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Paper 21
Date: August 12, 2024

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HISENSE USA CORPORATION,
Petitioner,

v.

BRIGHTPLUS VENTURES LLC,
Patent Owner.

IPR2023-01168
Patent 9,605,835 B2

Before MICHELLE N. WORMMEESTER, KEVIN C. TROCK, and JOHN D. HAMANN, *Administrative Patent Judges*.

WORMMEESTER, *Administrative Patent Judge*.

PRELIMINARY GUIDANCE
PATENT OWNER'S MOTION TO AMEND

I. INTRODUCTION

On January 23, 2024, we instituted trial as to claims 1–5 and 7–14 of U.S. Patent No. 9,605,835 B2 (Ex. 1001, "the '835 patent"). Paper 7 ("Inst. Dec."). After institution, Patent Owner filed a Motion to Amend (Paper 14, "Mot.") that is "contingent upon a finding in a final written decision that challenged claims 1–5 are unpatentable," requesting that "if claims 1–5 are found to be unpatentable, [we] substitute proposed amended claims 21, 22, 23, 24 and 25." Mot. 4. Patent Owner submitted a second Declaration of William K. Bohannon (Ex. 2006) in support of the Motion. Petitioner filed a corrected Opposition on July 19, 2024. Paper 19 ("Opp.").[1] Petitioner submitted a second Declaration of P. Morgan Pattison, Ph.D. (Ex. 1022) in support of the Opposition.

In the Motion, Patent Owner requested that we provide preliminary guidance concerning the Motion in accordance with the Board's pilot program concerning motion to amend practice and procedures. Mot. 4, 28; *see also* 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) (providing a patent owner with the option to receive preliminary guidance from the Board on its motion to amend) ("Notice"). 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 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

[1] We authorized the filing of Petitioner's corrected Opposition. *See* Ex. 3001.

unpatentable. *See* 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]."); *see also* 35 U.S.C. § 316(d) (statutory requirements for a motion to amend); 37 C.F.R. § 42.121 (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).

For purposes of this Preliminary Guidance, we focus on the proposed substitute claims, and specifically on the amendments proposed in the Motion. *See* Notice, 84 Fed. Reg. at 9,497. We do not address the patentability of the originally challenged claims. *Id.* 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. *See id.* at 9,500.

Before discussing our preliminary guidance concerning the Motion, we observe that Patent Owner's listing of the proposed substitute claims (i.e., Appendix A of the Motion) appears to include the following three *typographical errors*.

First, proposed substitute dependent claims 22, 23, and 25 recite "[t]he lighting panel of *claim 1*" (*see* Mot. App. A (substitute claims listing) (emphasis added)), however, Patent Owner's Motion indicates that all these proposed substitute claims are to depend from *proposed substitute claim 21* (*see id.* at 7). More particularly, the Motion states that

> With respect to *substitute claim 22*, original claim 2 has been substituted with *a dependent claim from proposed substitute independent claim 21*. The limitation "wherein the diffuser sheet contacts the reflector" *further limits the scope of proposed substitute claim 21*. . . .
>
> With respect to *substitute claim 23*, original claim 3 has been substituted with *a dependent claim from proposed substitute independent claim 21*. . . .
>
> . . . .
>
> With respect to *substitute claim 25*, original claim 5 has been substituted with *a dependent claim from proposed substitute independent claim 21*.

See id. (emphases added). We understand Patent Owner's discussion *supra* to indicate that *proposed substitute claims 22, 23, and 25 depend from proposed substitute claim 21*.[2] We therefore consider the listing of proposed substitute claims at Appendix A in the Motion to include a typographical error where claims 22, 23, and 25 are recited as depending from "claim 1." *See id.* at App. A (substitute claims listing). Patent Owner is advised to correct this typographical error in the listing of Patent Owner's proposed substitute claims.

Second, Patent Owner's listing of the proposed substitute claims (Appendix A of the Motion) appears to include another typographical error whereby the claim listing does not show the changes in proposed substitute claim 25 with respect to original patent claim 5 that it is intended to replace. *See* 37 C.F.R. § 42.121(b) ("A motion to amend claims must include a claim listing, which claim listing may be contained in an appendix to the motion, *show the changes clearly*. . . ." (emphasis added)); *Lectrosonics*, Paper 15 at 8 ("A motion to amend must include a claim listing reproducing each proposed substitute claim"

[2] Should our understanding not match Patent Owner's intentions with respect to the dependency of proposed substitute claims 22, 23, and 25, Patent Owner is advised to provide clarification thereof.

and "[f]or each proposed substitute claim, the motion must show clearly the changes in the proposed substitute claim with respect to the original patent claim that it is intended to replace. No particular form is required, but use of brackets to indicate deleted text and underlining to indicate inserted text is strongly suggested."). In particular, the listing of proposed substitute claims in Appendix A *does not show what limitations of original claim 5 have been deleted (struck out) in proposed claim 25* (which is intended to replace claim 5); claim 25 only shows limitations that have been added (via underline) vis-à-vis corresponding claim 5. For the purpose of the present guidance, we understand Patent Owner's proposed substitute claim 25 to be intending to delete "wherein the reflector sheet includes a plurality of apertures therethrough, wherein respective ones of the plurality of apertures aligned with corresponding ones of the plurality of solid state lighting devices" (recited in original claim 5) while adding "wherein the reflector forms at least one reflective optical cavity around at least one solid state lighting device." Patent Owner is advised to address this typographical error so that the listing of proposed substitute claims complies with our rules of practice concerning motions to amend.

Third, we observe that Patent Owner's Motion states that proposed substitute claim 25 recites "[t]he limitation 'wherein the reflector forms *one or more reflective optical cavities* around at least one solid state lighting device'" (*see* Mot. 7 (emphasis added)), while Patent Owner's listing of the proposed substitute claims (Appendix A of the Motion) presents the limitation of claim 25 as "wherein the reflector forms *at least one reflective optical cavity* around at least one solid state lighting device" (*id.* at App. A (substitute claims listing) (emphasis added)). Patent Owner is advised to clarify the exact language that is intended for proposed substitute claim 25.

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, it appears that Patent Owner *has 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 21–25.

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 no more than 1 substitute claim for each of challenged claims 1–5. Mot. 3–8, 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. *See* 37 C.F.R. § 42.121; *Lectrosonics*, Paper 15 at 4–5. Petitioner, however, argues that Patent Owner's proposed number of substitute claims is not reasonable because "proposed substitute claims 22, 23, and 25 depend from claim 1, not new substitute claim 21" such that "claim 1 continues to be part of the contingent motion to amend and one could interpret Patent Owner's motion as containing ten claims (1–5 and 21–25) or six claims (1 and 21–25), neither of which is reasonable." *See* Opp. 2. As discussed *supra*, however, Patent Owner's Motion indicates that proposed substitute claims 22, 23, and 25 *depend from proposed substitute claim 21*. *See* Mot. 7. The reference to claim 1 in the listing of claims 22, 23, and 25 in Appendix A of the Motion appears to be a typographical error. Petitioner also argues that even if claims 22, 23, and 25 are considered to depend from claim 21, the number of substitute claims is still not reasonable because "dependent claim 6 recites an element that has been eliminated in substitute claim 25" and "dependent claims 9, 10, 11, and 13 recite features (such as collimating light, diffusing light, recycling light) that have been eliminated or impacted by the cancellation of claims 2, 3,

and 4," and "[t]hese deficiencies necessitate further amendments, which would necessarily multiply the claims." Opp. 2. Petitioner's argument is unpersuasive because claim 6 (not challenged in this proceeding) is not impacted by a possible substitution of original claims 1–5 with proposed claims 21–25 (i.e., claim 6 would remain in the patent as an original claim including limitations of original claims 5, 3, and 1). Petitioner's argument is also unpersuasive because dependent claims 9, 10, 11, and 13 likewise are not impacted by a possible substitution of original claims 1–5 with proposed claims 21–25, and Patent Owner has not proposed amendments for claims 9, 10, 11, and 13 (e.g., Patent Owner's Motion does not propose changing the dependency of claims 9, 10, 11, and 13).

We therefore find unpersuasive Petitioner's arguments that the number of proposed substitute claims is not reasonable.

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. 5–6, 9–27. Upon review of Patent Owner's arguments, we agree that proposed substitute dependent claims 21–25 recite new limitations, and new combinations of limitations, that directly respond to the grounds of unpatentability involved in the trial. *See* Mot. 5–6, 9–27, App. A (substitute claims listing). We are unpersuaded by Petitioner's arguments that Patent Owner's Motion does not respond to a ground of unpatentability. *See* Opp. 3–4. Patent Owner and its declarant are not required to expressly address the "Board's construction of 'on,'" or to "analyze the Institution Decision in connection with [the supporting] declaration," or to "review the responsive claim construction briefs in the parallel litigation," or to "review other prior art or Patent Owner's related patents" (as Petitioner argues, *see id.*)—in order for the Motion to be responsive to the grounds of unpatentability involved in this trial. Moreover, we observe that Patent Owner's Motion presents good faith arguments as to why Patent Owner believes that art cited in the Petition's original grounds (e.g., Mok, Lamb, Ko, Kretman, and some of the

Petition's cited figures from Holman and Epstein) do not teach the limitation added in proposed substitute claim 21 (*see* Mot. 9–14).

We also find unpersuasive Petitioner's argument that the Motion is not responsive because the added limitation in proposed substitute claim 21 "simply recite[s] an angled reflector relative to the substrate, without limitation" such that the "reflector may have an angle of 0° relative to the substrate" and "[s]uch a configuration has already been shown to be invalid under the original grounds." Opp. 3. The added limitation in proposed substitute claim 21 reciting that "the reflector is extended and angled with respect to the surface of the substrate" requires the reflector to have "angled" portions—which are not portions at "an angle of 0° relative to the substrate" (as Petitioner argues, *see id.*). The reflector being "angled with respect to the surface of the substrate" recited in proposed substitute claim 21 requires the reflector to have portions *angled at more than 0° and less than 180° with respect to the surface of the substrate*.

Finally, we are unpersuaded by Petitioner's argument that the Motion is not responsive because the "Motion also fails to address Mok's reflective surface 50 that forms optical cavities for LEDs 14" and "[a]s shown in the excerpt of Mok's Figure 2 . . . , the sidewall of the optical cavity is angled relative to the substrate (i.e., at a 90° angle) at the location of these optical cavities." *See* Opp. 4. Petitioner's arguments are unpersuasive because (i) Patent Owner's Motion did in fact address Mok's reflective surface 50 (*see* Mot. 9–10, 22), and (ii) Mok's Figure 2 does not show the arrangement or geometry of the reflector (reflective surface 50) or that "Mok's reflective surface 50 . . . forms optical cavities for LEDs 14" (as Petitioner contends at Opp. 4). Mok's Figure 2 merely shows how "[t]he various light emitting elements 14 [(each comprising a light emitting diode 26)] may be mounted to the base panel 12 [which 'may comprise a generally rectangular shaped, plate-like member having a length 38 and a width 40']. . . . so that they define a plurality of rows 42 and columns 44." *See* Ex. 1005 ¶¶ 16, 19–20, Fig. 2.

For purposes of this preliminary guidance and based on the current record, we are persuaded that Patent Owner's amendments in proposed substitute claims 21–25 respond to the grounds of unpatentability on which the Board instituted review in the Decision to Institute. *See* Mot. 5–6, 9–27; Inst. Dec. 6, 14–29, 38–51.

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 21 (i) retains all limitations of its corresponding original independent claim 1, and (ii) further includes additional limitations as compared to claim 1. *See* Mot. 6, App. A (substitute claims listing). Therefore, proposed substitute claim 21 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. 6, 8. Petitioner, however, argues that proposed substitute independent claim 21 enlarges the scope of claim 1 because > original claim 1 recites a substrate "parallel to the principal plane of the lighting panel," but, as written, the claimed *reflector of substitute claim 21 is not parallel to the principal plane of the lighting panel*. Original claim 1 also recited a reflector "on the first side of the [] substrate." Accordingly, *the reflector on the first side of the parallel substrate would also have to be parallel to the principal plane of the lighting panel*, just as the substrate is required to by the claim. Substitute claim 21[] expands the claim to read on an angled reflector, which removes the requirement that the reflector be on the parallel-to-the-principal-plane substrate. In other words, the reflector can now both extend (and be parallel with the substrate) and be angled (and not parallel with the substrate). > Further, original claim 1 required that the diffuser be "on" *a reflector that was* extended and *parallel to the principal plane of the lighting panel*. Opp. 6–7 (emphases added). Petitioner's arguments are unpersuasive because they rely on features that are *not recited or required* by claim 1. Claim 1 (and the identical limitations retained in claim 21) *do not require the reflector to be* "parallel to the substrate" or "parallel to the principal plane of the lighting panel," and do not require "the reflector on the first side of the parallel substrate . . . to be parallel to the principal plane of the lighting panel" (as Petitioner

argues, *see id.* (capitalization altered, emphasis omitted)). Claim 1, and proposed claim 21, which retains all limitations of claim 1, merely require a "substrate having a first side parallel to a principal plane of the lighting panel" and "a reflector on the first side of the at least one substrate." *See* Mot. App. A (substitute claims listing). That is, claim 1 (and the identical limitations in proposed claim 21) require a *substrate's first side to be parallel to a principal plane of the lighting panel*, and the reflector to be *on the substrate's first side*, but original claim 1 does not require the reflector to strictly follow the orientation of the substrate's first side (or to contact the substrate's first side or the diffuser throughout)—as Petitioner's arguments seem to imply (*see* Opp. 6–7).

Thus, "the reflector [being] extended and angled with respect to the surface of the substrate" (as recited in proposed substitute claim 21) is not inconsistent with, and is not broadening with respect to, the limitations of original claim 1 (retained in their entirety in claim 21).

Accordingly, for these reasons and based on the current record, we agree with Patent Owner that proposed substitute claim 21 *does not enlarge the scope of original claim 1*.

Proposed substitute dependent claim 22 changes the scope of original dependent claim 2 that it is intended to replace (by deleting the limitation "the reflector comprises a coating on the substrate that is configured to reflect and scatter light incident thereon" of original claim 2), but because proposed substitute claim 22 depends from narrowed proposed substitute claim 21, proposed substitute claim 22 *does not enlarge the scope of the claims of the challenged patent*. *See Lectrosonics*, Paper 15 at 6–7 ("A substitute claim will meet the requirements of § 42.121(a)(2)(i) and (ii) *if it narrows the scope of at least one claim of the patent*, for example, the challenged claim it replaces, in a way that is responsive to a ground of unpatentability involved in the trial." (emphasis added)).

Proposed substitute dependent claim 23 changes the scope of original dependent claim 3 that it is intended to replace (by deleting the limitation "the reflector comprises a reflector sheet that is configured to reflect and scatter light incident thereon" of original claim 3), but because proposed substitute claim 23 depends from narrowed proposed substitute claim 21, proposed substitute claim 23 *does not enlarge the scope of the claims of the challenged patent*. *See Lectrosonics*, Paper 15 at 6–7.

Proposed substitute dependent claim 24 changes the scope of original dependent claim 4 that it is intended to replace (by deleting the limitation "at least one additional layer on the brightness enhancement film configured to diffuse, polarize, collimate and/or reflect light" of original claim 4), but because proposed substitute claim 24 depends (indirectly, via claim 23) from narrowed proposed substitute claim 21, proposed substitute claim 24 *does not enlarge the scope of the claims of the challenged patent*. *See Lectrosonics*, Paper 15 at 6–7.

Proposed substitute dependent claim 25 changes the scope of original dependent claim 5 that it is intended to replace (e.g., by deleting the limitation "the reflector sheet includes a plurality of apertures therethrough, wherein respective ones of the plurality of apertures aligned with corresponding ones of the plurality of solid state lighting devices" of original claim 5), but because proposed substitute claim 25 depends from narrowed proposed substitute claim 21, proposed substitute claim 25 *does not enlarge the scope of the claims of the challenged patent*. *See Lectrosonics*, Paper 15 at 6–7.

Accordingly, for these reasons and based on the current record, we agree with Patent Owner (*see* Mot. 6–8) that proposed substitute claims 22–25 *do not enlarge the scope of the claims of the '835 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))

No.

Having considered Petitioner's contrary arguments regarding proposed substitute claims 21–25 (*see* Opp. 7–9), on this record, we find Patent Owner has set forth sufficient written-description support for proposed substitute claims 21–25. *See* Mot. 8–9.

Petitioner submits several arguments regarding the proposed substitute claims having "no support in the specification," but Petitioner's arguments *do not sufficiently address Patent Owner's identified support for the claims*. *See* Opp. 7–9.

Some of Petitioner's arguments also assume that original claim 1 and corresponding proposed substitute claim 21 require "the substrate [to] be [in] a plane that is parallel to the reflector." *See id.* at 7, 9. As discussed

supra, we are not persuaded by Petitioner's arguments that original claim 1 and corresponding proposed substitute claim 21 require the claimed *reflector to be parallel to* the claimed substrate or "first side" of the substrate. Thus, we do not find that proposed claim 21's limitation of a reflector "extended and angled with respect to the surface of the substrate" contradicts any of the reflector limitations recited in original claim 1 (and retained by proposed claim 21).

Turning to Patent Owner's provided support for the added limitations in the proposed substitute claims, we are persuaded that Figures 5A and 7 and column 11, lines 43–47 and 49–51 of the '835 patent disclose a reflector that is "extended and angled with respect to the surface of the substrate" (as recited in proposed substitute claim 21). *See* Mot. 8 (citing Ex. 1001, 11:43–47, 11:49–51, Figs. 5A, 7). These cited portions of the '835 patent describe reflector 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. *See* Ex. 1001, 3:42–50, 11:35–51, Figs. 5A, 7. Our reading of the '835 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. 8.

We disagree with Petitioner's argument that "there is no written description support for any metes or bounds of the term 'angled' as recited in substitute claim 21" as "an angle could be 0° (i.e., parallel), 90° (i.e., perpendicular), or anything in between" and "[t]here is no support in the specification for any particular range of angles, and no guidance as to what constitutes an appropriate angle." *See* Opp. 8. Figures 5A and 7, column 3, lines 42–50, and column 11, lines 35–51 of the '835 patent explicitly disclose reflector 50 having angled portions at sidewalls 42A, such that one skilled in the art can reasonably conclude that the inventor had possession of the claimed *reflector having angled portions (i.e., at more than 0° and less than 180°) with respect to* the surface of the substrate.

We are also persuaded that Figures 5A and 7 and column 3, lines 42–51 and column 11, lines 35–51 of the '835 patent disclose a reflector that is "extended and angled with respect to the surface of the substrate" and "forms a [(or at least one)] reflective optical cavity around at least one solid state lighting device" (as required by proposed substitute claims 23 and 25). *See* Mot. 9 (citing Ex. 1001, 3:42–51, 11:35–51, Figs. 5A, 7). These cited portions of the '835 patent disclose reflector 50 forming reflective optical cavities around light emitting elements 12. *See* Ex. 1001,

3:42–50 ("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."), 11:35–51 ("[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.

Finally, we are persuaded that Figures 5A, 5B, and 7, column 3, lines 42–51, and column 11, lines 35–51 of the '835 patent disclose a diffuser sheet that contacts the reflector (as required by proposed substitute claims 22 and 24). *See* Mot. 9 (citing Ex. 1001, 6:66–7:12, 11:52–54, 12:2–3, Figs. 5A–5B, 7). As noted by Patent Owner, these cited portions of the '835 patent disclose diffuser sheet 60 contacting reflector 50 without intervening elements therebetween. *See* Mot. 9; Ex. 1001, 6:66–7:12, 11:52–12:3, Figs. 5A–5B, 7.

Thus, based on the current record, it appears that there is adequate support in the original disclosure of the '835 patent for "the reflector [that] is extended and angled with respect to the surface of the substrate" (as recited in proposed substitute claim 21), "wherein the diffuser sheet contacts the reflector" (as recited in proposed substitute claims 22 and 24), and "wherein the reflector forms a [or at least one] reflective optical cavity around at least one solid state lighting device" (as recited in proposed substitute claims 23 and 25).

B. Patentability

For the reasons discussed below, at this stage of the proceeding, and based on the current record,[3] it appears that Petitioner has shown a reasonable likelihood that proposed substitute claims 21–25 are unpatentable.

[3] We express no view on the patentability of original claims 1–5 in this Preliminary Guidance. Instead, we focus on proposed limitations added to the challenged claims in the Patent Owner's Motion to Amend.

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

I. Indefiniteness

No, as to substitute claims 21–25.

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 21) does not appear to be indefinite under 35 U.S.C. § 112 ¶ 2.

Petitioner argues the phrase "the reflector is extended and angled" is "unbound" and "broad and imprecise" 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. . . . [and] depending on how the limitation is interpreted, the substitute claims now require the reflector to be angled relative to the surface of the substrate. Yet, the claim also requires that the substrate be a plane that is parallel to the reflector. A reflector cannot be both angled and parallel to a plane defined by the substrate.

Opp. 8–9.

We are unpersuaded by Petitioner's arguments. Petitioner's argument that the "extended and angled" limitation is contradictory—because "the claim . . . requires that the substrate be a plane that is parallel to the reflector" and a "reflector cannot be both angled and parallel to a plane defined by the substrate" (*see id.*)—is unpersuasive because proposed claim 21 does not require the *substrate* to be *parallel to the reflector* (as Petitioner argues).

Proposed claim 21 (via its limitations retained from original claim 1) recites a "substrate having a first side parallel to a principal plane of the lighting panel" and "a reflector on the first side of the at least one

substrate." *See* Mot. App. A (substitute claims listing). That is, proposed claim 21 requires a *substrate's first side to be parallel* to *a principal plane of the lighting panel*, and the reflector to be "on the [substrate's] first side," but the claim does not require the reflector to strictly follow the orientation of the substrate's first side (or to contact the substrate's first side throughout), as Petitioner's argument seems to imply. That is, claim 21 does not require "that the substrate be a plane that is parallel to the reflector" (as Petitioner argues, *see* Opp. 9). Thus, "the reflector [being] extended and angled with respect to the surface of the substrate" (as currently recited in proposed substitute claim 21) is not inconsistent with the other limitations in claim 21.

We are also unpersuaded by Petitioner's contention that the "extended and angled" language in claim 21 is "broad and imprecise" and "indefinite, especially when measured against the lack of disclosure in the specification." *See* Opp. 9. Petitioner's argument does not address any of the portions in the '835 patent cited by Patent Owner as support for claim 21 (*see* Mot. 8–9). Moreover, as discussed *supra*, the '835 patent provides written description support for the "extended and angled" language in claim 21. And although the limitation "the reflector [being] extended and angled with respect to the surface of the substrate" in claim 21 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 at a non-zero angle, *see* Opp. 8–9)—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 Ultimax 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 21 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 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 are unpersuaded by Petitioner's contention that the scope of the recited "reflector [that] is extended and angled" is unclear. On this record, Petitioner has not 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 21 renders the claim indefinite.

Thus, Petitioner has not shown a reasonable likelihood that proposed substitute claim 21 (and claims 22–25, by virtue of their dependency from claim 21) fails to comply with the definiteness requirement.

II. Obviousness

Yes, as to substitute claims 21–25.

Petitioner has asserted the following ten obviousness challenges[4] against the following substitute claims:

- Ground asserting Mok (Ex. 1005), Holman (Ex. 1006), and Lamb (Ex. 1007) against proposed substitute claims 21–25;
- Ground asserting Epstein (Ex. 1008), Holman, and Lamb against proposed substitute claims 21–25;
- Ground asserting Mok, Holman, Lamb, and newly cited Ayabe (Ex. 1017)[5] against proposed substitute claims 21–25;
- Ground asserting Epstein, Holman, Lamb, and newly cited Ayabe against proposed substitute claims 21–25;

[4] Petitioner states that "proposed substitute claims 21-25 are not patentable in view of the prior art used in the original grounds" (Opp. 10, 13, 16 (capitalization altered, emphasis omitted)), and specifies that the "original grounds" are "**Ground I or Ground II**." *See* Opp. 22, 24 ("**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* Pet. 4 (indicating Ground I is based on Mok, Holman, and Lamb, and Ground II is based on Epstein, Holman, and Lamb). Because Petitioner specifically refers to original "**Ground I or Ground II**" of the Petition (*see* Opp. 22, 24) and discusses the asserted references of Grounds I and II (i.e., Mok, Holman, Lamb, and Epstein) (*see id.* at 10–16), but Petitioner *does not expressly refer to Ground III of the Petition or its asserted references (i.e., Ko and Kretman)*, we understand Petitioner's Opposition *not to be asserting original Ground III* against proposed substitute claims 21–25. *See* Pet. 4 (indicating Ground III is based on Ko, Kretman, and Epstein).

[5] US 2006/0083023 A1, published April 20, 2006.

- Ground asserting Mok, Holman, Lamb, and newly cited Roth (Ex. 1018)[6] against proposed substitute claims 21, 23, and 25;
- Ground asserting Epstein, Holman, Lamb, and newly cited Roth against proposed substitute claims 21, 23, and 25;
- Ground asserting Mok, Holman, Lamb, and newly cited Saccomanno (Ex. 1019)[7] against proposed substitute claims 21–25;
- Ground asserting Epstein, Holman, Lamb, and newly cited Saccomanno against proposed substitute claims 21–25;
- Ground asserting Mok, Holman, Lamb, and newly cited Chang (Ex. 1021)[8] against proposed substitute claims 21–25; and
- Ground asserting Epstein, Holman, Lamb, and newly cited Chang against proposed substitute claims 21–25.

Opp. 10–22.

On this record, it appears that Petitioner has shown a reasonable likelihood that each of Petitioner's challenges renders the respective proposed substitute claims unpatentable.

Ground: Mok, Holman, and Lamb

Proposed substitute independent claim 21 replaces original independent claim 1 and adds new limitations. *See* Mot. App. A (substitute claims listing). In particular, proposed substitute claim 21 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 23 replaces original dependent claim 3 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). Proposed substitute dependent

[6] US 2005/0274972 A1, published December 15, 2005.
[7] US 2007/0188425 A1, published August 16, 2007.
[8] Petitioner submitted a certified English translation (Ex. 1021) of a publication of Taiwanese Patent Application No. 93218806 to Chang (Ex. 1020).

claim 25 replaces original dependent claim 5 and adds new limitations reciting that "the reflector forms at least one reflective optical cavity around at least one solid state lighting device." *See id.*

Proposed substitute dependent claim 22 (depending from claim 21, *see* Mot. 7) replaces original dependent claim 2 and adds new limitations reciting that "the diffuser sheet contacts the reflector," and proposed substitute dependent claim 24 (depending from claim 23, *see* Mot. 7) replaces original dependent claim 4 and adds the same new limitations reciting that "the diffuser sheet contacts the reflector." *See* Mot. App. A (substitute claims listing).

Petitioner contends that "proposed substitute claims 21–25 are not patentable in view of the prior art used in the original ground[I (i.e., Mok, Holman, and Lamb ground)]." Opp. 10–16, 22 (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 21 reciting that "the reflector is extended and angled with respect to the surface of the substrate" is taught or suggested by Mok. Opp. 10–11. Petitioner also contends the added limitations in claims 23 and 25 reciting that the reflector forms "a reflective optical cavity [(or at least one reflective optical cavity)] around at least one solid state lighting device" are taught or suggested by Mok. Opp. 16. Finally, Petitioner contends the added limitations in claims 22 and 24 reciting that "the diffuser sheet contacts the reflector" is taught or suggested by Mok. Opp. 13–14.

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. 10–11 (citing Ex. 1005 ¶¶ 21, 27–28, Figs. 1, 3; Ex. 1022 ¶¶ 12–13).

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 renders obvious a reflector that "is extended and angled with respect to the surface of the substrate" (as recited in proposed claim 21). 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 21), *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 21), 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 claim 23, and similarly recited in claim 25). *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.
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> . . . .
>
> each 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 21, 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 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 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 21). 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. 16); and the recited "solid state lighting devices" in claim 21 *are distinct from* the recited "reflector on the first side of the at least one substrate" (for which Petitioner relied upon Mok's *reflective layer 50*, *see* Pet. 16–17).

Petitioner insists, however, that Mok's reflector cups 32 (with reflective coating 58) may be made in the same process as reflective surface 50 such that collection of reflector cups 32 and reflective surface 50 could then teach the claimed "reflector." *See* Opp. 10–11.

Petitioner does not cite any teachings in Mok that support Petitioner's assertions regarding how reflective surface 50 and reflector cups 32 "can be made," and 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. 10–11.

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 id.* ¶¶ 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 contemplated.

Petitioner's reliance (*see* Opp. 16) 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 claims 23 and 25, does not remedy the deficiencies discussed *supra* with respect to Petitioner's showing based on Mok with respect to claim 21.

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 21, or a reflector as recited in proposed substitute claims 22–25[9] (that further define the shape and arrangement of claim 21's reflector).

Discussion of Holman

- Proposed substitute claims 21, 23, and 25

Petitioner contends the added limitation in claim 21 reciting that "the reflector is extended and angled with respect to the surface of the substrate" is taught by Holman. Opp. 11. Petitioner also contends the added limitations in claims 23 and 25 reciting that the reflector forms "a reflective optical cavity [(or at least one reflective optical cavity)] around at least one solid state lighting device," are taught by Holman. Opp. 16. In particular, Petitioner references "Holman's sloped sidewalls 230 [as being] angled and reflecting" and Holman's LEDs 70 mounted in a "reflected [sic] cavity structure layer laminated to insulating layer 225." *See* Opp. 11 (citing Ex. 1006, 38–40, Figs. 13–15). Petitioner contends that "[s]loped sidewalls 230, with angle a, can be the same material as the [composite reflective] base layer [220]." *See id.* 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 16 (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 Figure 7 (which

[9] We acknowledge Patent Owner's argument (with respect to proposed substitute claims 22 and 24) that "because Mok discloses only a diffuser being spaced away from the base panel 12 [at a distance 48], this does not render obvious proposed substitute claims 22 and 24, which specifically recite that the diffuser sheet contacts the reflector." *See* Mot. 17. We note that *distance 48 in Mok* is actually *the distance between diffuser 16 and base panel (substrate 12)* (*see* Mok ¶¶ 23, 32, Fig. 1), not the distance between diffuser 16 and reflector (e.g., element 50). That is, it is not clear that Mok's "diffuser being spaced away from the base panel 12" would actually require the diffuser *not to contact the reflector* (as Patent Owner appears to imply, *see* Mot. 17).

was cited in the Petition's original ground, *see* Pet. 19). Opp. 11 (citing Ex. 1006, 40[10]).

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 . . . laminated to insulating layer 225." *See* Ex. 1006, 37–38,[11] 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.
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> . . . .
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> *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

[10] 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 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."

[11] 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).

> increasing the width of the cavity aperture 42, thereby providing some diffusive mixing of emitted light.
>
> . . . .
>
> 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), 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 21. 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 claims 23 and 25.

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 21), the "reflector form[ing] a [(or at least one)] reflective optical cavity around at least one solid state lighting device" (as recited in proposed substitute claims 23 and 25).

- Proposed substitute claims 22 and 24

Petitioner also contends that the added limitation in proposed claim 22 (and the similar added limitation in proposed claim 24) reciting that "the diffuser sheet contacts the reflector" is taught by Holman. Opp. 14–15. In

particular, Petitioner contends "Holman . . . teaches diffuser layers that contact the reflector" as

> *Holman discloses that reflective base layer 220*, which is reflected cavity structure layer laminated to insulating layer 225, *has angled sidewalls 230, which can be the same material as the base layer or a deposited reflective material. See id.* at FIG. 13. Moreover, Figure 13 of Holman discloses that *diffuse layer 68 contacts reflective base layer 220 and 225*. *Id.* at pp. 39-41.

Id. (emphases added).

We have reviewed Holman's Figure 13 and its description, and observe it appears to support Petitioner's assertions. For example, Holman explains that layer 68 is a diffuser, and "[c]avity gap height J, 246, in FIG 13, is used to provide some offset between the LED surface and the output diffuser 68." *See* Ex. 1006, 39. Holman's Figure 13 shows diffuser 68 located substantially above the reflector (composed of reflective cavity walls including sidewalls 230, and the reflective portions of height J extending vertically above the sidewalls), and page 43 in Holman provides that

> [i]ntervening diffusely scattering layer 68 and diffusely reflecting base layer 225 provide the angle and polarization randomization needed, and *may be either mechanically* or optically *coupled to layers 220* and 217 as desired. *Preferably, base layer 225, encapsulating layer 220, diffusing layer 68* and spacing layer 217 *would all be laminated together monolithically*, with boundary 57 between layers 217 and 58 being air. *Equally preferably, layers 225, 220 and 68 would be laminated monolithically*.

Id. at 43 (emphases added), Figs. 13, 15. Thus, Holman teaches or at least suggests that *diffuser 68 may contact the reflector* (composed of reflective cavity walls including sidewalls 230, and reflective portions of height J extending vertically above the sidewalls)—because Holman explains that layer 68 may be *monolithically laminated* to encapsulating reflective layer 220 (which extends upwards in Figure 13 forming the reflective cavity structures in which LEDs 70 are disposed). *See id.* at 37–39, 41–42, Fig. 13.

Thus, on the current record, Petitioner appears to have shown a reasonable likelihood that Holman teaches or suggests a "diffuser sheet [that] contacts the reflector" that is also "extended and angled with respect to the surface of the substrate," as required by proposed substitute claims 22 and 24.

Discussion of Lamb

Petitioner also contends the added limitation in proposed claim 21 reciting that "the reflector is extended and angled with respect to the surface of the substrate" is taught or suggested by Lamb. Opp. 12. Petitioner further contends the added limitations in proposed claims 23 and 25 reciting that the reflector forms "a reflective optical cavity [(or at least one reflective optical cavity)] around at least one solid state lighting device" are taught or suggested by Lamb. Opp. 16. Finally, Petitioner contends the added limitations in proposed claims 22 and 24 reciting that "the diffuser sheet contacts the reflector" are taught or suggested by Lamb. Opp. 15.

In particular, Petitioner contends reflector 17 in Lamb's Figure 1 "is both angled and extended" (as required by proposed substitute claim 21) and "form[s] optical cavities around each lighting source" (as required by claims 23 and 25). *See* Opp. 12, 16 (citing Ex. 1007 ¶¶ 34–35, Fig. 1; Ex. 1022 ¶¶ 17–18, 36). Petitioner relies on Lamb's Figure 2 for the "contact" limitation recited in proposed substitute claims 22 and 24. *See* Opp. 15 (citing Ex. 1007 ¶¶ 13, 15, 36 (describing Fig. 2)).

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 renders obvious a reflector that "is extended and angled with respect to the surface of the substrate" (as recited in claim 21). 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 21). 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 claim 21), 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. 12 (citing Ex. 1022 ¶¶ 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. 1022 ¶¶ 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. 1022 ¶ 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).

Thus, on the current record, we are unpersuaded that Lamb's Figure 1 teaches or suggests the reflector limitations recited in proposed substitute claim 21 (and the limitations in proposed substitute claims 23 and 25 further defining the shape of claim 21's reflector).

We are also unpersuaded that Lamb's Figure 2 (relied upon by Petitioner for claims 22 and 24, *see* Opp. 15) teaches or suggests the reflector limitations recited in proposed substitute claim 21. Petitioner references "the lightguide [which] is the reflector" and "reflects light 'from the surfaces 130a and 130b, e.g., by total internal reflection.'" Opp. 15 (citing Ex. 1007 ¶ 36).

Although Lamb discloses that "light emanating from the sources 165a, 165b is coupled into the interior of the lightguide 130 and propagates along its length by reflecting from the surfaces 130a and 130b, e.g., by total internal reflection" and "[l]amp cavity reflectors 156a, 156b may be provided as illustrated in FIG. 2, for increasing coupling efficiency from the sources 165a, 165b into the interior of the lightguide 130" (*see* Ex. 1007 ¶ 36), 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 21). The reflecting elements appearing in Lamb's Figure 2 (i.e., lightguide 130 that reflects propagating light by total internal reflection, lamp cavity reflectors 156a and 156b, 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 21). *See* Ex. 1007

¶¶ 36, 48, Fig. 2. Paragraphs 13 and 15 of Lamb additionally cited by Petitioner (*see* Opp. 15) do not describe such a reflector, either.

Thus, on the current record, we are unpersuaded that Lamb's Figure 2 teaches or suggests the reflector limitations recited in proposed substitute claim 21, and the limitations in claims 22, 23, 24, and 25 that further define the shape and arrangement of claim 21'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 21–25.

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 21–25, 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 21, 23, and 25, and a reflector and diffuser as recited in each of proposed substitute claims 22 and 24. 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 and contacting a diffuser in Figures 13 and 15 of Holman) with the previously relied-upon disclosures of Mok and Lamb. *See* Opp. 22–24; *see also* Inst. Dec. 23–24.

Based on the current record, at this stage of the proceeding, it appears that Petitioner has shown a reasonable likelihood that proposed substitute claims 21–25 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* Notice, *passim*.

Ground: Epstein, Holman, and Lamb

Petitioner contends that "proposed substitute claims 21–25 are not patentable in view of the prior art used in the original ground[II (i.e., Epstein, Holman, and Lamb ground)]." Opp. 10–16, 22 (capitalization altered, emphasis omitted).

Petitioner's discussion of Holman and Lamb with respect to this ground as applied to proposed substitute claims 21–25 is the same as the discussion of Holman and Lamb provided with respect to the Mok-Holman-Lamb ground. *See* Opp. 11–12, 14–16. As discussed *supra*, Petitioner appears to have shown a reasonable likelihood that Holman teaches and suggests the added limitations recited in proposed substitute claims 21–25, but Petitioner does not appear to have shown a reasonable likelihood that Lamb teaches or suggests the added limitations recited in claims 21–25.

Petitioner also contends that Epstein teaches the added limitations recited in each of proposed substitute claims 21–25. We analyze Petitioner's contentions with respect to Epstein below.

Discussion of Epstein

- Proposed substitute claims 21, 23, and 25

Petitioner contends the added limitation in proposed claim 21 reciting that "the reflector is extended and angled with respect to the surface of the substrate" is taught by Epstein. Opp. 12–13. Petitioner also contends the added limitations in proposed claims 23 and 25 reciting that the reflector forms "a reflective optical cavity [(or at least one reflective optical cavity)] around at least one solid state lighting device," are taught by Epstein. Opp. 16.

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. 12 (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 21. *Id.* at 13 (citing Ex. 1008 ¶ 96, Figs. 4A, 20B).

With respect to proposed substitute claims 23 and 25, 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. 16 (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," the "[a]pertures may be formed in the intermediate layer 422 using, for example, laser milling," and 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* that is *extended and angled* with respect to the surface of a substrate (e.g., substrate 408) as required by proposed claim 21, 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. . . . reflecting 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 claim 21, 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, reflective 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 claims 23 and 25. *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 id.* ¶¶ 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 21. *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 21), the "reflector form[ing] a [(or at least one)] reflective optical cavity around at least one solid state lighting device" (as recited in proposed substitute claims 23 and 25).

- Proposed substitute claims 22 and 24

Petitioner also contends that the added limitation in proposed claim 22 (and the similar added limitation in proposed claim 24) reciting that "the diffuser sheet contacts the reflector" are taught by Epstein. Opp. 15. In particular, Petitioner asserts "in reference to FIG. 18A, Epstein discloses a reflector 1822 in contact with diffuser 1830." *See id.*

We have reviewed Epstein's Figure 18A and observe that it appears to support Petitioner's assertions. For example, Epstein provides that after a "transparent material . . . [is] molded in place over the LED 1820 and reflecting surface 1824. . . a diffuser or screen film 1830 may be disposed above the sheet 1822 to diffuse the light after being reflected by the reflecting surfaces 1824." *See* Ex. 1008 ¶ 109, Fig. 18A. Moreover, Figure 18A appears to show *diffuser* 1830 *contacting top portions of reflecting sheet* 1822 (*or reflecting surface* 1824 if deposited thereon). *See id.* at Fig. 18A. Thus, Petitioner appears to have shown a reasonable likelihood that Epstein teaches or suggests a "diffuser sheet [that] contacts the reflector" that is also "extended and angled with respect to the surface of the substrate," as required by proposed substitute claims 22 and 24.

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 21–25 (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 21, 23, and 25, and a reflector and diffuser as recited in each of proposed substitute claims 22 and 24. 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. 22–24.

Based on the current record, at this stage of the proceeding, it appears that Petitioner has shown a reasonable likelihood that proposed substitute claims 21–25 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* Notice, *passim*.

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

- Proposed substitute claims 21, 23, and 25

Petitioner contends the added limitation in proposed claim 21 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. 17–18. Petitioner also contends the added limitations in proposed claims 23 and 25 reciting that the reflector forms "a reflective optical cavity [(or at least

one 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 2 discloses

> that lighting panels used reflectors that are extended and angled and house more than one solid state lighting device. Ex. 1022 at ¶¶39-40.
>
> The conventional design in FIG. 2 is described by Ayabe []as having a "reflective film 18", "diffusing film 15", and "brightness enhancing film 17". Ex. 1017, Fig. 2, [0005]–[0008]. Ayabe further discloses that the reflector is both extended and angled, and that the reflector forms an optical cavity that houses more than one optical lighting device, e.g. LEDs. *Id.* at [0007].

Opp. 17–18.

Petitioner's reliance on Ayabe's Figure 2 and its associated description does *not* appear to show a reasonable likelihood that Ayabe's Figure 2 teaches or renders obvious a reflector that "is extended and angled with respect to the surface of the substrate" and "forms a reflective optical cavity around at least one solid state lighting device" (as respectively recited in proposed substitute claims 21 and 23). In Ayabe's Figure 2, reflective film 18 covers the sides and back face of a cold cathode tube 14 in which cannonball type LEDs, 21R, 21G, and 21B are arranged on said reflective film. *See* Ex. 1017 ¶¶ 3–7, Fig. 2. That is, Ayabe's Figure 2 does not appear to have a *substrate distinct from the reflector*, 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 21). Although Ayabe's reflective film 18 has angled portions, the reflective film is not "extended and angled with respect to [a] surface of [a] substrate" (as required by claim 21). Moreover, the cathode tube arrangement of layers shown in Ayabe's Figure 2 appears to be significantly different from the arrangement of layers in Mok and Holman that Petitioner relied upon with respect to the claimed arrangement of layers in original claim 1 (retained in proposed claim 21).

Thus, we are unpersuaded that Ayabe's Figure 2 provides relevant teachings or suggestions with respect to the reflector limitations recited in

proposed substitute claim 21 (and the limitations in proposed substitute claims 23 and 25 that further define claim 21).

In the Opposition, Petitioner also references "Ayabe's other disclosures" in Figures 32, 34, and 35, 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 21, 23, and 25. Opp. 18 (citing Ex. 1017 ¶¶ 21–24, Figs. 32, 34, 35; Ex. 1022 ¶ 41).

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 a wiring board 55, light emitting devices 56R, 56G, and 56B (such as LED chips) installed on the surface of wiring board 55, a reflecting member 57 including annular reflecting areas 64b–64d, and a 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 21), 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 claims 23 and 25). *See id.* at Figs. 32, 34, 35.

Petitioner asserts that "the designs offered by [Ayabe] would improve efficiency as well as the quality and uniformity of light output by the backlight system" such that an ordinarily skilled artisan "would be motivated to modify the art presented in the original grounds [I or II] to include the additional disclosure[] of Ayabe . . . to provide increased efficiency and more on-axis light." Opp. 22–24 (citing Ex. 1022 ¶¶ 53–63).

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 21), "the reflector form[ing] a reflective optical cavity [(or at least one reflective optical cavity)] around at least one solid state lighting device" (as recited in proposed substitute claims 23 and 25).

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* 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 21, 23, and 25 would have been rendered obvious by the combination of Mok, Holman, Lamb, and Ayabe, and by the combination of Epstein, Holman, Lamb, and Ayabe.

- Proposed substitute claims 22 and 24

Petitioner contends the added limitation in proposed claim 22 (and the similar added limitation in proposed claim 24) reciting that "the diffuser sheet contacts the reflector" are taught or suggested by Ayabe. Opp. 20–21.

Petitioner relies on Ayabe to disclose these added limitations in two ways. Opp. 20–21.

First, Petitioner relies on Ayabe's Figure 39 as describing "a reflector sheet 'affixed to the inner surface of the casing 78'" and "optical components 80 and 81 [that] can be, among other things, a 'diffusing plate.'" *Id.* (citing Ex. 1017 ¶ 155, Fig. 39). Petitioner submits that because Ayabe discloses that "the diffusing plate can be 'installed in the interior or top surface of the casing 78.' . . . the diffuser would contact the reflector." *Id.*

On this record, we disagree with Petitioner's contentions. Ayabe's Figure 39 and paragraph 155 disclose a rectangular backlight 76 having optical components 80, 81 (that may be a diffusing plate), a casing 78, and "a reflecting member or reflection sheet having good reflectivity . . . affixed to the inner surface of the casing 78." *See* Ex. 1017 ¶ 155, Fig. 39.

Figure 39 appears to show optical components 80 and 81 contacting top sides of casing 78. However, neither Figure 39 nor its textual description discloses that optical components 80, 81 (the diffusing plates) *contact the* "*reflecting member or reflection sheet* . . . [that is] affixed to the inner surface of the casing 78." *See id.* (emphasis added).

Moreover, the arrangement of components in the rectangular backlight of Ayabe's Figure 39 is significantly different from the light emitters and *reflecting members 57* shown in Ayabe's Figures 32, 34, and 35 *(that Petitioner relied upon with respect to the "reflector" recited in claim 21, from which claims 22 and 24 depend)*. *See* Opp. 18. Ayabe's Figure 39 does not, in fact, include a reflecting member 57 (as that shown in Ayabe's Figures 32, 34, and 35). Figure 39 also does not show any reflector that is *extended and angled with respect to the surface of a substrate* (as required by claim 21); rather, Figure 39 includes a reflecting member described as being conformally affixed to its underlying layer/casing 78. *See* Ex. 1017 ¶ 155.

Thus, Ayabe's Figure 39 does not show a diffuser sheet that contacts a reflector, as recited in proposed substitute claims 22 and 24.

Second, Petitioner relies on Ayabe's Figure 9 for disclosing "light emitting source 49 . . . made with reflecting member 57" and "diffuser [51 that] is 'positioned on' the light emitting source" from which "one of skill in the art would understand that the various components of the lighting array could be placed in direct contact with one another." Opp. 21 (citing Ex. 1017 ¶ 92, Figs. 9, 32; Ex. 1022 ¶¶ 43–44).

On this record, we disagree with Petitioner's contentions. Although Ayabe's Figure 9 shows "a light diffusing film 51 . . . positioned on the front of light emitting source array 50 on which a plurality of light emitting sources 49 are arranged" with each light emitting source 49 including a reflecting member 57 (*see* Figure 10), Ayabe discloses that "reflecting member 57 [(a metal coating such as Au, Ag, Al)] . . . [is] deposited on the rear of the molded unit 54 [which is formed of a transparent resin]" but *does not disclose that reflecting member 57 is deposited on the top/front surface* of molded unit 54 (*see* Fig. 10, showing the top/front surface of molded unit 54 having a toric channel 58). *See* Ex. 1017 ¶¶ 89, 91–93, Figs. 9–10, 14A. Thus, even if an ordinarily skilled artisan could envision that "the various components of the lighting array [in Fig. 9 of Ayabe] could be placed in direct contact with one

another" (as argued by Petitioner, *see* Opp. 21), the alleged "direct contact" would at most *bring diffusing film 51* in *contact with the transparent resin* (and the toric channel 58) on the front surface of molded unit 54—*but would not bring diffusing film 51 in contact with reflecting member 57*. *See* Ex. 1017 ¶ 91, Figs. 9–10.

We are therefore not persuaded by Petitioner's arguments that Ayabe's Figure 9 teaches or suggests a diffuser sheet that contacts a reflector, as recited in proposed substitute claims 22 and 24.

Although we disagree with Petitioner's contentions that Ayabe teaches or renders obvious the limitations recited in proposed substitute claims 22 and 24, we note that Petitioner's grounds involving Ayabe also include other references (e.g., Holman and Epstein) that appear to render obvious the added limitations in proposed substitute claims 22 and 24, as discussed *supra*. Thus, although we are not persuaded that Ayabe alone teaches or renders obvious claims 22 and 24, at this stage of the proceeding, it appears that Petitioner has shown a reasonable likelihood that proposed substitute claims 22 and 24 would have been rendered obvious by the asserted combinations of Mok, Holman, Lamb, and Ayabe, or Epstein, Holman, Lamb, and Ayabe—by virtue of these combinations including the Holman and Epstein references.

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

- Proposed substitute claims 21, 23, and 25

Petitioner contends the added limitation in proposed claim 21 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. 18–19. Petitioner also contends the added limitations in claims 23 and 25 reciting that the reflector forms "a reflective optical cavity [(or at least one 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. 1022 at ¶¶45-46.

Opp. 18–19.

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 21. *See id.* Roth's Figure 2 also shows reflector 31 forming a reflective optical cavity around light emitting diode 6. *See id.* ¶¶ 28–29 ("The top-type package device may have reflector 31 which may reflect the light from the light emitting diode 6 to the desire [sic] 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 claims 23 and 25. *See id.*

Petitioner asserts that "the designs offered by [Roth] would improve efficiency as well as the quality and uniformity of light output by the backlight system" such that an ordinarily skilled artisan "would be motivated to modify the art presented in the original grounds [I or II] to include the additional disclosure[] of . . . Roth . . . to provide increased efficiency and more on-axis light." Opp. 22–24 (citing Ex. 1022 ¶¶ 53–63).

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 21), "the reflector form[ing] a reflective optical cavity [(or at least one reflective optical cavity)] around at least one solid state lighting device" (as recited in proposed substitute claims 23 and 25).

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* 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 21, 23, and 25 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 21–25

Petitioner contends the added limitation in claim 21 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. 19–20. Petitioner also contends the added limitations in claims 23 and 25 reciting that the reflector forms "a reflective optical cavity [(or at least one reflective optical cavity)] around at least one solid state lighting device" are taught or suggested by Saccomanno. *See id.* Finally, Petitioner contends the added limitation in claim 22 (and the similar added limitation in claim 24) reciting that "the diffuser sheet contacts the reflector" are taught or suggested by Saccomanno. *See id.* at 22.

In particular, Petitioner references Figures 4 and 5 of Saccomanno, asserting they teach the added limitations in proposed substitute claims 21, 23, and 25 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. 19–20 (citing Ex. 1019 ¶¶ 38–40, Figs. 4–5; Ex. 1022 ¶ 47). Petitioner also argues Saccomanno's Figure 5 teaches or suggests the limitations of proposed substitute claims 22 and 24 because the figure shows "reflective surface 505 in contact with light management film 575" and "[o]ne of skill in the art would know that in addition to brightness enhancement films,

diffusers are light managing films." Opp. 22 (citing Ex. 1019 ¶¶ 39–40, Fig. 5; Ex. 1022 ¶ 49).

On this record, we disagree with Petitioner's contentions.

Saccomanno's Figure 4 shows a flat reflective surface 405 located at an end of a light guide 400, which do 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. Saccomanno's Figure 4 also does not disclose a "diffuser sheet [that] contacts the reflector" (as recited in proposed substitute claims 22 and 24). *See id.* at Fig. 4.

Saccomanno'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 21) does not appear to be both "extended and angled with respect to the surface of [a] substrate" (as recited in proposed substitute claim 21); 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 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 21.

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 21).

Thus, we are unpersuaded that Saccomanno's Figure 5 provides relevant teachings with respect to the reflector limitations recited in proposed substitute claim 21 (and the limitations in proposed substitute claims 23 and 25 that further define claim 21).

We also do not see where Saccomanno's reflective surface 505 contacts *a diffuser sheet* (as required by proposed substitute claims 22 and 24). Contrary to Petitioner's arguments (*see* Opp. 22), light management film 575 (that contacts reflective surface 505 in Saccomanno's Figure 5) is expressly described as a BEF (brightness enhancement film) that may also be "utilize[d] . . . as the 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. Petitioner points to no teaching or suggestion in Saccomanno that light management film 575 would function as *a diffuser sheet*.

We are therefore not persuaded by Petitioner's arguments that Saccomanno's Figure 5 teaches or suggests a diffuser sheet that contacts a reflector, as recited in proposed substitute claims 22 and 24.

Although we disagree with Petitioner's contentions that Saccomanno teaches or renders obvious the added limitations recited in proposed substitute claims 21–25, 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 21–25, as discussed *supra*. Thus, although we are not persuaded that Saccomanno alone teaches or renders obvious limitations of claims 21–25, at this stage of the proceeding, it appears that Petitioner has shown a reasonable likelihood that proposed substitute claims 21–25 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 21, 23, and 25

Petitioner contends the added limitation in claim 21 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. 20. Petitioner also contends the added limitations in claims 23 and 25 reciting that the reflector forms "a reflective optical cavity [(or at least one 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 Figure 6 shows that "reflector 32 is angled and extended forming optical cavities around light emitting components 33, which can be LEDs." Opp. 20 (citing Ex. 1021, Fig. 6; Ex. 1022 ¶¶ 50–51).

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 ("base 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" and "[i]n 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 21. *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 claims 23 and 25. *See id.*

Petitioner asserts that "the designs offered by [Chang] would improve efficiency as well as the quality and uniformity of light output by the backlight system" such that an ordinarily skilled artisan "would be motivated to modify the art presented in the original grounds [I or II] to include the additional disclosure[] of . . . Chang to provide increased efficiency and more on-axis light." Opp. 22–24 (citing Ex. 1022 ¶¶ 53–63).

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 21), "the reflector form[ing] a reflective optical cavity" (or at least one reflective optical cavity) around at least one lighting device (as recited in proposed substitute claims 23 and 25).

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* 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 21, 23, and 25 would have been rendered obvious by the combination of Mok, Holman, Lamb, and Chang, and by the combination of Epstein, Holman, Lamb, and Chang.

- Proposed substitute claims 22 and 24

Petitioner contends the added limitation in claim 22 (and the similar added limitation in claim 24) reciting that "the diffuser sheet contacts the reflector" are taught by Chang. Opp. 22.

In particular, Petitioner contends that "Chang discloses a reflector in contact with light films, including diffusers" as "Chang shows a diffusion sheet 34 directly on and in contact with reflector 32." Opp. 22 (citing Ex. 1021, Fig. 6; Ex. 1022 ¶ 52).

We have reviewed the disclosure of Chang, and observe that the disclosure appears to support Petitioner's assertion. In particular, Chang's Figure 6 shows a diffusion sheet 34 disposed above reflector 32, where diffusion sheet 34 appears to be contacting two outer edges of reflector 32. *See* Ex. 1021, 3 ("The diffusion sheet is located on the light-emitting component to diffuse the light which is emitted from the light-emitting component."), 11, 13, Fig. 6. Thus, Chang's Figure 6 appears to teach a "diffuser sheet [that] contacts the reflector," as recited in proposed substitute claims 22 and 24.

At this stage, we are persuaded that Chang, in combination with originally asserted Mok, Holman, and Lamb or in combination with originally asserted Epstein, Holman, and Lamb, teaches or at least suggests a "diffuser sheet [that] contacts the reflector," as recited in proposed substitute claims 22 and 24.

We acknowledge that Patent Owner has not yet had the opportunity to address Chang 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* 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 22 and 24 would have been rendered obvious by the combination of Mok, Holman, Lamb, and Chang, and by the combination of Epstein, Holman, Lamb, and Chang.

III. CONCLUSION

This concludes the Preliminary Guidance, which is Patent Owner's first option under the Board's pilot program. Notice, 84 Fed. Reg. at 9,497. Patent

Owner has an additional option under the Board's pilot program to file a revised MTA by DUE DATE 3. *See* Paper 8, 9 (Scheduling Order).

In addition to those two options under the Board's pilot program, Patent Owner is reminded that amendments to 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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