Trials@uspto.gov
571-272-7822

Paper 21
Entered: April 10, 2025

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.,
Petitioner,

v.

SIONYX, LLC,
Patent Owner.

IPR2024-01431
Patent 11,069,737 B2

Before GEORGIANNA W. BRADEN, MONICA S. ULLAGADDI, and BRIAN D. RANGE, *Administrative Patent Judges*.

RANGE, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Samsung Electronics Co., Ltd. ("Petitioner") filed a Petition requesting *inter partes* review of claims 1–29 and 31–55 of U.S. Patent No. 11,069,737 B2 (Ex. 1001, "the '737 patent"). Paper 1 ("Pet.").[1] SiOnyx, LLC ("Patent Owner") filed a Preliminary Response. Paper 11 ("Prelim. Resp."). With our authorization (Exs. 3001, 3002), Patent Owner filed a Supplemental Submission regarding *Fintiv* discretionary denial (Paper 14, "PO *Fintiv* Supp."), Petitioner filed a Response (Paper 17, "Pet. *Fintiv* Resp."), and Patent Owner filed a Surreply (Paper 18, "PO *Fintiv* SurReply").

Patent Owner disclaimed claims 1, 7–27, 29–32, and 38–55 of the '737 patent. Prelim. Resp. 1 (citing Ex. 2002; Ex. 2003). In view of this disclaimer, claims 2–6, 28, and 33–37 of the '737 patent (the "challenged claims") remain at issue. Also, Petitioner withdraws ground A-3 (§ 103 challenge based on Haddad138 and Jiang) from this *inter partes* review. Pet. *Fintiv* Resp. 2. Thus, only grounds A-1 (§ 102 or § 103 challenge based on Haddad138) and B-1 (§ 102 or § 103 challenge based on Yap) remain relevant in this *inter partes* review. *Id.*

Under 35 U.S.C. § 314(a), an *inter partes* review may not be instituted unless the information presented in the petition "shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." The following findings of fact and conclusions of law are not final, but are made for the sole purpose

[1] Petitioner calls "IPR2024-01431 ('Petition B')." *See* Paper 3 (PETITIONER'S EXPLANATION OF PARALLEL PETITIONS CHALLENGING U.S. PATENT NO. 11,069,737), 1.

of determining whether Petitioner meets the threshold for instituting review. Any final decision shall be based on the full trial record, including any response timely filed by Patent Owner. Any arguments not raised by Patent Owner in a timely filed response may be forfeited.

For the reasons stated below, we determine that Petitioner has established a reasonable likelihood that it would prevail with respect to at least one claim. We hereby institute an *inter partes* review as to claims 2–6, 28, and 33–37 of the '737 patent based upon Petitioner's asserted challenges to patentability.

II. BACKGROUND

A. Related Matters

The parties identify a proceeding with the International Trade Commission ("ITC") and a district court case that involve the '737 patent: *Sensors with Pixels and Products Containing the Same*, Inv. No. 337-TA-1403 (ITC) and *SiOnyx, LLC v. Samsung Electronics, Co., Ltd.*, 2:24-cv-00291 (E.D. Tex.). Pet. 4; Paper 5, 2.

Petitioner filed a parallel petition for *inter partes* review of the '737 patent in IPR2024-01430, which challenges claims 1–55. Petitioner will, however, withdraw the Petition in IPR2024-01430. Pet. *Fintiv* Resp. 2.

B. The '737 patent

The '737 patent is titled "Shallow Trench Textured Regions and Associated Methods." Ex. 1001, code (54). The '737 patent describes a photosensitive imager device that includes a semiconductor layer, multiple doped regions, and a texture region that interacts with electromagnetic radiation. *Id.* at code (57). The '737 patent explains that silicon imaging devices can be used in devices such as digital cameras and cell phones with

front side illumination (FSI) or backside illumination (BSI). *Id.* at 1:17–39, 3:54–67. These devices for detecting infrared incident electromagnetic radiation, however, have been problematic "because silicon is an indirect bandgap semiconductor having a bandgap of about 1.1 eV" resulting in low radiation absorption, and the '737 purports to resolve such deficiency. *Id.* at 1:30–46, 5:16–37, 6:25–28.

Figure 2 of the '737 patent, reproduced below, is a cross-sectional view of an image sensor. *Id.* at 2:56–58.

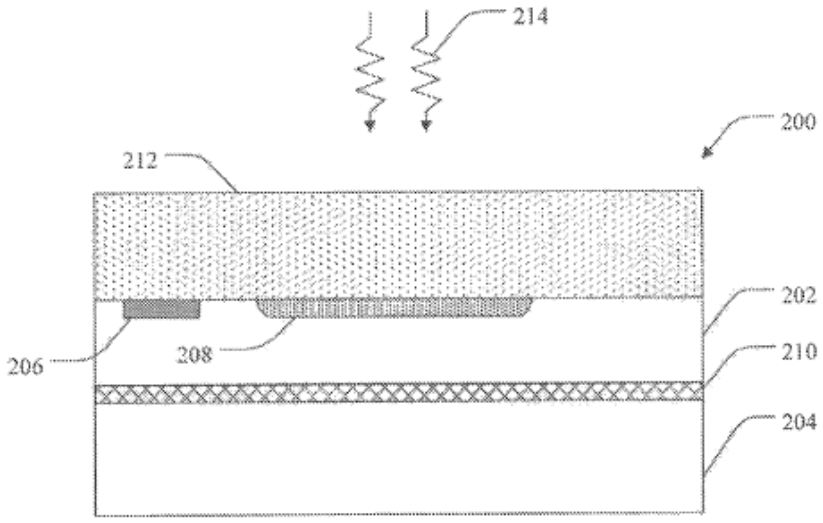

FIG. 2

Figure 2 illustrates a cross-sectional view of an image sensor. *Id.* at 2:56–58.

The image sensor depicted in Figure 2 is FSI device 200 having semiconductor layer 202, which includes doped regions 206, 208 and is coupled to support substrate 204. *Id.* at 6:33–37. Textured layer 210 with shallow trench isolation (STI) surface features is positioned between semiconductor layer 202 and support substrate 204. *Id.* at 6:37–39. Circuitry layer 212 is coupled to semiconductor layer 202 on opposite side of support substrate 204 such that light 214 passes through circuitry layer 212 first and

light that is not absorbed is redirected back via textured layer 210, "thus allowing light to be absorbed in a subsequent pass." *Id.* at 6:39–48.

Intervening layers can be present between the semiconductor layer and the support substrate to facilitate bonding. *Id.* at 8:6–8. Furthermore, a light reflecting layer can be disposed between any of the layers. *Id.* at 8:52–63. The surface features of the textured layer can be produced by etching to create shapes such as pyramids. *Id.* at 8:64–66, 9:27–33. The textured layer can diffuse and redirect light to increase quantum efficiency of the device, and for example, "the semiconductor layer can absorb from about 25% to about 40% of incident 940 nm light." *Id.* at 9:21–23, 11:41–52.

C. Illustrative Claims

Claim 2 (which is dependent upon and incorporates the limitations of disclaimed claim 1) is an illustrative claim. The other challenged claims are claims 3–6 which depend from claim 1, claim 28 which depends from claim 26, and claims 33–37 which depend from claim 32. *See* Ex. 1001, 13:13–24, 14:29–31, 14:56–67.

Claims 1 and 2 (with Petitioner's identifiers of claim elements, *see* Pet. iv–xii) are reproduced below.

> 1. [1Preamble] A photosensitive imager device capable of detecting visible and infrared electromagnetic radiation, comprising:
>
> [1a] a semiconductor layer having a light incident side and an opposed side, said semiconductor layer having multiple doped regions forming at least one junction,
>
> [1b] a textured region comprising a plurality of surface features configured to interact with incident electromagnetic radiation so as to increase the quantum efficiency of the device, wherein the surface features are arranged according to a pattern,

[1c] a support substrate coupled to said semiconductor layer, and

[1d] a first bonding layer disposed between the semiconductor layer and the support substrate.

2. The device of claim 1, wherein the textured region is located on the light incident side of the semiconductor layer.

Ex. 1001, 12:66–13:14.

D. Asserted Grounds of Unpatentability

Petitioner, supported by the declaration of Michael Lebby, Ph.D. (Ex. 1004), asserts[2] the following grounds of unpatentability (Pet. 5–6):[3]

Ground	Claims Challenged		35 U.S.C. §	References/Basis
A-1	2–6, 33–37		102, 103	Haddad138[4]
B-1	28		102, 103	Yap[5]

[2] Petitioner's grounds A-2, A-5, A-6, and B-2 are no longer at issue because Patent Owner disclaimed all of the '737 patent claims that these grounds address. Ex. 2002; Ex. 2003. Petitioner's ground A-3 is no longer at issue because Petitioner withdraws that ground. Pet. *Fintiv* Resp. 2. For the remaining two grounds, we list only the claims still at issue.

[3] The relevant sections of the Leahy-Smith America Invents Act ("AIA"), Pub. L. No. 112–29, took effect on March 16, 2013. The '737 patent claims priority to provisional Application No. 61/841,326, which was filed after this date. *See* Ex. 1001, codes (63), (60). For the purposes of this Decision, the AIA statutes apply.

[4] US 2011/0227138 A1, published September 22, 2011, Ex. 1012 ("Haddad138").

[5] US 7,928,389 B1, issued April 19, 2011, Ex. 1011 ("Yap").

III. ANALYSIS

A. Legal Standard

A claim may be invalid as anticipated by a prior art reference if "each and every limitation is found either expressly or inherently in a single prior art reference." *Sanofi–Synthelabo v. Apotex, Inc.,* 470 F.3d 1368, 1375 (Fed. Cir. 2006) (quoting *Celeritas Techs. Ltd. v. Rockwell Int'l Corp.*, 150 F.3d 1354, 1361 (Fed. Cir.1998)). Anticipation under § 102 may be established by showing, as a matter of fact, that all elements arranged as specified in a claim are disclosed within the four corners of a reference, either expressly or inherently, in a manner enabling one skilled in the art to practice an embodiment of the claimed invention without undue experimentation. *See ClearValue, Inc. v. Pearl River Polymers, Inc.*, 668 F.3d 1340, 1344 (Fed. Cir. 2012).

A patent claim is unpatentable as obvious under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and "the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains." 35 U.S.C. § 103; *see 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 in evidence, objective evidence of nonobviousness.[6] *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

[6] Neither party addresses objective evidence of nonobviousness at this time.

B. Level of Ordinary Skill in the Art

In order to determine whether an invention would have been obvious at the time the application was filed, we consider the level of ordinary skill in the pertinent art at the critical time. *Graham*, 383 U.S. at 17. The resolution of this question is important because it allows us to "maintain[] objectivity in the obviousness inquiry." *Ryko Mfg. Co. v. Nu–Star, Inc*., 950 F.2d 714, 718 (Fed. Cir. 1991). In assessing the level of ordinary skill in the art, various factors may be considered, including the "type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field." *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (quotation omitted). Generally, it is easier to establish obviousness under a higher level of ordinary skill in the art. *Innovention Toys, LLC v. MGA Entm't, Inc*., 637 F.3d 1314, 1323 (Fed. Cir. 2011) ("A less sophisticated level of skill generally favors a determination of nonobviousness . . . while a higher level of skill favors the reverse.").

> Petitioner asserts that a person of ordinary skill in the art (POSITA) would have had a Bachelor's degree in engineering, physics, or a related or equivalent field, and two or more years of experience researching, developing, designing, and/or evaluating image sensors using photonics. Ex-1004 ¶50. A person with less or different education but more relevant practical experience, or vice versa, may also meet this standard. Ex-1004 ¶50.

Pet. 9. Patent Owner does not dispute the level of ordinary skill in the art at this time.

For purposes of this Decision, we adopt Petitioner's proposal as

reasonable and consistent with the prior art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (the prior art may reflect an appropriate level of skill in the art).

C. Claim Construction

In an *inter partes* review proceeding based on a petition filed on or after November 13, 2018, a patent claim shall be construed 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) (as amended Oct. 11, 2018). This rule adopts the same claim construction standard used by Article III federal courts, which follow *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc), and its progeny. Under this standard, the words of a claim are generally given their "ordinary and customary meaning," which is the meaning the term would have to a person of ordinary skill at the time of the invention, in the context of the entire patent including the specification. *See Phillips*, 415 F.3d at 1312–13.

Petitioner does not assert that any claim terms require express construction for purposes of this Decision. Pet. 9.

At this stage of the proceeding, Patent Owner also does not propose that the Board explicitly construe any claim terms.

We determine that no claim terms require express construction for purposes of this Decision. *See, e.g.*, *Nidec Motor Corp. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) ("[W]e need only construe terms 'that are in controversy, and only to the extent necessary to resolve the controversy.'" (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

Although we determine that the Petition is sufficient for institution without engaging in express claim construction at this time, Patent Owner's arguments raise two potential claim construction issues that the parties may wish to address at trial. First, Patent Owner argues that Haddad138 does not teach or suggest "the light incident side of the semiconductor layer." Prelim. Resp. 5–9. At trial, we ask the parties to address whether the "light incident side" claim recitation structurally limits claim scope or, instead, recites non-limiting intended use. If the "light incident side" recitation is limiting, we ask the parties to address how this language structurally limits claim scope. Second, Patent Owner also argues that Yap's pyramid shapes are not a "plurality of surface features" as claims 26 and 28 recite. The parties may wish to further address claim construction of "plurality of surface features" at trial.

D. Discretionary Denial Under 35 U.S.C. § 314(a)

Patent Owner argues that, pursuant to *Apple Inc. v. Fintiv, Inc.*, IPR2022-00019, Paper No. 11 (precedential) ("*Fintiv*"), the Board should deny institution "because it would cause the parties and the Board to incur significant inefficiencies and risk inconsistent outcomes." PO *Fintiv* Supp. 1. Patent Owner argues that each of the six *Fintiv* factors supports discretionary denial. *Id.* at 3–5. Petitioner argues that *Fintiv* does not support discretionary denial. *See* Pet. *Fintiv* Resp., *passim*.

Below, we address the framework we apply to resolve these arguments, address each of the six *Fintiv* factors, and assess whether discretionary denial is appropriate.[7]

1. Legal Background and Framework

Under 35 U.S.C. § 314(a), the Director has discretion to deny institution. In determining whether to exercise discretion on behalf of the Director, we look to, for example, the guidance provided in *NHK Spring Co. v. Intri-Plex Technologies, Inc.*, IPR2018-00752, Paper 8 (PTAB Sept. 12, 2018) (precedential), and *Fintiv*.

Fintiv sets forth six non-exclusive factors for determining "whether efficiency, fairness, and the merits support the exercise of authority to deny institution in view of an earlier trial date" in a parallel proceeding. *Fintiv*, Paper 11 at 6. These factors consider:

> 1. whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted;
>
> 2. proximity of the court's trial date to the Board's projected statutory deadline for a final written decision;
>
> 3. investment in the parallel proceeding by the court and the parties;
>
> 4. overlap between issues raised in the petition and in the parallel proceeding;

[7] On June 21, 2022, the Director of the United States Patent and Trademark Office entered a Guidance Memorandum relating to discretionary denials under *Fintiv*. On February 28, 2025, the Office withdrew that guidance. We, thus, do not consider the June 21, 2022, Guidance Memorandum in our determination.

> 5. whether the petitioner and the defendant in the parallel proceeding are the same party; and
>
> 6. other circumstances that impact the Board's exercise of discretion, including the merits.

Id.

Fintiv recognizes that there is some overlap between the identified factors and that some facts may be relevant to more than one factor. *Fintiv*, Paper 11 at 6. "Therefore, in evaluating the factors, the Board takes a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review." *Id.*

2. Background

On April 30, 2024, Patent Owner initiated an ITC action[8] against Petitioner. Ex. 2002; *see* PO *Fintiv* Supp. 1. The ITC set a hearing date of May 5, 2025, initial determination date of September 5, 2025, and target date for completion of investigation of January 5, 2026. PO *Fintiv* Supp. 1–2, 4.

3. Fintiv Factor One: Stay

Patent Owner argues that factor one favors discretionary denial because there is no stay in the ITC. PO *Fintiv* Supp. 3–4. Petitioner argues this factor is neutral because there is no stay in the ITC but Patent Owner's district court case against Petitioner is stayed. Pet. *Fintiv* Resp. 5.

Fintiv instructs that "[a] district court stay of litigation pending resolution of the PTAB trial allays concerns about inefficiency." *Fintiv* at 6. But where the district court stay is a stay pending conclusion of the ITC

[8] The action is captioned *Sensors with Pixels and Products Containing the Same*, Inv. No. 337-TA-1403 (ITC) ("the ITC Investigation"). *See* Pet. 4.

Investigation, *Fintiv* suggests our focus should be on "whether the patentability disputes before the ITC will resolve all or substantially all of the patentability disputes between the parties, regardless of the stay." *Fintiv* at 9. We address *Fintiv* factor four (overlap) below.

We determine that, given *Fintiv*'s explanation of this scenario, the weight of the district court's stay pending the ITC Investigation and the weight of the lack of a stay of in the ITC Investigation itself depends, in part, on factor four. Thus, we determine that factor one, by itself, is neutral or bears little weight in our overall analysis, but consideration of the district court stay elevates the importance of factor four.

4. Fintiv Factor Two: Proximity of Trial Date

Patent Owner argues that the ITC Investigation has a target completion date of January 5, 2026, which is more than three months before the statutory deadline for a final written decision (April 22, 2026) if this *inter partes* review were instituted. PO *Fintiv* Supp. 4. Petitioner notes that while ITC trial "is imminent," the district court case is stayed. Pet. *Fintiv* Resp. 5.

The Board often considers the ITC target date when considering this *Fintiv* factor. *See, e.g., SK Innov. Co., Ltd. v. LG Chem, Ltd.*, IPR2020-01240, Paper 15, 16–17 (PTAB Jan. 12, 2021) (citing *Garmin Int'l, Inc. v. Koninklijke Philips N.V.*, IPR2020-00754, Paper 11, 12 (PTAB Oct. 27, 2020); *Comcast Cable Commc'n, LLC v. Rovi Guides, Inc.*, IPR2020-00800, Paper 10, 12–13 (PTAB October 22, 2020)). This approach aligns with the language of *Fintiv* which focuses on the difficulty of maintaining a district court action where a claim is "determined to be invalid at the ITC." *Fintiv* at 9.

Here, as Patent Owner argues, the ITC Investigation has a target completion date of January 5, 2026, which is more than three months before the statutory deadline for a final written decision (one year after the mailing of this decision; April 2025) if this *inter partes* review were instituted. Thus, proximity of trial date slightly favors discretionary denial.

5. Fintiv Factor Three: Investment in the Parallel Proceeding

Patent Owner argues that this factor favors discretionary denial because "the parties and the ITC have already invested (and will continue to invest) enormous time and resources in the ITC investigation." PO *Fintiv* Supp. 4. Patent Owner represents, and Petitioner does not dispute, that the parties "already concluded fact and expert discovery and are preparing for the hearing scheduled to take place in mere weeks." *Id.* Petitioner emphasizes that the ITC proceeding "covers only three claims of the '737 patent." Pet. *Fintiv* Resp. 5.

For this factor, *Fintiv* instructs us to consider "the amount and type of work already completed in the parallel litigation by the court and the parties at the time of the institution decision." *Fintiv* at 9. Here, the record before us supports that the ITC and Patent Owner have completed substantial work for the ITC Investigation. We thus determine that this factor favors discretionary denial.

6. Fintiv Factor Four: Overlapping Issues

Patent Owner initially argues that "the issues presented as to the validity of the '737 Patent are nearly identical" in the Petition and in the ITC. PO *Fintiv* Supp. 4.

Petitioner responds by moving to terminate its petition in IPR2024-01430, moving to withdraw Ground A-3 (§ 103 challenged based on

Haddad138 and Jiang) from its instant IPR2024-01431 petition, and stipulating that "if the Board institutes this IPR on the two remaining applicable grounds, Petitioner will not assert invalidity in parallel litigation using as primary or combination references any of the references asserted in those grounds." Pet. *Fintiv* Resp. 2. Petitioner then argues that, in view of this narrowing and the stipulation, "Petitioner has separated the grounds fully between the PTAB and the ITC." *Id.* at 4–5. Petitioner emphasizes that this IPR relies on references that the ITC will not address and that this IPR challenges eleven '737 patent claims while the ITC investigation will address only three of those eleven claims. *Id.* at 1, 4–5.

Patent Owner responds by arguing that the "Petitioner's tactical ploy does not avoid the duplication of effort and risk of inconsistent outcomes created by its overlapping positions here and in the ITC." PO *Fintiv* Surreply 1. Patent Owner argues that Petitioner already presented all of the Petition's grounds to the ITC in detail. *Id.* at 1–2. Patent Owner further argues that Petitioner's stipulation does not "extend to grounds that could have been raised in this proceeding." *Id.* at 3. Patent Owner also argues that the ITC's validity determination will decide "the fate of the remaining dependent claims at issue in the Petition." *Id.* at 4.[9]

Fintiv instructs that this factor should focus on "claims, grounds, arguments, and evidence *presented* in the parallel proceeding." *Fintiv* at 12 (emphasis added). Here, due to Petitioner's stipulation, the record does not

[9] To the extent Patent Owner's argument emphasizes that the parties have completed substantial work regarding references asserted in the petition here (PO *Fintiv* Surreply 1–3), this argument addresses to *Fintiv* factor three rather than factor four.

support that the Petition's invalidity grounds have been or will be presented to the ITC for consideration on the merits. The record also does not support that the ITC will ever adjudicate the invalidity grounds raised here[10] and does not support that the ITC will ever address the dependent claims at issue here. This is, therefore, not a situation where the ITC Investigation will "resolve key issues in the petition." *Fintiv* at 13.

Thus, this factor weighs against discretionary denial.

7. Fintiv Factor Five: Overlapping Parties

Petitioner is the same party as the respondent in the ITC investigation, and Patent Owner is the complainant in that investigation. PO *Fintiv* Supp. 5; *see also* Pet. *Fintiv* Resp. 5 ("Petitioner and Real Parties-in-Interest are Respondents in the ITC matter"). This factor favors discretionary denial.

8. Fintiv Factor Six: Other Circumstances

Patent Owner argues that this factor favors discretionary denial "Petitioner's invalidity arguments are already being considered in a parallel proceeding in its final stages." PO *Fintiv* Supp. 5. Patent Owner's argument relates to factors three and four and is not an "other circumstance[]" under *Fintiv*.

Petitioner argues that it "has established a strong case on the merits" and notes that, after the filing of the Petition, Patent Owner disclaimed 44 of the 55 claims in the '737 patent. Pet. *Fintiv* Reply 5. We do not agree that Patent Owner's disclaimer necessarily concedes Petitioner's strength on the

[10] Patent Owner argues that "Petitioner has taken the position in the ITC that Haddad138 is incorporated by reference in Carey." PO *Fintiv* Surreply 3. For purposes of this Decision, we interpret Petitioner's stipulation as forbidding Petitioner from using Haddad138 as a reference in the ITC. Ex. 1033.

merits. A patent owner might disclaim claims for a variety of reasons including efficiency or allocation of resources.

We agree with Petitioner, however, that Petitioner establishes a strong case on the merits. On the present record, the merits of the Petition are strong for the reasons we explain in Section III(F), *infra*. We emphasize that Patent Owner provides very little argument, on the merits, with regard to the Haddad138 reference. PO Resp. 3–10. Patent Owner argues that Petitioner does not establish a reason to modify or reasonable expectation of success (*id.* at 7–10), but the Haddad138 reference itself provides reason to modify. Ex. 1009 ¶ 48. Moreover, Patent Owner distinguishes Haddad138 based only on "the light incident side of the semiconductor layer" language of claim 2, and it is not clear, on this record, how "light incident side" structurally limits the scope of claim 2.

We also note that, because of Patent Owner and Petitioner both narrowing the scope of the present dispute, the burden of an *inter partes* review trial on both the parties and the Board is minimized.

Based on both the strength of the merits and minimization of burdens, this factor weighs against discretionary denial.

9. Conclusion

When considering the *Fintiv* factors, we "take[] a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review." *Fintiv* at 6. Here, *Fintiv* factor one is neutral, factor two slightly favors discretionary denial, factors three and five favor discretionary denial, and factors four and six weigh against discretionary denial.

Considering all factors as a whole, the integrity of the system will benefit from institution because of the strong merits the Petition presents

(factor six) and because the ITC Investigation will not resolve these merits (factor four). This outweighs any potential inefficiency as indicated by factors two, three, and five. We further note that any inefficiency in resolving the grounds the Petition presents is mitigated by the stay of the district court action (factor one) and the parties' narrowing of the issues in this *inter partes* review (factor six). We, thus, decline to exercise discretionary denial under 35 U.S.C. § 314(a).

E. Overview of the Asserted Art

1. Haddad138 (Exhibit 1012)

Haddad138 is titled "Photosensitive Imaging Devices and Associated Methods" and "provides broadband photosensitive diodes, pixels, and imagers capable of detecting visible as well as infrared electromagnetic radiation, including associated methods of making such devices." Ex. 1012, code (54), ¶ 45.

Figure 9 of Haddad138, reproduced below, is a schematic view of a photosensitive pixel device. *Id.* ¶ 19.

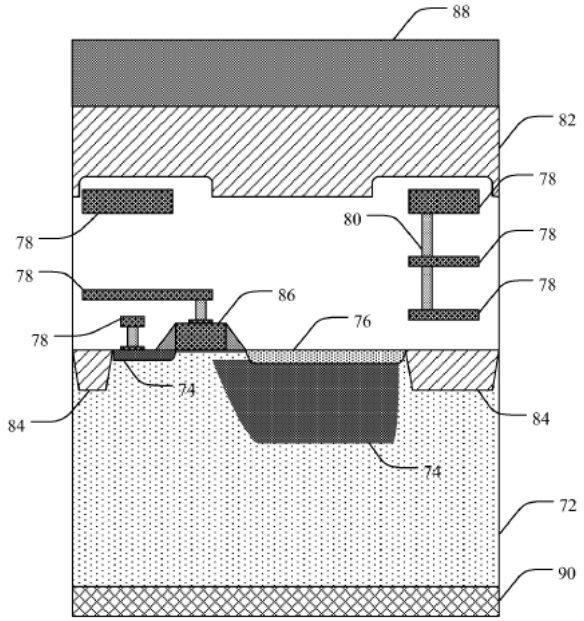

FIG. 9

Figure 9 illustrates a photosensitive pixel device. *Id.* ¶ 19.

The photosensitive pixel device illustrated in Figure 9 includes textured region 90 that is coupled to semiconductor substrate 72 opposite to the side that doped regions 74, 76 are coupled to semiconductor substrate 72. *Id.* ¶ 87. Light entering from the direction of doped regions 74, 76 passes through semiconductor substrate 72 prior to contacting textured region 90. *Id.* The photosensitive pixel device also includes carrier wafer or carrier support substrate 88, passivation layer 82, metal regions 78, and trench isolation 84 all positioned as shown in Figure 9. *Id.* ¶¶ 85–86. "[T]he textured region can function to diffuse electromagnetic radiation, to redirect electromagnetic radiation, and to absorb electromagnetic radiation, thus increasing the quantum efficiency of the device," via "surface features." *Id.* ¶ 63. An exemplary surface feature is a pyramid. *Id.*

According to Haddad138, "[p]hotosensitive imagers can be front side illumination (FSI) or back side illumination (BSI) devices, and there are

advantages and disadvantages to both architecture types." *Id.* ¶ 48. Further, a reflective layer "can be disposed between the textured region 90 and the carrier support substrate." *Id.* ¶ 88. Haddad138 discloses that the textured region can be formed by a variety of processes such as chemical etching. *Id.* ¶ 6. Further, the carrier support substrate can be coupled to the photosensitive pixel device using a bonding layer or an adhesive layer. *Id.* ¶ 86.

2. Yap (Exhibit 1011)

Yap is titled "Wide Bandwidth Infrared Detector and Imager" and "relates generally to photon detectors." Ex. 1011, code (54), 1:19–20.

Figure 9c of Yap, reproduced below, depicts a step in the fabrication process for manufacturing an optical imager. *Id.* at 3:42–43.

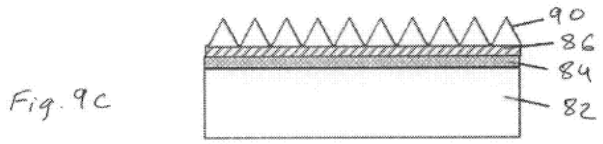

Figure 9c illustrates a step in the fabrication process for manufacturing an optical imager. *Id.* at 3:42–43.

Figure 9c shows pyramidal shapes 90 are produced via an etching process. *Id.* at 8:25–27. The optical imager also includes extractor layer 86, stop etch layer 84, and substrate wafer 82 as positioned and shown in Figure 9c. *Id.* at 8:41–45. Yap discloses that "[t]he set of pyramids act to reduce the reflection of the incident light." *Id.* at 7:18–20. Yap discloses that extractor layer 86 is "p-doped" and composed of InAsSb material, and an absorber layer 88 can be "formed on a substrate wafer 82," is "n-doped" and is "composed of InAsSb material." *Id.* at 7:41–51, Figs. 9a–9b. Pyramidal shapes 90 are formed in absorber layer 88. *Id.* at 8:25–26. In another step of the fabrication process, a planarized material 94 such as "spin on glass" is

deposited in the spaces between pyramids 90 and a carrier substrate 96 is bonded to the planarized material 94 or an adhesion layer. *Id.* at 8:44–52, Figs. 9d–9g.

F. Unpatentability Grounds

1. Alleged Unpatentability over Haddad138 (Petitioner's Ground A-1)

Petitioner asserts that claims 2–6, 28, and 33–37 are anticipated by, under 35 U.S.C. § 102(a)(1), (a)(2), or alternatively, unpatentable under 35 U.S.C. § 103 as obvious over Haddad138, citing the Declaration of Dr. Lebby for support. Pet. 5, 20–55 (citing Ex. 1004).

Because, as explained below, we determine that Petitioner adequately establishes that claims 2–6, 28, and 33–37 would have been obvious over Haddad138, we do not address the anticipation challenge at this time. We nonetheless institute on the anticipation ground pursuant to *SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018). *See PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018); 37 C.F.R. § 42.108(a).

Below, in the context of obviousness, we address limitations of claim 2 (which includes the limitations of claim 1) while addressing the remaining claims collectively.

a. *Claim 2*

Claim 2 depends from claim 1, so we first address the recitations of claim 1. Petitioner argues that Haddad138 discloses each limitation of claim 1. Pet. 20–28. Petitioner argues, for example, that Haddad138 discloses "photosensitive diodes, pixels, and imagers capable of detecting visible as well as infrared electromagnetic radiation." Pet. 21 (quoting Ex. 1012 ¶ 45). Petitioner argues that Haddad138 Figure 9 depicts claim 1's

recited semiconductor layer, textured region, and support substrate. Pet. 21–27. Petitioner illustrates this point by annotating Haddad138 Figure 9. Pet. 25. We reproduce that Haddad138 Figure 9 with Petitioner's annotations below.

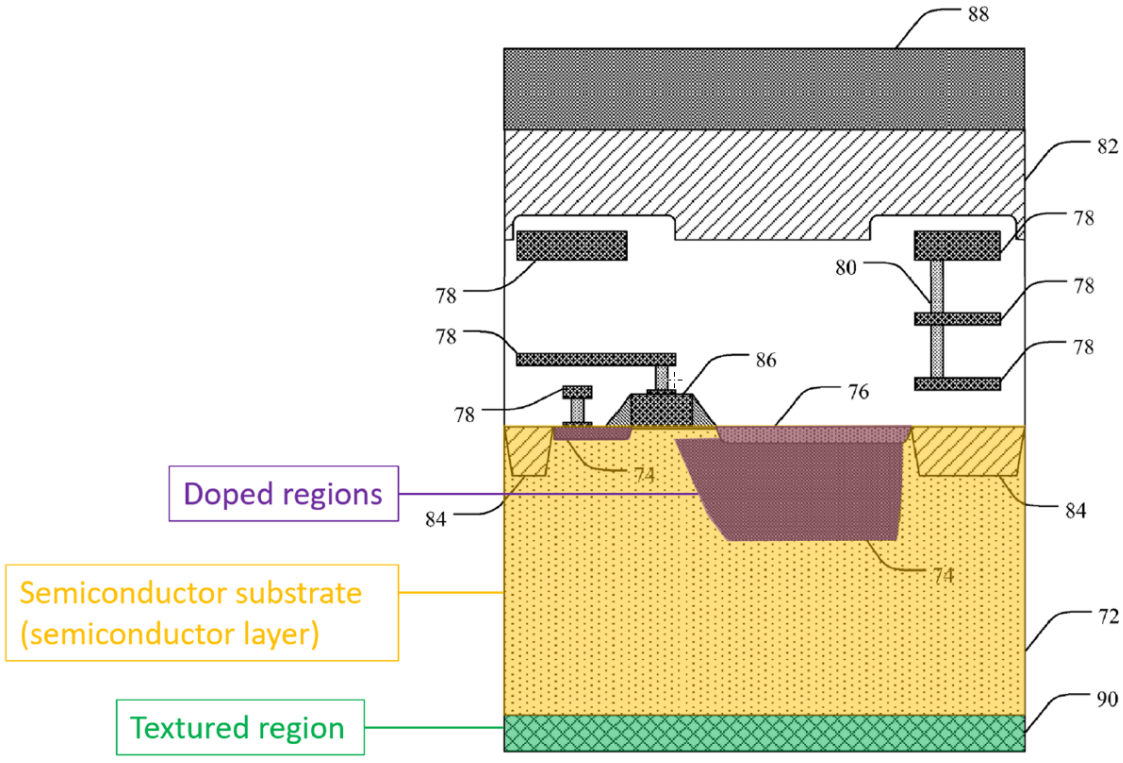

FIG. 9

Haddad138 Figure 9 is a schematic view of a photosensitive pixel device. Ex. 1012 ¶ 19. Petitioner annotates this figure by coloring regions 74 purple and labeling them "Doped regions," coloring region 72 yellow and labeling it "Semiconductor substrate (semiconductor layer)," and coloring region 90 green and labeling it "Textured region." Pet. 25. Petitioner also identifies layer 88 as "Carrier support substrate (support substrate)." *Id.* at 27. Petitioner further argues that Haddad138 teaches that "[t]he carrier substrate can be coupled to the photosensing pixel [including the semiconductor layer]

by various techniques" including "by way of a bonding layer." *Id.* at 27–28 (quoting Ex. 1012 ¶ 86; alterations by Petitioner).

Patent Owner does not, at this time, dispute Petitioner's contentions regarding the recitations of claim 1. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

Based on our review and consideration of the current record, we determine that the information presented sufficiently supports, for purposes of institution, Petitioner's assertions that Haddad138 satisfies each limitation of claim 1. *See* Pet. 21–27.

Claim 2 recites, "[t]he device of claim 1, wherein the textured region is located on the light incident side of the semiconductor layer." Ex. 1001, 13:13–14. Petitioner argues that Haddad138 discloses that its devices "can be front side illumination (FSI) or back side illumination (BSI) devices" and "can be adapted for either configuration." Pet. 29 (quoting Ex. 1012 ¶ 48). Petitioner argues that in a back side illumination (BSI) configuration, light enters the device from the bottom through the bottom surface of the semiconductor substrate 72. Pet. 30 (citing Ex. 1012 ¶ 48). Petitioner argues that, in this configuration, the bottom surface of semiconductor substrate 72 (where textured region 90 is located) corresponds to the recited light incident side of the semiconductor layer. *Id.* (citing Ex. 1004 ¶ 108).

Patent Owner argues[11] that Petitioner "offers no motivation to modify Haddad138." Prelim. Resp. 7–8. Patent Owner specifically argues that

[11] Patent Owner also argues that Petitioner does not establish that Haddad138 anticipates claim 2. Prelim. Resp. 5–7. We do not address the anticipation challenge at this time.

"Petitioner does not offer any showing on any motivation to modify Figure 9 of Haddad138 to change the configuration from a FSI to BSI architecture." *Id.* at 8. On this record, Patent Owner's argument does not undermine Petitioner's persuasive showing. As Petitioner argues (Pet. 29), Haddad138 teaches that its "present disclosure" (which would include the Figure 9 disclosure) can be adapted for a front side illumination (FSI) or back side illumination (BSI) configuration. Ex. 1012 ¶ 48. The express teaching of Haddad138 provides motivation to modify Figure 9 of Haddad138.

Patent Owner also argues that Petitioner "offers no showing that a POSITA would be able to modify the embodiment of Figure 9 to be back side illuminated with a reasonable expectation of success." Prelim. Resp. 9. Patent Owner's argument again does not undermine Petitioner's persuasive showing. Petitioner cites Haddad138 expressly teaching a FSI or BSI configuration. Pet. 29 (citing Ex. 1012 ¶ 48). Haddad138's teaching is sufficient, on this record, to establish a reasonable likelihood of Petitioner establishing a reasonable expectation of success at trial.

Conclusion as to claim 2

Based on our review and consideration of the current record, we determine that the information presented sufficiently supports, for purposes of institution, Petitioner's assertions that each recitation of claim 2 is taught or suggested by Haddad138. *See* Pet. 20–28. We, therefore, determine Petitioner has met its burden to show a reasonable likelihood it would prevail in demonstrating that claim 2 would have been obvious over Haddad138.

b. *Claims 3–6, 33–37*

Petitioner asserts claims 3–6 and 33–37 are unpatentable under 35 U.S.C. § 103 as having been obvious over Haddad138. Pet. 5, 28–55. Patent Owner does not dispute Petitioner's assertions except for the claim 2 arguments we address above. *See generally* Prelim. Resp. at 5 (disputing Petitioner's claim 33 position based on Patent Owner's claim 2 position and disputing Petitioner's position as to other claims because the claims depend from either claim 2 or claim 33). Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

Petitioner accounts for the limitations recited in claims 3–6 and 33–37. Pet. 28–55. Petitioner shows sufficiently for purposes of this Decision that each element of claims 3–6 and 33–37 is taught or suggested by Haddad138 and shows, to the extent modification is necessary, rational underpinning and reasonable expectation of success. Thus, we determine that Petitioner has a reasonable likelihood of establishing claims 3–6 and 33–37 would have been obvious in view of Haddad138. Furthermore, because Petitioner has demonstrated a reasonable likelihood of success in proving that at least one claim of the '737 patent is unpatentable, we include this ground in the instituted *inter partes* review. *See SAS*, 138 S. Ct. at 1354, 1359–60; *PGS Geophysical*, 891 F.3d at 1360; 37 C.F.R. § 42.108(a).

2. Alleged Unpatentability over Yap (Petitioner's Ground B-1)

Petitioner asserts that claim 28 (which depends from claim 26) is anticipated by Yap or, alternatively, would have been obvious over Yap, citing the Declaration of Dr. Lebby for support. Pet. 6, 85–90 (citing

Ex. 1004). We address Petitioner's arguments regarding claims 26 and 28 below.

As to claim 26, Petitioner argues that Yap at Figures 9a–9l discloses "an exemplary fabrication process for fabricating the [photon] detector array and attaching that detector array to the read-out integrated circuit." Pet. 85 (citing Ex. 1011, 7:35–37). Petitioner argues that Yap teaches the various recitations of claim 26 including providing a semiconductor layer, providing a support substrate, bonding the semiconductor layer to the support substrate, creating a plurality of surface features, and depositing an oxide material, and teaches processing the region comprising the surface features with CMP. Pet. 85–89. As to claim 28, Petitioner argues that Yap Figure 6 depicts pyramids 78 formed on the side of the incident light 62 as claim 28 recites. *Id.* at 89–90.

Patent Owner does not dispute that Yap teaches the recitations of claims 26 and 28 except for arguing that Petitioner does not establish that Yap discloses the recited "plurality of surface features." Prelim. Resp. 10–11. Patent Owner argues that Yap's "pyramid shapes" are distinct from the claimed "surface features" because size is different; in particular, Patent Owner argues the claimed surface features are "nano or micron scale variations in the surface of the semiconductor layer" but Yap's pyramidal shapes are "significantly larger." *Id.* (citing Ex. 1001, 4:4–8). Patent Owner also argues that the function is different; Patent Owner argues that the claimed "texture or surface features function to increase quantum efficiency by increasing the effective optical path length of absorbed light." *Id.* at 11 (citing Ex. 1001, 5:34–37; 6:48–50). In contrast, according to Patent Owner,

Yap's pyramidal shapes "reduce reflection, rather than increase effective optical path length by inducing multiple passes of incident light." *Id.*

Patent Owner's argument does not undermine Petitioner's persuasive showing because it is not supported by the record for three reasons. First, the "plurality of surface features" language of claim 28 does not require any particular size or function. Patent Owner does not, on this record, persuasively explain why this language should be narrowly construed based on any definition in the Specification or otherwise.

Second, as to size, Yap teaches that its pyramid width could be as small as that of the longest wavelength of interest and pyramid height could be one half of that wavelength. Ex. 1011, 5:34–55. Yap further teaches that its detector works with wavelengths as small as 0.4 microns.[12] *Id.* at 4:31–35. Thus, Yap's teaches that its pyramid shapes could be, for example, be 0.4 microns at base and 0.2 micron in height. Meanwhile, the '737 patent states that its "surface feature" have a depth or height "from about 50 nm [0.05 micron] to about 2 microns." Ex. 1001, 11:17–63. Thus, the size of Yap's pyramid shapes overlaps with the size of the '737 patent's surface features.

Third, as to function, the Court of Appeals for the Federal Circuit warns against confining claims to a specification's embodiments. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1323 (Fed. Cir. 2005) (en banc) ("[A]lthough the specification often describes very specific embodiments of the invention, we have repeatedly warned against confining the claims to those embodiments."). Here, Patent Owner does not explain sufficiently why

[12] Microns are the same as micrometers (μm).

the recited "surface features" must be construed as being capable of diffusing light. While the '737 patent states that "the textured layer *can* function to diffuse light, to redirect light, and to thus increase the quantum efficiency of the device" (Ex. 1001, 9:21–23 (emphasis added)), Patent Owner does not direct us to anything in the '737 patent specification (or otherwise) that would define "surface features" as requiring diffusion. Patent Owner cites the '737 patent at column 4, lines 4 to 28 (Prelim. Resp. 10–11) for support, but this passage does not address the "surface features" claim recitation. Moreover, to the extent the passage's "textured layer" is identical to a "surface feature," the passage focuses on structure size and spacing rather than requiring a diffusing functionality. Also, the '737 patent's invention summary does not refer to surface feature diffusion. Ex. 1001, 1:43–2:44.

Based on our review and consideration of the current record, we determine that the information presented sufficiently supports, for purposes of institution, Petitioner's assertions that each recitation of claim 28 is disclosed by Yap or is taught or suggested by Yap. *See* Pet. 20–28. We, therefore, determine Petitioner has met its burden to show a reasonable likelihood it would prevail in demonstrating that Yap anticipates claim 28 or, alternatively, that claim 28 would have been obvious over Yap.

IV. CONCLUSION

For the reasons above, we determine that the information presented in the Petition establishes that there is a reasonable likelihood that Petitioner would prevail with respect to challenged claims 2–6, 28, and 33–37 of the '737 patent. At this juncture in the proceeding, we have not made a final

determination with respect to the patentability of the challenged claims, or with respect to claim construction.

V. ORDER

For the foregoing reasons, it is

ORDERED that pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 2–6, 28, and 33–37 of the '737 patent is hereby instituted with respect to all grounds of unpatentability set forth in the Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial; the trial will commence on the entry date of this Decision.

FOR PETITIONER:

Scott Weidenfeller
Nitin Subhedar
Juwon Ahn
COVINGTON & BURLING LLP
sweidenfeller@cov.com
nsubhedar@cov.com
aahn@cov.com

FOR PATENT OWNER:

Alison McCarthy
Dustin Ferzacca
TROUTMAN PEPPER HAMILTON SANDERS LLP
alison.mccarthy@troutman.com
dustin.ferzacca@troutman.com