be within the claimed range.” *Id.* Petitioner also asserts a person of ordinary skill “would have been motivated to achieve tip height variations that are small to improve performance in the manner taught by Sung’026, such as by using a ‘reverse casting’ process.” *Id.* at 35 (citing Ex. 1002 ¶¶ 107–108). Patent Owner takes a different view.

Patent Owner asserts that Petitioner, having “declined to advance obviousness arguments for any limitation besides Claim Limitation [1C], . . . cannot argue that any of these other limitations would have been obvious to a POSITA in view of the disclosure of Sung ’026.” PO Resp. 45. Patent Owner also asserts that “Petitioners have failed to explain how the other limitations are obvious.” *Id.* However, we conclude that Petitioner need not explain the obviousness of claim limitations that are fully disclosed in a cited reference. Further, Sung ’026 fully discloses limitation [1C] as discussed above in this Section of our Decision, and also fully discloses the other limitations of claim 1 as discussed in other Sections of our Decision.

On balance, in weighing the evidence, we determine that a preponderance of the evidence supports Petitioner’s alternative ground 1B that claim 1 would have been obvious based on Sung ’026. In particular, Patent Owner does not dispute Petitioner’s particular obviousness contentions in relation to the subject matter recited in limitation [1C] within the context of the claimed invention as a whole. *See* PO Resp. 44–46.

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

Petitioner asserts Sung ’026 discloses that “pad dressers . . . cut asperities in the pad.” Pet. 36 (citing Ex. 1004, ¶¶ [0005], [0004], [0006]). More specifically, Petitioner asserts Sung ’026 explains that “**each** of the plurality of superabrasive particles may protrude to a predetermined height above the solidified organic material layer . . . [and] the predetermined height may produce a cutting depth of from about 10 micron[s] to about 20 microns when used to abrade a work piece.” *Id.* (citing Ex. 1004 ¶¶ [0010], [0052]).

Patent Owner's does not oppose these contentions. We find that the disclosed cutting depth in Sung '026 of about 10–20 microns meets the limitation stated in clause 1[D] in that it is less than 60 microns.

(vi) *Conclusion as to Claim 1*

Based on the evidence discussed above, we conclude a preponderance of the evidence supports Petitioner's argument that claim 1 is anticipated by Sung '026, or, in the alternative, claim 1 would have been obvious based on Sung '026.

3. *Dependent Claims 2–6, 9–12, 20*

Petitioner provides arguments and evidence in support of asserting dependent claims 2–6, 9–12, and 20, dependent, directly or indirectly, from claim 1, are unpatentable as anticipated by Sung '026 (Ground 1A), or alternatively, would have been obvious over Sung '026 (Ground 1B). *See* Pet. 37–50 (citing Ex. 1002 for evidentiary support).

Regarding Ground 1A (anticipation), Patent Owner asserts that “Petitioners have failed to show that Sung '026 discloses any of Claim Limitations [1A], [1C], or [1D], let alone all of them. And as discussed above, this deficiency is fatal to Petitioners' arguments regarding Ground 1A, contending that dependent claims 2–6, 9–12, and 20 are similarly invalid.” PO Resp. 46.

Regarding Ground 1B (obviousness), Patent Owner asserts that “Petitioners have failed to argue that these dependent claims would have been obvious in view of the disclosure of Sung '026. For these dependent claims, all Petitioners have done is have shown that Sung '026 also includes the additional limitations recited therein.” *Id.*

We recognize that in determining the differences between the prior art and the claims, the question under 35 U.S.C. § 103 is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Litton Indus.*, 755 F.2d at 164. Here, as Patent Owner correctly states, Petitioner relies on Sung '026 for the disclosure of the elements in the dependent claims. There is no modification of these elements from Sung '026 required. Petitioner's asserted rationale as to why the asserted modifications of elements and limitations in independent claim 1 would have been obvious is all that is required to meet Petitioner's burden to prove that dependent claims 2–6, 9–12, and 20 also are unpatentable.

***B. Grounds 2–6
Obviousness of Claims 5–10 and 13–19***

Grounds 2–6 assert that dependent claims 5–10 and 13–19 would have been obvious based on Sung '026 combined with an additional reference. Each of these dependent claims depends, directly or indirectly, from independent claim 1, and thus includes all of the elements and limitations of claim 1, which we have determined is not patentable based on Sung '026. The added limitations in the dependent claims do not cure the basis of unpatentability in claim 1. The secondary references in each of Grounds 2–6 do not address or rehabilitate the basis for unpatentability of claim 1 based on Sung '026. Thus, we determine that each of dependent claims 5–10 and 13–19 also are not patentable based on the unpatentability of claim 1. We adopt Petitioner's arguments for obviousness, which are not opposed by Patent Owner, as our own in this Decision. *See* Pet. 50–72.

V. CONCLUSION²¹

Based on a preponderance of the evidence and the analysis above, we determine claims 1–20 are not patentable.

VI. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1–20 of the '862 patent have been proven by a preponderance of the evidence to be unpatentable; and

FURTHER ORDERED that, because this is a final written decision, 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.

²¹ 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).

VII. SUMMARY TABLE

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not shown Unpatentable
1–6, 9– 12, 20	102	Sung '026	1–6, 9–12, 20	
1–6, 9– 12, 20	103	Sung '026	1–6, 9–12, 20	
5–10		Sung '026, Sung ICPT	5–10	
13, 17–19	103	Sung '026, Nishioka	13, 17–19	
14	103	Sung '026, Lin	14	
15	103	Sung '026, Kim	15	
16	103	Sung '026, Koyama	16	
Overall Outcome			1–20	

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