

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INNOSCIENCE (ZHUHAI) TECHNOLOGY COMPANY, LTD. and
INNOSCIENCE AMERICA, INC.,
Petitioner,

v.

EFFICIENT POWER CONVERSION CORPORATION,
Patent Owner.

IPR2023-01381
Patent 8,350,294 B2

Before JON B. TORNQUIST, JEFFREY W. ABRAHAM, and
KIMBERLY McGRAW, *Administrative Patent Judges*.

TORNQUIST, *Administrative Patent Judge*.

PRELIMINARY GUIDANCE
PATENT OWNER'S MOTION TO AMEND

I. INTRODUCTION

On March 20, 2024, we instituted trial as to claims 1–12 of U.S. Patent No. 8,350,294 B2 (“the ’294 patent”). Paper 11 (“Institution Decision” or “Inst. Dec.”). After institution, Patent Owner filed a Motion to Amend, which requests cancellation of claims 4–6 and 10–12 and entry of proposed substitute claims 13 and 14 in place of original claims 4 and 10, respectively. Paper 17, 1–2 (“Motion” or “Mot.”). Petitioner filed an Opposition to the Motion. Paper 27 (“Opposition” or “Opp.”). The Opposition was accompanied by a supplemental declaration from James Richard Shealy, Ph.D. Ex. 1039 (“Shealy Opp. Decl.”).

As a preliminary matter, Patent Owner does not affirmatively state whether the Motion to Amend is contingent on a finding that the original challenged claims are unpatentable. “[A Motion to Amend] will be contingent on the unpatentability of the original claims unless the patent owner indicates otherwise or cancels the original claims.” Notice Regarding a New Pilot Program Concerning Motion to Amend Practice and Procedures in Trial Proceedings Under the America Invents Act Before the Patent Trial and Appeal Board, 84 Fed. Reg. 9,500 (Mar. 15, 2019) (“Notice”). Here, Patent Owner requests cancellation of claims 4–6 and 10–12. Mot. 1–2. Accordingly, we treat the Motion to Amend as non-contingent. If this is not correct, Patent Owner should clarify the contingency of substitution for each claim. Mot. 1–2; *Lectrosonics, Inc. v Zaxcom, Inc.*, IPR2018-01129, Paper 15 at 3 (PTAB Feb. 25, 2019) (precedential) (“A patent owner should adopt a claim-by-claim approach to specifying the contingency of substitution, e.g., which claim is to be substituted for which claim, and under what circumstances.”).

In the Motion, Patent Owner requests that we provide preliminary guidance in accordance with the Board’s pilot program concerning motion to amend practice and procedures. Mot. 1; *see also* Notice 84 Fed. Reg. at 9,497 (providing a patent owner with the option to receive preliminary guidance from the Board on its motion to amend). This Preliminary Guidance provides information indicating our initial, preliminary, non-binding views on whether Patent Owner has shown a reasonable likelihood that it has satisfied the statutory and regulatory requirements associated with filing a motion to amend in an *inter partes* review, and whether Petitioner (or the record) establishes a reasonable likelihood that the substitute claims are unpatentable. *See* 35 U.S.C. § 316(d) (2018); 37 C.F.R. § 42.121 (2022); *Lectrosonics*, IPR2018-01129, Paper 15; *see also* Notice, 84 Fed. Reg. at 9,497 (“The preliminary guidance . . . provides preliminary, non-binding guidance from the Board to the parties about the [motion to amend].”); Rules of Practice to Allocate the Burden of Persuasion on Motions to Amend in Trial Proceedings Before the Patent Trial and Appeal Board, 85 Fed. Reg. 82,923 (Dec. 21, 2020) (“Rules”).

The Board’s Preliminary Guidance is directed to the substitute claims proposed in the Motion. *See* Notice, 84 Fed. Reg. at 9,497. As such, we do not address the patentability of the originally challenged claims. *Id.* We also emphasize that the views expressed below may change upon consideration of the complete record and may not apply to any revised motion to amend that Patent Owner may file in response to this Preliminary Guidance. Thus, this Preliminary Guidance is not binding on the Board when rendering its final written decision. *See id.* at 9,500.

II. PRELIMINARY GUIDANCE

A. Statutory and Regulatory Requirements

For the reasons discussed below, at this stage of the proceeding, and based on the current record, Patent Owner has shown a reasonable likelihood that it has satisfied the statutory and regulatory requirements associated with filing a motion to amend.

1. Reasonable Number of Substitute Claims

Does Patent Owner propose a reasonable number of substitute claims? (35 U.S.C. § 316(d)(1)(B))
Yes. Patent Owner proposes cancelling claims 4–6 and 10–12 and substituting one claim to replace claim 4 and one claim to replace claim 10. Mot. 2. Substituting one proposed claim for one challenged claim is presumptively reasonable, and Petitioner does not argue otherwise. <i>See Opp; Lectrosonics</i> , IPR2018-01129, Paper 15 at 4.

2. Respond to Ground of Unpatentability

Does the Motion respond to a ground of unpatentability involved in the trial? (37 C.F.R. § 42.121(a)(2)(i))
Yes. Patent Owner generally contends that proposed substitute claims 13 and 14 are patentable. Mot. 7. Petitioner does not argue that the Motion is nonresponsive. <i>See generally Opp.</i> Under Rule 42.121, the amendment must be responsive to “a ground of unpatentability.” 37 C.F.R. § 42.121(a)(2)(i). Patent Owner has met this requirement by amending the claims in response to the Petition’s asserted prior art.

3. Scope of Amended Claims

Does the amendment seek to enlarge the scope of the claims? (35 U.S.C. § 316(d)(3); 37 C.F.R. § 42.121(a)(2)(ii))

No. Patent Owner contends that “[t]he proposed amended claims do not broaden the claims scope” but “further limit the scope of independent claims 4 and 10.” Mot. 3.

Because no subject matter is removed by the proposed amendments, and additional limitations have been added, we agree with Patent Owner that the amendments do not seek to enlarge the scope of the claims.

Petitioner contends that the proposed amendments impermissibly broaden the term “semi-insulating III-N layer” to include the claimed “compensated GaN layer containing acceptor type dopant atoms passivated with hydrogen.” Opp. 7–8. According to Petitioner, the “semi-insulating” layer is distinct from the “compensated GaN layer” discussed in the ’294 patent. *Id.* at 8.

For the reasons discussed below in § II.A.4 regarding new matter, and based on the present record, we determine that Petitioner’s arguments at most raise an issue of material fact best resolved on the complete trial record. As a result, it is our preliminary view that Patent Owner has shown a reasonable likelihood that the proposed substitute claims do not enlarge the scope of the claims.

4. New Matter

Does the amendment seek to add new subject matter? (35 U.S.C. § 316(d)(3); 37 C.F.R. § 42.121(a)(2)(ii))

No.

Patent Owner cites several passages in support of proposed substitute claims 13 and 14 in the ’294 patent’s non-provisional application (Application No. 12/756,906) and provisional application (Application No. 61/167,792). Mot. 4–7 (citing Exs. 2007, 2008); *see* Ex. 1001, code (21), (60). Because there does not appear to be a dispute regarding priority that would involve the provisional application at this stage of the proceeding, we confine our analysis to the non-provisional application.

The test for sufficiency of a written description is whether the disclosure “clearly allow[s] persons of ordinary skill in the art to recognize that [the inventor] invented what is claimed.” *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc) (quoting *Vas-Cath Inc. v. Mahurkar*, 935 F.2d 1555, 1562–63 (Fed. Cir. 1991)). The disclosure must “reasonably convey[] to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Id.* at 1351. Possession means “possession as shown in the disclosure” and “requires an objective inquiry into the four corners of the specification from the perspective of a person of ordinary skill in the art.” *Id.*

Patent Owner provides specific citations to the '294 patent's non-provisional application to demonstrate written description support for the proposed substitute claims. For instance, Patent Owner cites to paragraph 27 as disclosing possession of an enhancement mode device; Figure 2 as disclosing barrier layer 34 above buffer layer 33; paragraph 26 as describing a compensated semiconductor layer (shown as layer 38 above barrier layer 34 in Figure 2) as a GaN layer with a passivated p-type impurity; paragraph 29 as describing the deposition of gate contact 37 on compensated semiconductor layer 38 and then etching away compensated semiconductor layer 38 except for its portion beneath gate contact layer 37, as shown in Figures 8–9; and paragraph 5 as disclosing the depletion of the two dimensional electron gas (“2DEG”) region below the gate at zero applied gate bias, which permits a device to be an enhancement mode device. Mot. 4–7 (citing Ex. 2007 ¶¶ 5, 26–27, 29, Figs. 2, 8–9).

Petitioner asserts that proposed substitute claims 13 and 14 fail to comply with the written description requirement. Opp. 2–7. Specifically, Petitioner argues that the limitation “wherein the semi-insulating III-N layer comprises a compensated GaN layer containing acceptor type dopant atoms passivated with hydrogen” lacks written description support because the '294 patent does not describe a “semi-insulating III-N layer” that “comprises a compensated GaN layer.” *Id.* at 2–3. Rather, according to Petitioner, the '294 patent describes the “compensated GaN layer” and the “semi-insulating layer” as being different layers made via different methods and used in different embodiments. *Id.* at 2 (“The patent never describes embodiments with a semi-insulating layer **comprising** a compensated GaN layer.”), 3 (asserting that the field of invention states

that “the invention relates to an enhancement mode GaN transistor with a compensated GaN layer *or* semi-insulating GaN layer”).

On this record, we question whether Petitioner has presented sufficient argument or evidence to call into question Patent Owner’s assertion that proposed substitute claims 13 and 14 find written description support in the ’294 patent and its priority documents.

As noted by Petitioner, the ’294 patent describes one embodiment in which a p-type dopant is passivated with hydrogen to form “a highly compensated semi-insulating material 38,” and a second embodiment in which “a semi-insulating layer 39” is used “in place of the compensated semiconductor layer 38.” Ex. 1001, 3:43–57; Opp. 3. In this second embodiment, the semi-insulating layer may comprise deep level impurity atoms, such as C, Fe, Mn, Cr, V, or Ni. *Id.* at 3:57–59; Opp. 4.

Consistent with these disclosures, Petitioner contends that the ’294 patent “never describes using hydrogen passivation for the ‘semi-insulating’ layer” and, instead, uses “deep acceptor type dopants.” Mot. 4.

According to Petitioner, the ’294 patent explains that the use of “deep acceptor type dopants” in the “semi-insulating layer,” in place of “a compensated semiconductor layer” in the second embodiment, leads to a device that “is not as sensitive to future processing steps involving hydrogen and/or high temperatures.” *Id.* at 6 (citing Ex. 1001, 3:36–4:3).

Although not without some merit, on this record, Petitioner’s arguments and evidence present, at most, a material issue of fact that is best resolved on the complete trial record. First, as noted by Petitioner, the first embodiment of the ’294 patent uses hydrogen to passivate acceptor type dopant atoms within a GaN layer and the second embodiment uses deep acceptor type dopant atoms to create a semi-insulating layer. Independent claims 1 and 4, however, are not limited to using hydrogen to form the compensated GaN layer (claim 1) or to the use of deep acceptor type dopant atoms to form the semi-insulating layer (claim 4). *See* Ex. 2007, original claims 1 and 4. Rather, dependent claims 2 and 5 recite these additional limitations. This suggests that the invention described in the ’294 patent is broader than embodiments 1 and 2.

Second, the ’294 patent specifically identifies the highly compensated semiconductor layer of the first embodiment as a “semi-insulating material.” Ex. 1001, 3:46–48. Petitioner contends the ’294 patent distinguishes between a “material” and a “layer,” and the fact that

compensated layer 38 has the electrical property of being semi-insulating, “does not mean it is or is part of ‘semi-insulating layer 39.’” Opp. 8. Petitioner does not persuasively explain, however, how a layer that is composed entirely of a semi-insulating material would not also be a semi-insulating layer. Thus, it would appear that the ’294 patent contemplates a compensated semiconductor layer with dopants passivated by hydrogen that is also a semi-insulating layer.

After considering the parties’ arguments and evidence, and on this record, we question whether Petitioner has sufficiently called into question Patent Owner’s evidence that proposed substitute claims 13 and 14 are adequately supported by the written description of the ’294 patent and its priority applications. This question is best resolved on a complete trial record.

B. Patentability

Petitioner contends that the proposed substitute claims are unpatentable for lack of enablement and that the subject matter of these claims would have also been obvious in view of the disclosures of Smith, Smith and Kigami, Smith and Uemoto, or Sheu and Kigami. Opp. 8–22. For the reasons discussed below, at this stage of the proceeding, and based on the current record, we question whether Petitioner has demonstrated a reasonable likelihood that proposed substitute claims are unpatentable as either being obvious over the recited prior art or for lack of enablement.

Does the record establish a reasonable likelihood that the proposed substitute claims are unpatentable?

Enablement

“[T]o be enabling, the specification of a patent must teach those skilled in the art how to make and use the full scope of the claimed invention without ‘undue experimentation.’” *In re Wright*, 999 F.2d 1557, 1561 (Fed. Cir. 1993) (citation omitted). “Whether undue experimentation is needed is not a single, simple factual determination, but rather is a conclusion reached by weighing many factual considerations.” *In re*

Wands, 858 F.2d 731, 737 (Fed. Cir. 1988). Some experimentation, even a considerable amount, is not “undue” if, e.g., it is merely routine, or if the specification provides a reasonable amount of guidance as to the direction in which the experimentation should proceed. *Id.* Factors to consider for enablement include “(1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims.” *Id.*

Petitioner asserts that the proposed substitute claims do not comply with the enablement requirement in view of the limitations: “wherein the semi-insulating III-N layer comprises a compensated GaN layer containing acceptor type dopant atoms passivated with hydrogen” and “wherein no two-dimensional electron gas (2DEG) region exists below the gate at zero volts applied gate bias.” Opp. 8–18.

Petitioner contends that the ability to form an enhancement mode transistor would require careful balancing of both doping concentration and passivation techniques. Opp. 9. In particular, Petitioner contends that to be a semi-insulator with a compensated layer, sufficient acceptors must be passivated, “[b]ut to deplete the 2DEG for an enhancement mode device requires sufficient active (unpassivated) acceptors.” *Id.* at 10. Petitioner further contends that there are upper limits on doping which would potentially require a thicker layer to account for the high number of dopants. *Id.* at 12. At the same time, in a thicker layer the acceptors are further from the 2DEG and less effective at depleting it, and the thicker layer is more difficult to passivate. *Id.* And, because the ’294 patent provides no guidance with respect to GaN layer thickness, doping concentration, or passivation, Petitioner contends the recited enhancement mode device with a compensated GaN layer but no 2DEG below the gate at zero volts applied gate bias would require undue experimentation to achieve. *Id.* at 14–17.

Petitioner’s arguments address enablement issues that are highly fact dependent and grounded in the skill and knowledge of the ordinarily skilled artisan. Such factual issues are best resolved on a complete trial record and after receiving testimony from both parties’ declarants.

Therefore, we encourage the parties to address this issue should Patent Owner further pursue proposed substitute claims 13 and 14.

Claim Construction

As a preliminary matter for the Opposition’s obviousness grounds, Petitioner contends that the limitations “wherein the semi-insulating III-N layer comprises a compensated GaN layer” of proposed substitute claims 13 and 14 may “be interpreted as (i) the ‘compensated GaN layer’ is the ‘semi-insulating III-N layer’ or (ii) the ‘compensated GaN layer’ is included in a larger ‘semi-insulating III-N layer.’” *Id.* at 19–21 (citing Ex. 1039 ¶¶ 72–73).

For the reasons discussed above with regard to Petitioner’s written description argument, we do not agree that proposed substitute claims 13 and 14 need be interpreted in either way because the limitation “semi-insulating” appears to refer to a material property (i.e., conductivity). Furthermore, it is not necessary to construe this term at this stage to resolve whether the Opposition’s grounds render proposed substitute claims 13 and 14 unpatentable. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (“[O]nly those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.”)). However, the parties may address this issue during trial if they so choose.

35 U.S.C. § 103 — Obviousness over Smith

Petitioner asserts that proposed substitute claims 13 and 14 would have been obvious in view of Smith (Ex. 1005). Opp. 19–35.

Petitioner argues that Smith teaches the limitations of proposed substitute claims 13 and 14. *Id.* at 24–35. For instance, Petitioner contends that Smith’s cap layer 34 is a compensated GaN layer above barrier layer 2, cap layer 34 contains acceptor dopant atoms that are passivated with hydrogen (because it was well-known that as-grown GaN films are naturally passivated due to impurities), and “[a] POSITA would have identified doping concentration and layer thickness that result in enhancement mode devices even with natural passivation given Smith’s disclosure of ranges of these variables.” *Id.* at 27–28, 31 (citing Pet. 21–33, 38–45; Ex. 1005 ¶¶ 77, 87; Ex. 1039 ¶¶ 96–97, 100, 113); *see also id.*

at 27–28 (noting that Smith contains the same type of deep level dopants that are described in the '294 patent as providing a semi insulating layer).

Patent Owner does not present specific arguments in the Motion with regard to Petitioner's obviousness ground over Smith. Mot. 7.

We question whether Petitioner has sufficiently demonstrated at this stage that Smith discloses a sufficient amount of non-passivated acceptor type dopants to result in no two-dimensional electron gas (2DEG) region below a gate at zero volts applied gate bias (e.g., an enhancement mode device (Ex. 1001, 1:47–50)), as proposed substitute claims 13 and 14 recite. Petitioner sufficiently demonstrated for purposes of institution that hydrogen would be present in cap layer 34 of Smith. Inst. Dec. 19.

Petitioner did not quantify, however, how much hydrogen would be present in this layer, as such evidence was not required to show the layer was a compensated GaN layer. *See* Pet. 39–40. But without knowledge of the level of hydrogen present in cap layer 34, it is unclear how one of ordinary skill in the art could conclude that sufficient non-passivated acceptors are present in cap layer 34, or doped region 40, to *completely* remove the 2DEG layer. *See* Ex. 1005 ¶ 87 (identifying the concentration of p-type dopants, but not the level of naturally present hydrogen).

Dr. Shealy's opposition testimony does not appear sufficient to resolve this question because, although he identifies the cap layer thickness and doping concentrations disclosed in Smith, he does not explain sufficiently why these parameters demonstrate that there would be no 2DEG under the gate at zero volts applied gate bias. Ex. 1039 ¶ 113.

Petitioner also contends that one of ordinary skill in the art would have found the subject matter of the proposed substitute claims obvious over Smith alone. Opp. 31. For the reasons set forth in the Institution Decision, we have questions as to whether one of ordinary skill in the art would have selected preferred doping concentrations for cap layer 40 and then sought to passivate these very same dopants to create a compensated GaN layer, in view of Smith's disclosures. Should Patent Owner further pursue proposed substitute claims 13 and 14, we encourage the parties to address this issue further.

35 U.S.C. § 103 — Obviousness over Smith and Kigami

Petitioner argues that proposed substitute claims 13 and 14 would have been obvious in view of Smith in view of Kigami (Ex. 1008). Opp. 19–35.

Petitioner asserts that it would have been obvious to modify Smith to use Kigami’s passivation technique. *Id.* at 24–35. Specifically, Petitioner argues that Smith in view of Kigami renders obvious the recited “compensated GaN layer above the barrier layer” and an enhancement mode device with no 2DEG region below Smith’s gate at zero volts applied gate bias, as proposed substitute claims 13 and 14 recite. *Id.* at 26–28, 31–32 (citing Pet. 21–33, 38–45; Ex. 1039 ¶¶ 94–97, 100, 114–115; Kigami ¶ 36; Ex. 1038, 1).

To support this proposed modification of Smith in view of Kigami, Petitioner cites the rationales set forth in the Petition. *Id.* at 22 (citing Pet. 21–33; Ex. 1039 ¶ 79).

Patent Owner does not present specific arguments in the Motion with regard to Petitioner’s obviousness ground over Smith in view of Kigami. Mot. 7.

As stated in the Institution Decision, we have concerns whether Petitioner has sufficiently articulated why one of ordinary skill in the art, at the time of the invention, would have modified Smith’s cap layer 34 to be passivated in view of Kigami’s teachings. Dec. 24. As stated in the Institution Decision, Smith teaches doping cap layer 34 to form doped region 40, which is used “to screen the channel region from surface states, pin the surface energy level at a predictable and desired level to reduce and/or minimize trapping effects and to reduce leakage currents.” *Id.* (quoting Ex. 1005 ¶ 87). The proposed modification in view of Kigami would passivate these very same dopants, which Smith uses to alter the electrical characteristics of its device. *Id.* Given this understanding of Smith, we have concerns about whether Petitioner has sufficiently articulated a reason why one of ordinary skill in the art would have modified Smith in view of Kigami to passivate Smith’s dopants. *Id.*

Should Patent Owner further pursue proposed substitute claims 13 and 14, we encourage the parties to address this issue further.

35 U.S.C. § 103 — Obviousness over Smith and Uemoto

Petitioner argues that proposed substitute claims 13 and 14 would have been obvious in view of Smith in view of Uemoto (Ex. 1006). Opp. 19–35.

Petitioner contends it would have been obvious to modify Smith to use Uemoto’s passivation technique. *Id.* at 24–35. Specifically, Petitioner asserts that Smith in view of Uemoto renders obvious the recited “compensated GaN layer above the barrier layer” and an enhancement mode device with no 2DEG region below Smith’s gate at zero volts applied bias, as proposed substitute claims 13 and 14 recite. *Id.* at 26–28, 31–32 (citing Pet. 21–33, 38–45; Ex. 1039 ¶¶ 94–97, 100, 114–115; Uemoto ¶ 62; Ex. 1038, 1).

To support this proposed modification of Smith in view of Kigami, Petitioner cites the rationales set forth in their Petition. *Id.* at 22 (citing Pet. 21–33; Ex. 1039 ¶ 79).

Patent Owner does not present specific arguments in the Motion with regard to Petitioner’s obviousness ground over Smith in view of Uemoto. Mot. 7.

For reasons similar to those stated in our Institution Decision with regard to Petitioner’s ground over Smith in view of Kigami, we have concerns whether Petitioner has sufficiently articulated why one of ordinary skill in the art, at the time of the invention, would have passivated Smith’s cap layer 34 in view of Uemoto’s teachings. Dec. 24. Uemoto does not appear to desire passivated dopants within the gate, a requirement in both proposed substitute claims. Ex. 1006 ¶ 49. Rather, Uemoto uses a thermal treatment to remove hydrogen from control region 15a, which is under the gate electrode, and a hydrogen diffusion layer to retain hydrogen in “high resistive region 15b.” *Id.* ¶¶ 51, 59. This highly resistive layer is located between the control region (gate) and the drain electrode. *Id.* ¶ 59. We question whether Uemoto’s disclosures would have motivated one of ordinary skill in the art to use hydrogen to compensate dopants in a GaN layer that is part of a gate, as opposed to regions between the gate and the drain electrode.

Should Patent Owner further pursue proposed substitute claims 13 and 14, we encourage the parties to address this issue further.

35 U.S.C. § 103 — Obviousness over Sheu and Kigami

Petitioner asserts that proposed substitute claims 13 and 14 would have been obvious in view of Sheu in view of Kigami. Opp. 35–49.

Petitioner provides a copy of Sheu, Taiwanese Patent Publication No. TW200414540 A (Ex. 1035), and a certified English language translation of Sheu (Ex. 1036). Further references to Sheu will be to Ex. 1036 unless stated otherwise.

As an initial matter, we note that Petitioner does not address the publication date for Sheu. *See generally* Opposition. Should Petitioner continue to pursue unpatentability of proposed substitute claims over Sheu, Petitioner should address this issue further.

Petitioner argues it would have been obvious to modify Sheu’s device to be passivated in view of Kigami’s teachings. *Id.* at 37–49. Specifically, Petitioner asserts it would have been obvious to passivate Sheu’s p-type doped gate insulating layer 318 with hydrogen in view of Kigami’s teachings, which would provide a compensated GaN layer containing acceptor type dopant atoms passivated with hydrogen along with an enhancement mode device with no 2DEG region below Sheu’s gate, as proposed substitute claims 13 and 14 recite. *Id.* at 41–43, 45–46 (citing Ex. 1039 ¶¶ 159–165, 172–173, 186–190; Ex. 2009 ¶ 31).

Petitioner argues one of ordinary skill in the art would have passivated Sheu’s gate insulating layer 318 “to adjust resistivity and achieve advantages of localized hydrogenation.” *Id.* at 35–36 (citing Ex. 1008 ¶¶ 7–12). More specifically, Petitioner contends that Sheu teaches doping its gate insulating layer 318 “to enhance the resistance value,” that “[i]t was well-known that hydrogen passivated GaN layer dopants and enhanced resistivity,” and that one of ordinary skill in the art would have used Kigami’s “hydrogenation to passivate magnesium in gate insulating layer 318” to control resistivity.” *Id.* at 36 (citing Ex. 1036, 9–10; Pet. 8–10; Ex. 1039 ¶¶ 60–64, 132–134). According to Petitioner, “*Sheu* and *Kigami* both disclose III-nitride transistors and target the same problems of breakdown voltage and gate leakage,” Kigami teaches improving the characteristics of devices with magnesium dopants, and Sheu seeks to improve the same characteristics for devices doped with magnesium. *Id.* at 36–37. Thus, Petitioner contends the proposed modification would

have constituted the use of a known technique to improve a known device, and one of ordinary skill in the art “would have expected to succeed in controlling Sheu’s layer resistance in applying Kigami’s hydrogenation because such passivation had been known for decades and Kigami adequately explains the passivation process and its effects.” *Id.* (citing Ex. 1039 ¶¶ 136–141; Ex. 1008 ¶¶ 7–8, 12, 22–26, 29; Ex. 1036, 10).

We have concerns at this stage whether Petitioner has sufficiently articulated why one of ordinary skill in the art, at the time of the invention, would have passivated Sheu’s gate insulating layer 318 in view of Kigami’s teachings. Sheu teaches that its gate insulating layer 318 “may also have a dopant to *enhance* the resistance value of the GaN-based gate insulating layer 318.” Ex. 1036, 10 (emphasis added). Given that Sheu teaches adding dopant, such as magnesium, we understand Sheu’s teaching of “enhance[ing] the resistance value” as a teaching to lower gate insulating layer 318’s resistance value. *Id.* Conversely, Kigami teaches inactivating p-type impurities via hydrogen atoms so “the resistance of the III-V group compound semiconductor *is made high*.” Ex. 1008 ¶ 7 (emphasis added). As a result, Kigami’s purpose for its passivation technique may be inapposite to Sheu’s objective for its gate insulating layer 318. Should Patent Owner further pursue proposed substitute claims 13 and 14, we encourage the parties to address this issue further.

We acknowledge that Patent Owner has not yet had the opportunity to address Sheu in this proceeding (which Petitioner first made of record in support of its Opposition). Patent Owner will have the opportunity to do so in its Reply to Petitioner’s Opposition (or in a revised motion to amend). *See Notice, passim.*

III. CONCLUSION

This concludes the Preliminary Guidance. Patent Owner may file a revised MTA by DUE DATE 3. Paper 12, 11.

Patent Owner is reminded that amendments of the challenged claims may also be pursued in a separate reissue or reexamination proceeding

before, during, or after an AIA trial proceeding, including subsequent to the issuance of the Final Written Decision. We draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

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