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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

II-VI Incorporated,
Petitioner.

v.

Saint-Gobain Ceramics & Plastics, Inc.,
Patent Owner.

CASE IPR2018-01022
U.S. PATENT NO: RE43,469

PETITIONER'S NOTICE OF APPEAL

Pursuant to 35 U.S.C. § 142 and 37 C.F.R. 90.2(a), Petitioner, II-VI Incorporated ("Petitioner"), hereby gives notice of its appeal under 35 U.S.C. § 141(c) to the United States Court of Appeals for the Federal Circuit from the Final Written Decision (Paper No. 45)[1] issued by the Patent Trial and Appeal Board ("the Board") on November 14, 2019 of the above-captioned proceeding, and from all other orders, decisions, rulings, opinions and/or issues underlying or related to the Final Written Decision.

In accordance with 37 C.F.R. § 90.2(a)(3)(ii), the expected issues on appeal include, but are not limited to, the Board's decision that Petitioner did not show by a preponderance of the evidence that claims 24 and 44 of U.S. Patent Re43,469 E are unpatentable as obvious under 35 U.S.C. § 103(a) and any finding or determination supporting or relating to that issue, as well as all other issues decided adversely to Petitioner or not considered in any orders, decisions, rulings, or opinions.

This Notice of Appeal is being filed simultaneously with the Director of the United States Patent and Trademark Office, the Board, and the Clerk's Office for the United States Court of Appeals for the Federal Circuit.

[1] Exhibit A.

Respectfully submitted,

THE WEBB LAW FIRM

Dated: January 15, 2020

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CERTIFICATE OF SERVICE AND FILING

I hereby certify that, pursuant to 37 C.F.R. §§ 90.2(a)(1), on the 15th of January, 2020, I electronically filed the foregoing **PETITIONER'S NOTICE OF APPEAL** with the PTAB E2E, in accordance with 37 C.F.R. § 42.6(b)(1), and mailed to the Director of the United States Patent and Trademark Office via FedEx Express in accordance with 37 C.F.R. §§ 1.10 and 104.2(a) at the following address:

Director of the U.S. Patent and Trademark Office
c/o Office of the General Counsel
U.S. Patent and Trademark Office
Madison Building East, Room 10B20
600 Dulany Street
Alexandria, VA 22313

I also hereby certify that on the 15th day of January, 2020, a true and correct copy of the foregoing **PETITIONER'S NOTICE OF APPEAL** and the filing fee, were filed with the Clerk's Office of the U.S. Court of Appeals for the Federal Circuit, via CM/ECF.

I hereby certify that on the 15th day of January, 2020, I served the foregoing **PETITIONER'S NOTICE OF APPEAL** on opposing counsel, via email, to the following:

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EXHIBIT A

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Paper No. 45
Entered: November 14, 2019

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

II-VI INCORPORATED,
Petitioner,

v.

SAINT-GOBAIN CERAMICS & PLASTICS, INC.,
Patent Owner.

IPR2018-01022
Patent RE43,469 E

Before DAVID C. McKONE, KRISTINA M. KALAN, and WESLEY B. DERRICK, *Administrative Patent Judges*.

KALAN, *Administrative Patent Judge.*

JUDGMENT
Final Written Decision
Determining Some Challenged Claims Unpatentable
35 U.S.C. § 318(a)

Granting Petitioner's and Patent Owner's Motions to Seal
37 C.F.R. § 42.54

I. INTRODUCTION

II-VI Incorporated ("Petitioner") filed a Petition (Paper 1, "Pet.") seeking *inter partes* review of claims 1, 2, 4–9, 11–14, and 16–44 of U.S. Patent No. RE43,469 E (Ex. 1001, "the '469 patent"). Saint-Gobain Ceramics & Plastics, Inc. ("Patent Owner") filed a Preliminary Response. Paper 10 ("Prelim. Resp."). We instituted an *inter partes* review of claims 1, 2, 4–9, 11–14, and 16–44 of the '469 patent on all grounds of unpatentability alleged in the Petition. Paper 15 ("Institution Decision" or "Dec."). After institution of trial, Patent Owner filed a Patent Owner Response. Paper 33 ("PO Resp."); Paper 32 (Redacted Public Version of Patent Owner Response). Petitioner filed a Reply. Paper 41 ("Reply"); Paper 40 (Redacted Public Version of Petitioner's Reply). No oral hearing was held in this case.

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). For the reasons that follow, we determine that Petitioner has established by a preponderance of the evidence that claims 1, 2, 4–9, 11–14, 16–23, and 25–43 of the '469 patent are unpatentable.

A. Related Proceedings

The parties represent that the '469 patent was at issue in *Saint-Gobain Ceramics & Plastics, Inc. v. II-VI Inc.*, Case No. 5:18-cv-01798-CAS-SHK (C.D. Cal.). Paper 12, 1; Paper 13, 1. On March 26, 2019, Defendant's Motion for Summary Judgment was granted in that case, and the grant of summary judgment is being appealed. Paper 38, 1; Paper 39, 1.

B. The ’469 Patent

The ’469 patent, titled “Single Crystals and Methods for Fabricating Same” discusses single crystals, including sapphire, that have desirable geometric properties, and methods and apparatus for making the same. Ex. 1001, at code (54), code (57). The claims of the ’469 patent, however, are all directed to a “sapphire single crystal,” rather than methods for fabricating the same. *Id*. at 9:40–12:19. According to the ’469 patent, the industry demands “large-sized single crystal sheets that can be produced in a cost-effective manner.” *Id*. at 1:47–49. In one aspect of the invention, a sapphire single crystal is in the form of a sheet having a length>width>thickness, the width being not less than 15 centimeters and the thickness being not less than about 0.5 centimeters; in another aspect, the sapphire single crystal is in the form of a sheet having a length>width>thickness, the width being not less than 15 centimeters and a variation in thickness of not greater than 0.2 centimeters. *Id*. at 1:56–65. In another aspect of the invention, the single crystal has a main body and a neck, where the transition of the neck to the main body is defined by respective ends or transition points of the first and second opposite lateral sides. *Id*. at 1:66–2:9. Figure 6 of the ’469 patent is reproduced below:

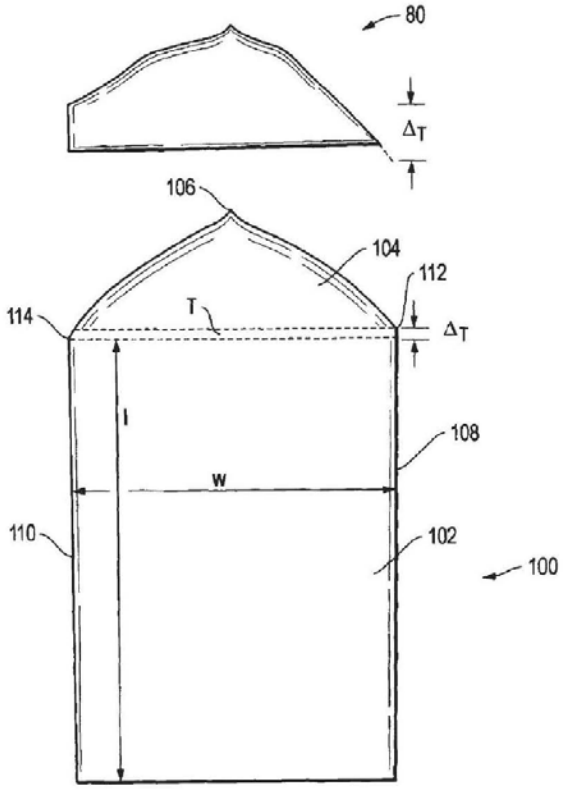

FIG. 6

Figure 6 shows two as-grown sapphire crystals, including transition zone T, and the difference in heights between transition points of opposite lateral sides of 108 and 110 (Δ_T) of main body 102. *Id.* at 2:48, 6:9–18.

C. Illustrative Claim

The '469 patent, as reissued, includes 44 claims. Claim 1 is illustrative of the challenged claims and is reproduced below:[1]

> 1. A sapphire single crystal, comprising:
> a single crystal sheet having a length, width and thickness,
> wherein length >width>thickness, the width is not less

[1] In Exhibit 1001, matter enclosed in heavy brackets **[ ]** appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue. Ex. 1001, 1:5–8. We reproduce claim 1 here as set forth in the reissued patent.

> than **[**about 15**]** *28* cm, and the thickness is not less than about 0.5 cm.

Ex. 1001, 9:41–45.

D. Instituted Grounds of Unpatentability

We instituted *inter partes* review of claims 1, 2, 4–9, 11–14, and 16–44 of the '469 patent on the following grounds. Dec. 3, 25.

Ground	Reference(s)	35 U.S.C. §	Claims Challenged
1	Patel[2]	§ 102(b)	1, 2, 4, 25–27, 33–38
2	Patel, Locher,[3] LaBelle '636[4]	§ 103(a)	1, 2, 4, 5, 25–28, 33–39
3	Patel, LaBelle '348,[5] LaBelle '636	§ 103(a)	6–9, 29–32, 40–43
4	Saint-Gobain,[6] Locher, LaBelle '636, Kyocera,[7] Window and Dome,[8]	§ 103(a)	1, 2, 4, 5, 25–28, 33–39, 44

[2] Patel, Parimal J., *Transparent Armor*, AMPTIAC, THE AMPTIAC NEWSLETTER, VOL. 4 NO. 3 (Fall 2000) (Ex. 1015, "Patel").
[3] Locher, John W., *Large Diameter Sapphire Window from Single Crystal Sheets*, PROCEEDINGS OF THE 5TH DOD ELECTROMAGNETIC WINDOW SYMPOSIUM 8 (Oct. 1993) (Ex. 1006, "Locher").
[4] U.S. Patent No. 3,701,636, issued October 31, 1972 (Ex. 1014, "LaBelle '636").
[5] U.S. Patent No. 3,591,348, issued July 6, 1971 (Ex. 1016, "LaBelle '348").
[6] Saint-Gobain Semiconductor, *Properties and Benefits of Sapphire: A Quick Reference Guide*, available at http://web.archive.org/web/20030315075922/http://www.saphikon.com/qrg.pdf (Ex. 1010, "Saint-Gobain" or "QRG").
[7] Kyocera, *Industrial Ceramic Products: Products and Markets*, available at https://web.archive.org/web/20010618161723/http://www.kyocera.com:80/KICC/industrial/products/crystal.htm (Ex. 1017, "Kyocera").
[8] Locher, John W., *The production of 225 x 325 mm sapphire windows for IR (1–5 μm) applications*, WINDOW AND DOME TECHNOLOGIES VIII,

Ground	Reference(s)	35 U.S.C. §	Claims Challenged
	Journal of Crystal Growth[9]		
5	Harris,[10] LaBelle '636, Chalmers[11]	§ 103(a)	11–14, 16, 21–24
6	Harris, LaBelle '636, Chalmers, LaBelle '348	§ 103(a)	17–20

Petitioner relies on the Declarations of Dr. Frank J. Bruni. Ex. 1002; Ex. 1024. Patent Owner relies on the Declaration of Dr. Jeffrey J. Derby. Ex. 2009 (Public and Confidential versions).

II. ANALYSIS

A. Legal Standards

To anticipate a claim under 35 U.S.C. § 102, "a single prior art reference must expressly or inherently disclose each claim limitation." *Finisar Corp. v. DirecTV Grp., Inc.*, 523 F.3d 1323, 1334 (Fed. Cir. 2008). Accordingly, "the dispositive question regarding anticipation [i]s whether one skilled in the art would reasonably understand or infer from the [prior art reference's] teaching" that every claim element was disclosed in that single

PROCEEDINGS OF SPIE, VOL. 5078, 40–46 (2003) (Ex. 1020, "Window and Dome").

[9] LaBelle Jr., H.E., *EFG, the Invention and Application to Sapphire Growth*, JOURNAL OF CRYSTAL GROWTH 50 (1980) 8–17, North-Holland Publishing Company (Ex. 1021, "Journal of Crystal Growth").

[10] Harris, Daniel C., *Materials for Infrared Windows and Domes: Properties and Performance*, SPIE-THE INTERNATIONAL SOCIETY FOR OPTICAL ENGINEERING 176 (1999) (Ex. 1018, "Harris").

[11] Chalmers, Bruce, *Growth of Controlled Profile Crystals From the Melt: Part III – Theory*, MAT. RES. BULL. 6 (1971) 681–690, Pergamon Press, Inc. (Ex. 1019, "Chalmers").

reference. *Dayco Prods., Inc. v. Total Containment, Inc.*, 329 F.3d 1358, 1368 (Fed. Cir. 2003).

A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious to a person of ordinary skill in the art at the time the invention was made. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). Obviousness is resolved based on underlying factual determinations, including: (1) the scope and content of the prior art; (2) differences between the prior art and the claims at issue; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness, i.e., secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). Secondary considerations may include the following: "commercial success, long-felt but unmet needs, failure of others, etc." *Id.* The totality of the evidence submitted may show that the challenged claims would not have been obvious to one of ordinary skill in the art. *In re Piasecki*, 745 F.2d 1468, 1471–72 (Fed. Cir. 1984).

Petitioner bears the burden of proving unpatentability of the challenged claims, and the burden of persuasion never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). Petitioner must demonstrate unpatentability by a preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d); *see also 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")). A party that petitions the Board for a determination of obviousness must show that "a skilled artisan would have

been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so." *Procter & Gamble Co. v. Teva Pharm. USA, Inc.*, 566 F.3d 989, 994 (Fed. Cir. 2009) (quoting *Pfizer, Inc. v. Apotex, Inc.*, 408 F.3d 1348, 1361 (Fed. Cir. 2007)).

B. Level of Ordinary Skill in the Art

Petitioner contends that a person of ordinary skill in the art "would be an individual with at least a Bachelor's degree in physics, engineering, or material science and five or more years of experience in the growth of any type of crystal from a melt by any method, including, without limitation, EFG growth." Pet. 21–22 (citing Ex. 1002 ¶ 43). Patent Owner contends that a person of ordinary skill in the art

> is an individual with at least a Bachelor's degree in the scientific disciplines of physics, chemistry, geology, or mineralogy, or in the engineering disciplines, particularly material science and engineering, mechanical engineering, chemical engineering, or electrical engineering, who has five or more years of experience in the growth of any type of crystal from a melt by any method, including, without limitation, EFG growth.

PO Resp. 17.

For the purposes of our Institution Decision, we determined that a person of ordinary skill in the art would be an individual with at least a Bachelor's degree in physics, engineering, or material science and five or more years of experience in the growth of crystals from a melt by methods including EFG growth. Dec. 7 (citing Ex. 1002 ¶ 43).

Neither party argues that the outcome of this case would differ based on our adoption of any particular definition of one of ordinary skill in the art. In light of the record now before us, and consistent with the Institution

Decision, we find again, as in the Institution Decision, that a person of ordinary skill in the art would be an individual with at least a Bachelor's degree in physics, engineering, or material science and five or more years of experience in the growth of crystals from a melt by methods including EFG growth. Ex. 1002 ¶ 43. The level of ordinary skill in the art is also reflected by the references themselves. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) ("[T]he absence of specific findings on the level of skill in the art does not give rise to reversible error 'where the prior art itself reflects an appropriate level and a need for testimony is not shown.'"); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (finding that the Board of Patent Appeals and Interferences did not err in concluding that the level of ordinary skill in the art was best determined by the references of record).

C. Claim Construction

In an *inter partes* review in which the petition was filed on or before November 13, 2018, claim terms in an unexpired patent are given their broadest reasonable interpretation in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b) (2017); *see Cuozzo Speed Tech., LLC v. Lee*, 136 S. Ct. 2131, 2142–46 (2016) (upholding application of the broadest reasonable interpretation standard in an *inter partes* review).[12]

[12] The revised claim construction standard for interpreting claims in *inter partes* review proceedings, which requires that we interpret claims in the same manner used in a civil action under 35 U.S.C. § 282(b), does not apply here, because the Petition was filed before the effective date of the new Rule, November 13, 2018. *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340, 51,344 (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 that standard, we generally give claim terms their ordinary and customary meaning as would have been understood by a person of ordinary skill in the art in the context of the entire patent disclosure. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

Petitioner proposes that the broadest reasonable construction "in light of the specification for all claim terms in the '469 patent is their plain and ordinary meaning in the context to which the '469 patent pertains (*i.e.*, sapphire crystal growth)." Pet. 21. Patent Owner agrees that "the broadest reasonable construction in light of the specification for all claim terms in the '469 patent" is the "plain and ordinary meaning to a person of ordinary skill in the art." PO Resp. 18. On the full record now before us, we determine it is not necessary to construe any claim term expressly to resolve the parties' dispute. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) ("only those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy"); *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (applying *Vivid Techs.* in the context of an *inter partes* review).

D. Asserted Anticipation by Patel (Ground 1)

Petitioner argues that claims 1, 2, 4, 25–27, and 33–38 are anticipated under 35 U.S.C. § 102(b) by Patel. Pet. 22–32.

i. Patel

Patel, an article titled "Transparent Armor," discusses a "material or system of materials designed to be optically transparent, yet protect from fragmentation or ballistic impacts." Ex. 1015, 1. More particularly,

Petitioner relies upon the following passage from Patel, describing one of the known transparent crystalline ceramics of the time:

> Saphikon, Inc. [Patent Owner's predecessor] produces transparent sapphire using an edge, defined growth technique. Sapphire grown by this technique produces an optically inferior material to that which is grown via single crystal techniques, but is much less expensive. Saphikon is currently capable of producing 0.25in. thick sapphire, in 12in. x 15in. sheets.

Id. at 5.

ii. Analysis

Petitioner states that "claims 1, 2, 4, 25–27, and 33–38 of the '469 patent generally recite single crystal sapphire sheets and values for certain dimensions and characteristics of the sheets such as the width and the thickness." Pet. 22. Petitioner notes that "the claims of the '469 patent do not include a single limitation directed to a particular system or method for forming the single crystal sapphire sheets." *Id.* at 23. Regarding claim 1, Petitioner argues that Patel discloses a sapphire single crystal ("a transparent sapphire single sheet grown using an edge-defined growth technique," *id.* at 23–24 (citing Ex. 1015, 5 col. 2; Ex. 1002 ¶¶ 48–52)); a single crystal sheet having a length, width, and thickness (*id.* at 24 (citing Ex. 1015, 5 col. 2)); wherein length>width>thickness, the width is not less than **[**about 15**]** *28* cm ("a sapphire sheet having a thickness of 0.25 inches (0.635 cm), a width of 12 inches (30.48 cm), and a length of 15 inches (38.1 cm)," *id*. (citing Ex. 1015, 5 col. 2)); and the thickness is not less than about 0.5 cm ("sapphire sheet having a thickness of 0.25 inches (0.635 cm))," *id.* (citing Ex. 1015, 5 col. 2)). Petitioner presents charts illustrating where it believes each limitation of the remaining challenged claims can be found in Patel. *Id.* at 23–32.

Petitioner relies on the testimony of Dr. Bruni, who testifies that "the term 'sapphire' always refers to single crystal aluminum oxide," "aluminum oxide that is not a single crystal would never be referred to as 'sapphire,'" instead "[i]t would be called 'alumina' or just ceramic aluminum oxide," and that "[a]ny reference in materials science or the ceramics industry that uses the term 'sapphire' refers, by general convention and accepted usage, to single crystal aluminum oxide." Ex. 1002 ¶ 49. Dr. Bruni further testifies that "[t]he EFG process, when used to produce sapphire sheets, inherently produces a sheet having a neck and main body adjacent to the neck." *Id.* ¶ 68.

Patent Owner argues, first, that one of ordinary skill in the art "would understand Patel as describing Saphikon's products as *not* expressly or inherently disclosing certain claim elements." PO Resp. 18. More particularly, Patent Owner argues that Patel lacks explicit disclosure of (1) the "single crystal" element; (2) the "neck" element in claim 34; and (3) the "substantially transparent" element in claims 35 and 36. *Id.* at 19–20. Patent Owner also argues that Patel lacks implicit disclosure of these same three elements. *Id.* at 21–26. Regarding whether Patel inherently discloses the "single crystal" limitation, Patent Owner challenges the testimony of Dr. Bruni that the term "sapphire" always refers to "single crystal aluminum oxide," arguing that sapphire can include polycrystalline areas and multi-crystalline bodies. *Id.* at 22–23 (citing Ex. 2031, 1; Ex. 1016, 2:3–5). Regarding the "neck" element of claim 34, Patent Owner argues that Patel's lack of implicit statement that the EFG-grown sheets have a neck, together with evidence that "a neck is not inevitably or necessarily present from the EFG process," means that a neck is not inherent. *Id.* at 24 (relying on a

"series of patents (US 2014352604, US 2016122899, US 2016032485, US 2015308012)" that "describe a method for growing a β-Ga2O3 single crystal via EFG using a seed crystal that spans the entire width of the die"). Regarding the "substantially transparent" element, Patent Owner argues that Patel calls the EFG-grown sheet "optically inferior," indicating there were "significant issues with the transparency." *Id.* at 25 (citing Ex. 1015, 5).

Patent Owner also argues that the Petitioner ignores the second of the three sentences it relies on in Patel, dismissing it as "unclear," "ambiguous," and "self-contradicting," and in the process fails to "satisfy Petitioner's burden of demonstrating that a single crystal 'necessarily must be present' as required for inherency." *Id*. at 26–27 (referring to Ex. 1015, 5). Patent Owner argues that Petitioner is attempting "to have the Board credit the Patel article for disclosing things it does not disclose, and to discount disclosures that directly contradict [Petitioner's] position." *Id.* at 28.

Petitioner replies that Patel in fact discloses (1) the "single crystal" element; (2) the "neck" element in claim 34; and (3) the "substantially transparent" element in claims 35 and 36. Reply 3–12. More particularly, Petitioner argues that the references in other art to "sapphire" that allegedly does not refer to single-crystal sapphire has nothing to do with sapphire sheets produced by EFG, as in Patel. *Id.* at 3–4. Petitioner relies on Dr. Bruni's testimony that "'sapphire' in this industrial context always refers to single crystal aluminum oxide" (Ex. 1024 ¶ 6) and Dr. Derby's testimony that transparent sapphire grown using EFG is typically crystalline sapphire (Ex. 1032, 14:1–9). *Id.* Petitioner also criticizes the references that discuss polycrystalline areas and multi-crystalline bodies, arguing that these discussions of potential defects in the single crystal growing process do not

counter the evidence that "the objective of sapphire growth using EFG is a single crystal." *Id.* at 5 (citing Ex. 1032, 18:4–9). Regarding the "neck" argument, Petitioner reiterates that EFG, when used to produce sapphire sheets, "inherently produces a sheet having a neck and main body adjacent thereto," and that Patent Owner's reliance on references that "describe a method for growing β-Ga_2O_3 (gallium oxide) single crystal via EFG using a seed crystal that spans the entire die-width" are inapposite. *Id.* at 6–7. Regarding the "substantially transparent" element, Petitioner argues that "the inherent transparency of sapphire down to the 5 μm wavelength (*i.e.*, in the infrared range) was known to be an 'infrared window material,'" and Patel discusses "the performance of infrared materials" including "sapphire." *Id.* at 8 (citing Ex. 1015, 17 col. 1).

Regarding the "single crystal" limitation, we are persuaded by Petitioner's evidence and argument that the relied-upon portion of Patel discloses a single crystal sapphire. The relied-upon portion of Patel provides that "Saphikon, Inc. produces transparent sapphire using an edge, defined growth technique," i.e., using EFG. Ex. 1015, 5 col. 2. The purpose of EFG is to produce single-crystal sapphire. Reply 3 (citing Ex. 1032, 18:4–9 (Dr. Derby opining that the "goal" of successful EFG growth "would be a single crystal of sapphire")). Thus, the disclosure in Patel that "Saphikon, Inc. produces transparent sapphire using an edge, defined growth technique," i.e., using EFG, would mean that Patel discloses a single crystal sapphire. Patel itself identifies sapphire as single-crystal aluminum oxide. Ex. 1015, 2 col. 1 ("single crystal sapphire (Al_2O_3)"), 4 col. 2 ("single crystal aluminum oxide (sapphire)"), 5 col. 1 ("Single crystal aluminum oxide (Sapphire - Al_2O_3)"); Ex. 1029 § 3.6.2 (p.119), § 5.4.2 (p.185)

("Single-crystal aluminum oxide (α-Al_2O_3), better known as sapphire"), Table 5.1 (p.162) (defining sapphire as single-crystal). Dr. Bruni confirms that sapphire in the industrial context of sapphire sheets, as here, always refers to single crystal aluminum oxide, refuting Patent Owner's arguments about different uses of the term "sapphire" in relation to "sapphire glass" and "sapphire powder" in other contexts. Reply 4 (citing Ex. 1024 ¶ 6). Although we note Patent Owner's concern with the second relied-upon sentence of Patel, that sapphire "grown by this technique produces an optically inferior material to that which is grown via single crystal techniques," Patel appears to be contrasting the sapphire produced by the edge, defined growth technique with another technique to produce single crystal sapphire boules. Ex. 1015, 5 col. 1–2. This disclosure contrasting sapphire produced by two different methods, in two different shapes, is not persuasive evidence that sapphire in the form of a sheet produced by the edge, defined growth technique is not also a single crystal sapphire. Accordingly, we find that Patel discloses a single crystal sapphire in the form of a sheet.

Regarding the "neck and a main body" limitation in claim 34, we are persuaded by Petitioner's evidence and argument that the relied-upon portion of Patel discloses a neck. Petitioner provides evidence that "EFG, ***when used to produce sapphire sheets***, inherently produces a sheet having a neck and main body adjacent thereto." Reply 6 (citing Ex. 1014, Fig. 2; Ex. 1018, Fig. 5.36); *see also* Ex. 2013, 75:13–77:23 (Dr. Bruni testifying that, in the context of EFG-grown sapphire, he was unaware that it had ever been grown with no neck); Ex. 1032, 70:11–15 (Dr. Derby testifying that he was unaware of anyone using a wide seed to manufacture sapphire using

EFG). Patent Owner's reliance on patents that disclose an EFG process for growing β-Ga_2O_3 (gallium oxide) are inapposite to the sapphire-growing process, because, as Petitioner points out, sapphire and gallium oxide are distinct materials having different properties. *Id.* at 7. Accordingly, Patent Owner's evidence does not persuasively rebut Petitioner's evidence that Patel would inherently disclose a neck and a main body adjacent thereto.

Regarding the "substantially transparent" limitation in claims 35 and 36, we are persuaded by Petitioner's evidence and argument that Patel discloses substantially transparent single crystal sapphire. Patel is titled "Transparent Armor." Ex. 1015, 1. Patel introduces its article by stating: "Transparent armor is a material or system of materials designed to be optically transparent." *Id.* The section of Patel in which the relied-upon language is found is titled "Transparent crystalline ceramics" and provides: "Three major transparent candidates currently exist: aluminum oxynitride (AlON), magnesium aluminate spinel (spinel), and single crystal aluminum oxide (sapphire)." *Id.* at 4 col. 2. Patel references a report that focuses on "the performance of infrared materials," and more particularly, "[s]ix initial materials, namely . . . sapphire . . . ." *Id.* at 17 col. 1. Dr. Bruni testifies that this "shows that the inherent transparency of sapphire down to the 5 μm wavelength (which is in the infrared range) was a well-known phenomenon and it is typically considered an 'infrared window material.'" Ex. 1002 ¶¶ 71, 73. Although Patent Owner argues that Patel calls the EFG-grown sheet "optically inferior," we read this relied-upon sentence in Patel as contrasting EFG-produced sapphire with sapphire produced by other methods, but not overcoming Patel's explicit disclosure of Saphikon's crystal as "transparent sapphire" in the introductory sentence of the same

paragraph. PO Resp. 25; Ex. 1015, 5. Therefore, we find that Patel discloses a single crystal sheet that is substantially transparent in the infrared and visible wavelength spectrums.

Accordingly, on this record, we are persuaded that Petitioner has established by a preponderance of the evidence that claims 1, 2, 4, 25–27, and 33–38 are anticipated by Patel.

E. Asserted Obviousness Over Patel, Locher, and LaBelle '636 (Ground 2)

Petitioner contends that claims 1, 2, 4, 5, 25–28, and 33–39 would have been obvious over Patel in view of Locher and LaBelle '636. Pet. 33–36.

i. Locher

Locher describes an EFG process for producing a single crystal sapphire sheet of 30.5 cm wide by 46 cm long by 0.25 cm thick, by "scaling up" the old technology. Ex. 1006, 1.0, 3.1. Locher also states that "it is envisioned that even larger windows are possible." *Id.* at 5.0. Locher describes a vertical temperature gradient was less than 150 °C/cm and a horizontal gradient of no more than 0.3 °C/cm, with an overall temperature control good to 0.05% or 1 °C. *Id.* at 3.1.

ii. LaBelle '636

LaBelle '636 describes an apparatus and method for growing "relatively large size monocrystalline plates of materials such as alumina, by the EFG process." Ex. 1014, 1:68–71. LaBelle '636 discloses a single crystal sapphire sheet of 3 inches wide by 3/8 inch thick and 4–6 inches long. *Id.* at 2:2–4. LaBelle '636 uses susceptor 40 to minimize temperature gradients in the melt along the plane of the liquid film from which the crystal body is grown. *Id.* at 6:13–50.

iii. Analysis

Petitioner relies on arguments presented in Section V.A (Ground 1) of the Petition to argue that the combination of these three references discloses all the limitations of claims 1, 2, 4, 5, 25–28, and 33–39. Pet. 33–35. Petitioner argues that Locher "discloses an EFG process for producing a 30.5 cm wide by 46 cm long by 0.25 cm thick single crystal sapphire sheet by simply 'scaling up' the old technology" and states that "it is envisioned that even larger windows are possible." *Id.* at 33 (citing Ex. 1006 §§ 3.1, 5.0). Petitioner also argues that LaBelle '636 discloses "production of a single crystal sapphire sheet having a length>width>thickness with the thickness being 3/8 inch (0.95 cm) (*i.e.*, within the thickness range required by claims 1, 4, 5, 27, 28, 33, 36, 38, and 39)." *Id*. at 33–34 (citing Ex. 1014, 1:68–71, 2:2–4). Petitioner further argues that it would have been obvious to one of skill in the art to "scale processes and equipment known prior to April 2003 to produce a single crystal sapphire sheet having all the limitations of claim 1, without undue experimentation." *Id.* at 34 (citing Ex. 1002 ¶ 81).

Patent Owner argues that the Patel article does not explicitly or implicitly disclose the claim elements as explained in its Ground 1 arguments. PO Resp. 30. Patent Owner further argues that Locher discloses a single crystal sapphire sheet made by EFG, but only half the thickness of the claimed sheets (i.e. 30.5 cm wide by 46 cm long by 0.25 cm thick), and the evidence demonstrates that undue experimentation is required to create larger sizes. *Id.* (citing Pet. 33). Patent Owner refers to its earlier arguments regarding the difficulty of scaling up the old technology (*id.* at 31) and further argues that Locher itself indicates that scaling up is not simple (*id.*).

Patent Owner also argues that LaBelle ’636 does not allow one of ordinary skill in the art to arrive at the claimed invention without undue experimentation, and teaches away from making large-sized, single crystal sheets. *Id.* at 33. Patent Owner relies on an equation disclosed by Carroz, “linking the crystal thickness to the meniscus height and the meniscus height to the die temperature by accounting for heat equilibrium flows across the interface, pressure equilibrium across the meniscus, and other inputs and variables” (*id.* at 14 (citing Ex. 2027, 3)) to argue that LaBelle ’636 does not recognize challenges with scaling up to larger sized widths and thicknesses. *Id.* at 34. Patent Owner also argues that Petitioner fails to provide any motivation to combine Patel with Locher and LaBelle ’636. *Id*. Patent Owner also argues that one of ordinary skill in the art would not have a reasonable expectation of success in scaling up the “old technology.” *Id*. at 36. Patent Owner faults Petitioner for not providing “the requisite specificity to demonstrate a reasonable expectation of success” at combining the relied-upon references. *Id.*

Petitioner replies that Patel discloses every limitation of the challenged claims under this ground, and Locher and LaBelle ’636 “are provided to explain the manner in which a single crystal sapphire sheet having the dimensions described in Patel would be made” by one of ordinary skill in the art. Reply 12. Petitioner maintains that it would be obvious to scale up known processes without undue experimentation, relying again on Dr. Bruni’s testimony illustrating that one of ordinary skill in the art “could have scaled the processes and equipment known prior to April 2003 to produce a single crystal sapphire sheet having the limitations of claim 1 without undue experimentation.” *Id.* at 13 (citing Ex. 2013, 98:9–99:19,

102:14–103:18). Petitioner also argues that Patent Owner's reliance on Carroz is flawed, because Carroz was published nearly 15 years after the priority date of the challenged patent, and discusses a drastically different system, and because Carroz is based on an apparatus with just two degrees of freedom, whereas consideration of a third factor (after-heater temperature) is "quite reasonable—even necessary." Reply 14–15 (citing Ex. 1032, 9:22–10:3) (arguing that Dr. Derby stated that Carroz is irrelevant due to lack of consideration of this third factor). Petitioner also replies that the Petition establishes that one of ordinary skill in the art would have followed the teachings of Locher and LaBelle '636 to scale the process and equipment known in the art prior to April 2003, without undue experimentation. *Id.* at 15 (quoting Pet. 35). Petitioner argues that Patent Owner provided no refuting evidence, other than misinterpreting Dr. Bruni's testimony and relying on Carroz. *Id.*

In our discussion of the anticipation ground based on Patel, we determined that Patel discloses each element of the claims challenged thereunder, *supra*, and refer back to that discussion insofar as it applies to this ground. We are further persuaded that, for the purposes of filling in the details of the EFG process that may not be explicitly disclosed in Patel, Petitioner has provided adequate explanation that one of ordinary skill would have looked to and combine the relied-upon references by following the EFG "teachings and principles disclosed in the Locher article and LaBelle '636 regarding controlling/minimizing temperature gradients (desirably to zero) on the top surface of the die and/or in the melt along the plane of the liquid film." Pet. 35; *see also* Ex. 1002 ¶¶ 81–86. We credit Dr. Bruni's testimony that it would have been obvious to a person of

ordinary skill in the art, following the teachings and principles disclosed in Locher and LaBelle ’636 regarding controlling/minimizing temperature gradients, to produce a crystal sheet having all of the features of the challenged claims “by scaling the process and equipment known in the art prior to April 2003 without undue experimentation.” Ex. 1002 ¶¶ 81–86. The evidence and argument provided by Petitioner and Dr. Bruni as to what Patel, Locher, and LaBelle ’636 would have suggested to one of ordinary skill in the art has not, in our determination, been rebutted.

F. Asserted Obviousness Over Patel, LaBelle ’348 and LaBelle ’636 (Ground 3)

Petitioner contends that claims 6–9, 29–32, and 40–43 would have been obvious over Patel in view of LaBelle ’348 and LaBelle ’636. Pet. 36–39. Each of the claims challenged under this ground contains a limitation directed to the variation in thickness of the single crystal sheet. *Id*. at 36–37.

i. LaBelle ’348

LaBelle ’348 discloses methods of growing crystalline materials, in that it “relates to growth of materials from the melt and more particularly to growth of elongate crystalline bodies of predetermined configuration.” Ex. 1016, 1:23–25. Petitioner characterizes LaBelle ’348 as a reference in which “solid materials can be pulled from the melt as elongated crystalline bodies of indefinite lengths and predetermined cross-sectional configurations; and (b) elongate bodies of solid materials may be grown from the melt to various arbitrary shapes and sizes and with smooth surfaces.” Pet. 36. LaBelle ’348 discloses that ribbons “grown using capillary members similar to those shown in FIGS. 6 and 7 have flat surfaces

that are smooth to within a maximum deviation of about 1000 angstroms." Ex. 1016, 9:26–29.

ii. Analysis

Petitioner relies on its arguments presented in Section V.A (Ground 1) and Section V.B (Ground 2) to argue that Patel discloses all the limitations of independent claims 1 and 36 and dependent claim 25. Pet. 36–37. Petitioner then argues that, although Patel "does not mention a variation in thickness of the disclosed sapphire sheet, LaBelle '636 and LaBelle '348 each disclose systems and methods for producing single crystal sapphire sheets [that] have a variation of thickness within the claimed range." *Id.* at 37–38. More particularly, Petitioner argues that LaBelle '348 provides that "[r]ibbons grown using capillary members similar to those shown in FIGS. 6 and 7 have flat surfaces that are smooth to within a maximum deviation of about 1000 angstroms," i.e., equivalent to a flatness of 10^{-5} cm. *Id.* at 38 (citing Ex. 1016, 9:26–29). Thus, Petitioner argues, it would be obvious to one of ordinary skill in the art to "produce a single-crystal sapphire sheet having a variation in thickness (*i.e.*, the difference between the maximum and minimum thickness values along a segment spanning the width of the sheet) that is less than 0.07 cm, thereby meeting all the limitations of claims 6–9, 29–32, and 40–43." *Id.* at 39 (citing Ex. 1002 ¶ 98).

Patent Owner argues that variation of thickness is defined in the challenged claims, particularly in claim 6, and none of the relied-upon references in this ground disclose the claimed variations in thickness. PO Resp. 38. Patent Owner criticizes LaBelle '348's statements that its ribbons "have flat surfaces that are smooth to within a maximum deviation of 1000

angstroms" and that its surfaces are "flat" as having nothing to do with variation in thickness. *Id.* at 39. Patent Owner also criticizes LaBelle '636's statement that discloses that the growing crystal body will have a rectangular cross-section as "just as imprecise as the term 'flat.'" *Id.* Patent Owner also argues that Petitioner does not articulate any reasoning on how or why one of ordinary skill in the art would have looked to and combined the relied upon references, and that Petitioner failed to articulate a reasonable expectation of success, as discussed in Patent Owner's arguments in its earlier sections. *Id.* at 41–42.

Petitioner replies that LaBelle '348 discloses ribbon 122 (Fig. 6) with a variation of thickness within the claimed range, i.e. zero, as Petitioner argues that Dr. Derby agreed. Reply 16–17 (citing Ex. 1016, 9:26–29; Ex. 1032, 64:5–16). Petitioner also replies that the Petition's reliance on Dr. Bruni's declaration regarding motivation to combine and reasonable expectation of success has not been addressed by Patent Owner. *Id.* at 17.

On the complete record now before us, we are persuaded that Petitioner's arguments are reasonable and adequately supported. In our discussion of the anticipation ground based on Patel, we determined that Patel discloses each element of the claims challenged thereunder, *supra*, and refer back to that discussion insofar as it applies to this ground. We also credit the testimony of Dr. Bruni regarding the three factors affecting the local thickness of a sheet between two points along a segment of the width, and his calculations to determine the variations in thickness of the sheet based on the disclosures of LaBelle '348 and LaBelle '636. *See* Ex. 1002 ¶¶ 90–97. Accordingly, we are persuaded that application of the process of LaBelle '348 and LaBelle '636 would result in a sheet with a variation of

thickness of not greater than 0.2 cm, 0.15 cm, 0.10 cm, and 0.07 cm, as set forth in the challenged claims. We note that LaBelle '348 also expressly provides that its ribbons "have flat surfaces that are smooth to within a maximum deviation of about 1000 angstroms," i.e., equivalent to a flatness of 10^{-5} cm, which does not strike us as imprecise, as argued by Patent Owner. Ex. 1016, 9:26–29; Ex. 1002 ¶¶ 95, 97.

We also accept, on this record, Petitioner's arguments and Dr. Bruni's testimony regarding motivation to combine the references to produce a smooth, flat sheet having the claimed variation in thickness. Pet. 39; Ex. 1002 ¶ 98. Petitioner's proposed combination relies primarily on Patel, which Petitioner argues discloses all the limitations of the base independent claims, and relies on LaBelle '348 and LaBelle '636 for variations in thickness of the crystal sheet. We are persuaded by Petitioner's argument and testimony that such variances in thickness, which Dr. Bruni opines would be obvious to produce, would not require undue experimentation.

G. Asserted Obviousness Over Saint-Gobain, Locher, LaBelle '636, Kyocera, Window and Dome, and Journal of Crystal Growth (Ground 4)

Petitioner contends that claims 1, 2, 4, 5, 25–28, 33–39, and 44 would have been obvious over Saint-Gobain in view of Locher, LaBelle '636, Kyocera, Window and Dome, and Journal of Crystal Growth. Pet. 40–47.

i. Saint-Gobain

Saint-Gobain, a brochure titled "Properties and Benefits of Sapphire: A Quick Reference Guide," discloses a single crystal sapphire sheet having a length, width, and thickness, more particularly, a thickness of 1.5 to 12.7 mm, widths to 304 mm, and lengths to 2057 mm. Ex. 1010, 2 col. 2. The

front cover of the brochure shows a partial view of what appears to be a rectangular sheet of sapphire. *Id.* at 1.

ii. Kyocera

Kyocera discloses a single crystal sapphire sheet grown using the EFG method, having dimensions of 200 mm wide x 300 mm long, with a thickness of up to 20 mm. Ex. 1017, 2–3.

iii. Window and Dome

Window and Dome discloses a 300 mm x 300 mm x 9.5 mm as-grown sapphire crystal, and states that there were plans to grow 300 mm x 450 mm x 9.5 mm crystals in the near future. Ex. 1020, Fig. 8, Sec. 5.

iv. Journal of Crystal Growth

Journal of Crystal Growth discloses an as-grown sapphire crystal, having dimensions of 30 cm wide x 30 cm long, with a thickness of 1.25 cm. Ex. 1021, 14.

v. Analysis

Petitioner argues that while Saint-Gobain discloses the limitations of the challenged claims, "the details of the EFG process are not explicitly disclosed," but that Locher and LaBelle '636 "are provided to explain the manner in which a single crystal sapphire sheet having the dimensions as disclosed in the Saint-Gobain brochure would be made by a person having ordinary skill in the art." Pet. 41–44. Petitioner further argues that one of ordinary skill in the art, relying on the teachings of Locher and LaBelle '636 regarding controlling and minimizing temperature gradients on the top surface of the die and/or in the melt along the plane of the liquid film, would have found it obvious to produce a crystal sheet having all of the features of the challenged claims "by scaling the process and equipment known in the

art prior to April 2003, without undue experimentation." *Id.* at 47 (citing Ex. 1002 ¶ 108). Regarding the remaining three references (Kyocera, Window and Dome, and Journal of Crystal Growth), Petitioner argues that "the dimensions disclosed in these references was a constraint imposed by the design of the equipment used for growth, an intentional choice in the growth of the crystal, and/or simply a size dictated by the dimensional requirements of the finished product." *Id.*

Patent Owner argues that two of the references upon which Petitioner attempts to rely were previously considered during prosecution. PO Resp. 42–43. Patent Owner also argues that it would not be possible to scale up the processes describe in Locher and LaBelle '636, as argued in connection with Petitioner's Ground 2. *Id.* at 43. Patent Owner disagrees that Kyocera, Window and Dome, and Journal of Crystal Growth render the challenged claims obvious, because they do not provide enough information about the EFG process parameters. *Id.* at 43–44. Finally, Patent Owner argues that Petitioner fails to articulate any motivation to combine the six cited references, or to articulate a reasonable expectation of success at combining the references. *Id.* at 44–45.

Petitioner replies that Saint-Gobain discloses every limitation of the claims challenged under this ground, and Locher and LaBelle '636 explain the manner in which the Saint-Gobain sheet would have been made by one of ordinary skill in the art. Reply 17. Petitioner further replies that Patent Owner misinterprets Kyocera, Window and Dome, and Journal of Crystal Growth. *Id.* at 18.

We determine, on this complete record, that Petitioner has provided insufficiently articulated motivation for combining Kyocera, Window and

Dome, and Journal of Crystal Growth with the remaining references in this ground. Obviousness requires "a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does." *KSR*, 550 U.S. at 418. It is Petitioner's burden to demonstrate "that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so." *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367–68 (Fed. Cir. 2016). In this light, the modifications proposed by Petitioner, the reasons for such modifications, and the specificity required to demonstrate whether there would be a reasonable expectation of success are not adequately supported on this record. Although Petitioner attempts to establish reasons to combine the elements of the respective six references relied upon, Petitioner does not expressly discuss whether one of ordinary skill in the art would have had a reason to combine the cited teachings in these six references. The cited paragraphs of the Bruni Declaration (Ex. 1002 ¶¶ 103–108) are substantially the same as the corresponding portions of the Petition (Pet. 44–47) and are deficient for the same reasons as discussed above.

H. Asserted Obviousness Over Harris, LaBelle '636, and Chalmers (Ground 5)

Petitioner contends that claims 11–14, 16, and 21–24 would have been obvious over Harris in view of LaBelle '636 and Chalmers. Pet. 48–62.

i. Harris

Harris, a page from a book titled "Materials for Infrared Windows and Domes," shows a "[l]arge flat sheet of sapphire being drawn from a crucible

of molten alumina by the EFG method." Ex. 1018, 3, Fig. 5.36; *see also* Ex. 1029 (complete copy of book from which Ex. 1018 was excerpted). Figure 5.36 of Harris is reproduced below (yellow highlighting by Petitioner):

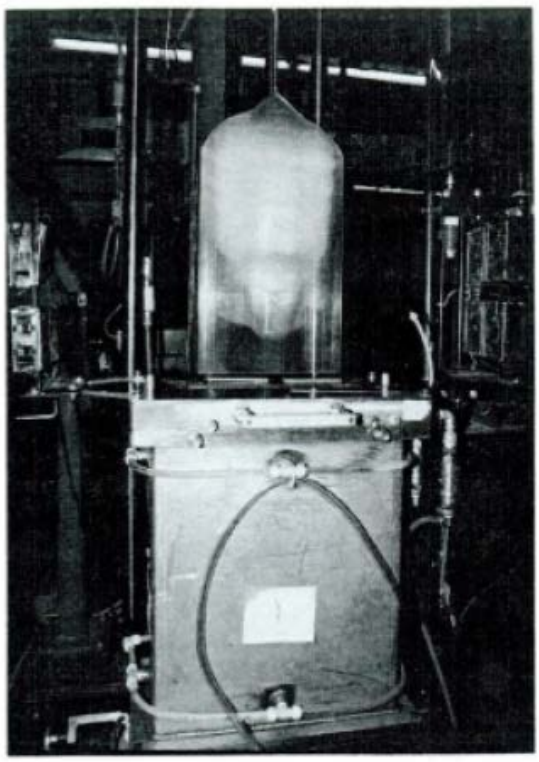

Fig. 5.36. Large flat sheet of sapphire being drawn from a crucible of molten alumina by the EFG method. The single-crystal sapphire seed (15 cm long × 0.75 cm wide) widened to 30 cm during the initial growth process. The final sheet was 30 cm wide for a length of 46 cm. (Courtesy Saphikon, Inc.)

Figure 5.36 is a picture of a sheet of sapphire being drawn from a crucible of molten alumina. As shown in Harris, the "single-crystal sapphire seed (15 cm long x 0.75 cm wide) widened to 30 cm during the initial growth process. The final sheet was 30 cm wide for a length of 46 cm." *Id.*

ii. Chalmers

Chalmers, an article co-authored by LaBelle, is titled "Growth of Controlled Profile Crystals from the Melt: Part III – Theory." Ex. 1019, 681. Figures 1 and 2 of Chalmers are reproduced below:

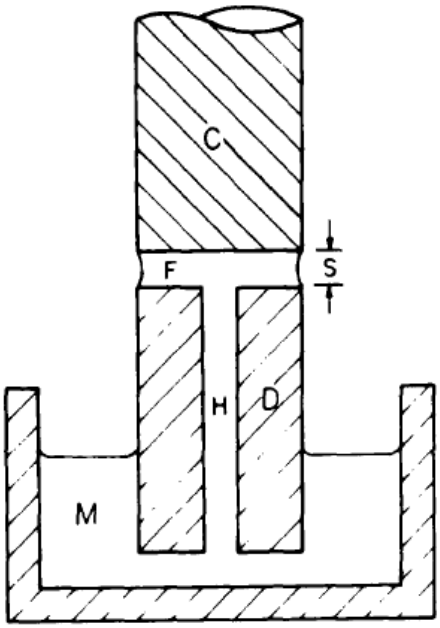

FIG. 1
Edge-Defined, Film-Fed Growth (EFG)

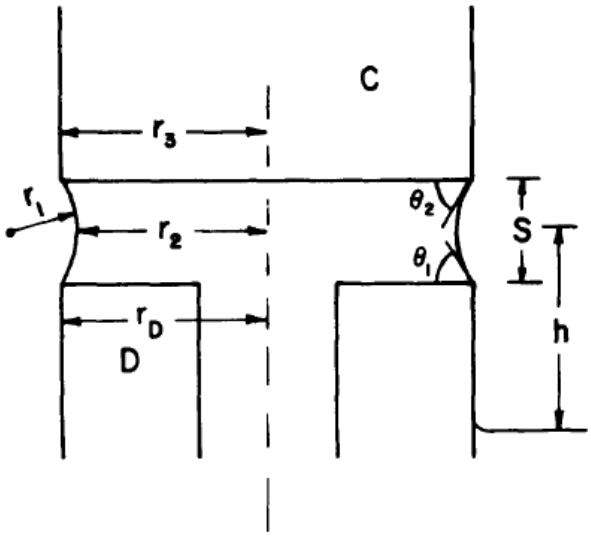

FIG. 2
EFG - Detailed geometry of film

Ex. 1019, 682. Figures 1 and 2 of Chalmers depict aspects of the EFG process, namely, that a film F of melt M exists on top of die D, on which film F is supported by growing crystal C. *Id.* at 681–82. The angles and dimensions in Figure 2 demonstrate the geometry of the static equilibrium of the film. *Id.* at 682.

iii. Analysis

Petitioner presents arguments and a chart demonstrating where Petitioner believes every element of claims 11–14, 16, and 21–24 is found in the relied-upon references. Pet. 58–62. Petitioner summarizes that "it would have been obvious to a person of ordinary skill in the art to grow an as-grown single crystal sapphire sheet having the Δ_T of not greater than 4.0cm, 3.0 cm, and 2.0 cm as required by claims 11–13" because "Δ_T is

inherent in an as-grown single crystal sapphire sheet grown under proper growth conditions, especially since temperature control across the die surface is a desired goal in the growth of an as-grown single crystal sapphire sheet grown by the EFG method." *Id.* at 52 (citing Ex. 1002 ¶ 118). Petitioner argues that "it would be obvious to a person having ordinary skill in the art to minimize the temperature gradients across the surface of the die and, across the plane of the liquid film (meniscus F) from which the body (crystal C) grows" in order to minimize Δ_T. *Id.* at 55 (citing Ex. 1014, 6:35–38; Ex. 1002 ¶ 122). More particularly, Petitioner refers to Figures 1 and 2 of Chalmers, the teachings of LaBelle '636, and the calculations of Dr. Bruni to argue that it would be obvious to a person having ordinary skill in the art "that a large value of Δ_T is indicative of a large temperature variation between the ends of the die" and thus "it can be concluded that Δ_T in the '469 patent is used as a substitute or proxy for a precise measurement of temperature gradient across the surface of the die." *Id.* at 55–56 (citing Ex. 1002 ¶ 123). Petitioner further argues that LaBelle '636 discloses "the concept of providing a symmetrical temperature distribution about the melt, the growth zone, the die, and the growing crystalline body," and therefore, one of ordinary skill in the art following the teachings of Chalmers and LaBelle '636 "would consider it obvious to produce an as-grown single crystal sapphire sheet having a Δ_T not greater than the values set forth in claims 11–13." *Id.* at 58.

Patent Owner argues, first, that Petitioner's analysis of Harris is flawed, because one of ordinary skill in the art would not have understood Harris's sheets to be single crystals. PO Resp. 45–46. Patent Owner also argues that, for claim 24, which requires a crystal that is substantially

transparent in the infrared and visible wavelength spectrums, "Harris is not applicable because it shows an image of an as-grown sheet that is opaque." *Id.* at 46. Patent Owner argues, next, that Petitioner's analysis of LaBelle '636 is flawed, because one of ordinary skill in the art would understand the disclosure as applying to small sheets, not large sheets. *Id.* at 47. Patent Owner argues that Petitioner's analysis of Chalmers/LaBelle is flawed, because the results in those articles were "derived for the EFG growth of cylindrical crystals of very small diameter," and are "therefore inapplicable to the claimed widths and thicknesses." *Id.* at 50. Patent Owner also faults Petitioner's equating S (maximum meniscus height) with Δ_T. *Id.*

Petitioner replies, first, that Harris's disclosure of some manufacturing defects that can occur during EFG "in no way implies that sapphire produced by EFG is not single crystal. Indeed, on numerous occasions, Harris defines sapphire as being single crystal." Reply 19 (citing Ex. 1029 § 3.6.2 (p.119), § 5.4.2 (p.185), Table 5.1 (p.162)). Petitioner replies, next, that a large portion of Harris's sheet is "substantially transparent" as shown in Figure 5.36. *Id.* Petitioner further replies that LaBelle '636's disclosure of sheet thickness is well within the claimed range, and faults Patent Owner for failing to provide a definition distinguishing "small" sheets from "large" sheets. *Id.* at 20. Petitioner also points to Figure 2 of LaBelle '636, which Petitioner asserts has a Δ_T of nearly zero. *Id.* at 21 (citing Ex. 1014, Fig. 2; Ex. 1032, 69:3–6). Petitioner replies that Dr. Bruni has described the manner in which Chalmers is relevant and can be adapted to a system for growing sheets (Ex. 1002 ¶¶ 119–123), and that Patent Owner has not addressed these positions from Dr. Bruni's declaration. *Id.* at 21–22.

We are persuaded by the evidence before us that Harris discloses its EFG-produced sapphire is a single crystal, notwithstanding the defects that can occur in the EFG manufacturing process. Reply 19 (citing Ex. 2004, 176–77). Harris's description of Figure 5.36 provides that the "single-crystal sapphire seed . . . widened to 30 cm during the initial growth process," indicating that the Figure shows a single-crystal sapphire, for which the measurements changed during the growth process, but for which the single-crystal characteristics did not. Ex. 1018, 176, Fig. 5.36. We also are persuaded that Harris is consistent in its discussion of "sapphire" to mean "single-crystal sapphire" as required by the claims. *See, e.g.,* Ex. 1029 § 3.6.2 (p.107), § 5.4.2 (p.173), Table 5.1 (p.150).

Regarding the "substantially transparent" requirement of claim 24, we disagree with Petitioner's argument that claim 24 does not require the entire crystal sheet to be substantially transparent. Petitioner cites no evidence or support for this assertion, and the assertion without elaboration is not persuasive. Reply 19. We determine that the plain and ordinary meaning of the claim 24, referring to the crystal, and not merely to a portion of the crystal, requires that the crystal of claim 11 be substantially transparent in the infrared and visible wavelength spectrums, not merely that it includes a portion that is. Claim 11 requires that its crystal have a width of not less than about 28 centimeters, and a length greater than the width, i.e., longer than 28 centimeters. The crystal pictured in Figure 5.36 of Harris is 30 cm wide and 46 centimeters long. The portion that Petitioner argues is "transparent" in Figure 5.36 is only approximately one quarter of the length of the crystal, at the bottom; the remainder of the crystal appears opaque. Ex. 1018, 176, Fig. 5.36. Such a sapphire crystal having a larger portion that

is opaque rather than transparent is not "substantially transparent in the infrared and visible wavelength spectrums." Further, although the transparent portion shown in Harris's Figure 5.36 has a width of 30 centimeters, which is greater than 28 centimeters, the length of the transparent portion shown appears to be manifestly less than 28 centimeters, and therefore would fall outside the scope of the claim even if the opaque portion was not considered, or even if it were obvious to remove the opaque portion. We also refer back to the Petition's argument regarding claim 24, in which Petitioner argues that the Harris crystal sheets could be used in grocery store scanners, and "such sheets are inherently transparent in the infrared and visible wavelengths." Pet. 62. Petitioner cites to nothing apart from a paragraph in Harris to support this assertion, and this paragraph does not discuss transparency apart from stating that these sheets are used in grocery store scanners. *Id.* (citing Ex. 1018, 176, first paragraph). Accordingly, we discern inadequate support for Petitioner's assertions that a crystal according to claim 11 is substantially transparent in the infrared and visible wavelength spectrums. Thus, we agree with Patent Owner that Petitioner fails to make its case as to claim 24 under this ground.

Regarding the "small sheets" argument, we are persuaded that LaBelle '636 discloses sheets of an adequate size to allow one of ordinary skill in the art to use its disclosures with those of Harris, LaBelle '636, and Chalmers to grow the size of sheets required by the claims. We understand Petitioner's argument to rely primarily on Harris to meet the elements of the claims, and on Chalmers and LaBelle '636 to "disclose additional details of the EFG process." Pet. 48, 58. We also note, as Petitioner points out, that the statement Patent Owner criticizes in LaBelle '636 as applying only to

"small" sheets in fact characterizes the prior art systems (Reply 20 (citing Ex. 1014, 2:3–8)), whereas LaBelle '636 itself states that the "primary object of the present invention is to provide an improvement in apparatus and a method for growing relatively large size monocrystalline plates of materials such as alumina, by the EFG process." Ex. 1014, 1:67–70. In the absence of quantification of "small" and "large" as it applies to single crystal sapphire sheets (Ex. 1032, 52:13–55:9), we accept LaBelle '636's statement that at least subjectively it is directed to large size sheets.

Regarding the Δ_T argument, on this record, we accept Petitioner's interpretation of LaBelle '636 as having a Δ_T of effectively zero. Petitioner characterizes the existence of Δ_T as "inherent," which Patent Owner criticizes, but we do not view this as inherency *per se*. Pet. 52. Rather, it would appear that a single-crystal sapphire sheet grown by the EFG method, such as the one shown in LaBelle '636 Figure 2, is capable of being measured to yield a numerical value for Δ_T. Although we are cognizant that figures are not always to scale, Petitioner relies on Figure 2 not to calculate a particular value for Δ_T, but to disclose "a sheet having no or a very small Δ_T" as a result of "symmetrical temperature distribution around the melt, the growth zone, and the growing crystalline body." Pet. 56, 51 (citing Ex. 1014, 3:23–32), 56; Reply 21 ("a sheet having no or *de minimis* Δ_T as shown in Fig. 2"); Ex. 1032, 69:3–6 (Dr. Derby stating "the value of Δ_T indicated by this drawing would be nearly zero"). On this complete record, we are persuaded by Petitioner's arguments and Dr. Bruni's testimony, particularly, Dr. Bruni's calculations and explanations regarding how to determine Δ_T based on the disclosures of LaBelle '348 and LaBelle '636. Ex. 1002 ¶¶ 115–130.

We also accept, on this record, Petitioner's arguments and Dr. Bruni's testimony regarding a skilled artisan's motivation to combine the references to produce a smooth, flat sheet having the claimed dimensions and Δ_T. Pet. 39; Ex. 1002 ¶ 98. Petitioner's proposed combination relies primarily on Harris, which Petitioner argues discloses most of the limitations of the base independent claims. Petitioner relies on LaBelle '636 and Chalmers for details of the EFG process that would lead to the claimed dimensions and Δ_T. We are in agreement that such processes would lead to the claimed dimensions and Δ_T, which Dr. Bruni opines would be obvious to one of ordinary skill in the art, because Dr. Bruni persuasively details the mathematical and analytical steps he took to arrive at his conclusion. Ex. 1002 ¶¶ 119–126.

I. Asserted Obviousness Over Harris, LaBelle '636, Chalmers, and LaBelle '348 (Ground 6)

Petitioner contends that claims 17–20 would have been obvious over Harris in view of LaBelle '636, Chalmers, and LaBelle '348. Pet. 62–64. Each of the claims challenged under this ground contains a limitation directed to the variation in thickness of the single crystal sheet.

Petitioner relies on arguments presented in Section V.E (Ground 5) of the Petition to argue that the combination of these references discloses all the limitations of independent claim 11 and dependent claim 16, from which these challenged claims depend. *Id.* at 62–63. Petitioner argues that one of ordinary skill in the art would have considered it obvious that "performing the EFG process disclosed in the combination of the Harris article, LaBelle '636, and the Chalmers/LaBelle article using a die of rectangular cross-section, as disclosed in LaBelle '348, will yield a sheet of rectangular or

substantially rectangular cross-section determined by the cross-section of the die," and that "the surfaces of the sheet will be exceptionally flat and smooth." *Id.* at 64.

Patent Owner argues that Petitioner "has failed its burden of demonstrating obviousness," in that its "variation in thickness" arguments are deficient for the reasons discussed in the Response Section IX, and in that its "Δ_T of 'not greater than 4.0 cm'" arguments are deficient for the reasons discussed in the Response Section XI. PO Resp. 51–52. Patent Owner also argues that Petitioner "has not articulated any motivation or any reasonable expectation of success in combining" the relied-upon references. *Id.* at 52.

Petitioner replies by relying on its rebuttal to Patent Owner's arguments presented in the Reply Section III. Reply 22.

On the complete record, and for substantially the same reasons given above in our analysis of Ground 3 and Ground 5, we are persuaded that the arguments made in the Petition are adequate and supported by Dr. Bruni's testimony. As discussed in Ground 3, the arguments regarding calculations to determine the variations in thickness of the sheet based on the disclosures of LaBelle '348 and LaBelle '636 are supported adequately by Petitioner's arguments and testimony. Ex. 1002 ¶¶ 90–98. As articulated above, we are not persuaded that such variances in thickness, which Dr. Bruni opines would have been obvious to produce, would have required undue experimentation. We also find the testimony regarding Dr. Bruni's calculations for the claim 11-dependent limitations generally supported, as discussed in Ground 5. Ex. 1002 ¶¶ 115–130.

J. Objective Indicia

Before we make a final obviousness determination, we must consider the evidence of obviousness in light of any evidence of secondary considerations of nonobviousness presented by Patent Owner. *See Graham*, 383 U.S. at 17–18 ("Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented. As indicia of obviousness or nonobviousness, these inquiries may have relevancy."); *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349 (Fed. Cir. 2012) ("This objective evidence must be 'considered as part of all the evidence, not just when the decisionmaker remains in doubt after reviewing the art.'" (quoting *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538–39 (Fed. Cir. 1983))).

Patent Owner argues that failure of others, copying, and commercial success demonstrate the nonobviousness of the challenged claims. PO Resp. 52–58. Petitioner disagrees. Reply 22–24.

i. Commercial Success

"When a patentee can demonstrate commercial success, usually shown by significant sales in a relevant market, and that the successful product is the invention disclosed and claimed in the patent, it is presumed that the commercial success is due to the patented invention." *J.T. Eaton & Co. v. Atl. Paste & Glue Co.*, 106 F.3d 1563, 1571 (Fed. Cir. 1997); *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1329 (Fed. Cir. 2016). "Demonstrating that an invention has commercial value, that it is commercially successful, weighs in favor of its non-obviousness." *WBIP*, 829 F.3d at 1337.

We begin with the required nexus inquiry. *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 305 n.42 (Fed. Cir. 1985), *cert. denied*, 475 U.S. 1017 (1986) ("Case law requires that a nexus be established between the merits of the claimed invention and the evidence proffered on secondary considerations, if the evidence on secondary considerations is to be given substantial weight in the calculus of obviousness/nonobviousness"). The presumption of nexus between the proffered evidence and the merits of the claimed invention (*see J.T. Eaton,* 106 F.3d at 1571*)* is rebuttable, as "a patent challenger may respond by presenting evidence that shows the proffered objective evidence was 'due to extraneous factors other than the patented invention.'" *WBIP*, 829 F.3d at 1329 (quoting *Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1393 (Fed. Cir. 1988)). Such evidence may include, for example, demonstrating the commercial success "is due to an unclaimed feature," or if such feature "was known in the prior art." *Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1312 (Fed. Cir. 2006); *see also Richdel, Inc. v. Sunspool Corp.*, 714 F.2d 1573, 1580 (Fed. Cir. 1983) (holding the claims obvious despite a purported showing of commercial success when the patentee failed to show the "commercial success [] its marketed system enjoyed was due to anything disclosed in the patent in suit which was not readily available in the prior art"). To establish a proper nexus between a claimed invention and the commercial success of a product, a patent owner must offer proof that the sales were a direct result of the unique characteristics of the claimed invention, and not a result of economic and commercial factors unrelated to the quality of the patented subject matter. *In re Applied Materials, Inc.*, 692 F.3d 1289, 1299–1300 (Fed. Cir. 2012). If the feature that created the

commercial success was known in the prior art, the success is not pertinent to the issue of obviousness. *Galderma Labs., L.P. v. Tolmar, Inc.*, 737 F.3d 731, 740 (Fed. Cir. 2013).

Patent Owner argues that a nexus is presumed here, "because Patent Owner's EFG™ Sheet Products and CLASS® Sheet Products practice the challenged claims of the '469 patent." PO Resp. 53 (citing Ex. 2009 ¶¶ 203–215). Patent Owner presents arguments mapping elements of the challenged claims, namely, "sapphire single crystal"/ "single crystal sheet," the dimension elements, "substantially transparent in the infrared and visible wavelength spectrums" in claims 24, 35, and 36, and "at least part of a window" in claim 44, to the products sold by Patent Owner. *Id.* at 53–56.

Petitioner replies that the presumption of nexus is easily rebutted, because it is "well-established that additional features/aspects *not* in the claims may generate commercial success." Reply 22–23 (citing *WBIP*, 829 F.3d at 1329). The Federal Circuit has explained that "[t]his is true even when the product has additional, unclaimed features." *PPC Broadband, Inc. v. Corning Optical Commc'ns RF, LLC*, 815 F.3d 734, 747 (Fed. Cir. 2016). Even if unclaimed features do not prevent the presumption of a nexus, however, they may be the basis for rebutting the presumption. *Id.* To do so, a person challenging patent validity must show that the commercial success, or other objective evidence of non-obviousness, was due to "extraneous factors" including "additional unclaimed features." *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1072 (Fed. Cir. 2018). Petitioner points to the inventors' declarations including, as "innovative improvements described in the specification," the features of "circular crucible, a new heat shield, and special graphite shielding." *Id.* at 23 (citing Ex. 1008, 92–93).

Here, we determine that insufficient nexus exists between the evidence surrounding Patent Owner's sheet products and the merits of the challenged claims, because the claimed features were already disclosed in the prior art. *In re Kao*, 639 F.3d 1057, 1068 (Fed. Cir. 2011) ("Where the offered secondary consideration actually results from something other than what is both claimed and *novel* in the claim, there is no nexus to the merits of the claimed invention."). Specifically, as set forth in our discussion regarding Patel, the features of the claimed invention were known in the prior art. *See supra*. In view of such express disclosure in the prior art, the claimed features were indeed known. Under such circumstances, we find an insufficient nexus between the proffered evidence and the merits of the claimed invention.

Moreover, even assuming there is sufficient nexus, we still find Patent Owner's evidence insufficient to establish commercial success. Specifically, Patent Owner does not provide sufficient evidence regarding its products' market share. First, Patent Owner does not make clear what it believes the relevant market to be, nor the size or volume of the relevant market. Instead, Patent Owner presents evidence that it was the sole supplier of sapphire sheets to Lockheed Martin, and obtained "strong revenue." PO Resp. 58. Such sparse evidence, particularly in the absence of a defined market, is inadequate to establish commercial success. *See Ex parte Jellá*, 90 USPQ 1009, 1012 (BPAI 2008) (precedential) ("[G]ross sales figures do not show commercial success absent evidence as to market share . . . or as to the time period during which the product was sold, or as to what sales would normally be expected in the market"). According to the Federal Circuit, "the more probative evidence of commercial success relates to whether the sales

represent 'a substantial quantity in th[e] market.'" *Applied Materials*, 692 F.3d at 1300 (quoting *In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996)). Patent Owner offers no evidence of the size of the market against which to measure sales.

In sum, after considering the fully developed record evidence, we are not persuaded that Patent Owner's commercial success arguments weigh in favor of nonobviousness to any significant degree.

ii. Failure of Others

Patent Owner argues that "no other entity in the world was able to manufacture sheets of the claimed thicknesses, widths, lengths and single crystal form until Patent Owner did so in late 2003." PO Resp. 56. Dr. Bruni, according to Patent Owner, corroborates this with his testimony regarding the challenges "faced in growing sheets with the characteristics and size in the claims of the '469 patent." *Id.* (citing *id.* Section III).

Petitioner replies that the evidence provided by Patent Owner in support of its "failure of others" assertion "is of specific contracts and a party-employee declaration," which is "without support and making a legal conclusion." Reply 24.

As we have noted above, particularly regarding Patel, a crystal sheet with the properties claimed was available in the prior art. Accordingly, it is not clear from Patent Owner's arguments how others failed in making a sheet as described in the challenged claims. Moreover, Patent Owner's evidence of the difficulties encountered by others in making such a crystal sheet is not particularly probative of the failure of others. Although Dr. Bruni does testify that the process was challenging (*see also* PO Resp. Section III), it appears that at least Patel discloses a sheet that was able to be

made prior to the critical date. In short, the record contains insufficient evidence demonstrating that others attempted to develop a single crystal sapphire sheet and failed in the attempt prior to the '469 patent. Accordingly, we give little weight to Patent Owner's evidence that others attempted but failed to develop a single crystal sapphire sheet prior to the '469 patent. Thus, the failure of others factor does not weigh in favor of a finding of nonobviousness.

iii. Copying

Copying requires evidence of "efforts to replicate a specific product, which may be demonstrated through internal company documents, direct evidence such as disassembling a patented prototype, photographing its features, and using the photograph as a blueprint to build a replica, or access to the patented product combined with substantial similarity to the patented product." *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1246 (Fed. Cir. 2010); *accord Tokai Corp. v. Easton Enters., Inc.*, 632 F.3d 1358, 1370 (Fed. Cir. 2011).

Patent Owner argues Petitioner's subsidiary company undertook efforts to copy Patent Owner's invention. PO Resp. 57. More particularly, Patent Owner cites to Dr. Bruni's testimony about the efforts of the subsidiary "to grow sheets of the widths and thicknesses and characteristics" of the challenged patent claims. *Id.* (citing Ex. 2013, 16:17–20:20, 23:21–28:8, 30:1–33:9, 34:1–24, 48:4–49:15, 50:13–54:22, 98:4–103:18; Ex. 2009 ¶¶ 117–124; Ex. 2009 ¶¶ 118–124 (summary)). Patent Owner also points to the subsidiary's hiring of Dr. David Shum, a former employee of Patent Owner, and Dr. Shum's work with Dr. Bruni as evidence of copying. *Id.*

On this record, we are not persuaded by Patent Owner's evidence, and we accord minimal weight to Patent Owner's evidence of copying. Patent Owner's evidence indicates that Dr. Bruni used his own previously developed software on a machine provided to him, thereby undercutting assertions of copying. *See, e.g.*, Ex. 2013, 24:12–15, 34:17–24, 99:8–103:18. Although we recognize that both Patent Owner's product and Petitioner's product are single sheet sapphire crystals, we credit Dr. Bruni's testimony that he worked on his crystals using his own software. We are not presented with any evidence of internal company documents, direct evidence such as disassembling a patented prototype, photographing its features, and using the photograph as a blueprint to build a replica, or access to the patented product combined with substantial similarity to the patented products. The absence of such evidence indicative or suggestive of improper copying, in our view, is consistent with Petitioner's actions being attempts to create its own large single crystal sapphire sheet, and not merely to copy. Moreover, the claims at issue here are not directed to a particular method of making a product, but instead are directed to a particular product with certain characteristics, and we are not presented with significant evidence regarding copying of a particular product, but rather, evidence that others desirous of large single-crystal sapphire sheets were developing their own methodology. Taking all of these facts into consideration, Patent Owner's evidence of copying is entitled to minimal weight.

K. Conclusions of Obviousness (Grounds 2–6)

We have reviewed Petitioner's obviousness grounds, including proffered evidence, and Patent Owner's arguments and proffered evidence, including evidence of objective indicia, in determining that the claims

challenged under Grounds 2, 3, 5 (apart from claim 24), and 6 are unpatentable by a preponderance of the evidence.

On balance, in view of the strength of the evidence in favor of obviousness for each of claims 1, 2, 4–9, 11–14, 16–23, and 25–43, and the deficiencies in the evidence relied on as supporting the contended objective indicia of patentability, we determine that Petitioner has established by a preponderance of the evidence that the subject matter of claims 1, 2, 4–9, 11–14, 16–23, and 25–43 is unpatentable. As to claims 24 and 44, however, we determine that Petitioner failed to establish by a preponderance that the subject matter is unpatentable.

L. Real Party-in-Interest

A petition must identify all real parties in interest ("RPIs"). 35 U.S.C. § 312(a)(2). The petitioner bears the burden of persuasion to show that it accurately names all RPIs. *Applications in Internet Time, LLC v. RPX Corp.*, 897 F.3d 1336, 1343 (Fed. Cir. 2018) (citing *Zerto, Inc. v. EMC Corp.*, IPR2014-01295, Paper 34 at 6–7 (PTAB Mar. 3, 2015). We generally accept a petitioner's initial identification of its RPIs unless the patent owner presents some evidence to support its argument that an unnamed party should be included as an RPI. *Worlds Inc. v. Bungie, Inc.*, 903 F.3d 1237, 1242 (Fed. Cir. 2018).

Whether a particular entity is an RPI is a "highly fact-dependent question" that is assessed "on a case-by-case basis." Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,759 (Aug. 14, 2012) ("TPG"). We consider multiple factors, including the following: whether a non-party is funding, directing, or controlling the IPR; whether the non-party had the ability to exercise control; the non-party's relationship with the petitioner

and with the petition, including any involvement in the filing; and the nature of the entity filing the petition. TPG, 77 Fed. Reg. at 48759–60.

Patent Owner argues that the Petition should be dismissed for failure to name a real party-in-interest. PO Resp. 59. More particularly, Patent Owner argues that "II-IV Optical Systems, Inc. is a 'clear beneficiary' of this proceeding with a 'preexisting, established relationship' with Petitioner, and thus Petitioner should have identified it as a real party-in-interest." *Id.* Patent Owner presents a statement by a II-IV Optical Systems, Inc. representative regarding the impact of a potential enjoinder on II-IV Optical Systems, Inc. from making its sapphire windows (*see* Ex. 2024, 5 (declaration of Andrew Riser, General Manager at II-IV Optical Systems, Inc.)) and agreements between II-IV Optical Systems, Inc., and Lockheed to argue that II-IV Optical Systems, Inc. is a financial beneficiary of the outcome of this proceeding (Ex. 2025, 3 (declaration of Sandra Lucero, business operations manager for II-VI Optical Systems, Inc.)). *Id.* at 59–60.

Petitioner replies that there is no time-bar in this case, the civil suit against Petitioner was filed well after this IPR, and summary judgment against Patent Owner was granted in that case. Reply 24–25. Petitioner further replies: "Optical is a wholly owned subsidiary of II-VI. Optical did not and cannot exercise control over Petitioner in this proceeding. Optical did not fund or direct this petition." *Id.* at 25. We are not aware of any evidence that contradicts Petitioner's assertions on these matters.

We agree with Petitioner that II-IV Optical Systems, Inc. is not an unnamed RPI. The record contains no evidence of specific communications between Petitioner and II-IV Optical Systems, Inc. regarding this proceeding or the preparation of the Petition filed in this proceeding. There is also no

specific evidence that the Petition was filed at II-IV Optical Systems, Inc.'s behest or to benefit II-IV Optical Systems, Inc. To the contrary, as Petitioner notes, Petitioner filed the Petition prior to Patent Owner's lawsuit against Petitioner and II-IV Optical Systems, Inc. Reply 25. Moreover, it appears that II-IV Optical Systems, Inc., is a wholly-owned subsidiary of Petitioner. Thus, the evidence and arguments advanced by Petitioner lead us to determine that II-IV Optical Systems, Inc. is not an unnamed RPI to this proceeding.

III. MOTIONS TO SEAL

Patent Owner and Petitioner each filed Motions to Seal certain papers and exhibits. Paper 34 (Patent Owner); Paper 42 (Petitioner).

In its Motion to Seal, Patent Owner seeks to seal the confidential version of the Patent Owner Response (Paper 33), as well as Exhibit 2009 (Declaration of Jeffrey J. Derby, Ph.D, filed in redacted and unredacted forms), Exhibit 2013 (Deposition Transcript of Frank J. Bruni, Ph.D., filed in redacted and unredacted forms), Exhibits 2029 and 2030 (containing confidential technical and financial information), and Exhibit 2036 (Declaration of Ajay Krishnan, filed in redacted and unredacted forms). Paper 34, 1–5. Patent Owner represents that it "will file redacted public versions of its POR and confidential exhibits concurrently with this motion except for two exhibits that are completely confidential [Exhibits 2029 and 2030]." *Id.* at 1. Patent Owner also represents that the parties agreed to a modified version of the Board's Default Protective Order, and submits a Proposed Protective Order as Appendix A, along with a redline of the Standing Protective Order as Appendix B. *Id.* at 2.

In its Motion to Seal, Petitioner seeks to seal the confidential version of the Petitioner's Reply (Paper 41), as well as Exhibit 1032 (Deposition Transcript of Jeffrey Jay Derby, filed in redacted and unredacted forms). Paper 42, 1. Petitioner represents that it has filed a non-confidential redacted version of Exhibit 1032, and a non-confidential version of Petitioner's Response. *Id*.

"There is a strong public policy for making all information filed in a quasi-judicial administrative proceeding open to the public, especially in an *inter partes* review which determines the patentability of claims in an issued patent and therefore affects the rights of the public." *Garmin Int'l v. Cuozzo Speed Techs., LLC*, IPR2012–00001, Paper 34 at 1–2 (PTAB Mar. 14, 2013). For this reason, except as otherwise ordered, the record of an *inter partes* review trial shall be made available to the public. *See* 35 U.S.C. § 316(a)(1); 37 C.F.R. § 42.14. The standard for granting a motion to seal is good cause. 37 C.F.R. § 42.54. That standard includes showing that the information addressed in the motion to seal is truly confidential, and that such confidentiality outweighs the strong public interest in having the record open to the public. *See Garmin*, Paper 34 at 2–3.

After having considered the arguments, we determine that the parties establish good cause for sealing the documents identified in the respective Motions. Specifically, the parties demonstrate that the information they seek to seal consists of portions of papers and transcript excerpts dealing with confidential technical information about the parties' products, and papers having to do with confidential material specifications. *See, e.g.*, Paper 34, 1; Paper 42, 1. The parties have also filed publicly available, redacted versions of the majority of the documents sought to be sealed. Accordingly, the

Motions are *granted* and the Proposed Protective Order (Paper 34, Appendix A) is *entered*.

There is an expectation that information will be made public where the information is identified in a final written decision, and that confidential information that is subject to a protective order ordinarily would become public 45 days after final judgment in a trial, unless a motion to expunge is granted. 37 C.F.R. § 42.56; TPG, 77 Fed. Reg. at 48,761. A party who is dissatisfied with the Final Decision may appeal the Decision pursuant to 35 U.S.C. § 141(c), and has 63 days after the date of the Decision to file a notice of appeal. 37 C.F.R. § 90.3(a). Thus, it remains necessary to maintain the record, as is, until resolution of an appeal, if any. In view of the foregoing, the confidential documents filed in the instant proceeding will remain under seal, at least until the time period for filing a notice of appeal has expired or, if an appeal is taken, the appeal process has concluded. The record for the instant proceeding will be preserved in its entirety, and the confidential documents will not be expunged or made public, pending appeal. Notwithstanding 37 C.F.R. § 42.56 and the Office Patent Trial Practice Guide, neither a motion to expunge confidential documents nor a motion to maintain these documents under seal is necessary or authorized at this time. *See* 37 C.F.R. § 42.5(b).

IV. CONCLUSION

We conclude that Petitioner has satisfied its burden of demonstrating, by a preponderance of the evidence, that the subject matter of claims 1, 2, 4–9, 11–14, 16–23, and 25–43 is unpatentable. Petitioner, however, has not satisfied its burden of demonstrating, by a preponderance of the evidence, that the subject matter of claims 24 and 44 of the ’469 patent is unpatentable.

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner establishes, by a preponderance of the evidence, that claims 1, 2, 4–9, 11–14, 16–23, and 25–43 of U.S. Patent No. RE43,469 E are unpatentable; and

FURTHER ORDERED that Petitioner fails to establish, by a preponderance of the evidence, that claims 24 and 44 of U.S. Patent No. RE43,469 E are unpatentable;

FURTHER ORDERED that Petitioner's and Patent Owner's Motions to Seal are *granted*; and

FURTHER ORDERED that this is a Final Written Decision; therefore, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2. In summary:

Claims	**35 U.S.C. §**	**Basis**	**Claims Shown Unpatentable**	**Claims Not Shown Unpatentable**
1, 2, 4, 25–27, 33–38	102(b)	Patel	1, 2, 4, 25–27, 33–38	
1, 2, 4, 5, 25–28, 33–39	103(a)	Patel, Locher, LaBelle '636	1, 2, 4, 5, 25–28, 33–39	
6–9, 29–32, 40–43	103(a)	Patel, LaBelle '348,LaBelle '636	6–9, 29–32, 40–43	

Claims	35 U.S.C. §	Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1, 2, 4, 5, 25–28, 33–39, 44	103(a)	Saint-Gobain, Locher, LaBelle ’636, Kyocera, Window and Dome, Journal of Crystal Growth		1, 2, 4, 5, 25–28, 33–39, 44
11–14, 16, 21–24	103(a)	Harris, LaBelle ’636, Chalmers	11–14, 16, 21–23	24
17–20	103(a)	Harris, LaBelle ’636, Chalmers, LaBelle ’348	17–20	
Overall Outcome			1, 2, 4–9, 11–14, 16–23, 25–43	24, 44

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