Trials@uspto.gov
571-272-7822

Paper 11
Entered: October 28, 2022

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LITE-ON TECHNOLOGY CORPORATION,
Petitioner,

v.

SENSOR ELECTRONIC TECHNOLOGY, INC.,
Patent Owner.

IPR2022-00780
Patent 9,923,117 B2

Before DONNA M. PRAISS, KRISTINA M. KALAN, and ELIZABETH M. ROESEL, *Administrative Patent Judges.*

KALAN, *Administrative Patent Judge*.

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

I. INTRODUCTION

Lite-On Technology Corporation ("Petitioner") filed a Petition (Paper 1, "Pet.") requesting *inter partes* review of claim 1 of U.S. Patent No. 9,923,117 B2 (Ex. 1001, "the '117 patent"). Sensor Electronic Technology, Inc. ("Patent Owner") filed a Preliminary Response (Paper 6, "Prelim. Resp.").

To institute *inter partes* review, we must determine that the information presented in the Petition shows "there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a). For the reasons discussed below, after considering the parties' submissions and the evidence of record, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing with respect to at least one claim of the '117 patent, and we institute *inter partes* review on all challenges raised in the Petition.[1]

A. Related Proceedings

The parties identify the following district court litigation as a related matter: *Sensor Electronic Technology, Inc. v. Lite-On Technology Corporation*, No. 6:21-cv-322-ADA (W.D. Tex.) ("the parallel District Court litigation"). Pet. 1; Paper 3, 2 (Patent Owner's Mandatory Notices).

B. Real Parties-in-Interest

Petitioner identifies Lite-On Technology Corporation, Lite-On Technology USA, Inc., Lite-On, Inc., and Lite-On Trading USA, Inc. as real

[1] *Guidance on the Impact of SAS on AIA Trial Proceedings* (Apr. 26, 2018), https://www.uspto.gov/patents-application-process/patent-trial-and-appeal-board/trials/guidance-impact-sas-aia-trial; *see also SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018).

parties-in-interest. Pet. 1. Patent Owner identifies Sensor Electronic Technology, Inc. as the real party-in-interest. Paper 3, 2.

C. The '117 Patent

The '117 patent is titled "Semiconductor Structure with Inhomogeneous Regions" and is directed to a "semiconductor layer including a plurality of inhomogeneous regions," in which "each inhomogeneous region has one or more attributes that differ from a material forming the semiconductor layer" and the "regions can include transparent and/or reflective regions." Ex. 1001, codes (54), (57). The '117 patent relates "generally to semiconductor devices, and more particularly, to emitting semiconductor devices, such as deep ultraviolet light emitting devices." *Id.* at 1:19–21. The '117 patent recognizes problems with deep-ultraviolet LEDs caused by "light trapping within the device, light absorption in the semiconductor layers, as well as light absorption in the contact regions," and seeks to resolve these problems with "a design using ultraviolet transparent p-type cladding and contact layers, an ultraviolet reflecting ohmic contact, and chip encapsulation having an optimized shape and refractive index." *Id*. at 1:53–60.

Figure 1 of the '117 patent is reproduced below.

FIG. 1

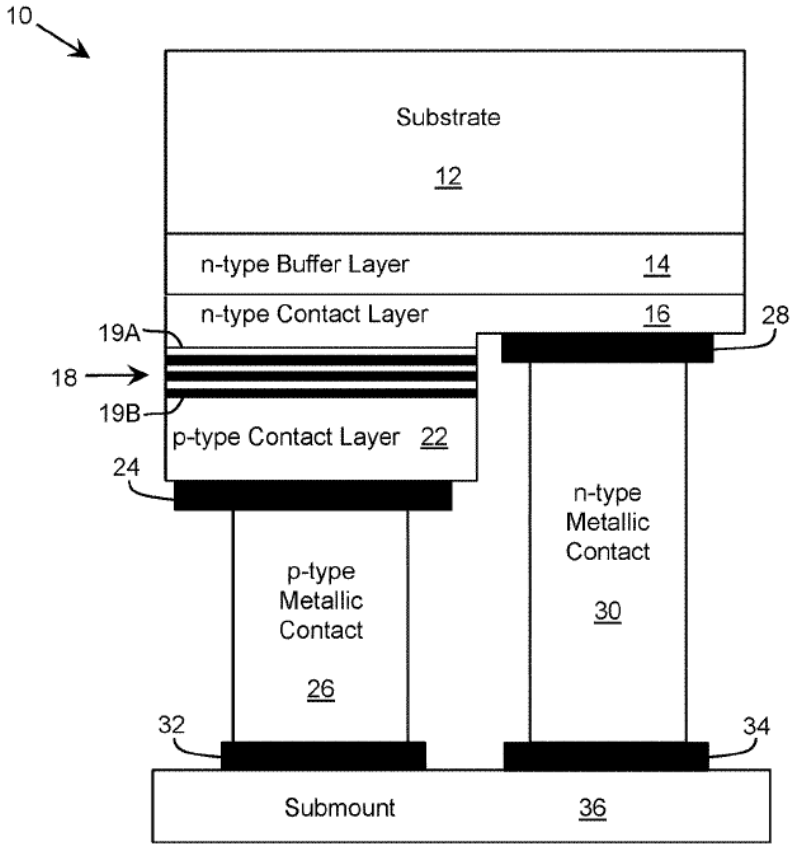


Figure 1 of the '117 patent "shows a typical design of a flip-chip emitting device." *Id.* at 3:12–13. As shown in Figure 1, the emitting device 10 includes active region 18, p-type contact layer 22 adjacent to active region 18, p-type metal 24 attached to p-type contact layer 22, and p-type metallic contact 26 attached to p-type metal 24. *Id.* at 4:52–60, 5:24–25, 5:29–30.

Figure 3A of the '117 patent is reproduced below:

FIG. 3A

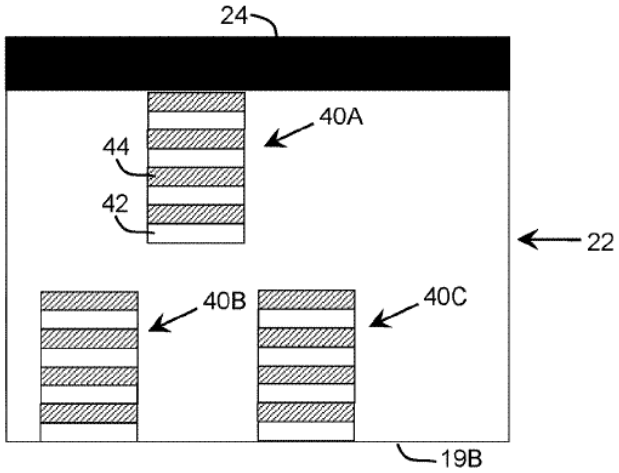


Figure 3A shows a layer including a plurality of reflective regions. *Id.* at 3:16–17. As shown in Figure 3A, reflective regions 40A–40C are located adjacent to a planar side of p-type contact layer 22. *Id.* at 7:10–12. Reflective regions 40A–40C "can be formed of a composite mirror having alternating sublayers of low index of refraction material 42 and relatively high index of refraction material 44." *Id.* at 7:15–18.

D. Illustrative Claim

Claim 1 is reproduced below.

1. A semiconductor heterostructure, comprising:
[1a] an active region;
[1b] a metallic contact;
[1c] a group III nitride semiconductor layer located between the active region and the metallic contact,
[1d] the semiconductor layer including a plurality of inhomogeneous regions arranged within multiple levels of the semiconductor layer along a height direction of the semiconductor layer,
[1e] wherein some of the inhomogeneous regions in a first level of the semiconductor layer are vertically offset from

inhomogeneous regions in a second level of the semiconductor layer, and

[1f] wherein the plurality of inhomogeneous regions include one or more of a set of transparent regions, a set of reflective regions and/or a set of conductive regions,

[1g] each of the inhomogeneous regions having a set of attributes differing from a group III nitride material forming the semiconductor layer.

Ex. 1001, 19:62–20:12 (bracketed designations added by Petitioner).

E. Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability.

Claim Challenged	Reference(s)	Basis[2]
1	Ohmae[3] in view of the knowledge of a POSITA	§ 103
1	Ban[4] in view of the knowledge of a POSITA	§ 103
1	Shur[5] in view of the knowledge of a POSITA	§ 103
1	Saxler[6] in view of the knowledge of a POSITA	§ 103

In support of its unpatentability arguments, Petitioner relies on the declaration of James Richard Shealy, Ph.D. Ex. 1002.

[2] The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) ("AIA"), amended 35 U.S.C. §§ 102 and 103. Petitioner represents that the '117 Patent "claims priority to a provisional application filed on February 25, 2013, which would render the effective filing date before the March 16, 2013 cutoff for the application of AIA 35 U.S.C. §§102 and 103. *See* 35 U.S.C. §100(i)(1)(B)." Pet. 10 n.1.

[3] US 2007/0085093 A1, published April 19, 2007 (Ex. 1004).

[4] Japan Pat. App. No. 2000–22283, published January 21, 2000 (Ex. 1005). Petitioner includes a certified translation and declaration. Ex. 1005, 11–33.

[5] WO Pub. No. 2013/023197 A2, published February 14, 2013 (Ex. 1006).

[6] US 2004/0031956 A1, published February 19, 2004 (Ex. 1007).

II. ANALYSIS

A. Claim Construction

We apply the claim construction standard articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005). 37 C.F.R. § 42.100(b) (2022). Under *Phillips*, claim terms are afforded "their ordinary and customary meaning." *Phillips*, 415 F.3d at 1312. The "ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Id.* at 1313. Only terms that are in controversy need to be construed, and then only to the extent necessary to resolve the controversy. *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) ("The Board is required to construe 'only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.'" (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

Petitioner states that "unless otherwise specifically noted herein, the claim terms in the '117 Patent are accorded their ordinary and customary meaning." Pet. 21. "For clarity, the ordinary and customary meaning of 'inhomogeneous regions' in Claim 1 should take into account how that term is described in the '117 Patent." *Id*. Without providing any explicit construction proposals, Petitioner points to certain portions of the '117 patent's discussion of the terms "inhomogeneous regions," "conductive region," "transparent region," "reflective region," and "set." *Id.* at 21–22 (citing Ex. 1001, 2:5–13, 4:11–14, 5:60–65, 6:5–9, 5:46–49, 5:50–53, 6:64–66, 3:71–4:1).

Patent Owner "does not believe any claim constructions are necessary" for purposes of deciding institution. Prelim. Resp. 5. Patent

Owner, however, argues that the word "inhomogeneous" means "a system in which the chemical composition/physical state of some of the physically small portions are different from other portions" and points to portions of the '117 patent that reference U.S. Patent No. 7,812,366, which discusses inhomogeneities. *Id.* at 5–6 (citing Ex. 1001, 17:67–18:4; Ex. 2002, 1:39–44, 11:45–50).

We determine we need not explicitly construe any claim term at this stage of the proceeding. *See Realtime Data*, 912 F.3d at 1375. We encourage the parties to propose an express construction for the term "inhomogeneous regions," which appears to be a focus of the parties' arguments.

B. Level of Ordinary Skill in the Art

Petitioner asserts that one of ordinary skill in the art "would have a Bachelor's degree in physics, electrical engineering, materials science, or a related field, and three to five years of experience in semiconductor devices, with specific experience in nitride based LEDs." Pet. 24 (citing Ex. 1002 ¶¶ 30–34). Patent Owner "does not offer an alternative definition of a person of ordinary skill in the art" but "reserves the right to do so should institution be granted." Prelim. Resp. 6. Accordingly, for the purposes of this Decision, we adopt Petitioner's proposal regarding the level of one of ordinary skill in the art. The level of ordinary skill in the art is also reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

C. Discretion under 35 U.S.C. § 314(a)

Patent Owner argues the Board should exercise its discretion under 35 U.S.C. § 314(a) and deny institution in light of the parallel District Court litigation involving the '117 patent. Prelim. Resp. 42–50.

In assessing whether to exercise such discretion, the Board weighs six non-exclusive factors, known as the *Fintiv* factors. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 6 (PTAB Mar. 20, 2020) (precedential) ("*Fintiv*"). Recognizing that "there is some overlap among these factors" and that "[s]ome facts may be relevant to more than one factor," the Board "takes a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review." *Id.* On June 21, 2022, the Director of the USPTO issued several clarifications concerning the application of the *Fintiv* factors. *See Interim Procedure For Discretionary Denials In AIA Post-Grant Proceedings With Parallel District Court Litigation,* issued June 21, 2022 ("Guidance Memo").[7] The Guidance Memo clarifies "the PTAB's current application of *Fintiv* to discretionary institution where there is parallel litigation." *Id.* at 2.

We have considered Patent Owner's arguments in light of the *Fintiv* factors, and we decline to exercise our discretion to deny the Petition as explained further below.

[7] Available at https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf.

1. Factor 1: Whether a Stay Exists or Is Likely to Be Granted if a Proceeding Is Instituted

Patent Owner argues that there "is no stay in the parallel litigation" and "no reason to believe that a stay will be granted." Prelim. Resp. 44.

There is no evidence of record that a stay has been requested in the parallel District Court litigation. We decline to speculate on how the district court would rule on a stay, if one were requested. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 15 at 12 (PTAB May 13, 2020) (informative) ("*Fintiv II"*) (explaining that factor 1 "does not weigh for or against discretionary denial" when neither party has requested a stay). Accordingly, this factor is neutral.

2. Factor 2: Proximity of the Court's Trial Date to the Board's Projected Statutory Deadline

The projected statutory deadline for issuance of a final written decision in this proceeding is in October 2023. According to Patent Owner, the scheduling order in the parallel District Court litigation "sets a trial date for November 6, 2023." Prelim. Resp. 46 (citing Ex. 2014). Patent Owner also argues this "is actually longer from filing (950 days) than the average time to trial in the Western District of Texas" of 774 days. *Id.* (citing Ex. 2015 (Docket Navigator Time to Trial) (showing 774 days for time to trial in 2022 according to the Docket Navigator website)).

If the trial date is earlier than the projected statutory deadline, the Board "generally has weighed this fact in favor of exercising authority to deny institution." *See Fintiv* at 9. Conversely, here, the fact that the trial date of November 2023 is later than our projected statutory deadline of October 2023 weighs against exercising authority to deny institution. In the same vein, although the time to the presently stipulated trial date is longer

than the average time to trial, we find no evidence in the record that the trial date would be moved any earlier, which weighs against exercising authority to deny institution.

Accordingly, we find that this factor weighs strongly against exercising discretion to deny institution.

3. Factor 3: Investment in the Parallel Proceeding by the Court and Parties

Patent Owner submits that "by the time that an institution decision is due in this proceeding," the district court "will, based on previous averages, issue its *Markman* Order no later than October 4, 2022 and likely earlier" and the parties "will also have served final contentions and will be significantly into the fact discovery period." Prelim. Resp. 47.

Here, the co-pending litigation is in its early stages, and the investment in it has been relatively minimal, because "much of the district court's investment relates to ancillary matters untethered to the validity issue itself," and "much work remains in the district court case as it relates to invalidity: fact discovery is still ongoing, expert reports are not yet due, and substantive motion practice is yet to come." *Sand Revolution II, LLC v. Continental Intermodal Group – Trucking LLC*, IPR2019-01393, Paper 24 at 10–11 (June 16, 2020) (informative) ("*Sand*").

Under these circumstances, we determine that this factor weighs against exercising our discretion to deny institution.

4. Factor 4: Overlap Between Issues Raised in the Petition and in the Parallel Proceeding

Patent Owner argues that there "the one asserted claim at issue in the parallel case is at issue here" and "Petitioner asserts the same prior art" in the parallel District Court litigation. Prelim. Resp. 48.

Concerns about the degree of overlap may be mitigated where a petitioner agrees not to pursue in the parallel proceeding the grounds advanced in the petition. *Sand* at 11–12, 12 n.5. A petitioner stipulating not to pursue "any ground raised or that could have been reasonably raised" weighs strongly in favor of not exercising discretionary denial. *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 at 18–19 (PTAB Dec. 1, 2020) (precedential as to § II.A).

Here, however, Petitioner, has not provided a stipulation. Nevertheless, because the projected statutory deadline for a final written decision predates the currently scheduled trial date in the parallel District Court litigation, in which "Petitioner asserts that claim 1 of the '117 Patent is anticipated or rendered obvious based on each of the prior art references (Ohmae, Ban, Shur, and Saxler) presented in this Petition" (Prelim. Resp. 48 (citing Ex. 2016, 30 (invalidity contentions)), some of the potential issues about overlap and inconsistent decisions are resolved by statutory estoppel, which attaches as soon as the final written decision issues. 35 U.S.C. § 315(e)(2). Thus, we determine that the fourth *Fintiv* factor weighs only slightly in favor of discretionary denial of institution.

5. Factor 5: Whether the Petitioner and the Defendant in the Parallel Proceeding Are the Same Party

The Petitioner here is a defendant in the parallel District Court litigation. The Board has found that "this factor favors denial if trial precedes the Board's Final Written Decision and favors institution if the opposite is true." *See, e.g., Huawei Tech. Co. v. WSOU Inv., LLC*, IPR2021-00225, Paper 11 at 14 (PTAB June 14, 2021) (internal quotation marks omitted). Thus, because the final written decision in this case precedes trial

in the parallel District Court litigation, this factor weighs against exercising our discretion to deny institution under § 314(a).

6. Factor 6: Other Circumstances that Impact the Board's Exercise of Discretion, Including the Merits

Patent Owner contends Petitioner "has not demonstrated a reasonable likelihood that it would prevail in showing that the claims are unpatentable," and "has not made out the type of 'particularly strong' prior art showing to overcome the other factors." Prelim. Resp. 49–50.

"*Fintiv* factor six reflects that the PTAB considers the merits of a petitioner's challenge when determining whether to institute a post-grant proceeding in view of parallel district court litigation." Guidance Memo at 4. According to the Guidance Memo, the Board should determine whether the information presented at the institution stage "is merely sufficient to meet the statutory institution threshold" or whether it "presents a compelling unpatentability challenge." *Id.* at 4–5.

We discuss the merits of this case below, finding Petitioner's evidence and arguments are sufficient to meet our standard for instituting *inter partes* review. Thus, we determine that *Fintiv* factor six is neutral.

7. Balancing the Fintiv Factors

We have considered the circumstances and facts before us in view of the *Fintiv* factors, taking "a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review." *Fintiv* at 6. Having evaluated all of the factors, we determine that the circumstances presented here do not warrant exercising our discretion under § 314(a) to deny institution.

D. Reasonable Likelihood under 35 U.S.C. § 314(a)

"In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable." *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim")); *see also* 37 C.F.R. § 42.104(b) (requiring a petition for *inter partes* review to identify how the challenged claim is to be construed and where each element of the claim is found in the prior art patents or printed publications relied upon).

A patent claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved 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 pertinent art; and (4) when presented, objective evidence of nonobviousness, i.e., secondary considerations.[8] *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). Petitioner cannot satisfy its burden of proving obviousness by employing "mere conclusory statements," but "must instead articulate specific reasoning, based on evidence of record, to support the legal conclusion of obviousness." *In re Magnum Oil Tools Int'l, Ltd.*,

[8] At this stage, Patent Owner does not present any objective evidence of nonobviousness (i.e., secondary considerations).

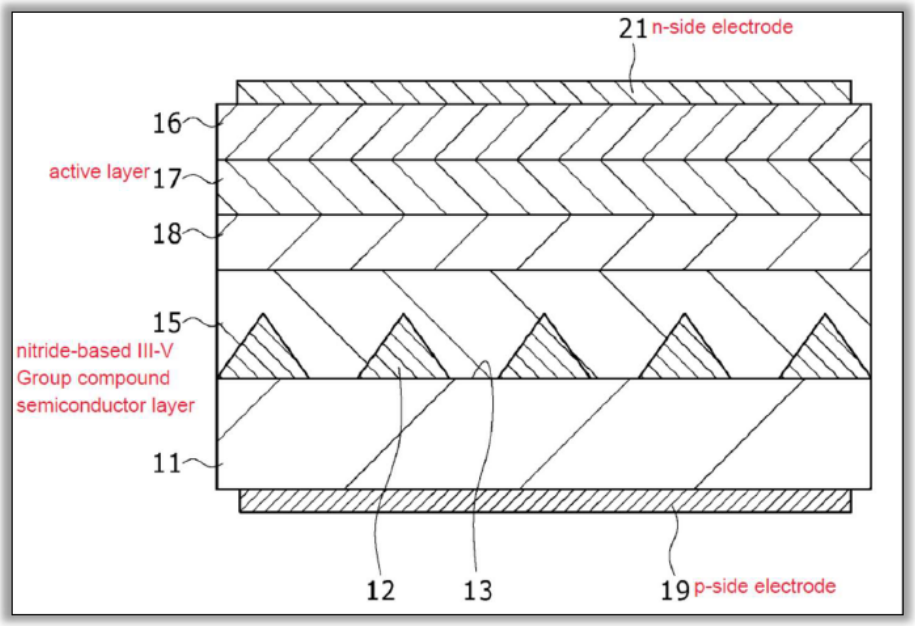
829 F.3d 1364, 1380 (Fed. Cir. 2016). A reason to combine or modify the prior art may be found explicitly or implicitly in market forces; design incentives; the "'interrelated teachings of multiple patents'"; "'any need or problem known in the field of endeavor at the time of invention and addressed by the patent'"; and the background knowledge, creativity, and common sense of the person of ordinary skill. *Perfect Web Techs., Inc. v. InfoUSA, Inc*., 587 F.3d 1324, 1329 (Fed. Cir. 2009) (quoting *KSR*, 550 U.S. at 418–21).

E. Ground 1

Petitioner argues that Ohmae renders obvious claim 1. Pet. 25–36. Patent Owner disagrees. PO Resp. 7–19.

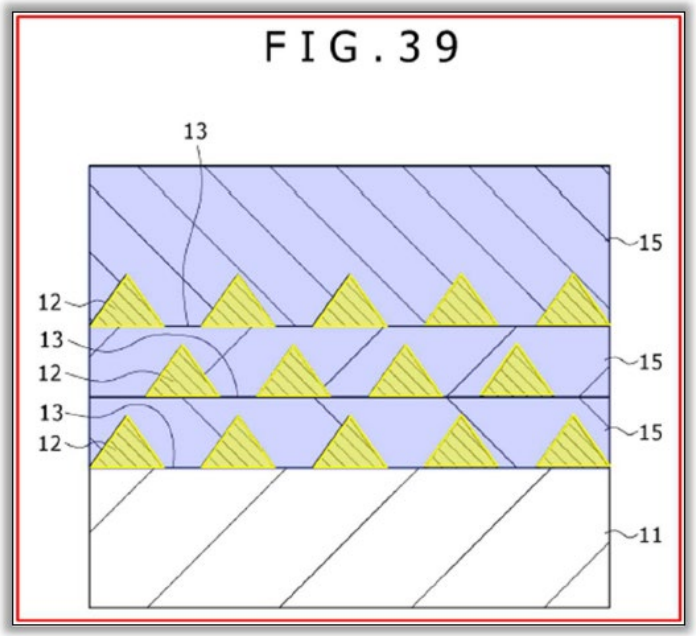
1. Ohmae

Ohmae is a U.S. patent application titled "light-emitting diode and method for manufacturing same, integrated light-emitting diode and method for manufacturing same, method for growing a nitride-based III-V group compound semiconductor, substrate for growing a nitride-based III-V group compound semiconductor, light source cell unit, light-emitting diode backlight, light-emitting diode illuminating device, light-emitting diode display and electronic instrument, electronic device and method for manufacturing same." Ex. 1004, code (54). The device is suited for application "to a light-emitting diode using a nitride-based III-V Group compound semiconductor and also to various types of instruments or devices using the light-emitting diode." *Id.* ¶ 3. Petitioner's annotated version of Ohmae's Figure 35 is reproduced below.



Pet. 11 (citing Ex. 1004, Fig. 35 (annotated)). Figure 35 "is a sectional view illustrating a method for manufacturing a light-emitting diode" that is "is similar to the first embodiment." Ex. 1004 ¶¶ 100, 232. As shown in Figure 35, nitride-based III-V Group compound semiconductor layer 15 is located between active layer 17 (with intervening layer 18) and p-side electrode 19 (with intervening substrate 11). *Id.* ¶ 231. The "layer 15 used is of a p-type, on which a p-type nitride-based III-V Group compound semiconductor layer 18, an active layer 17 and an n-type nitride-based III-V Group compound semiconductor layer 16 are successively grown." *Id.*

Petitioner's annotated version of Ohmae's Figure 39 is reproduced below.



Pet. 12 (citing Ex. 1004, Fig. 39 (annotated)). According to Petitioner, annotated Figure 39 shows a plurality of yellow protruded portions 12 arranged within multiple levels of blue semiconductor layer 15 along a height direction. Pet. 11–12. Ohmae discloses that Figure 39 "is a sectional view illustrating a method for manufacturing a light-emitting diode" and illustrates "the step of forming protruded portions 12 and growing the nitride-based III-V Group compound semiconductor layer 15 like the first embodiment" which "starts from forming protruded portions 12 on the substrate 11, followed by repeating the step plural times." Ex. 1004 ¶¶ 104, 247. "Like the first embodiment," layer 15 "is successively grown thereon, for example, with a nitride-based III-V Group compound semiconductor layer 16, an active layer 17 and a p-type nitride-based III-V Group compound semiconductor layer 18." *Id.* ¶ 247.

2. Petitioner's Arguments

Petitioner asserts that every element of claim 1 is taught or suggested by Ohmae. Pet. 26–36. Our analysis focuses on the disputed claim limitations. As to limitation [1d], Petitioner relies on Dr. Shealy's testimony that "protruded portions made of dielectric materials or conductors would constitute inhomogeneous regions within the semiconductor layer composed of nitride-based III-V Group compound semiconductor" and "the nitride-based semiconductor material grown on to of the protruded portions are also inhomogeneous regions." *Id.* at 30 (citing Ex. 1002 ¶ 76). Dr. Shealy also testifies that "repeating the step of forming protruded portions and growing the semiconductor layer results in a plurality of inhomogeneous regions arranged within multiple levels of the semiconductor layer along a height direction of the semiconductor layer." *Id.* at 31 (citing Ex. 1002 ¶ 77). As to limitation [1e], Petitioner argues that one of ordinary skill in the art would understand that "as a result of the layers formed at positions that are mutually shifted by a half cycle, some of the inhomogeneous regions in a first level of the semiconductor layer are vertically offset (e.g., vertically misaligned) from inhomogeneous regions in a second level of the semiconductor layer." *Id.* at 33 (citing Ex. 1002 ¶ 80). As to limitation [1g], Petitioner argues that the protruded portions in Ohmae made of, for example, dielectric materials or conductors would be understood to have "different material attributes" than the group III nitride semiconductor material. *Id.* at 35–36 (citing Ex. 1002 ¶ 83).

3. Patent Owner's Arguments

Patent Owner argues that Petitioner's Ground 1 challenge fails because Petitioner fails to provide any justification for its single-reference

obviousness ground based on multiple embodiments, namely, Ohmae's Figures 35 and 39. Prelim. Resp. 7–9. Patent Owner also argues that Ohmae does not disclose or render obvious limitation 1[d], because (1) Ohmae has "protruded portions grown on top of substrate 11," but lacks a "plurality of inhomogeneous regions"; (2) the purported "regions" are not disposed "within" the semiconductor layers in Ohmae, but are arranged "underneath" the semiconductor layers; and (3) the purported "regions" are disposed in multiple semiconductor layers rather than a single semiconductor layer with multiple levels. *Id.* at 9–19.

4. Analysis

We have reviewed the parties' arguments and evidence, and we determine that, for purposes of institution, Petitioner has shown sufficiently that Ohmae teaches or suggest all the elements of claim 1. Although Patent Owner criticizes Petitioner for relying on the Figure 35 embodiment for limitations [1a], [1b], and 1[c], and the Figure 39 embodiment for limitations [1d] and [1e] (Prelim. Resp. 7–8), it appears that Petitioner cites to Figure 35 to demonstrate the overall structure of the Ohmae device (Pet. 27–29), and Figure 39 to depict certain layers of Figure 35, i.e., layers 12 and 15, when those layers are grown by "repeating the step plural times." Pet. 30–35; Ex. 1004 ¶ 247; Ex. 1002 ¶¶ 75–80. Patent Owner's "mix-and-match" argument notwithstanding, it does not appear that the depictions in Figure 35 and Figure 39 are "multiple, distinct teachings." Prelim. Resp. 8 (citing *Net MoneyIN, Inc. v. VeriSign Inc.*, 545 F.3d 1359, 1371 (Fed. Cir. 2008) (discussing anticipation); *cf.* Ex. 1004 ¶¶ 232, 248 (each of the embodiments shown in Figure 35 and Figure 39 "is similar to the first embodiment"). On this record, Ohmae appears to teach the combination of the embodiments

shown in Figures 35 and 39. Ex. 1004 ¶¶ 231, 232, 247, 248, Figs. 35, 39. Petitioner's declarant opines about how this combination meets claim element 1[d]: "Based on the teachings of Figure 39 of Ohmae, in my opinion, the nitride-based III-V Group compound semiconductor layer 15 in Figure 35 of Ohmae can include multiple levels (i.e., multiple sub-layers 15) as shown in Figure 39 of Ohmae." Ex. 1002 ¶ 78 (cited in Pet. 32).

Patent Owner also disputes that Ohmae discloses a "plurality of inhomogeneous regions," arguing "under any construction or definition of 'inhomogeneous,' Petitioner's argument fails because of its entirely conclusory nature" and that Dr. Shealy's testimony is also "conclusory." Prelim. Resp. 10–14. After considering Patent Owner's arguments, we are persuaded that Petitioner's arguments and evidence are sufficient for purposes of institution. Citing Ohmae and declarant testimony, Petitioner argues that Ohmae's protruded portions 12 (i.e. "inhomogeneous regions" according to Petitioner) may be made of "various types" of materials such as dielectric materials or conductors and that "protruded portions made of dielectric materials or conductors would constitute inhomogeneous regions within the semiconductor layer composed of nitride-based III-V Group compound semiconductor." Pet. 30–32; Ex. 1002 ¶¶ 75–76; Ex. 1004 ¶ 26 ("materials for the protruded portions may be of various types and may be electrically conductive or non-conductive," such as "dielectric materials such as oxides, nitrides, carbides and the like and conductors such as of metals, alloys, and the like (including transparent conductors)").

On this record, Petitioner provides sufficient evidence, including declarant testimony, to support its argument that Ohmae's Figures 35 and 39 disclose a plurality of inhomogeneous regions as recited in limitation 1[d].

Pet. 30–32 (citing Ex. 1002 ¶¶ 75–78); *see also Realtime Data*, 912 F.3d at 1373 (although use of a single reference might have been more properly raised under § 102, "it is well settled that 'a disclosure that anticipates under §102 also renders the claim invalid under § 103, for "anticipation is the epitome of obviousness."'").

Patent Owner also argues that Ohmae's protruded portions 12 are not "within" semiconductor layer 15, but, rather, arranged "outside of" or "without" semiconductor layer 15. Prelim. Resp. 14–17. More particularly, Patent Owner argues that protruded portions 12 "are formed on the substrate 11 *before* the lowermost semiconductor layer 15 is grown" and are therefore "located underneath that semiconductor layer." *Id.* at 16. Finally, Patent Owner argues that Ohmae's protruded portions 12 are arranged under multiple semiconductor layers 15, not in "multiple levels of the semiconductor layer." Prelim. Resp. 17–19. More particularly, Patent Owner argues that the process of forming protruded portions 12 followed by semiconductor layer 15, then repeating the step "plural times," results in an improper conflation of "multiple levels," as required by the claim, with the multiple semiconductor layers disclosed by Ohmae. *Id.* at 18 (citing Ex. 1002 ¶ 78). Relative to these arguments, Petitioner contends that Ohmae's annotated Figure 39 demonstrates that "a plurality of inhomogeneous regions," i.e. yellow-highlighted regions 12 in Petitioner's annotation, are "arranged within multiple levels of the semiconductor layer," i.e., that yellow-highlighted regions 12 are arranged within multiple levels of the blue-highlighted semiconductor layer 15 as supported by Petitioner's annotation. Pet. 31–32.

On this record, we are persuaded that Petitioner has made an adequate

showing as to those limitations and the other limitations of claim 1 under this ground. In summary, Petitioner provides a reasonable likelihood of prevailing on its contention that claim 1 would have been obvious over Ohmae.

F. Ground 2

Petitioner argues that Ban renders obvious claim 1. Pet. 36–45. Patent Owner disagrees. PO Resp. 19–21.

1. Ban

Ban is a Japanese patent publication titled "Semiconductor device, manufacturing method of semiconductor device, and manufacturing method of semiconductor substrate" and is directed to providing "a semiconductor device capable of suppressing warpages of N-containing group III-V compound semiconductor devices caused by thermal stress and preventing crystal defects or cracks occurred in device layers." Ex. 1005, codes (54), (57). Petitioner's annotated Figure 3 is reproduced below.

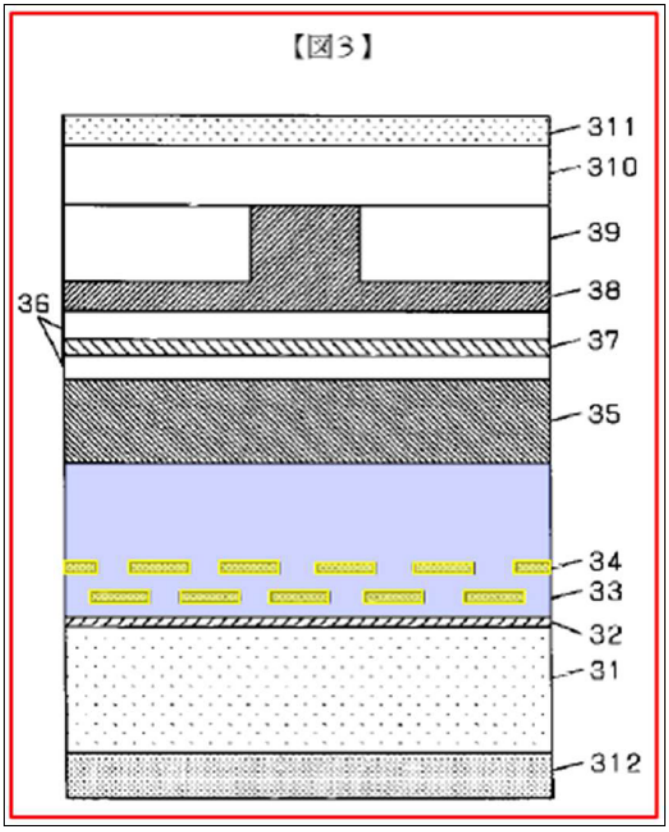


Figure 3 is a cross-sectional view showing the structure of a semiconductor laser device in accordance with a third embodiment of Ban. Ex. 1005, 32. As shown in Petitioner's annotated Figure 3, GaN layer 33 (in blue) includes a plurality of SiO_2 mask layers 34 (in yellow); also shown are GaInN quantum well active layer 37 and Ni/Au layer 312. Pet. 13 (citing Ex. 1005 ¶ 42). Multiple layers of SiO_2 mask layers 34 are grown with the mask shifted between the first layer and the second layer. Ex. 1005 ¶ 46.

2. Petitioner's Arguments

Petitioner asserts that every element of claim 1 is taught or suggested by Ban. Pet. 37–45. We focus our analysis on the disputed claim limitations. As to limitation [1d], Petitioner relies on Dr. Shealy's testimony that "the SiO_2 mask layer [of Ban] constitutes an inhomogeneous region."

Id. at 41 (citing Ex. 1002 ¶ 92). As to limitation [1e], Petitioner argues that one of ordinary skill in the art would understand that "that the shifting of the mask opening causes mask of the first layer to be vertically offset (e.g., vertically misaligned) from the mask of the second layer." *Id.* at 43 (quoting Ex. 1002 ¶ 94). As to limitation [1f], Petitioner argues that one of ordinary skill in the art would have understood that SiO_2 is a transparent material. *Id.* at 44 (citing Ex. 1002 ¶ 96). As to limitation [1g], Petitioner argues that one of ordinary skill in the art would have understood that the SiO_2 layer is made of a dielectric material with different attributes than the semiconductor layer, and forms a transparent region with different attributes than the semiconductor layer. *Id.* at 45 (citing Ex. 1002 ¶ 98).

3. Patent Owner's Arguments

Patent Owner argues that Petitioner's Ground 2 challenge fails because Ban does not disclose or render obvious limitation 1[d]. Prelim. Resp. 19–20. More particularly, Patent Owner argues that Ban discloses SiO_2 mask layer 34, which Petitioner fails to demonstrate "is the claimed plurality of inhomogeneous regions, except by saying, without support, that they are." *Id.* at 20. Patent Owner argues that Dr. Shealy's testimony that SiO_2 mask layer 34 is "a plurality of homogeneous regions" is conclusory and lacks explanation. *Id.* at 20–21.

4. Analysis

We have reviewed the parties' arguments and evidence, and we determine that, for purposes of institution, Petitioner has shown sufficiently that Ban teaches or suggest all the elements of claim 1. Although Patent Owner criticizes Petitioner for relying on Dr. Shealy's allegedly conclusory testimony for limitation [1d], we determine that, for purposes of institution,

Petitioner provides sufficient support for its argument that Ban discloses the "plurality of inhomogeneous regions" with its SiO_2 layers. Pet. 40–42 (citing Ex. 1005 ¶¶ 42, 43, 45, 46, Fig. 3; Ex. 1002 ¶¶ 92–93). As noted by Petitioner, the '117 patent discusses inhomogeneous regions: "Each inhomogeneous region has one or more attributes that differ from a material forming the semiconductor layer." Pet. 21–22 (quoting Ex. 1001, 2:5–13). In the case of limitation [1d] and Ban, Petitioner argues that the "SiO_2 mask layer" which is "embedded in a stripe shape in the group III-V compound semiconductor layer on the substrate" is an "inhomogeneous region," the SiO_2 mask layer 34 having one or more attributes that differ from the GaN semiconductor layer 33. Pet. 40–41. On this record, we are persuaded that Petitioner has made an adequate showing as to limitation [1d] and the other limitations of claim 1 under this ground.

In summary, Petitioner provides a reasonable likelihood of prevailing on its contention that claim 1 would have been obvious over Ban.

G. Ground 3

Petitioner argues Shur renders obvious claim 1. Pet. 45–57. Patent Owner opposes. Prelim. Resp. 21–29.

1. Shur

Shur is titled "Emitting Device with Compositional and Doping Inhomogeneities in Semiconductor Layers" and is directed to use of composite inhomogeneities to obtain a more optimal semiconductor material for light emitting/transmission applications. Ex. 1006, code (54), ¶ 11. Shur's Figures 3A and 3B are reproduced below.

FIG. 3A

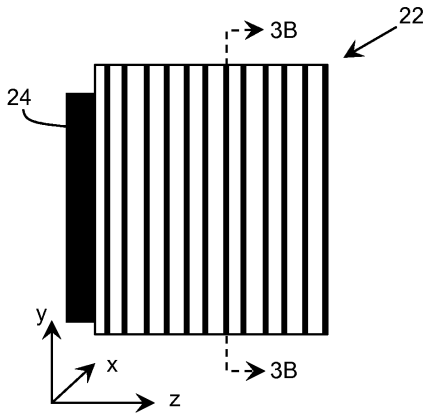
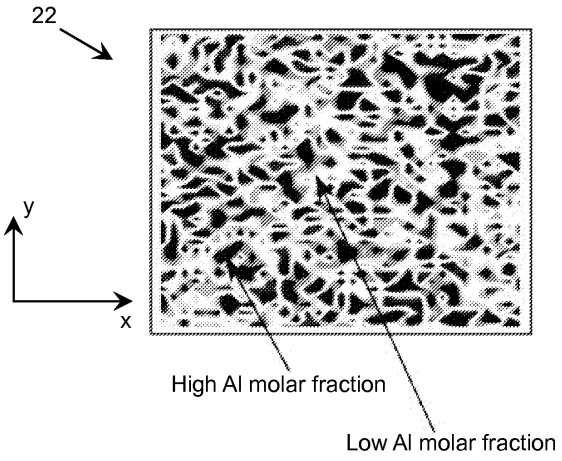


FIG. 3B



Figures 3A and 3B "show illustrative schematic representations of the p-type cladding layer 22 formed using a p-type superlattice according to an embodiment." *Id.* ¶¶ 20, 45. Shur's Figure 5 is reproduced below.

FIG. 5

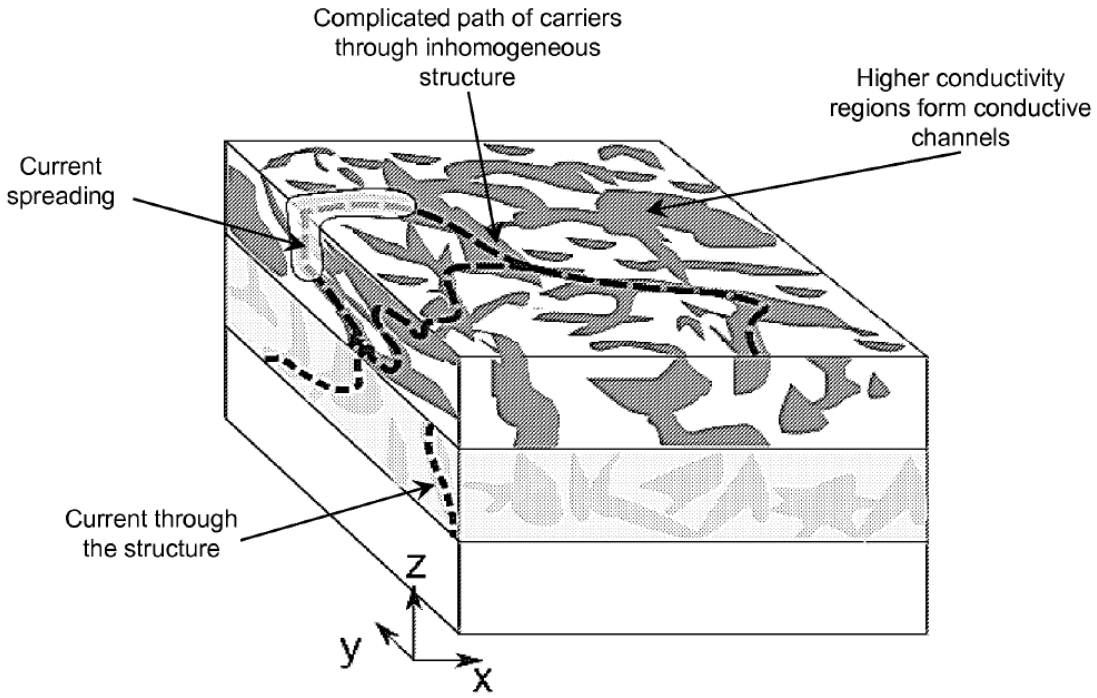


Figure 5 "shows a schematic representation of an illustrative carrier path" through the layer 22 shown in Figures 3A and 3b "in a complicated energy landscape caused by the inhomogeneities according to an embodiment." *Id.* ¶¶ 22, 54. As shown in Figure 5, "the carrier path runs through the low energy valleys (e.g., higher conductivity regions) of the energy landscape (indicated by dark regions), and propagates through regions containing a high concentration of dopants." *Id.* ¶ 54.

2. Petitioner's Arguments

Petitioner asserts that every element of claim 1 is taught or suggested by Shur. Pet. 45–57. We focus our analysis on the disputed limitations. As to limitation [1d], Petitioner argues that a "POSITA would have understood 'that each layer of the multi-layer superlattice (as shown in FIG. 3A) includes a plurality of inhomogeneous regions within such layer (as shown in FIG. 3B).'" Pet. 52 (quoting Ex. 1002 ¶ 114). Petitioner also argues that a "POSITA would have understood 'that FIG. 5 of Shur teaches a plurality of inhomogeneous regions arranged within multiple levels of the semiconductor layer along a height direction z of the semiconductor layer.'" *Id.* at 53–54 (quoting Ex. 1002 ¶ 113).

3. Patent Owner's Arguments

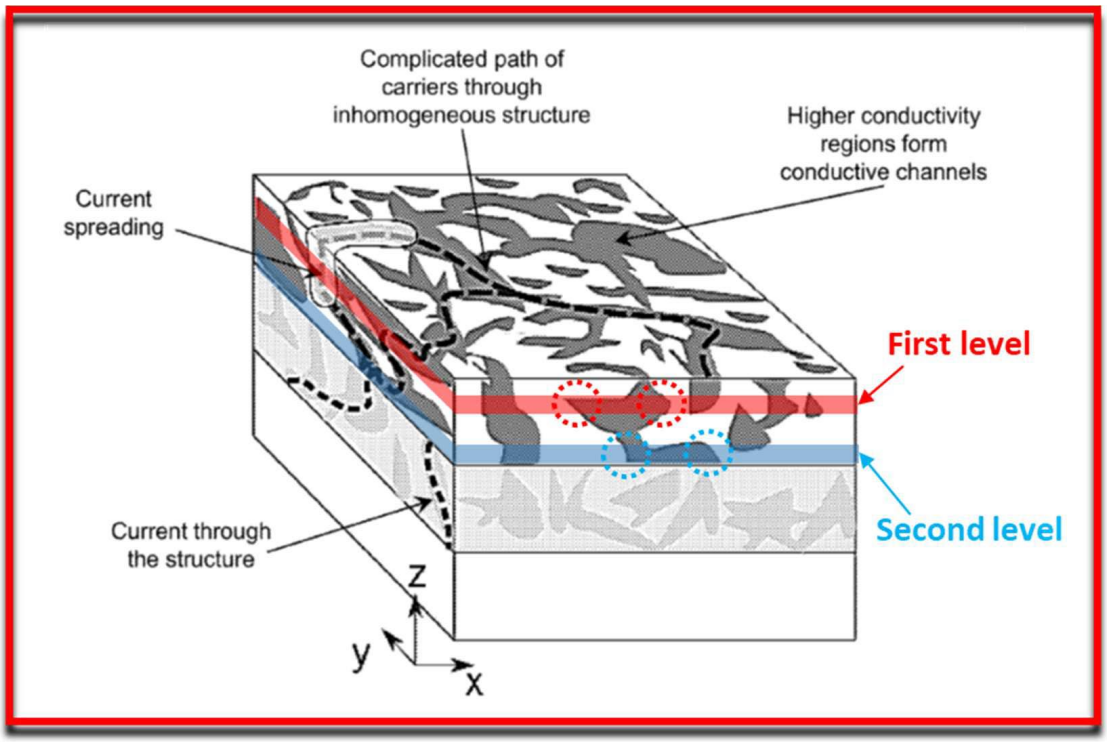
Patent Owner argues that Petitioner's Ground 3 challenge fails because Shur does not disclose or render obvious limitations [1d] or [1e]. Prelim. Resp. 21–29. Regarding limitation [1d], Patent Owner argues that Petitioner's division into "levels" is "completely arbitrary" and Petitioner's reliance on Dr. Shealy's opinion lacks explanation or analysis. *Id.* at 23–24, 26. Regarding limitation [1e], Patent Owner argues that Petitioner's

"regions" and "levels" are random, and that Dr. Shealy's testimony is conclusory and lacks analysis or explanation. *Id.* at 28.

4. Analysis

We have reviewed the parties' arguments and evidence, and we determine that, for purposes of institution, Petitioner has shown sufficiently that Shur teaches or suggest all the elements of claim 1. Although Patent Owner criticizes Petitioner for relying on Dr. Shealy's allegedly conclusory testimony for limitations [1d] and [1e], we determine that, for purposes of institution, Petitioner provides sufficient support for its argument that Shur discloses these limitations, as discussed below.

Petitioner argues that Shur's "FIG. 3A illustrates variation in aluminum composition within the layer 22 along the height of the layer (e.g., indicated by direction z) in a direction normal to a surface of the layer 22 adjacent to the p-type metal 24" (Pet. 51 (quoting Ex. 1006 ¶ 45)), and "FIG. 3B illustrates variation in the aluminum composition of the p-type cladding layer 22 in the lateral directions (e.g., indicated by directions x and y) of the layer 22" (*id.* (quoting Ex. 1006 ¶ 46)). Petitioner also argues that Shur's Figure 5 shows that "inhomogeneities are incorporated into a layer formed using a p-type superlattice, such as p-type cladding layer 22." Pet. 50–51 (quoting Ex. 1006 ¶ 44). Petitioner provides the following annotation of Shur's Figure 5 to illustrate its contentions:



Pet. 53, 55. According to Petitioner, "the inhomogeneous regions within the first level (within red circles) are vertically offset from the inhomogeneous regions within the second level (within blue circles)" and "each of the red circle or blue circle constitutes an inhomogeneous region within the semiconductor layer." *Id.* at 53–55 (citing Ex. 1002 ¶ 117).

Patent Owner argues that Petitioner's Figure 5 annotation "arbitrarily divides a single sub-layer . . . into 'multiple levels'" and that Shur's conductive regions "are confined to one sub-level." Prelim. Resp. 22, 24–25. After considering Patent Owner's arguments, we determine that Petitioner's arguments and evidence are sufficient for purposes of institution. On this record, the "multiple levels," "first level," and "second level" of claim 1 do not appear to have to correspond to certain sublayers, such as the sublayers of Shur's semiconductor layer 22. Accordingly, on this record, we are persuaded that Petitioner has made an adequate showing

as to limitations 1[d] and 1[e] and the other limitations of claim 1 under this ground.

In summary, Petitioner provides a reasonable likelihood of prevailing on its contention that claim 1 would have been obvious over Shur.

5. 35 U.S.C. § 325(d)

In determining whether to institute review, "the Director may take into account whether, and reject the petition or request because, the same or substantially the same prior art or arguments previously were presented to the Office." 35 U.S.C. § 325(d). The following two-part framework is used to determine whether to exercise discretion under § 325(d) to deny institution:

> (1) whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office; and (2) if either condition of the first part of the framework is satisfied, whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of the challenged claims.

Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH, IPR2019-01469, Paper 6 at 8 (PTAB Feb. 13, 2020) (precedential). *Advanced Bionics* explains that the *Becton, Dickinson* factors[9] provide

[9] *Becton, Dickinson* identifies the following non-exclusive factors: (a) the similarities and material differences between the asserted art and the prior art involved during examination; (b) the cumulative nature of the asserted art and the prior art evaluated during examination; (c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection; (d) the extent of the overlap between the arguments made during examination and the manner in which petitioner relies on the prior art; (e) whether petitioner has pointed out sufficiently how the examiner erred in its evaluation of the asserted prior art; and (f) the extent to which additional evidence and facts presented in the petition

"useful insight" into how to apply the statutory framework and address "challenging factual questions, such as when a ground of unpatentability presents 'substantially the same prior art or arguments' previously presented to the Office." *Id.* at 9.

Under the first part of the *Advanced Bionics* framework, we consider whether the art presented in the Petition is the same or substantially the same as the art previously presented to the Office during examination. Patent Owner argues that "Shur was submitted in an IDS by the Patent Owner, and the examiner considered the reference during prosecution." Prelim. Resp. 41 (citing Ex. 1018, 172–73 (IDS)). Thus, Shur was presented to the Office in an IDS during examination.

Under the second part of the *Advanced Bionics* framework, we consider whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of the challenged claims. Petitioner argues that "Shur was cited but not discussed during prosecution of the '117 Patent." Pet. 73. Although the Shur was presented to the Office in an IDS during examination, Shur was not discussed in any Office Action or Response, as far as we can discern. Thus, according to *Becton, Dickinson* factor (c), we find that Shur was not extensively evaluated during examination and was not the basis for a rejection. For the reasons discussed above, we are persuaded that Petitioner has shown a reasonable likelihood of prevailing on its contention that claim 1 would have been obvious over Shur. *See supra*. Relative to *Becton Dickinson* factor (f), we find that "the

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warrant reconsideration of the prior art or arguments. *Becton, Dickinson and Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 17–18 (PTAB Dec. 15, 2017) (precedential as to § III.C.5, first paragraph).

additional evidence and facts presented in the petition warrant reconsideration of the prior art or arguments." Based on the strength of Petitioner's challenge, we find that Petitioner sufficiently demonstrates that the Examiner erred in overlooking the relevant disclosures of Shur.

H. Ground 4

Petitioner argues Saxler renders obvious claim 1. Pet. 57–73. Patent Owner opposes. Prelim. Resp. 29–39. More particularly, Patent Owner argues that Petitioner fails to show that Saxler discloses limitations [1a], [1b], [1d], and [1e]. *Id.* at 31–39. Patent Owner also argues that institution of any of the asserted grounds is not appropriate under 35 U.S.C. § 325(d), because Saxler was the basis for an examiner rejection during prosecution of the '117 patent. *See id.* at 39–42. We acknowledge Patent Owner's concerns under 35 U.S.C. § 325(d), and concerns about whether Petitioner fails to show that Saxler discloses limitations [1a], [1b], [1d], and [1e], but because we determine that Petitioner establishes a reasonable likelihood that claim 1 is unpatentable under Grounds 1–3, we proceed to institute *inter partes* review as to all challenges in the Petition. *See PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (indicating that a decision whether to institute an *inter partes* review "require[s] a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition").

III. CONCLUSION

For the reasons set forth above, we determine that Petitioner has demonstrated a reasonable likelihood of prevailing with respect to at least one challenged claim of the '117 patent, and we institute *inter partes* review on all challenges raised in the Petition.

At this preliminary stage of the proceeding, we have not made a final determination as to the patentability of any challenged claim or any factual or legal issue underlying the patentability inquiry. Any final determination will be based on the record developed during trial. We place Patent Owner on express notice that any argument not asserted in a timely-filed Response to the Petition, or in another manner permitted during trial, shall be deemed waived, even if that argument was presented in the Preliminary Response.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that *inter partes* review is instituted on each of the grounds asserted 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, which shall commence on the entry date of this decision.

FOR PETITIONER:

Matthew W. Hindman
Jack Ko
PILLSBURY WINTHROP SHAW PITTMAN LLP
matthew.hindman@pillsburylaw.com
jack.ko@pillsburylaw.com

FOR PATENT OWNER:

David C. Radulescu
Kevin S. Kudlac
Bryon Wasserman
Jonathan Auerbach
RADULESCU LLP
david@radip.com
kevin@radip.com
bryon@radip.com
jonathan@radip.co