

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HISENSE USA CORPORATION,
Petitioner,

v.

BRIGHTPLUS VENTURES LLC,
Patent Owner.

IPR2023-01410
Patent 8,294,075 B2

Before BARBARA A. PARVIS, STACEY G. WHITE, and
JOHN D. HAMANN, *Administrative Patent Judges*.

PARVIS, *Administrative Patent Judge*.

PRELIMINARY GUIDANCE
PATENT OWNER'S MOTION TO AMEND
37 C.F.R. § 42.121(e)

I. INTRODUCTION

On April 2, 2024, we instituted trial as to claims 1–7 and 9–12 of U.S. Patent No. 8,294,075 B2 (Ex. 1001, “the ’075 patent”). Paper 7 (“Inst. Dec.”). After institution, Patent Owner filed a Motion to Amend (Paper 12, “Mot.”) that is “contingent upon a finding in a final written decision that challenged claims 1 and 2 are unpatentable,” requesting that “if claims 1 and 2 are found to be unpatentable, [we] substitute proposed amended claims 34 and 35.” Mot. 2. Patent Owner submitted a second Declaration of William Bohannon (Ex. 2006) in support of the Motion. Petitioner filed an Opposition on September 30, 2024. Paper 18 (“Opp.”). Petitioner submitted a second Declaration of P. Morgan Pattison, Ph.D. (Ex. 1016) in support of the Opposition.

In the Motion, Patent Owner requested that we provide preliminary guidance concerning the Motion in accordance with 37 C.F.R. § 42.121(a)(1)(ii). Mot. 2, 15; *see* 37 C.F.R. § 42.121(e)(1); *see also Rules Governing Motion to Amend Practice and Procedures in Trial Proceedings under the America Invents Act before the Patent Trial and Appeal Board*, 89 Fed. Reg. 76,421 (Sept. 18, 2024) (“Final Rule”).¹ We have considered Patent Owner’s Motion and Petitioner’s Opposition.

In this Preliminary Guidance, we provide 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

¹ Patent Owner requested our preliminary guidance in accordance with the Board’s pilot program. *See* Mot. 2; 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. 9,497 (Mar. 15, 2019). Since then, the Final Rule went into effect on October 18, 2024, and this Preliminary Guidance is governed by the Board’s Final Rule.

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. 37 C.F.R. § 42.121(e)(1), (2); *see also* 35 U.S.C. § 316(d) (statutory requirements for a motion to amend); 37 C.F.R. § 42.121(a)(2), (a)(3), (b) (regulatory requirements and burdens for a motion to amend); *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 (PTAB Feb. 25, 2019) (precedential) (providing information and guidance regarding motions to amend). The reasonable likelihood standard this Preliminary Guidance applies is different than the preponderance of the evidence standard applied when ultimately deciding the Motion. *Compare* 37 C.F.R. § 42.121(e)(1) *with* § 42.121(d). Finally, this preliminary guidance is not a “decision” for purposes of rehearing under 37 C.F.R. § 42.71(d). 37 C.F.R. § 42.121(e)(2).

For purposes of this Preliminary Guidance, we focus on the proposed substitute claims, and specifically on the amendments proposed in the Motion. *See* 37 C.F.R. § 42.121(e)(1); Final Rule, 89 Fed. Reg. at 76,425. We do not address the patentability of the originally challenged claims. *See* 37 C.F.R. § 42.121(e)(1); Final Rule, 89 Fed. Reg. at 76,425. Moreover, in formulating our preliminary views on the Motion and Opposition, we have not considered the parties’ other substantive papers on the underlying merits of Petitioner’s challenges. We emphasize that the views expressed in this Preliminary Guidance are subject to change upon consideration of the complete record, including any revision to the Motion filed by Patent Owner. Thus, this Preliminary Guidance is not binding on the Board when rendering a final written decision or any other subsequent decision in this proceeding. 37 C.F.R. § 42.121(e)(2); *see Medytox, Inc. v. Galderma S.A.*, 71 F.4th 990, 1000 (Fed. Cir. 2023).

II. PRELIMINARY GUIDANCE

A. Statutory and Regulatory Requirements

Patent Owner bears the ultimate burden to show that its motion to amend complies with the requirements of 35 U.S.C. § 316(d)(1), (3) and 37 C.F.R. § 42.121(a)(2), (a)(3), (b)(1), and (b)(2). 37 C.F.R. § 42.121(d)(1). For the reasons discussed below, at this stage of the proceeding, and based on the current record, it appears that Patent Owner *has not shown* a reasonable likelihood that it has satisfied the statutory and regulatory requirements associated with filing a motion to amend with respect to proposed substitute claims 34 and 35. *See* 37 C.F.R. § 42.121(e)(1).

1. Reasonable Number of Substitute Claims

Does Patent Owner propose a reasonable number of substitute claims? (35 U.S.C. § 316(d)(1)(B); 37 C.F.R. § 42.121(a)(3))
Yes. Patent Owner proposes 1 substitute claim for each of challenged claims 1 and 2. Mot. 2–3, App. A (substitute claims listing). Thus, Patent Owner’s proposed number of substitute claims is equal to the number of contingently-replaced challenged claims, such that the proposed number of substitute claims is reasonable. <i>See</i> 35 U.S.C. § 316(d)(1)(B); 37 C.F.R. § 42.121(a)(3); <i>Lectrosonics</i> , Paper 15 at 4–5. Petitioner does not argue otherwise. <i>See generally</i> Opp.

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 responds to the grounds of unpatentability on which we instituted trial. Mot. 3–4, 7–14. Petitioner does not argue otherwise. <i>See generally</i> Opp. Upon review of Patent Owner’s arguments, we agree that proposed substitute claims 34 and 35 recite new limitations that directly

respond to the grounds of unpatentability involved in the trial. *See* Mot. 3–4, 7–14, App. A (substitute claims listing).

We observe that Patent Owner’s Motion presents arguments as to why Patent Owner believes that art cited in the Petition’s original grounds (e.g., Mok, Holman, Lamb, and Epstein) does not teach the limitations added in proposed substitute claims 34 and 35 (*see* Mot. 7–14).

For purposes of this preliminary guidance and based on the current record, we are persuaded that Patent Owner’s amendments in proposed substitute claims 34 and 35 respond to the grounds of unpatentability on which the Board instituted review of claims 1 and 2 in the Decision to Institute. *See* Mot. 3–4, 7–14; Inst. Dec. 7, 20–36, 46–57.

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.

Proposed substitute independent claim 34 (i) retains all limitations of its corresponding original independent claim 1, and (ii) further includes additional limitations as compared to claim 1. *See* Mot. 4, App. A (substitute claims listing). Therefore, proposed substitute claim 34 includes narrowing limitations as compared to corresponding original independent claim 1, and does not enlarge the scope of the claims of the challenged patent. *See* Mot. 4, 5.

Proposed substitute dependent claim 35 changes the scope of original dependent claim 2 that it is intended to replace (by deleting the limitation “the reflector sheet is configured to reflect and disperse light incident thereon” of original claim 2), but because proposed substitute claim 35 depends from narrowed proposed substitute claim 34, proposed substitute claim 35 does not enlarge the scope of the claims of the challenged patent. *See Lectrosonics*, Paper 15 at 6–7.

Petitioner does not argue otherwise. *See generally* Opp.

Accordingly, for these reasons and based on the current record, we agree with Patent Owner (*see* Mot. 4–5) that proposed substitute claims 34 and 35 do not enlarge the scope of the claims of the ’075 patent.

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))

Yes.

On the current record, and having considered the parties' contentions, we find preliminarily that Patent Owner does not satisfy its burden of establishing that the amendment does not introduce new matter because Patent Owner does not identify sufficient written description support in the ***originally filed disclosure*** of the '075 Patent for ***all*** of the limitations of the proposed substitute claims. As described in *Lectrosonics*, a motion to amend "must set forth written description support for each proposed substitute claim ***as a whole, and not just the features added by the amendment.***" *Lectrosonics*, Paper 15 at 8 (emphasis added). *Lectrosonics* further states that "[t]his applies equally ***to independent claims and dependent claims, even if the only amendment to a dependent claim is in the identification of the claim from which it depends.***" *Id.* (emphasis added). *Lectrosonics* also states that "to meet this requirement, citation should be made to the ***original disclosure of the application***, as filed, rather than to the patent as issued." *Id.* (emphasis added). Patent Owner only purports to show support for the additional features added by the amendments by citing to the '075 patent rather than the original disclosure of the underlying application. Patent Owner has not shown support in the original disclosure for any other limitations of the proposed substitute claims. Thus, Patent Owner does not satisfy its burden of establishing that the amendment does not introduce new matter as articulated in 37 C.F.R. §§ 42.121(a)(2)(ii) and 42.121(b)(1).

Nevertheless, in order to give further guidance to the parties, assuming *arguendo* that Patent Owner satisfies its burden by identifying written description support in the Specification of the challenged patent, it appears that there is a reasonable likelihood that there is adequate written description support for the proposed amendments (Mot. 5–7), even after having considered Petitioner's contrary arguments regarding proposed substitute claims 34 and 35 (*see* Opp. 2–3).

Petitioner asserts that the proposed substitute claims "broaden the previously claimed extended, parallel reflector to a reflector with angled side-walls" and argues that "there is simply no support in the specification for angled reflectors." Opp. 2. However, Petitioner's argument does not

appear to sufficiently address Patent Owner’s identified support for the claims.

Turning to Patent Owner’s provided support for the added limitations in proposed substitute claim 34, we are persuaded that Figures 5A and 7 and column 11, lines 10–12, 19–23, and 24–27 of the ’075 patent disclose a reflector that is “extended and angled with respect to the surface of the substrate” (as recited in proposed substitute claim 34). *See* Mot. 5–6 (relying on Ex. 1001, 11:19–23, 11:25–26, Figs. 5A, 7, and discussing *id.* at 11:10–12, 11:24–27). These cited portions of the ’075 patent describe reflector sheet 50, which includes apertures 42 with slanted sidewalls 42A, such that the reflector is both extended and angled with respect to a surface of substrate 10 and one skilled in the art can reasonably conclude that the inventor had possession of the claimed reflector. *See* Ex. 1001, 3:31–39, 11:10–27, Figs. 5A, 7. Our reading of the ’075 patent is consistent with Petitioner’s acknowledgement that “angled sidewalls are only described in the specification as pertaining to apertures in the reflector.” *See* Opp. 2.

We are also persuaded that Figures 5A and 7 and column 3, lines 31–39 and column 11, lines 10–27 of the ’075 patent disclose a reflector that “forms a reflective optical cavity around at least one solid state lighting device” (as required by proposed substitute claim 35). *See* Mot. 6–7 (citing Ex. 1001, 3:31–39, 11:10–27, Figs. 5A, 7). These cited portions of the ’075 patent disclose reflector 50 forming reflective optical cavities around light emitting elements 12. *See* Ex. 1001, 3:35–38 (“Respective ones of the apertures may include angled sidewalls to thereby form reflective optical cavities around the corresponding ones of the plurality of solid state lighting devices.”), 11:24–27 (“[A]pertures 42 may be circular apertures, and may have a sidewall 42A that is angled with respect to the surface of the tiles 10, thereby forming reflective optical cavities around the lighting elements 12.”), Figs. 5A, 7.

B. Patentability

Petitioner bears the ultimate burden to show that any proposed substitute claims are unpatentable. 37 C.F.R. § 42.121(d)(2). For the reasons discussed

below, at this stage of the proceeding, and based on the current record,² it appears that Petitioner has shown a reasonable likelihood that proposed substitute claims 34 and 35 are unpatentable. *See* 37 C.F.R. § 42.121(e)(1).

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

I. Indefiniteness

No, as to substitute claims 34 and 35.

The phrase “the reflector is extended and angled” (in the limitation “the reflector is extended and angled with respect to the surface of the substrate” recited in proposed substitute claim 34) does not appear to be indefinite under 35 U.S.C. § 112 ¶ 2.³

Noting that “as amended [substitute claim 34] recites ‘a *reflector sheet* on the first side of the at least one substrate, wherein the *reflector* is extended and angled with respect to the surface of the substrate,’” Petitioner argues that “there is no antecedent basis for ‘the reflector’ as recited in substitute claim 34.” Opp. 2. Petitioner asserts that “it is unclear whether the claim requires both a reflector *and* a reflector sheet, or if [Patent Owner] equates a reflector with a reflector sheet.” *Id.*

We tend not to agree with Petitioner’s argument that the scope of “the reflector” recited in substitute claim 34 is unclear based on the current record. As discussed above, Figures 5A and 7 and column 11, lines 10–12, 19–23, and 24–27 of the ’075 patent describe reflector sheet 50, which includes apertures 42 with slanted sidewalls 42A, and appear to provide written description support for “the reflector [that] is extended and angled with respect to the surface of substrate” (as recited in proposed substitute claim 34). Mot. 5–6. As such, it appears to be reasonably ascertainable by those skilled in the art that “the reflector” recited in substitute claim 34

² We express no view on the patentability of original claims 1 and 2 in this Preliminary Guidance. Instead, we focus on proposed limitations added to the challenged claims in the Patent Owner’s Motion to Amend.

³ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284 (2011), amended 35 U.S.C. § 112. Here, we apply the pre-AIA version of § 112.

makes reference to the recitation of “reflector” in “reflector sheet” recited in the same clause of the claim. The ’075 patent does not appear to provide a contrary definition or description of a “reflector” element. Since the scope of a claim would be reasonably ascertainable by those skilled in the art, the claim does not appear to be indefinite for the reason of lack of antecedent basis.

Petitioner also argues the phrase “the reflector is extended and angled” is “indefinite,” because the phrase

could mean that the reflector is perpendicular to the substrate and extends upward from the substrate. Or it could mean that some portion of the reflector is parallel to the substrate and some portion is angled (at some unspecified angle) to the reflector. Such broad and imprecise claim language is indefinite, especially when measured against the lack of disclosure in the specification. Further, the substitute claims now require the reflector to be angled relative to the surface of the substrate. Yet, the claim also requires that the reflector be “arranged parallel to the principal plane of the lighting panel.” A reflector cannot be both angled and parallel to a plane defined by the substrate.

Opp. 2–3.

We tend not to agree with Petitioner’s argument based on the current record. Petitioner’s argument that the “extended and angled” limitation is contradictory—because a “reflector cannot be both angled and parallel to a plane defined by the substrate” (*see id.*)—is unpersuasive because proposed substitute claim 34 does not require the *substrate* to be *parallel to the reflector*. Proposed substitute claim 34 (via its limitations retained from original claim 1) recites a “substrate having a first side parallel to a principal plane of the lighting panel,” “a reflector sheet on the first side of the at least one substrate,” and “the reflector sheet . . . extend[s] and [is] arranged parallel to the principal plane of the lighting panel.” *See* Mot. App. A (substitute claims listing). Proposed substitute claim 34 does not require the *reflector* to strictly follow the orientation of the substrate’s first side as Petitioner’s argument seems to imply. *See* Opp. 3. Thus, “the reflector [being] extended and angled with respect to the surface of the

substrate” (as currently recited in proposed substitute claim 34) is not inconsistent with the other limitations in claim 34.

We are also unpersuaded by Petitioner’s contention that the “extended and angled” language in claim 34 is “broad and imprecise” and “indefinite, especially when measured against the lack of disclosure in the specification.” *See* Opp. 3. As discussed *supra*, Petitioner’s argument does not address any of the portions in the ’075 patent cited by Patent Owner as support for claim 34 (*see* Mot. 5–6). And although the limitation “the reflector [being] extended and angled with respect to the surface of the substrate” in claim 34 is broad (e.g., as noted by Petitioner, it encompasses a reflector having “some portion . . . parallel to the substrate and some portion . . . angled” with respect to the substrate, *see* Opp. 3)—we do not find the limitation indefinite. Merely claiming broadly does not render a claim indefinite as long as its meaning is clear. *See In re Gardner*, 427 F.2d 786, 788 (CCPA 1970) (“Breadth is not indefiniteness.”); *see also Ultimex Cement Mfg. Corp. v. CTS Cement Mfg. Corp.*, 587 F.3d 1339, 1352 (Fed. Cir. 2009) (merely claiming broadly does not prevent public from understanding claim scope). The “extended and angled” limitation in claim 34 clearly indicates that the reflector is both extended and angled with respect to a surface of the substrate, and one having ordinary skill in the art would, in light of the Specification, have understood how a reflector, the reflective surface of a reflector sheet positioned on a substrate, may be both extended and angled with respect to the substrate’s surface. *See* Ex. 1001, 3:42–51, 11:35–51, Figs. 5A, 7.

Thus, we tend not to agree with Petitioner’s contention that the scope of the recited “reflector [that] is extended and angled” is unclear. On this record, Petitioner does not appear to have established a reasonable likelihood that the phrase “the reflector is extended and angled with respect to the surface of the substrate” recited in proposed substitute claim 34 renders the claim indefinite.

At this stage in the proceeding and on this record, Petitioner does not appear to have shown a reasonable likelihood that proposed substitute claim 34 (and substitute claim 35, by virtue of its dependency from claim 34) fails to comply with the definiteness requirement.

II. Obviousness

Yes, as to substitute claims 34 and 35.

Petitioner has asserted the following sixteen obviousness challenges⁴ against substitute claims 34 and 35:

- Ground asserting Mok (Ex. 1005),⁵ Holman (Ex. 1006),⁶ and Lamb (Ex. 1007)⁷ against proposed substitute claims 34 and 35;
- Ground asserting Epstein (Ex. 1008),⁸ Holman, and Lamb against proposed substitute claims 34 and 35;
- Ground asserting Mok, Holman, Lamb, and newly cited Ayabe (Ex. 1017)⁹ against proposed substitute claims 34 and 35;
- Ground asserting Epstein, Holman, Lamb, and newly cited Ayabe against proposed substitute claims 34 and 35;
- Ground asserting Mok, Holman, Lamb, and newly cited Roth (Ex. 1018)¹⁰ against proposed substitute claims 34 and 35;
- Ground asserting Epstein, Holman, Lamb, and newly cited Roth against proposed substitute claims 34 and 35;
- Ground asserting Mok, Holman, Lamb, and newly cited Saccomanno (Ex. 1019)¹¹ against proposed substitute claims 34 and 35;
- Ground asserting Epstein, Holman, Lamb, and newly cited Saccomanno against proposed substitute claims 34 and 35;
- Ground asserting Mok, Holman, Lamb, and newly cited Chang (Ex. 1021)¹² against proposed substitute claims 34 and 35; and
- Ground asserting Epstein, Holman, Lamb, and newly cited Chang against proposed substitute claims 34 and 35.
- Ground asserting Mok, Holman, Lamb, and newly cited Hiroki (Ex. 1025)¹³ against proposed substitute claims 34 and 35;
- Ground asserting Epstein, Holman, Lamb, and newly cited Hiroki against proposed substitute claims 34 and 35;

- Ground asserting Mok, Holman, Lamb, and newly cited Lee (Ex. 1027)¹⁴ against proposed substitute claims 34 and 35;
- Ground asserting Epstein, Holman, Lamb, and newly cited Lee against proposed substitute claims 34 and 35;
- Ground asserting Mok, Holman, Lamb, and newly cited Hiratsuka (Ex. 1029)¹⁵ against proposed substitute claims 34 and 35; and
- Ground asserting Epstein, Holman, Lamb, and newly cited Hiratsuka against proposed substitute claims 34 and 35.

⁴ Petitioner states that “proposed substitute claims 34 and 35 are not patentable in view of the prior art used in the original grounds” (Opp. 3 (capitalization altered, emphasis omitted)), and specifies that the “original grounds” are “**Ground I or Ground II.**” See Opp. 16 (“**One of Skill in The Art Would Have Been Motivated to Combine the Features of the Prior Art with Either Ground I or Ground II**”); see also *id.* (“For both Grounds 1 and 2, for the same reasons articulated in the Petition, such features would have been combined or used with the existing disclosures.”); *id.* at 3 (“**Ground 1 – Mok, Holman, and Lamb in view of the Knowledge of a POSITA**”); *id.* at 7 (“**Ground 2 – Epstein, Holman, and Lamb in view of the Knowledge of a POSITA**”).

⁵ US 2006/0227545 A1, filed Apr. 11, 2005, published Oct. 12, 2006.

⁶ WO 03/056876 A2, filed Dec. 13, 2002, published July 10, 2003.

⁷ US 2005/0135115 A1, filed Dec. 23, 2003, published June 23, 2005.

⁸ US 2005/0265029 A1, filed June 1, 2004, published Dec. 1, 2005.

⁹ US 2006/0083023 A1, filed Oct. 18, 2005, published Apr. 20, 2006.

¹⁰ US 2005/0274972 A1, filed Dec. 30, 2004, published Dec. 15, 2005.

¹¹ US 2007/0188425 A1, filed Feb. 10, 2006, published Aug. 16, 2007.

¹² Petitioner submitted a certified English translation (Ex. 1021) of a publication of Taiwanese Patent Application No. 93218806 to Chang (Ex. 1020).

¹³ US 6,495,861 B1, filed Mar. 16, 2000, issued Dec. 17, 2002.

¹⁴ Petitioner submitted a certified English translation (Ex. 1027) of Korean Laid-Open Patent Publication No. 2002-0095782 A to Lee et al. (Ex. 1026), published Dec. 28, 2002.

¹⁵ Petitioner submitted a certified English translation (Ex. 1029) of Japanese Unexamined Patent Application Publication No. H7-199829 A to Hiratsuka (Ex. 1028), published Aug. 4, 1995.

Opp. 3–25.

On this record, it appears that Petitioner has shown a reasonable likelihood that each of Petitioner’s challenges would have rendered proposed substitute claims 34 and 35 obvious.

Ground: Mok, Holman, and Lamb

Proposed substitute independent claim 34 replaces original independent claim 1 and adds new limitations. *See* Mot. App. A (substitute claims listing). In particular, proposed substitute claim 34 amends original claim 1 to further recite that “the reflector is extended and angled with respect to the surface of the substrate.” *See id.*

Proposed substitute dependent claim 35 replaces original dependent claim 2 and adds new limitations reciting that “the reflector forms a reflective optical cavity around at least one solid state lighting device.” *See* Mot. App. A (substitute claims listing).

Petitioner contends that “proposed substitute claims 34 and 35 are not patentable in view of the prior art used in the original ground[I (i.e., Mok, Holman, and Lamb ground)].” Opp. 3–7, 8–9 (capitalization altered, emphasis omitted). We analyze Petitioner’s contentions with respect to each of Mok, Holman, and Lamb below.

Discussion of Mok

Petitioner contends the added limitation in claim 34 reciting that “the reflector is extended and angled with respect to the surface of the substrate” is taught or suggested by Mok. Opp. 3–5. Petitioner also contends the added limitations in claim 35 reciting that the reflector forms “a reflective optical cavity around at least one solid state lighting device” are taught or suggested by Mok. Opp. 9.

In particular, Petitioner references multiple reflective surfaces in Mok including “reflective surface 50 on base panel 12” and “reflector cup 32 . . . [with] a reflective coating 58 provided within the reflector cup,” and asserts that “Mok discloses reflective surfaces 50 and 58 that are both extended and angled with respect to the substrate.” Opp. 3 (citing Ex. 1005 ¶¶ 21, 27–28, Figs. 1, 3; Ex. 1016 ¶¶ 12–13), 5 (citing Ex. 1016 ¶¶ 11–13).

Petitioner's reliance on Mok's reflective surface 50 and reflector cup 32 having reflective coating 58 thereon does *not* appear to show a reasonable likelihood that Mok teaches or suggests a reflector that "is extended and angled with respect to the surface of the substrate" (as recited in proposed substitute claim 34). Reflective surface 50 is a layer deposited on base panel 12 on which an array of light emitting elements 14 are also disposed. *See* Ex. 1005 ¶¶ 15, 19, 21–22, Figs. 1–2. Although Mok's Figure 1 shows *reflective surface 50* being "on the first side of the at least one substrate [(e.g., base panel 12)]" and "extended . . . with respect to the surface of the substrate" (as required by proposed substitute claim 34), *reflective surface 50* is *not disclosed* as also being "angled with respect to the surface of the substrate [(base panel 12)]" (as required by claim 34), and is not disclosed as "form[ing] a reflective optical cavity around at least one solid state lighting device [(light emitting element 14)]" (as recited in proposed substitute claim 35). *See id.* at Fig. 1.

Reflector cup 32 and its reflective coating 58 in Mok are *not part of the reflective layer 50 deposited on base panel 12*; rather, *reflector cup 32 and its reflective coating 58* (together with other elements, such as lens 36 and diode junction 34) form a *light emitting element 14* with a "flat-topped radiation pattern [that] is achieved by the combination of the reflector cup 32 and the lens 36." *See* Ex. 1005 ¶¶ 12, 16, 28–30, Fig. 3. In particular, Mok explains that

each light emitting element 14 may comprise a light emitting diode 26 that produces an illumination pattern 46 that includes a region 28 of substantially uniform intensity. . . . light emitting diode 26 may comprise a body or substrate 300 in which is formed a reflector cup 32. A light emitting diode junction 34 (i.e., a die) is positioned within the reflector cup 32. A lens 36 is then formed over the diode junction 34 and reflector cup 32 in the manner best seen in FIG. 3. The reflector cup, 32 and lens 36 collect and direct light emitted by the diode junction 34 so that the light emitting diode 26 produces an illumination pattern 46 that comprises the region 28 of substantially uniform intensity, as illustrated in FIG. 4.

. . . .

[E]ach light emitting element 14 may comprise a light emitting diode 26 that produces an illumination pattern 46 having a

region 28 of substantially uniform intensity. . . . *light emitting diode 26 may comprise a base portion or substrate 30 in which is formed a reflector cup 32. The light emitting diode junction 34 or die is then positioned within the reflector cup 32.*

. . . .

The reflector cup 32 may be formed in the base portion 30 during fabrication thereof. Alternatively, the reflector cup 32 may be mechanically formed after fabrication of the base portion 30, such as, for example, by drilling. It is generally preferred that *the reflector cup 32 be provided with a reflective coating 58 thereon to improve efficiency.*

Id. ¶¶ 16, 26, 28.

Thus, *each light emitting element 14 in Mok includes a reflector cup 32 with a reflective coating 58 thereon. See id.*

Proposed substitute claim 34, on the other hand, recites “a plurality of solid state lighting devices arranged on the first side of the at least one substrate and configured to emit light,” and “a reflector sheet on the first side of the at least one substrate, wherein the reflector is extended and angled with respect to the surface of the substrate.”

We do not find the *reflector cups 32 (and attached reflective coatings 58) embedded in each of Mok’s light emitting devices 14* to be teaching “a reflector sheet on the first side of the at least one substrate, wherein the reflector is extended and angled with respect to the surface of the substrate” (as recited in claim 34). Rather, *each reflector cup 32 (and attached reflective coating 58) is part of a solid state lighting device* (elements 14 in Mok, relied upon in the Petition for claim 1’s “plurality of solid state lighting devices,” see Pet. 15–16); and the recited “solid state lighting devices” in claim 34 *are distinct from* the recited “reflector sheet on the first side of the at least one substrate” (for which Petitioner relied upon Mok’s *reflective layer 50*, see Pet. 16).

Petitioner also argues, however, that it would have been obvious to modify Mok’s reflective surface to cover the angled sidewalls of reflector cup 32. See Opp. 4–5. Petitioner argues “it would have been obvious to deposit reflective surface 50 directly on all surfaces, including the sidewalls of reflector cup 32, by the very same process the reflective surface 50 may be

deposited directly on the base panel 12.” *Id.* at 4 (citing Ex. 1016 ¶¶ 11–13).

Petitioner relies on the testimony of Dr. Pattison to fill a gap in the disclosure of Mok. We are unpersuaded by Petitioner’s contention that “it would have been obvious to deposit reflective surface 50 directly on all surfaces, including the sidewalls of reflector cup 32.” *See* Opp. 4.

In particular, Mok provides that each light emitting element 14 is made by (i) fabricating a base portion or substrate 30 of the element, (ii) forming reflector cup 32 in the base portion 30 and providing reflective coating 58 thereon (for example, “the reflector cup 32 is initially plated with copper, then with a subsequent layer of gold or silver to maximize reflectivity”), (iii) positioning diode junction 34 within reflector cup 32, and (iv) forming “lens 36 . . . over the diode junction 34 and reflector cup 32.” *See* Ex. 1005 ¶¶ 16, 26–29. Mok explains that light emitting elements 14 thus made are mounted to the base panel 12 “in a two dimensional array or pattern over both the length 38 and width 40 of the base panel 12.” *See id.* ¶¶ 19–20. Reflective surface 50 and diffuser 16 are then provided on base panel 12, “reflective surface 50 . . . provided on the base panel 12 to ‘recycle’ (i.e., reflect) light which may be reflected by the back surface 60 of diffuser 16” and “diffuser 16 . . . positioned in spaced-apart relation to the base panel 12 so that it receives and diffuses light produced by the light emitting elements 14 as well as light that m[a]y be reflected by the reflective surface 50 provided on base panel 12.” *See id.* ¶¶ 21–23. Mok explains that reflective surface 50 may be made of a specular reflective material such as aluminum, or a diffuse reflective material such as white paint, and “may comprise a separate component (e.g., a sheet-like material) that is affixed to the base panel 12. . . . [or] may be deposited directly on the base panel 12.” *See id.* ¶¶ 21–22.

Thus, Mok discloses that reflector cups 32 and reflective surface 50 are made by separate processes (which also appear to employ different materials). *See* Ex. 1005 ¶¶ 16, 19–23, 26–29. Moreover, because reflector cup 32 (and attached reflective coating 58) in each light emitting element 14 is completely covered by lens material 36/136 (*see* Figs. 3, 5), reflector cups 32 are spatially separated from reflective surface 50 (*see* Figs. 1, 3, 5), such that Petitioner’s proposal “to deposit reflective surface 50 directly on all surfaces, including the sidewalls of reflector cup 32” (*see* Opp. 10) does not appear to be consistent with the disclosure of Mok.

Petitioner's reliance (*see* Opp. 9) on Mok's reflective cup 32 for the claimed "reflective optical cavity" (formed by the reflector around a solid state lighting device) in proposed substitute claim 35, does not remedy the deficiencies discussed *supra* with respect to Petitioner's showing based on Mok with respect to claim 34.

In conclusion, on the current record, Petitioner does not appear to have shown a reasonable likelihood that Mok teaches or suggests a "reflector [that] is extended and angled with respect to the surface of the substrate" as recited in proposed substitute claim 34, or a reflector as recited in proposed substitute claim 35 (that further defines the shape and arrangement of claim 34's reflector).

Discussion of Holman

- Proposed substitute claims 34 and 35

Petitioner contends the added limitation in claim 34 reciting that "the reflector is extended and angled with respect to the surface of the substrate" is taught by Holman. Opp. 5–6. Petitioner also contends the added limitations in claim 35 reciting that the reflector forms "a reflective optical cavity around at least one solid state lighting device" are taught by Holman. Opp. 9. In particular, Petitioner references "Holman's sloped sidewalls 230 [as being] angled and reflecting" and Holman's LEDs 70 mounted in a "reflected cavity structure layer laminated to insulating layer 225." Opp. 5 (citing Ex. 1006, 7, Figs. 1, 13–15). Petitioner contends that "[s]loped sidewalls 230, with angle α , can be the same material as the [composite reflective] base layer [220]." *Id.* (citing Ex. 1006, 38–40, Figs. 13–15). Petitioner also contends "Holman's disclosures in Figures 13, 14, and 15 regarding the use of two-dimensional light source panels combining LED back planes with interior walls that are reflective and create a cavity" teach optical cavities around LEDs by extended and angled reflectors. *See id.* at 9 (citing Ex. 1006, 39–41, Figs. 13–15). Finally, Petitioner notes that Holman's Figures 13–15 disclose details of elements that are also in Holman's Figures 7–8 (which were cited in the Petition's original ground, *see* Pet. 18–20). Opp. 5–6 (citing Ex. 1006, 40–41¹⁶).

¹⁶ Holman's page 40 states that "FIG. 15 shows one possible set of fully integrated two-dimensional light source panels combining the high-density LED back plane

We have reviewed Holman's Figures 13–15 and their textual description and observe they appear to support Petitioner's assertions. For example, Holman explains that LEDs 70 in Figure 13 are "mounted flip-chip (electrodes below the light emission) on composite, electrically-insulating, reflective base layers 220 and 225 of thickness H, 222" where "reflective cavity structure layer 220 . . . [may be] made separately by molding, embossing, casting or electroforming . . . [and] laminated to insulating layer 225." See Ex. 1006, 37–38,¹⁷ Fig. 13. Holman also describes reflective sidewalls 230 as follows:

[s]loped sidewalls 230 are used to increase the amount of LED light coupled to the cavity's output aperture of width W, 42. The sloped sidewall can be a diffusely reflecting material identical to the base layer material 220 or deposited as an external coating. The sloped sidewall 230 can also be made specularly reflecting. In either case, light emitted by the LED towards the side of the cavity is reflected generally upwards, towards the cavity aperture. . . . this sidewall is sloped at an angle, α , 232, to the vertical, which may in some cases be nearly 0 degrees, and covers a height M, 234, that is made approximately equal to the thickness of the LED chip 70.

. . . .

Cavity gap height J, 246, in FIG 13, is used to provide some offset between the LED surface and the output diffuser 68. The reason such a gap, J, is introduced, is to extend the cavity's interior scattering or reflecting surface without increasing the width of the cavity aperture 42, thereby providing some diffusive mixing of emitted light

. . . .

of FIG. 13 with the multi-layer illuminator arrangement of FIG. 7. The same type of integration applies to the arrangements of FIG. 14 and FIG. 7, and also to the light sources of either FIG. 13 or FIG. 14 and the system of FIG. 8."

¹⁷ We cite to the original pages of Holman, not to Petitioner's added page numbers (which do not correspond to Holman's original page numbering).

Preferable choices for cavity dimensions W, H and J, in FIGS. 13-15, as well as *for the reflective properties (diffuse or specular) given to its interior walls 230* and the optical properties given to its immersing media 238 depend on the size 236 of the LED and the specific system application within which the LED light source array is to be used.

Id. at 37–40 (emphases added); *see also id.*, Fig. 13.

Thus, Holman’s Figure 13 (and Figure 15 showing additional layers disposed above those shown in Figure 13) show *light emitting devices 70 disposed in cavities* of width W and height H (which is the sum of heights M, 234, and J, 246), *the cavities defined by sloped sidewalls 230 and additional vertical portions of height J, 246*, with sidewalls 230 and cavity height J *made of a reflecting material*—such that the cavities provide a reflecting surface to light emitted from the LEDs. *See* Ex. 1006, 37–40, Figs. 13, 15. Holman’s Figure 13 therefore appears to teach a reflector (reflective cavity walls including sidewalls 230 and the reflective portions of height J extending vertically above the sidewalls in Figure 13) that is extended and angled with respect to the surface of a substrate (insulating base layer 225), as required by proposed substitute claim 34. Holman’s Figures 13 and 15 also appear to teach that the reflector forms a reflective optical cavity around at least one solid state lighting device (70 in Figure 13), as recited in proposed substitute claim 35.

Thus, on the current record, Petitioner appears to have shown a reasonable likelihood that Holman teaches or suggests a “reflector [that] is extended and angled with respect to the surface of the substrate” (as recited in proposed substitute claim 34), the “reflector form[ing] a reflective optical cavity around at least one solid state lighting device” (as recited in proposed substitute claim 35).

Discussion of Lamb

Petitioner also contends the added limitation in proposed substitute claim 34 reciting that “the reflector is extended and angled with respect to the surface of the substrate” is taught or suggested by Lamb. Opp. 6–7. Petitioner further contends the added limitations in proposed substitute claim 35 reciting that the reflector forms “a reflective optical cavity

around at least one solid state lighting device” are taught or suggested by Lamb. Opp. 9.

In particular, Petitioner contends reflector 17 in Lamb’s Figure 1 “is both angled and extended” (as required by proposed substitute claim 34) and “form[s] optical cavities around each lighting source” (as required by proposed substitute claim 35). *See* Opp. 6, 9 (citing Ex. 1007 ¶¶ 34–35, Fig. 1; Ex. 1016 ¶ 25).

Petitioner’s reliance on Lamb’s Figure 1 and its associated description does *not* appear to show a reasonable likelihood that Lamb’s Figure 1 teaches or suggests a reflector that “is extended and angled with respect to the surface of the substrate” (as recited in claim 34). In Lamb’s Figure 1, a direct-lit backlight 10 for television includes an array of light bulbs 15 such as CCFLs (cold cathode fluorescent lamps), and a shaped reflector 17 located behind the array of light bulbs 15 for directing more light toward a viewer. Ex. 1007 ¶ 34, Fig. 1. Lamb’s direct-lit backlight 10, however, does not appear to have a *substrate* with solid state lighting devices and the reflector arranged on the first side of such a *substrate*, and the reflector *extended and angled with respect to the surface of such a substrate* (as recited in proposed substitute claim 34). Although Lamb’s reflector 17 has angled portions, the reflector is not “extended and angled with respect to [a] surface of [a] substrate” (as required by proposed substitute claim 34), since there is no substrate in Lamb’s Figure 1. And although Petitioner asserts that having “a substrate or base layer . . . would have been obvious to one of skill in the art” (Opp. 7 (citing Ex. 1016 ¶¶ 17–18)), Petitioner has not shown that *the addition of a substrate* would have been desirable (or even feasible) in the configuration of Lamb’s direct-lit backlight in Figure 1. Moreover, Petitioner’s relied-upon declaration testimony (Ex. 1016 ¶¶ 17–18) provides an insufficient underlying factual basis for Petitioner’s contention with respect to the addition of a substrate. Dr. Pattison’s testimony asserts that “[a] person of ordinary skill in the art reviewing this disclosure [in Lamb’s Fig. 1] would recognize that Lamb thus discloses a reflector that is extended and angled *with respect to the surface of the substrate on which it is positioned*” (*see* Ex. 1016 ¶ 18 (emphasis added))—an assertion that does not appear to be supported by Lamb (which has no substrate in Figure 1, and does not show reflector 17 being positioned on any substrate). Petitioner’s reliance on Lamb’s description of backlighting system 100 illustrated in Figure 2 (Opp. 7

(citing Ex. 1006 ¶ 37, Fig. 2)) does not remedy the deficiency as Petitioner has not provided sufficient reasoning to modify the Figure 1 embodiment.

Thus, on the current record, we are unpersuaded that Lamb's Figure 1 teaches or suggests the reflector limitations recited in proposed substitute claim 34 (and the limitations in proposed substitute claim 35 further defining the shape of claim 34's reflector).

We are also unpersuaded that Lamb's Figure 2 teaches or suggests the reflector limitations recited in proposed substitute claim 34. *See* Opp. 7 (citing Ex. 1007 ¶ 37, Fig. 2; Ex. 1016 ¶ 18). Petitioner asserts that "Lamb explicitly discloses placing light sources 185a and 185b on a substrate (light guide 140)." Opp. 7 (citing Ex. 1007 ¶ 36, Fig. 2; Ex. 1016 ¶ 18).

Although Lamb discloses that "light emanating from the sources 185a, 185b is coupled into the interior of the lightguide 140 and propagates along its length by reflecting from the surfaces 140a and 140b, e.g., by total internal reflection" and "[l]amp cavity reflectors 176a, 176b . . . may be provided as illustrated in FIG. 2 for increasing coupling efficiency from the sources 185a, 185b into the interior of the lightguide 140" (*see* Ex. 1007 ¶ 37), it is not clear where Lamb's Figure 2 shows *a substrate with respect to which a reflector is extended and angled* (as required in claim 34). The reflecting elements appearing in Lamb's Figure 2 (i.e., lightguide 140 that reflects propagating light by total internal reflection, lamp cavity reflectors 176a and 176b, and reflector sheet 127) do not appear to be "extended and angled with respect to the surface of [a] substrate" (as required in proposed substitute claim 34). *See* Ex. 1007 ¶¶ 37, 48, Fig. 2.

Thus, on the current record, we are unpersuaded that Lamb's Figure 2 teaches or suggests the reflector limitations recited in proposed substitute claim 34, and the limitations in claim 35 that further define the shape and arrangement of claim 34's reflector.

In conclusion, Petitioner does not appear to have shown a reasonable likelihood that Lamb teaches a reflector as recited in each of proposed substitute claims 34 and 35.

Conclusion Regarding the Mok, Holman, and Lamb Ground

Although Petitioner does not appear to have shown a reasonable likelihood that Mok or Lamb teaches a reflector as recited in each of proposed

substitute claims 34 and 35, as discussed *supra*, Petitioner appears to have shown a reasonable likelihood that Holman teaches or suggests a reflector as recited in each of proposed substitute claims 34 and 35. Petitioner has also submitted arguments that an ordinarily skilled artisan would have combined or used the newly relied-upon features (e.g., the extended and angled reflector forming optical cavities in Figures 13 and 15 of Holman) with the previously relied-upon disclosures of Mok and Lamb. *See* Opp. 16–19; *see also* Inst. Dec. 20–21.

Based on the current record, at this stage of the proceeding, it appears that Petitioner has shown a reasonable likelihood that proposed substitute claims 34 and 35 would have been rendered obvious by the asserted combination of Mok, Holman, and Lamb.

We acknowledge that Patent Owner has not yet had the opportunity to address Petitioner’s discussion of Holman (such as the disclosure in Holman’s Figures 13 and 15 relied upon by Petitioner in support of its Opposition) and respond to Petitioner’s modified combination of Mok, Holman, and Lamb. Patent Owner will have the opportunity to do so in its Reply to Petitioner’s Opposition (or in a revised motion to amend) in this proceeding. *See* 37 C.F.R. § 42.121(e)(3); *see also* Notice, *passim*.

Ground: Epstein, Holman, and Lamb

Petitioner contends that “proposed substitute claims 34 and 35 are not patentable in view of the prior art used in the original ground[II (i.e., Epstein, Holman, and Lamb ground)].” Opp. 3 (capitalization altered, emphasis omitted), 7–9.

Petitioner’s discussion of Holman and Lamb with respect to this ground as applied to proposed substitute claims 34 and 35 is the same as the discussion of Holman and Lamb provided with respect to the Mok-Holman-Lamb ground. *See* Opp. 5–7, 9. As discussed *supra*, Petitioner appears to have shown a reasonable likelihood that Holman teaches or suggests the added limitations recited in proposed substitute claims 34 and 35, but Petitioner does not appear to have shown a reasonable likelihood

that Lamb teaches or suggests the added limitations recited in claims 34 and 35.

Petitioner also contends that Epstein teaches the added limitations recited in each of proposed substitute claims 34 and 35. We analyze Petitioner's contentions with respect to Epstein below.

Discussion of Epstein

- Proposed substitute claims 34 and 35

Petitioner contends the added limitation in proposed substitute claim 34 reciting that “the reflector is extended and angled with respect to the surface of the substrate” is taught by Epstein. Opp. 7–8. Petitioner also contends the added limitations in proposed substitute claim 35, reciting that the reflector forms “a reflective optical cavity around at least one solid state lighting device,” are taught by Epstein. *Id.* at 9.

In particular, Petitioner references Epstein's Figures 18A and 18B as disclosing “a reflective surface that may be ‘parabolic, elliptical or have some other shape’” and that “is both angled and extended at different points along its surface.” Opp. 7 (citing Ex. 1008 ¶ 107, Figs. 18A–18B). Petitioner additionally references Epstein's Figures 4A and 20B, contending that “Epstein's Figure 20B . . . discloses a reflective surface that is extended and angled relative to a base layer 608,” and Epstein's Figure 4A discloses a “reflector with apertures 423” that is “extended and angled,” as recited in proposed substitute claim 34. *Id.* at 8 (citing Ex. 1008 ¶ 96, Figs. 4A, 20B; Pet. 44–45).

With respect to proposed substitute claim 35, Petitioner references Figures 18A and 18B and contends that “reflective sheet 1822 forms apertures that create an optical cavity around each LED 1820 disposed on substrate 1808.” Opp. 9 (citing Ex. 1008 ¶¶ 106–107, Figs. 18A–18B).

We have reviewed Epstein's Figures 4A, 18A–B, and 20B and their textual description and observe they appear to support Petitioner's assertions.

For example, Epstein explains that “intermediate layer 422 includes apertures 423, also referred to as vias, that are registered to the LEDs 420 disposed on the substrate 408. The intermediate layer 422 may be reflective . . . ,” that the “[a]pertures may be formed in the intermediate layer 422 using, for example, laser milling,” and that an aperture 423 may

be “a blind hole, which holds the LED in place in the aperture 423.” *See* Ex. 1008 ¶¶ 48, 53, Fig. 4A. Thus, Epstein’s layer 422 appears to be a *reflector sheet* with a *reflector* that is *extended and angled* with respect to the surface of a substrate (e.g., substrate 408) as required by proposed substitute claim 34, because *the reflector’s apertures 423 have sidewalls that appear to be angled at 90° (i.e., vertical) with respect to the horizontal surface of substrate 408* (as shown in Figures 4A and 4B). *See id.* at Figs. 4A–4B.

With respect to Figures 18A and 18B, Epstein discloses an “[optical] sheet 1822 [that] is provided with a reflecting surface 1824 that reflects the light emitted by the diodes 1820. . . . [R]eflecting surface 1824 is curved so as to direct the light in a desired direction,” whereby “reflecting surface 1824 may be deposited on the sheet 1822” or “the sheet 1822 itself may be formed of reflecting material.” *See* Ex. 1008 ¶¶ 106–107, 110, Figs. 18A–18B. Thus, Epstein’s *reflecting sheet or surface (1822 or 1824)* appears to form a *reflector* that is *extended and angled* with respect to the surface of a substrate (e.g., substrate 1808) as required by proposed substitute claim 34, because reflecting sheet 1822 (or reflecting surface 1824 if deposited thereon) forms sidewalls around diodes 1820, on substrate 1808, as shown in Figures 18A–18B. *See id.* at Figs. 18A–18B. Moreover, reflecting sheet 1822 (or reflecting surface 1824 if deposited thereon) appears to form a *reflective optical cavity* around a solid state lighting device (e.g., LED 1820), as required by proposed substitute claim 35. *See id.* ¶¶ 106 (“optical sheet 1822 has apertures to accommodate the LEDs 1820, so that LEDs 1820 penetrate through the apertures” and “the substrate 1808 is on one side of the sheet 1822 and the light emitting portions of the LED 1820 at least have a clear path to emit light through the apertures, or may be through the apertures themselves, as illustrated”), 107 (“sheet 1822 is provided with a reflecting surface 1824 that reflects the light emitted by the diodes 1820”), 109 (“The space 1826 above the LED 1820 and reflecting surface 1824, may be in air or may be filled with transparent material.”), Figs. 18A–18B.

Finally, Epstein’s Figure 20B illustrates an “intermediate layer 622 [that] is reflective” and “may be curved, for example as shown in FIG. 20B.” *See* Ex. 1008 ¶¶ 95–96, Fig. 20B. Epstein’s layer 622 appears to form a *reflector* that is *extended and angled* with respect to the surface of a substrate (e.g., substrate 608) as required by claim 34. *See id.* at Fig. 20B.

Thus, on this record, Petitioner appears to have shown a reasonable likelihood that Epstein teaches a “reflector [that] is extended and angled with respect to the surface of the substrate” (as recited in proposed substitute claim 34), the “reflector form[ing] a reflective optical cavity around at least one solid state lighting device” (as recited in proposed substitute claim 35).

Conclusion Regarding the Epstein, Holman, and Lamb Ground

Although Petitioner does not appear to have shown a reasonable likelihood that Lamb teaches or suggests a reflector as recited in each of proposed substitute claims 34 and 35 (as discussed *supra*), Petitioner appears to have shown a reasonable likelihood that each of Epstein and Holman teaches or suggests a reflector as recited in each of proposed substitute claims 34 and 35. Petitioner has also submitted arguments that an ordinarily skilled artisan would have combined or used the newly relied-upon features (e.g., the extended and angled reflector forming optical cavities in Figures 13 and 15 of Holman, and the extended and angled reflector forming optical cavities in Epstein’s Figures 18A and 20B) with the previously relied-upon disclosure of Lamb. *See* Opp. 18–19.

Based on the current record, at this stage of the proceeding, it appears that Petitioner has shown a reasonable likelihood that proposed substitute claims 34 and 35 would have been rendered obvious by the asserted combination of Epstein, Holman, and Lamb.

We acknowledge that Patent Owner has not yet had the opportunity to address Petitioner’s discussion of Holman and Epstein (such as the disclosure in Holman’s Figures 13 and 15 and Epstein’s Figures 4A, 18A–18B, and 20B relied upon by Petitioner in support of its Opposition) and respond to Petitioner’s modified combination of Epstein, Holman, and Lamb. Patent Owner will have the opportunity to do so in its Reply to Petitioner’s Opposition (or in a revised motion to amend) in this proceeding. *See* 37 C.F.R. § 42.121(e)(3); *see also* Notice, *passim*.

**Grounds: Mok, Holman, Lamb, and Ayabe; and
Epstein, Holman, Lamb, and Ayabe**

- Proposed substitute claims 34 and 35

Petitioner contends the added limitation in proposed substitute claim 34 reciting that “the reflector is extended and angled with respect to the surface of the substrate” is taught or suggested by newly cited Ayabe. Opp. 10–11. Petitioner also contends the added limitations in proposed substitute claim 35 reciting that the reflector forms “a reflective optical cavity around at least one solid state lighting device” are taught or suggested by Ayabe. *See id.*

In particular, Petitioner contends Ayabe’s Figure 32 discloses

that lighting panels used reflectors that are extended and angled and house more than one solid state lighting device. Ex. 1016, ¶¶28-30.

...

The design in FIG. 32 is described by Ayabe []as having “light emitting devices” 56R, 56G, and 56B (such as LED chips) installed on the surface of “wiring board” 55 and a “reflecting member 57” that is “comprised of a plurality of annular reflecting areas” 64b–64d and “shaped like a concave mirror for reflecting light.” Ex. 1017, Fig. 32, [0091]–[0092], [0097], [0135]–[0139]. Ayabe further describes and shows that there may be multiple reflecting members 57 arranged along wiring board 55. *Id.*, [0089], Figs. 9–10.

Opp. 10–11. Petitioner contends that “[t]he reflecting members 57 in Ayabe are a reflector that is ‘extended and angled’ with respect to the surface of a substrate (wiring board 55) to form a ‘reflective optical cavity’ bounded by annular reflecting areas 64b–64d around the solid state lighting device(s) (light emitting devices 56R, 56G, and 56B).” *Id.* at 11 (citing Ex. 1017, Figs. 32, 34, 35).

Petitioner also references “Ayabe’s other disclosures,” contending they “include extended and angled reflectors that form optical cavities via backward sloped surfaces of reflecting members that house solid state lighting sources” as recited in proposed substitute claims 34 and 35. *Id.*

(citing Ex. 1017 ¶¶ 21–24, Figs. 2, 34, 35, claims 1–4, 6–7; Ex. 1016 ¶¶ 28–30).

We have reviewed Ayabe’s Figures 32, 34, and 35 and their associated description and observe these figures appear to support Petitioner’s assertions. In particular, Ayabe’s Figure 32 discloses wiring board 55, light emitting devices 56R, 56G, and 56B (such as LED chips) installed on the surface of wiring board 55, reflecting member 57 including annular reflecting areas 64b–64d, and cup unit 65 provided to stabilize reflecting member 57 on wiring board 55. *See* Ex. 1017 ¶¶ 91, 97, 127, 135, 137, 139, Figs. 32, 34, 35. Multiple reflecting members 57 may be arranged along wiring board 55. *See id.* ¶ 89, Figs. 9–10.

Thus, Ayabe’s Figures 9, 32, 34, and 35 appear to show a reflector (collection of reflecting members 57 in Ayabe) that is “extended and angled” with respect to the surface of a substrate (wiring board 55) (as required by proposed substitute claim 34), the reflector (each reflecting member 57) forming a “reflective optical cavity” (cavity bounded by annular reflecting areas 64b–64d) around solid state lighting device(s) (light emitting devices 56R, 56G, 56B in Ayabe) (as required by proposed substitute claim 35). *See id.* at Figs. 32, 34, 35.

Petitioner asserts that an ordinarily skilled artisan “would be motivated to combine the reflecting members 57 of Ayabe” with the art presented in the original grounds I or II “to create a reflector” that meets the limitations of proposed substitute claims 34 and 35 because such a reflector would provide “more uniform and efficient lighting.” Opp. 19–20, 25 (citing, e.g., Ex. 1016 ¶¶ 44–53).

At this stage, we are persuaded that Ayabe, in combination with the originally asserted Mok, Holman, and Lamb, or in combination with the originally asserted Epstein, Holman, and Lamb, teaches or at least suggests a “reflector [that] is extended and angled with respect to the surface of the substrate” (as recited in proposed substitute claim 34), “the reflector form[ing] a reflective optical cavity around at least one solid state lighting device” (as recited in proposed substitute claim 35).

We acknowledge that Patent Owner has not yet had the opportunity to address Ayabe (which Petitioner first made of record in this proceeding in support of its Opposition) and respond to Petitioner’s asserted combination of Ayabe with Mok, Holman, and Lamb, and with Epstein, Holman, and

Lamb. Patent Owner will have the opportunity to do so in its Reply to Petitioner's Opposition (or in a revised motion to amend) in this proceeding. *See* 37 C.F.R. § 42.121(e)(3); *see also* Notice, *passim*.

Accordingly, based on the current record, at this stage of the proceeding, it appears that Petitioner has shown a reasonable likelihood that proposed substitute claims 34 and 35 would have been rendered obvious by the combination of Mok, Holman, Lamb, and Ayabe, and by the combination of Epstein, Holman, Lamb, and Ayabe.

**Grounds: Mok, Holman, Lamb, and Roth; and
Epstein, Holman, Lamb, and Roth**

- Proposed substitute claims 34 and 35

Petitioner contends the added limitation in proposed substitute claim 34 reciting that “the reflector is extended and angled with respect to the surface of the substrate” is taught or suggested by the newly cited Roth. Opp. 11–12. Petitioner also contends the added limitations in proposed substitute claim 35 reciting that the reflector forms “a reflective optical cavity around at least one solid state lighting device” are taught or suggested by Roth. *See id.*

In particular, Petitioner contends that

Roth shows a light emitting device structure 50 in which an LED is mounted on substrate 1. Ex. 1018 at [0024]. Roth discloses an angled reflector 31 on substrate 1 creating an optical cavity. *Id.* at Fig. 2, [0028]. Roth also discloses that the substrate may be a metal substrate, which one of skill in the art would understand is reflective. *Id.* at [0030]. Thus, Roth discloses extended and angled reflectors that form an optical cavity around an LED. Ex. 1016, ¶¶31-32.

Opp. 11–12.

We have reviewed the disclosure of Roth and observe that the disclosure appears to support Petitioner's assertions. In particular, Roth's Figure 2 illustrates reflector 31 which is extended with respect to the surface of a substrate 1, reflector 31 also having angled side walls with respect to the surface of substrate 1. *See* Ex. 1018 ¶¶ 21, 28–29, Fig. 2. Thus, Roth's

Figure 2 appears to teach a reflector (reflector 31) that is “extended and angled” with respect to the surface of a substrate (substrate 1), as required by proposed substitute claim 34. *See id.* Roth’s Figure 2 also shows reflector 31 forming a reflective optical cavity around light emitting diode 6. *See id.* ¶ 28 (“The top-type package device may have reflector 31 which may reflect the light from the light emitting diode 6 to the desire[d] direction.”), Fig. 2. Thus, Roth’s Figure 2 appears to teach a reflector that forms a “reflective optical cavity around at least one solid state lighting device,” as recited in proposed substitute claim 35. *See id.*

Petitioner asserts that an ordinarily skilled artisan “would be motivated to combine the angled reflector 31 of Roth” with the art presented in the original ground I because “creating an extended and angled reflector forming an optical cavity would mean greater surface area for light reflection, and thus greater, more uniform light emission.” Opp. 20 (citing, e.g., Ex. 1016 ¶¶ 44–53). Petitioner asserts that an ordinarily skilled artisan “would be motivated to combine the angled reflector 31 of Roth” with the art presented in the original ground II in the manner recited in proposed substitute claims 34 and 35 because “such a modification would increase light emission.” *Id.* at 20–21 (citing, e.g., Ex. 1016 ¶¶ 44–57).

At this stage, we are persuaded that Roth, in combination with the originally asserted Mok, Holman, and Lamb or in combination with the originally asserted Epstein, Holman, and Lamb, teaches or at least suggests a “reflector [that] is extended and angled with respect to the surface of the substrate” (as recited in proposed substitute claim 34), “the reflector form[ing] a reflective optical cavity around at least one solid state lighting device” (as recited in proposed substitute claim 35).

We acknowledge that Patent Owner has not yet had the opportunity to address Roth (which Petitioner first made of record in this proceeding in support of its Opposition) and respond to Petitioner’s asserted combination of Roth with Mok, Holman, and Lamb, and with Epstein, Holman, and Lamb. Patent Owner will have the opportunity to do so in its Reply to Petitioner’s Opposition (or in a revised motion to amend) in this proceeding. *See* 37 C.F.R. § 42.121(e)(3); *see also* Notice, *passim*.

Accordingly, based on the current record, at this stage of the proceeding, it appears that Petitioner has shown a reasonable likelihood that proposed substitute claims 34 and 35 would have been rendered obvious by the

combination of Mok, Holman, Lamb, and Roth, and by the combination of Epstein, Holman, Lamb, and Roth.

**Grounds: Mok, Holman, Lamb, and Saccomanno; and
Epstein, Holman, Lamb, and Saccomanno**

- Proposed substitute claims 34 and 35

Petitioner contends the added limitation in claim 34 reciting that “the reflector is extended and angled with respect to the surface of the substrate” is taught or suggested by newly cited Saccomanno. Opp. 12–13. Petitioner also contends the added limitations in claim 35 reciting that the reflector forms “a reflective optical cavity around at least one solid state lighting device” are taught or suggested by Saccomanno. *See id.*

In particular, Petitioner references Figures 4 and 5 of Saccomanno, asserting they teach the added limitations in proposed substitute claims 34 and 35 because the lighting panel in the figures has a “[r]eflector 505 [that] is angled at 90° relative to the substrate and also extends upwards, all of which forms an optical cavity around at least one LED.” Opp. 12 (citing Ex. 1019 ¶¶ 38–40, Figs. 4–5; Ex. 1016 ¶¶ 33–35).

On this record, we tend to disagree with Petitioner’s contentions.

Sacomanno’s Figure 4 shows a flat reflective surface 405 located at an end of a light guide 400, which does not teach an “extended and angled” reflector (as recited in proposed substitute claim 21), or a reflector forming “a reflective optical cavity” around lighting device(s) (as recited in proposed substitute claims 23 and 25). *See* Ex. 1019 ¶ 38, Fig. 4.

Sacomanno’s Figure 5 illustrates an LCD panel lighting arrangement including LEDs 100 whose light “travels through air until striking light management films 575, such as BEF and/or DBEF films from 3M,” and a reflective surface 505 that helps recycle a portion of the light back towards the LEDs, light management film 575 and reflective surface 505 acting as “optical couplers to transmit light (e.g., excess light not otherwise being used to illuminate the LCD panel) from the LEDs to the photosensors 420 or 520 for control over the emittance of the LEDs.” *See* Ex. 1019 ¶¶ 39–40, Fig. 5. Saccomanno’s reflective surface 505 (that Petitioner relied upon for the claimed “reflector” in claim 34) does not appear to be both “extended and angled with respect to the surface of [a] substrate” (as

recited in proposed substitute claim 34); rather, Figure 5 shows *reflective surface 505 having vertical walls located next to a horizontal substrate*, not on a first side of the substrate *so as to be extended with respect to the surface of the substrate*. See Ex. 1019, Fig. 5. We do not see Saccomanno's reflective surface 505 as teaching "a reflector sheet on the first side of . . . [a] substrate" wherein "the reflector is extended and angled with respect to the surface of the substrate" as recited in proposed substitute claim 34.

Moreover, reflective surface 505 (having only vertical walls located next to a substrate in Saccomanno's Figure 5) appears to be significantly different from the arrangement of layers (including the reflector) in Mok that Petitioner relied upon with respect to a substantial number of limitations recited in original claim 1 (retained in claim 34).

Thus, we are unpersuaded that Saccomanno's Figure 5 provides relevant teachings with respect to the reflector limitations recited in proposed substitute claim 34 (and the limitations in proposed substitute claim 35 that further defines claim 34).

Although we disagree with Petitioner's contentions that Saccomanno teaches or suggests the added limitations recited in proposed substitute claims 34 and 35, we note that Petitioner's asserted grounds involving Saccomanno also include other references (e.g., Holman and Epstein) that appear to render obvious the added limitations in proposed substitute claims 34 and 35, as discussed *supra*. Thus, although we are not persuaded that Saccomanno alone teaches or suggests limitations of claims 34 and 35, at this stage of the proceeding, it appears that Petitioner has shown a reasonable likelihood that proposed substitute claims 34 and 35 would have been rendered obvious by the asserted combinations of Mok, Holman, Lamb, and Saccomanno, or Epstein, Holman, Lamb, and Saccomanno—by virtue of these combinations including the Holman and Epstein references.

**Grounds: Mok, Holman, Lamb, and Chang; and
Epstein, Holman, Lamb, and Chang**

- Proposed substitute claims 34 and 35

Petitioner contends the added limitation in proposed substitute claim 34 reciting that “the reflector is extended and angled with respect to the surface of the substrate” is taught or suggested by the newly cited Chang. Opp. 13–14. Petitioner also contends the added limitations in proposed substitute claim 35 reciting that the reflector forms “a reflective optical cavity around at least one solid state lighting device” are taught or suggested by Chang. *See id.*

In particular, Petitioner contends that Chang’s backlight display illustrated in Figure 6 includes “a base plate, reflector, lighting element, diffusion sheet, and optical film to enhance brightness,” and that Figure 6 shows that “reflector 32 is angled and extended forming optical cavities around light emitting components 33, which can be LEDs.” Opp. 13–14 (citing Ex. 1021, Fig. 6; Ex. 1016 ¶¶ 36–37).

We have reviewed the disclosure of Chang and observe that the disclosure appears to support Petitioner’s assertions. In particular, Chang’s Figure 6 shows a display device 40 including a casing 41 supporting a backlight module 30 that includes a base plate 31, light-emitting components 33, and a reflector 32 disposed on base plate 31 and casing 41. *See* Ex. 1021, Fig. 6. Reflector 32 is conformally disposed on fins 311 that form inclination angles with the surface of base plate 31. *See id.* at 4, 9 (“[B]ase plate 31 includes at least one fin 311, and the surface of the fin 311 forms an inclination angle with the surface of the base plate 31. The reflector 32 covers the base plate 31 and forms a convex region 321 along the surface of the fin 311 and the base plate 31.”; “In order to achieve the purpose of heat dissipation, the convex region 321 must be kept in contact with the surface of the fin 311.”), 11, 13, Figs. 3, 5B (showing fins on the base plate), 6.

Thus, Chang’s reflector 32 appears to be extended and angled with respect to base plate 31, such that Chang appears to teach a reflector that is “extended and angled” with respect to the surface of a substrate (base plate 31), as required by proposed substitute claim 34. *See id.* at Figs. 3, 6. Chang’s Figure 6 also shows reflector 32 forming reflective optical cavities around lighting devices (light-emitting components 33). *See id.*

Thus, Chang’s Figure 6 appears to teach a reflector that forms a “reflective optical cavity” around at least one lighting device, as recited in proposed substitute claim 35. *See id.*

Petitioner asserts that an ordinarily skilled artisan would have been motivated to make the proposed combinations with Chang “because the combinations with [original grounds [I or II]] would lead [to] increased light uniformity and brightness.” Opp. 22 (citing Ex. 1016 ¶¶ 44–57).

At this stage, we are persuaded that Chang, in combination with the originally asserted Mok, Holman, and Lamb or in combination with the originally asserted Epstein, Holman, and Lamb, teaches or at least suggests a “reflector [that] is extended and angled with respect to the surface of the substrate” (as recited in proposed substitute claim 34), “the reflector form[ing] a reflective optical cavity” around at least one lighting device (as recited in proposed substitute claim 35).

We acknowledge that Patent Owner has not yet had the opportunity to address Chang (which Petitioner first made of record in this proceeding in support of its Opposition) and respond to Petitioner’s asserted combination of Chang with Mok, Holman, and Lamb, and with Epstein, Holman, and Lamb. Patent Owner will have the opportunity to do so in its Reply to Petitioner’s Opposition (or in a revised motion to amend) in this proceeding. *See* 37 C.F.R. § 42.121(e)(3); *see also* Notice, *passim*.

Accordingly, based on the current record, at this stage of the proceeding, it appears that Petitioner has shown a reasonable likelihood that proposed substitute claims 34 and 35 would have been rendered obvious by the combination of Mok, Holman, Lamb, and Chang, and by the combination of Epstein, Holman, Lamb, and Chang.

Grounds: Mok, Holman, Lamb, and Hiroki; and
Epstein, Holman, Lamb, and Hiroki

- **Proposed substitute claims 34 and 35**

Petitioner contends the added limitation in proposed substitute claim 34 reciting that “the reflector is extended and angled with respect to the surface of the substrate” is taught or suggested by the newly cited Hiroki. Opp. 14–15. Petitioner also contends the added limitations in proposed substitute claim 35 reciting that the reflector forms “a reflective optical

cavity around at least one solid state lighting device” are taught or suggested by Hiroki. *See id.*

Petitioner contends that Hiroki discloses

“a substrate; a semiconductor light-emitting element mounted on the substrate; and a reflector having an aperture having a slant surface in an inner wall thereof and to be rested on the substrate in a manner encompassing the semiconductor light emitting element by the slant surface.” Ex. 1025, at 2:49–54. As shown by the figures in Hiroki, “[t]he reflector 6 is rested on the substrate 2 to accommodate the LED element 1 mounted on the substrate 2 in a center of a space surrounded by the slant surface.” *Id.* at 4:31–33; *see also* Figs. 1–5, 12–14.

Opp. 14. Referencing Figure 4 of Hiroki in particular, Petitioner asserts that Hiroki’s “reflector 6 is extended and angled with respect to the substrate 2 and forms an[] optical cavity around the LED element 1.” *Id.* at 14–15 (citing Ex. 1025, Fig. 4; Ex. 1016 ¶¶ 38–39).

We have reviewed the disclosure of Hiroki and observe that the disclosure appears to support Petitioner’s assertions. In particular, Hiroki’s Figure 4 illustrates reflector 6 “having a slant surface 6X that is inclined at an acute angle θ_1 relative to the substrate 2.” Ex. 1025, 1:36–38, 5:55–61. Hiroki explains that “[t]he reflector 6 is rested on the substrate 2 and then an LED element 1 is mounted in the aperture 6a encompassed by the slant surface 6X and penetrating vertically through thereof,” wherein “[t]he output light of the LED element 1 will reflect[] evenly over a wide angle upon the reflection surface.” *Id.* at 1:42–45, 5:61–62.

Thus, Hiroki’s Figure 4 appears to teach a reflector sheet (reflector 6) on the first side of a substrate (substrate 2), wherein a reflector (slant surface 6X of the reflector 6) is extended and angled with respect to the surface of the substrate (substrate 2), as required by proposed substrate claim 34. Hiroki’s Figure 4 also appears to teach that the reflector (slant surface 6X) forms a reflective optical cavity around at least one solid state lighting device (LED element 1), as recited in proposed substitute claim 35.

Petitioner asserts that an ordinarily skilled artisan would have been motivated to combine the reflector 6 of Hiroki with the teachings of the art presented in the original grounds I or II “to create a reflector that is extended

and angled with respect to the substrate that forms an optical cavity, as this would further the references['] common goal of creating brighter, more uniform light emission.” Opp. 22–23, 25 (citing Ex. 1016 ¶¶ 44–57).

At this stage, we are persuaded that Hiroki, in combination with the originally asserted Mok, Holman, and Lamb or in combination with the originally asserted Epstein, Holman, and Lamb, teaches or at least suggests a “reflector [that] is extended and angled with respect to the surface of the substrate” (as recited in proposed substitute claim 34), “the reflector form[ing] a reflective optical cavity” around at least one lighting device (as recited in proposed substitute claim 35).

We acknowledge that Patent Owner has not yet had the opportunity to address Hiroki and respond to Petitioner’s asserted combination of Hiroki with Mok, Holman, and Lamb, and with Epstein, Holman, and Lamb. Patent Owner will have the opportunity to do so in its Reply to Petitioner’s Opposition (or in a revised motion to amend) in this proceeding. *See* 37 C.F.R. § 42.121(e)(3); *see also* Notice, *passim*.

Accordingly, based on the current record, at this stage of the proceeding, it appears that Petitioner has shown a reasonable likelihood that proposed substitute claims 34 and 35 would have been rendered obvious by the combination of Mok, Holman, Lamb, and Hiroki, and by the combination of Epstein, Holman, Lamb, and Hiroki.

Grounds: Mok, Holman, Lamb, and Lee; and
Epstein, Holman, Lamb, and Lee

- **Proposed substitute claims 34 and 35**

Petitioner contends the added limitation in proposed substitute claim 34 reciting that “the reflector is extended and angled with respect to the surface of the substrate” is taught or suggested by the newly cited Lee. Opp. 15–16. Petitioner also contends the added limitations in proposed substitute claim 35 reciting that the reflector forms “a reflective optical cavity around at least one solid state lighting device” are taught or suggested by Lee. *See id.*

In particular, Petitioner contends that Lee discloses

LED lamps 11 that are installed on LED substrate 10 through an insertion hole 210 that has an inclined surface 211. Ex. 1027, [0034]–[0035]. Lee further discloses that a “coating layer 230 is formed on an inner surface of the insertion hole 210 to allow light of the LED lamp 11 installed on the LED substrate 10 to be smoothly reflected.” *Id.* at [0037].

Opp. 15. Referencing Figure 3 of Lee, Petitioner asserts that Lee’s “reflective coating 230 on the inclined surface 211 of the insertion hole 210 is a reflector that is extended and angled with respect to the surface of the substrate, and that forms a reflective optical cavity around the LED.” *Id.* at 15–16 (citing Ex. 1027, Fig. 3; Ex. 1016 ¶¶ 40–41).

We have reviewed the disclosure of Lee and observe that the disclosure appears to support Petitioner’s assertions. In Lee’s Figures 1–4, “a light collection panel 200 is installed on the front surface of the LED substrate 10,” wherein the light collection panel 200 has insertion holes 210, each of which is “formed in such a shape that it becomes gradually narrower toward a lower side, and ha[ving] an inclined surface 211.” Ex. 1027 ¶¶ 34–35, Figs. 1–4. Lee discloses that the collection panel 200 comprises “[a] coating layer 230 . . . formed on an inner surface of the insertion hole 210 to allow light of the LED lamp 11 installed on the LED substrate 10 to be smoothly reflected.” *Id.* ¶ 37.

Thus, Lee’s Figures 1–4 appear to teach a reflector sheet (light collection panel 200) on the first side of a substrate (LED substrate 10), wherein a reflector (coating layer 230 of the light collection panel 200) is extended and angled with respect to the surface of the substrate (LED substrate 10), as required by proposed substrate claim 34. Lee’s Figures 1–4 also appear to teach that the reflector forms a reflective optical cavity around at least one solid state lighting device (LED lamp 11 in Figures 1 and 3), as recited in proposed substitute claim 35.

Petitioner asserts that an ordinarily skilled artisan would have made Petitioner’s proposed combinations with the teachings of Lee “to create a reflector that is extended and angled with respect to the substrate that forms an optical cavity,” which Petitioner contends “would create greater and brighter light.” Opp. 23–24, 25 (citing Ex. 1016 ¶¶ 44–57).

At this stage, we are persuaded that Lee, in combination with the originally asserted Mok, Holman, and Lamb or in combination with the originally asserted Epstein, Holman, and Lamb, teaches or at least suggests a “reflector [that] is extended and angled with respect to the surface of the substrate” (as recited in proposed substitute claim 34), “the reflector form[ing] a reflective optical cavity” around at least one lighting device (as recited in proposed substitute claim 35).

We acknowledge that Patent Owner has not yet had the opportunity to address Lee and respond to Petitioner’s asserted combination of Lee with Mok, Holman, and Lamb, and with Epstein, Holman, and Lamb. Patent Owner will have the opportunity to do so in its Reply to Petitioner’s Opposition (or in a revised motion to amend) in this proceeding. *See* 37 C.F.R. § 42.121(e)(3); *see also* Notice, *passim*.

Accordingly, based on the current record, at this stage of the proceeding, it appears that Petitioner has shown a reasonable likelihood that proposed substitute claims 34 and 35 would have been rendered obvious by the combination of Mok, Holman, Lamb, and Lee, and by the combination of Epstein, Holman, Lamb, and Lee.

**Grounds: Mok, Holman, Lamb, and Hiratsuka; and
Epstein, Holman, Lamb, and Hiratsuka**

- **Proposed substitute claims 34 and 35**

Petitioner contends the added limitation in proposed substitute claim 34 reciting that “the reflector is extended and angled with respect to the surface of the substrate” is taught or suggested by the newly cited Hiratsuka. Opp. 16. Petitioner also contends the added limitations in proposed substitute claim 35 reciting that the reflector forms “a reflective optical cavity around at least one solid state lighting device” are taught or suggested by Hiratsuka. *See id.*

In particular, Petitioner contends that Hiratsuka describes “an LED chip 3 on a substrate 1 through a light emitting hole 6, which is ‘. . . a truncated cone-shaped inclined surface’” that is “‘a reflecting surface 7.’” Opp. 16 (citing Ex. 1029 ¶ 5). Referencing Figure 3 of Hiratsuka, Petitioner asserts that Hiratsuka’s “inclined reflecting surface 7 is a reflector that is extended and angled with respect to the surface of the substrate 1 and that forms a

reflective optical cavity around the LED 3.” *Id.* (citing Ex. 1029, Figs. 3, 4, 9; Ex. 1016 ¶¶ 42–43).

We have reviewed the disclosure of Hiratsuka and observe that the disclosure appears to support Petitioner’s assertions. Hiratsuka’s Figures 1–4 illustrate a light emitting unit with housing 5 anchored on circuit board 1, wherein the housing 5 has light-radiating holes 6. Ex. 1029 ¶¶ 4–5. Hiratsuka discloses that “the peripheral wall of this light radiating hole 6 is an inclined surface forming a truncated conical shape for which the diameter of the upper opening part 6a side is larger than the circuit board 1 side, and this inclined surface is reflective surface 7” *Id.* ¶ 5.

Hiratsuka further explains that “each of said LED chips 3 . . . are positioned in the central axis of each light-radiating hole 6 . . . such that, when LED chip 3 is illuminated, that radiated light will be efficiently irradiated outside of housing 5 via reflective surface 7.” *Id.*

Thus, Hiratsuka’s Figures 1–4 appear to teach a reflector sheet (housing 5) on the first side of a substrate (circuit board 1), wherein a reflector (reflective surface 7 of the light radiating hole 6 of the housing 5) is extended and angled with respect to the surface of the substrate (circuit board 1), as required by proposed substrate claim 34. Hiratsuka’s Figures 1–4 also appear to teach that the reflector (reflective surface 7 of the light radiating hole 6 of the housing 5) forms a reflective optical cavity around at least one solid state lighting device (LED chip 3), as recited in proposed substitute claim 35.

Petitioner asserts that an ordinarily skilled artisan would have made Petitioner’s proposed combinations to achieve the goal of Hiratsuka. Petitioner relies on Hiratsuka’s Abstract (Opp. 24 (citing Ex. 1029, code (57))), which teaches that an “objective is to efficiently emit light incident from an LED chip onto a reflective surface from the opening of the housing in order to increase the brightness and luminance.” Ex. 1029, code (57). Petitioner also asserts “Hiratsuka further states that its invention seeks to create a ‘light-emitting unit, display device, and lighting system that boast an increase in the luminance or amount of light that will be irradiated from the light-emitting holes, improving the brightness.’” *Id.* (quoting Ex. 1029 ¶ 41).

At this stage, we are persuaded that Hiratsuka, in combination with the originally asserted Mok, Holman, and Lamb or in combination with the originally asserted Epstein, Holman, and Lamb, teaches or at least

suggests a “reflector [that] is extended and angled with respect to the surface of the substrate” (as recited in proposed substitute claim 34), “the reflector form[ing] a reflective optical cavity” around at least one lighting device (as recited in proposed substitute claim 35).

We acknowledge that Patent Owner has not yet had the opportunity to address Hiratsuka and respond to Petitioner’s asserted combination of Hiratsuka with Mok, Holman, and Lamb, and with Epstein, Holman, and Lamb. Patent Owner will have the opportunity to do so in its Reply to Petitioner’s Opposition (or in a revised motion to amend) in this proceeding. *See* 37 C.F.R. § 42.121(e)(3); *see also* Notice, *passim*.

Accordingly, based on the current record, at this stage of the proceeding, it appears that Petitioner has shown a reasonable likelihood that proposed substitute claims 34 and 35 would have been rendered obvious by the combination of Mok, Holman, Lamb, and Hiratsuka, and by the combination of Epstein, Holman, Lamb, and Hiratsuka.

III. CONCLUSION

This concludes our Preliminary Guidance. Patent Owner has the option to reply to this Preliminary Guidance *or* to file a revised MTA by DUE DATE 3. 37 C.F.R. § 42.121(e)(3), (f); Paper 10, 9 (Scheduling Order); Paper 15 (the parties’ joint stipulation to modify DUE DATE 3 from October 29, 2024 to November 5, 2024). Patent Owner’s reply or revised MTA may only respond to this Preliminary Guidance or Petitioner’s Opposition and may be accompanied by new evidence (including declarations). 37 C.F.R. § 42.121(e)(3). Petitioner has the option to file a sur-reply responsive to this Preliminary Guidance, Patent Owner’s reply, or Patent Owner’s revised MTA but may not present new evidence in any case. 37 C.F.R. § 42.121(e)(3). Petitioner may also file a reply to the preliminary guidance in the case Patent Owner does not file a reply or revised MTA. 37 C.F.R. § 42.121(e)(4).

In addition, 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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