

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SEOUL SEMICONDUCTOR CO., LTD.,
SEOUL SEMICONDUCTOR, INC., and
EVERLIGHT ELECTRONICS CO. LTD.
Petitioner,

v.

DOCUMENT SECURITY SYSTEMS, INC.,
Patent Owner.

Case IPR2018-00265¹
Patent 6,949,771 B2

Before SALLY C. MEDLEY, SCOTT C. MOORE, and
BRENT M. DOUGAL, *Administrative Patent Judges*.

DOUGAL, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

¹ Everlight Electronics Co., Ltd., which filed a Petition in IPR2018-01244, has been joined as a petitioner in this proceeding.

I. INTRODUCTION

A. Background

Seoul Semiconductor Co., Ltd. and Seoul Semiconductor, Inc. filed a Petition (Paper 1, “Pet.”) to institute an *inter partes* review of claims 1–9 (the “challenged claims”) of U.S. Patent 6,949,771 B2 (Ex. 1001, the “’771 patent”). We subsequently granted a request filed by Everlight Electronics Co., Ltd., to join this proceeding as a petitioner.² IPR2018-01244, Paper 15. Document Security Systems, Inc. (“Patent Owner”) timely filed a Preliminary Response (Paper 6, “Prelim. Resp.”). Applying the standard set forth in 35 U.S.C. § 314(a), we instituted an *inter partes* review of all challenged claims. Paper 8 (“Dec.”).

Patent Owner filed a Patent Owner’s Response (Paper 22, “PO Resp.”), Petitioner filed a Reply (Paper 25, “Reply”), and Patent Owner filed a Patent Owner’s Sur-Reply (Paper 28, “Sur-Reply”). An oral hearing was held on January 31, 2019, and a copy of the transcript was entered into the record. Paper 33 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This Decision is a Final Written Decision under 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73 as to the patentability of the claims on which we instituted trial. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). Having reviewed the arguments of the parties and the supporting evidence, we determine that Petitioner has shown, by a preponderance of the evidence, that the challenged claims of the ’771 patent are unpatentable.

² Seoul Semiconductor Co., Ltd., Seoul Semiconductor, Inc., and Everlight Electronics Co., Ltd. are referred to collectively hereinafter as “Petitioner.”

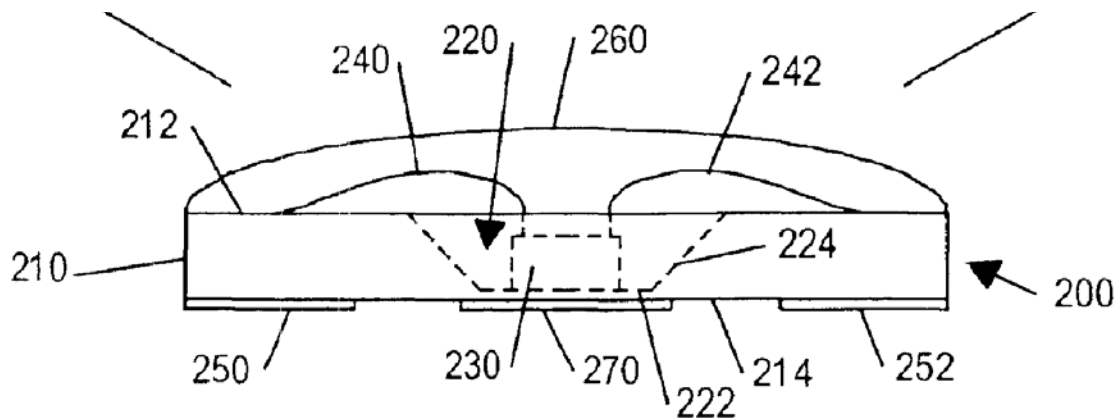
B. Related Proceedings

The parties indicate that there are a number of related court proceedings: *Document Security Systems, Inc. v. Seoul Semiconductor Co. Ltd.*, No. 8:17-cv-00981 (C.D. Cal.); *Document Security Systems, Inc. v. Cree, Inc.*, No. 2:17-cv-04263 (C.D. Cal.); *Document Security Systems, Inc. v. Everlight Electronics Co.*, No. 2:17-cv-04273 (C.D. Cal.); *Document Security Systems, Inc. v. OSRAM GmbH*, No. 2:17-cv-05184 (C.D. Cal.); *Document Security Systems, Inc. v. Lite-On, Inc.*, No. 2:17-cv-06050 (C.D. Cal.); and *Document Security Systems, Inc. v. Nichia Corporation et al.*, No. 2:17-cv-08849 (C.D. Cal.). Pet. 2; Paper 5, 2.

We note that the petition in IPR2019-00398 (institution denied April 15, 2019) challenged the '771 patent. Pending petitions in IPR2019-00397 and IPR2019-00398 also challenge the '771 patent. The parties indicate that the following additional pending *inter partes* reviews are related to the present *inter partes* review: IPR2018-00333, IPR2018-00522, IPR2018-00965, IPR2018-00966, IPR2018-01165, and IPR2018-01166. Pet. 2; Paper 18, 2–3.

C. The '771 Patent

The '771 patent generally relates to a light source, such as a light emitting diode (LED), for mounting on a printed circuit board. Ex. 1001, Abstract, 1:4–6. An LED package is schematically illustrated in a top portion of Figure 2, reproduced below. *Id.* at 3:2–4, 24–25.



A top portion of Figure 2 schematically shows a side view of a surface mount LED package 200. *Id.*

“FIGS. 4 to 17 are cross-sectional side views of the surface mount LED package of FIG. 2 at different stages in a manufacturing process.” *Id.* at 3:8–10. The Specification also teaches that, whereas Figure 2 is a schematic representation of the LED package, “[m]any of the features in FIG. 2 are shown in more detail in FIG. 17,” reproduced below. *Id.* at 7:35–36.

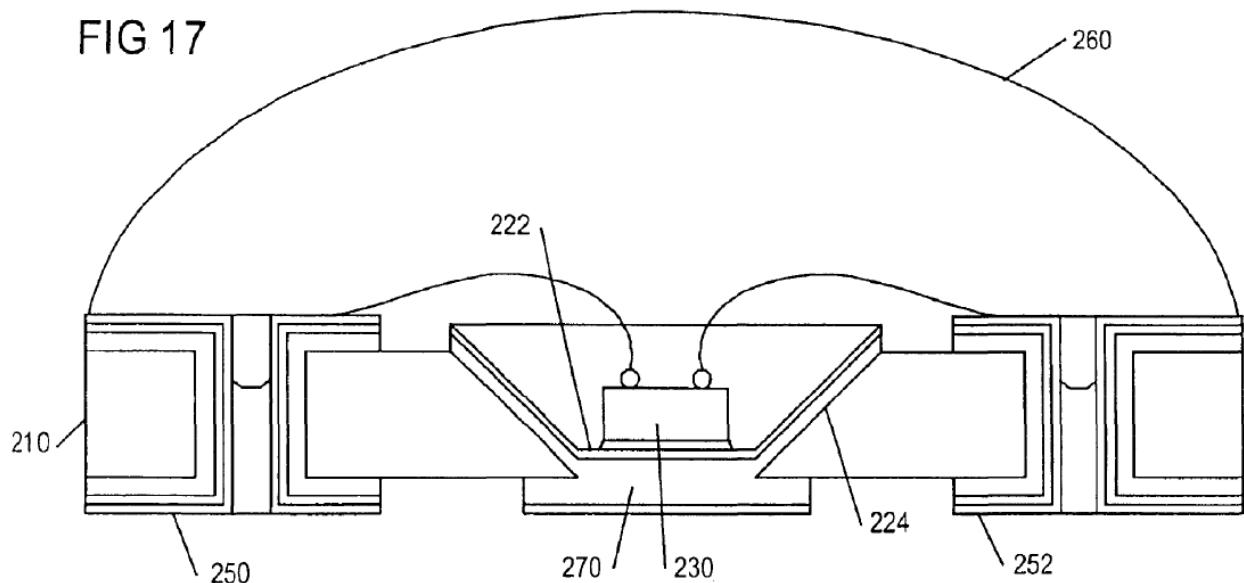


Figure 17, above, shows “[t]he cured encapsulated unit . . . in detail.” *Id.* at 7:34–35.

As can be seen in Figures 2 and/or 17 above, the LED package 200 includes a substrate 210 with a recess 220 therein. *Id.* at 3:28–33. An LED 230 is mounted in the recess 220 of the substrate 210 and encapsulated with encapsulant 260. *Id.* at 3:38–41, 4:12–15. Wires 240, 242 connect the LED to terminals 212, which in turn are connected to conductive pads 250, 252. *Id.* at 3:41–50.

The '771 patent discusses a problem with prior art LED packages: they are “inefficient in dissipating heat away from the LED.” *Id.* at 1:39–40. This is especially an issue as “[d]emand for higher brightness surface mount LED packages is increasing in many fields,” while “[t]he poor heat dissipation properties of the LED package . . . limit the ability of the package to operate at higher power and thus increased brightness.” *Id.* at 1:56–57, 61–63.

One of the ways the '771 patent discloses these shortcomings can be overcome is by mounting an LED 230 to a thermal dissipation pad or a platform 270. *Id.* at 3:56–59; *see also id.* at 2:10–23. The '771 patent teaches that the thermal dissipation pad 270 covers the lower opening of the recess 220, and further “extends into the bulk of the package 200 through an aperture” at the bottom of the recess 220. *Id.* at 3:59–61. The thermal dissipation pad 270 “provides the circular floor 222 of the recess, and extends as a layer over the side surface of the aperture to form the side walls 224.” *Id.* at 3:63–65; *see also id.* at 4:20–21. The pad 270 is metal and “preferably copper plated with nickel.” *Id.* at 3:66–67. The Specification teaches that the thermal dissipation pad 270 both reflects light from the LED and dissipates heat from the LED. *Id.* at 4:25–30.

The '771 patent also discloses a method of manufacturing an LED package. *Id.* at 5:9–7:44. The manufacturing process comprises a process of building up the thermal dissipation pad 270 including plating, coating, applying dry film, photochemical etching, plating again, and applying a coating of flash gold. *Id.*

This results in a pad 270 that is built up both inside of and outside of the recess, as shown in Figure 17 and as previously described. *See, e.g., id.* at 6:8–11 (“The original copper plating 410B and the later copper plating 800 are integrally joined at the lower opening of the aperture in the substrate [thereby starting to form the pad 270], as illustrated by the dashed line in FIG. 8.”)

Of the contested claims, claims 1–8 are independent and claim 9 depends from claim 8. Claim 1, reproduced below, is illustrative of the claimed subject matter:

1. A light source comprising:
 - a substrate having opposing first and second surfaces, the substrate defining an aperture extending from the first surface to the second surface, said aperture having a first opening in the first surface and second opening in said second surface;
 - a platform covering said first opening, said platform being located outside of said aperture,
 - a light emitting diode mounted on the platform within the aperture, and
 - a transparent encapsulant material encapsulating the light emitting diode in the aperture,
 - wherein the aperture comprises a side wall tapering outwards towards the second surface, and
 - wherein the platform extends over the side wall.

D. Prosecution History of the '771 Patent

As much of the parties’ dispute revolves around the claim language describing the recited platform, we now review some of the relevant prosecution history of the ’771 patent.

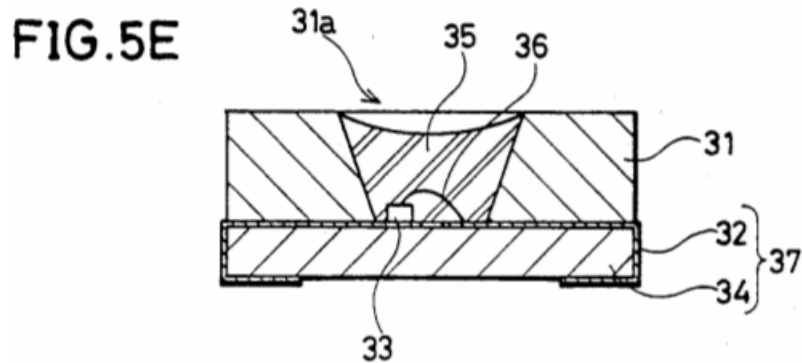
The first four original claims read as follows:

1. A light source comprising:
a substrate having opposing first and second surfaces, the substrate defining an aperture extending between the first and second surfaces,
a platform covering an opening of the aperture adjacent the first surface,
a light emitting diode *mounted on the platform within the aperture,* and
a transparent encapsulant material encapsulating the light emitting diode in the aperture.
2. A light source as claimed in claim 1, wherein *the platform extends beyond the opening of the aperture over the first surface.*
3. A light source as claimed in claim 1, wherein the aperture comprises a side wall tapering outwards towards the second surface.
4. A light source as claimed in claim 3, wherein *the platform extends over the side wall.*

Ex. 1002, 15 (emphasis added).

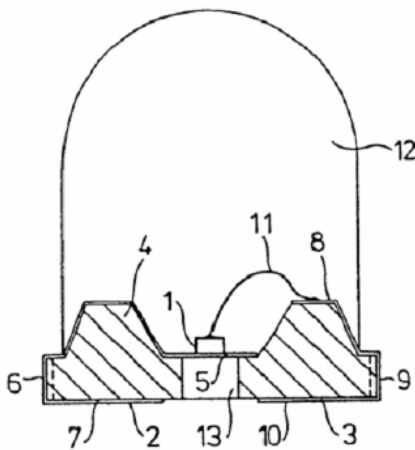
Claim 1 subsequently was amended to recite that the aperture extends “from the first surface to the second surface” (*id.* at 152), and the Examiner subsequently indicated that original claim 4 would be allowable if rewritten in independent form (*id.* at 179). The Examiner wrote that “[p]rior art could not be located that taught the platform extending over the sidewall of the substrate.” *Id.* The Examiner indicated that certain other claims would also be allowable if rewritten in independent form. These claims did not include limitations similar to original claim 4. *Id.* at 180.

At the same time, claims 1 and 3 were rejected as anticipated by Abe (U.S. Patent 5,177,593 (“Abe”)). Ex. 1002, 176–177. Abe Figure 5E is reproduced below, showing a sectional view of a display device.



Abe Figure 5E, above, shows a display device in which the LED 33 has been bonded to the interconnection frame 37 and encased with epoxy 35. Abe, 5:18–28. In the rejection of claims 1 and 3, the Examiner indicated that feature 31 is the claimed substrate, 31a is the aperture, and 34 is the platform. Ex. 1002, 176–177. In response, the Applicants³ cancelled claims 1–3 and amended claim 4 to include the features of claims 1 and 3. Ex. 1002, 188–189, 196.

The Examiner then withdrew the allowance of claim 4, and rejected the claim as anticipated by Brunner (U.S. Patent 6,645,783 B1 (“Brunner”)). Ex. 1002, 201–202. Figure 1 of Brunner is reproduced below.



³ We distinguish between the Applicants of the '771 patent and Patent Owner, as the '771 patent issued to Agilent Technologies, Inc., Palo Alto, CA, which is not a party to the present *inter partes* review.

Brunner's Figure 1 shows "a diagrammatic sectional view of a completed optoelectronic component in the form of a light-emitting diode with a lens for surface mounting." Brunner, 4:42–44. The Examiner provided no analysis of the rejection of claim 4. Ex. 1002, 201–202.

In response, claim 4 and some of the other independent claims were amended to further recite "said platform being located outside of said aperture" after the phrase "a platform covering said first opening." *Id.* at 211 (emphasis omitted). Of these amended independent claims, claim 4 was the only claim to also include "wherein the platform extends over the side wall," the side wall referring back to the limitation "wherein the aperture comprises a side wall tapering outwards towards the second surface" or top of the substrate. *Id.* at 212.

Applicants noted that the Examiner did not specifically address claim 4; thus, in addressing the rejection, Applicants articulated two different potential understandings of what the Examiner interprets as the aperture in Brunner. *Id.* at 217. Applicants argued that "[t]he aperture must [] be the hole that is filled with the copper heat sink 13" or "that the aperture extends to the two protrusions labeled 4 and 8." *Id.* If it is the first, then "this does not satisfy the condition that the light emitting diode be mounted within the aperture." *Id.* If it is the second, then Applicants argued that "the platform on which the die is mounted is the upper surface [5] of heat sink 13," which "is within the aperture." *Id.* Applicants also stated "that a platform is defined as a horizontal flat surface ('Webster's New Collegiate Dictionary')." *Id.*

In response, the Examiner stated:

The aperture that extends from the first surface to the second surface of the substrate is the opening optionally filled by the heat sink 13 (5, 14+). The definition of aperture provided by applicant, an

opening that extends from one surface to the other, is meet [sic] by the opening in which the heat sink 13 sits.

Id. at 222. Thus, the Examiner indicated that Applicants' first understanding was correct. No further discussion of claim 4 was provided.

Applicants responded by appealing the rejection. *Id.* at 229. In the Appeal Brief, Applicants described claim 4, in relevant part, in the Summary of the Invention section, as follows:

(1) . . . Referring again to Figure 2, a platform 270 covers the first opening. The LED 230 is mounted on the platform within the aperture 220. . . . All of the Claims except Claims 14 and 15 require the platform to be located outside of the aperture.

(2) Claim 4 is directed to a light source having the features described in (1) with the additional limitation that the aperture 220 has a sidewall 224 that tapers outward towards the second surface 212. The platform is required to extend over this sidewall.

Id. at 234.

Applicants repeated their argument that Brunner's LED 1 is not mounted within the aperture (i.e. the space filled by the heat sink 13) as required by claim 4. *Id.* at 237. Applicants also argued that the space filled by the heat sink 13 does not have tapered sidewalls, as also required by claim 4. *Id.*

In response, the Examiner withdrew the rejections and allowed all of the claims without comment. Ex. 1002, 227. Claim 4 became claim 1 on issuance of the '771 patent.

II. ANALYSIS

A. Obviousness under 35 U.S.C. § 103

The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any

differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness.⁴ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). A patent claim can be obvious in light of a single prior art reference if it would have been obvious to modify that reference to arrive at the patented invention. *See, e.g., Takeda Chem. Indus., Ltd. v. Alphapharm Pty, Ltd.*, 492 F.3d 1350, 1357 (Fed. Cir. 2007); *SIBIA Neurosciences, Inc. v. Cadus Pharm. Corp.*, 225 F.3d 1349, 1356 (Fed. Cir. 2000).

B. Level of Ordinary Skill

Petitioner states that a person of ordinary skill in the art “at the time of the [] invention would have had at least a B.S. in mechanical or electrical engineering or a related field, and four years’ experience designing LED packages.” Pet. 12 (citing Ex. 1003, Declaration of Petitioner’s proffered expert, Dr. Michael Pecht, (“Pecht Decl.”) ¶¶ 29–31). Petitioner contends that “a higher level of education or skill might make up for less experience, and vice-versa.” *Id.*

Patent Owner does not contest or otherwise address Petitioner’s proposed level of ordinary skill. *See generally*, PO Resp. Having reviewed the argument and evidence, we adopt Petitioner’s definition above.

C. Claim Construction

In an *inter partes* review filed before November 13, 2018, claim terms in an unexpired patent are given their broadest reasonable construction in light of the specification of the patent. *See* 37 C.F.R. § 42.100(b) (2017); *see also* *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2142 (2016) (affirming that USPTO has statutory authority to construe claims according to 37 C.F.R. § 42.100(b)).⁵

⁴ The parties do not direct us to any objective evidence of nonobviousness.

⁵ The Office recently changed the claim construction standard used in *inter partes*

Claim terms are given their ordinary and customary meaning as would be understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). We apply this standard to the claims of the '771 patent.

Petitioner submits a proposed construction for the phrase “said platform being located outside of said aperture,” as recited in independent claims 1–5, 7, and 8. Pet. 9–11. Petitioner argues that this phrase should be construed to “mean[] that at least a portion of the platform extends outside of the aperture.” *Id.* at 11; *see also id.* at 9. Petitioner notes that claim 1 recites “said platform being located outside of said aperture,” and requires that “the platform extends over the side wall” of the aperture. *Id.* at 9 (emphasis omitted). In other words, the language of claim 1 requires that the platform be both outside and inside of the aperture. Petitioner also identifies embodiments in the Specification of the '771 patent with a platform or thermal dissipation pad 270, which Petitioner argues are consistent with its proposed construction of “said platform being located outside of said aperture.” *Id.* at 10–11 (citing Ex. 1001, 3:60–65, 4:20–25, Figs. 2 & 17).

In our institution decision, we determined that the phrase “said platform being located outside of said aperture” does not require any explicit construction, but also noted that the claim language, on its face, does not require that the *entire*

review proceedings. 37 C.F.R. § 42.100(b) (2018). As stated in the Federal Register notice, however, the new rule applies only to petitions filed on or after November 13, 2018, and, therefore, does not impact this matter. *See Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board*, 83 Fed. Reg. 51,340, 51,340 (Oct. 11, 2018) (stating “[t]his rule is effective on November 13, 2018 and applies to all IPR, PGR and CBM petitions filed on or after the effective date”).

platform be located outside of the aperture.⁶ Dec. 5. Patent Owner disagrees with our preliminary observation, arguing that the plain language of claim 1 requires that the entire platform be located outside of the aperture, and further that because of prosecution history estoppel, the phrase “said platform being located outside of said aperture” cannot include a platform that is only partially outside of the aperture. PO Resp. 11–17. We understand Patent Owner to be arguing that the phrase “said platform being located outside of said aperture” should be construed to mean “the platform is located completely outside of the aperture.”

To resolve this dispute regarding the term “platform,” first we look to how that term is used in the claims, claim 1 being representative. Claim 1 contains the following three requirements:

- 1) the “platform covering said first opening” of the aperture, which is “in the first surface” of the substrate, “said platform being located outside of said aperture;”
- 2) “a light emitting diode [LED] mounted on the platform within the aperture;” and
- 3) “wherein the platform extends over the [aperture] side wall,” wherein the “side wall tapering outwards towards the second surface” of the substrate.

Ex. 1001, 7:53–67.

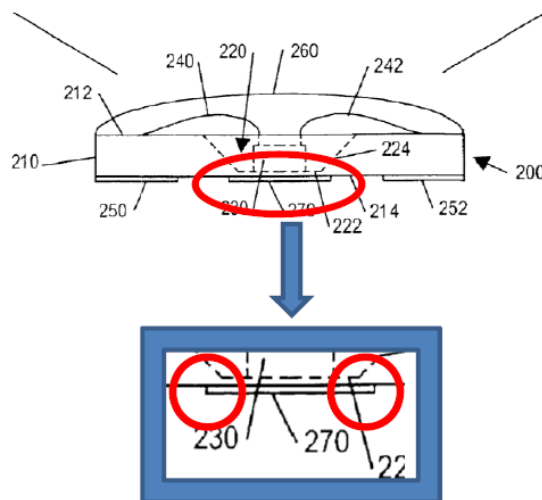
On its face, requirement 1, above, would appear to require that at a minimum some portion of the platform be located outside of the aperture. Requirement 2 would appear to require that at least one of, if not both of, the LED and the platform be within the aperture, in order for the LED to be “mounted on

⁶ We further note that claim 1 is the only independent claim that includes the limitation that “the platform extends over the side wall” of the aperture. *Compare, e.g.,* Ex. 1001, claim 1, *with* claim 2.

the platform within the aperture.” Requirement 3 would appear to require that at least a portion of the platform be within the aperture in order to extend over the side wall of the aperture. Thus, claim 1 on its face appears to require that a portion of the platform be within the aperture, and a portion be outside of the aperture. Patent Owner’s position on the claim limitation “said platform being located outside of said aperture,” thus, is directly inconsistent with other limitations recited in claim 1.

Patent Owner argues that this interpretation of claim 1 is incorrect with respect to requirement 3 because it interprets “over the side wall” to mean “extending beyond the corresponding region of substrate 210 where the side walls 224 begin.” PO Resp. 13. In other words, Patent Owner contends that “the platform extends over the [aperture] side wall” means that the platform extends linearly beyond a portion of the side wall, or that a portion of the platform overlaps with a portion of the side wall.

Patent Owner’s sole support for this understanding (*see* PO Resp. 14) is a marked-up version of Figure 2 of the patent ’771, reproduced below.



Id. Figure 2 schematically shows a side view of a surface mount LED package where Patent Owner has circled portions of the platform in red. Patent Owner states that “[i]n this way, the ‘platform’ of claim 1 is located outside of said aperture, **covers** said first opening of the aperture, and also **extends over**, or past, the sidewalls of the aperture.” *Id.*

We do not find any teachings in the Specification that indicate that “extends over the sidewalls” is limited to “extends [linearly] beyond a portion of the side wall,” as interpreted by Patent Owner. To the contrary, the Specification specifically teaches, “[r]eferring to FIG. 2,” that the thermal dissipation pad 270 “provides the circular floor 222 of the recess, and extends as a layer over the side surface of the aperture to form the side walls 224.” Ex. 1001, 3:24, 3:63–65; *see also id.* at 4:20–21. The Specification also teaches that “the platform extends over the first surface and over the side wall of the substrate [the side wall being part of the aperture]. This has the advantage of holding the platform firmly in place on the substrate, thus preventing it from detaching easily.” *Id.* at 2:31–34. Thus, by extending over both the bottom of the substrate and the side wall, the platform creates a sandwiching effect, holding it “firmly in place” and “preventing it from detaching easily.” *Id.* Patent Owner does not explain in any way how the description of the Figure 2 embodiment supports its interpretation that the “platform” of claim 1 is located outside of said aperture. *See also* Pet. 10–11, Reply 6–9. For example, Patent Owner does not explain how the description of pad 270, which provides the circular floor of the recess, relates to the sidewall of the aperture.

Further, reviewing the prosecution history, there does not appear to be any point where the Applicants or the Examiner took a position consistent with Patent Owner’s arguments in how the platform extends over the sidewall. In fact,

considering the Examiner's statements in initially allowing claim 4 (which later became claim 1), discussed above, such an interpretation of the claim would not have rendered the claim allowable, as Abe's platform 34 extends linearly beyond not only a portion of the sidewall, but the entire sidewall. See U.S. Patent 5,177,593, Fig. 5E; see also Ex. 1002, 176–177. Thus, if the Examiner understood the limitation “said platform being located outside of said aperture” in the manner Patent Owner now proposes, the Examiner's statement that “[p]rior art could not be located that taught the platform extending over the sidewall of the substrate” would not make sense. Ex. 1002, 179.

Though Patent Owner does not address the prosecution history related to the limitation “wherein the platform extends over the [aperture] side wall,” Patent Owner does argue that the doctrine of prosecution history estoppel requires that the limitation “said platform being located outside of said aperture” be interpreted to require a platform located completely outside of the aperture. PO Resp. 14–17. “During prosecution, a patent applicant may consistently and clearly use a term in a manner either more or less expansive than it is used in the relevant art, thereby expanding or limiting the scope of the term in the context of the patent claims.” *Sorensen v. Int'l Trade Comm'n*, 427 F.3d 1375, 1378 (Fed. Cir. 2005) (citing *Middleton, Inc. v. Minn. Mining & Mfg. Co.*, 311 F.3d 1384, 1388 (Fed. Cir. 2002)).

As discussed more fully above, following an initial allowance of claim 4, the Examiner rejected the claim as anticipated by Brunner without providing a substantive analysis of the rejected claim.

Without having an express statement of the Examiner's reasoning, Applicants amended the claim to add “said platform being located outside of said aperture” after the phrase “a platform covering said first opening” and argued over

two different potential understandings of what the Examiner could have interpreted as the aperture in Brunner. Ex. 1002, 211, 217. Applicants argued that “[t]he aperture must [] be the hole that is filled with the copper heat sink 13” or “the aperture extends to the two protrusions labeled 4 and 8.” *Id.* The Examiner then indicated that the first position was correct, and Applicants exclusively argued against that position in the Appeal Brief. *Id.* at 222, 237.

Patent Owner now argues that this “amendment was critical to the application’s allowance” and that “the examiner accepted the Applicant’s amendment as excluding the opening ‘extend[ing] to the two protrusions labeled 4 and 8’ and containing electrode surface 5 from two possible ‘aperture’ candidates discussed by the Applicant.” PO Resp. 16. However, there is no indication that this is the case. The Examiner stated that the arguments “have been fully considered,” but did not address or acknowledge Applicants’ amendment while responding to certain of the other arguments. *See* Ex. 1002, 222. Further, the Examiner did not withdraw the rejection of claim 4. Thus, there is no indication that the “amendment was critical to the application’s allowance” as asserted by Patent Owner. Rather, with respect to claim 4, it would appear that Applicants’ arguments that Brunner’s LED is not within the aperture were more critical to the allowance.

In view of the above, we determine that the phrase “said platform being located outside of said aperture” does not require any special claim construction. However, we agree with Petitioner that this claim language, on its face, does not require that the *entire* platform be located outside of the aperture.

We decline to provide an express construction for any terms in the ’771 patent because we determine that no such construction is required for purposes of this Decision. *See Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803

(Fed. Cir. 1999) (holding that “only those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy”); *see also Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (citing *Vivid Techs.* in the context of an *inter partes* review).

D. Instituted Grounds

Petitioner contends that the challenged claims are unpatentable under 35 U.S.C. § 103 based on the following grounds (Pet. 3, 16–67):⁷

Reference[s]	Claim[s] challenged
Sharp	1–9
Stanley	1–8
Sharp and Konishi	9
Stanley and Konishi	9

As further support, Petitioner offers the Declaration of Michael Pecht, Ph.D. Ex. 1003.

E. Obviousness over Sharp – Claims 1–5, 7–9

Petitioner asserts that claims 1–9 would have been obvious over Sharp, citing record evidence. Pet. 16–46. Patent Owner identifies that independent claims 1–5, 7, and 8 share many common elements, and thus addresses these claims together. PO Resp. 19–20. Patent Owner does not separately address Petitioner’s assertion that dependent claim 9 would have been obvious over Sharp. *See generally id.* at 19–28.

⁷ Japanese Pat. Pub. JP7-235696, Sept. 5, 1995 (Ex. 1004) (“Sharp”); Japanese Pat. Pub. 11-284233, Oct. 15, 1999 (Ex. 1005) (“Stanley”); U.S. Patent 5,635,115, June 3, 1997 (Ex. 1006) (“Konishi”).

Patent Owner identifies that independent claims 1–5, 7, and 8 have at least the following common limitations, a “light source” including:

a substrate having opposing first and second surfaces, the substrate defining an aperture extending from the first surface to the second surface, said aperture having a first opening in the first surface and second opening in said second surface;

a platform covering said first opening, said platform being located outside of said aperture,

a light emitting diode mounted on the platform within the aperture, and

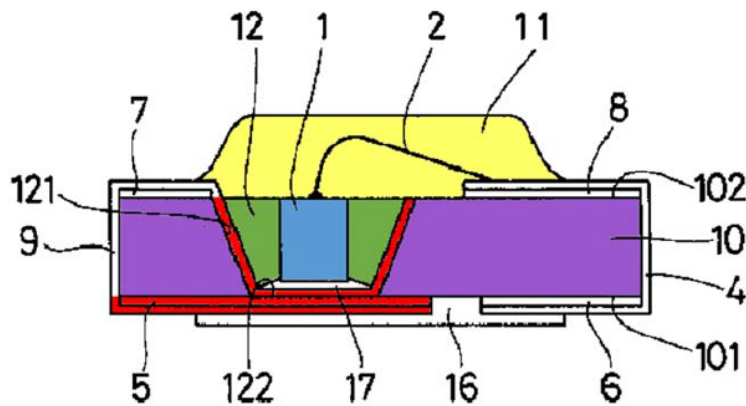
a transparent encapsulant material encapsulating the light emitting diode in the aperture.

Id. at 19–20.

Petitioner asserts that all of these limitations, as well as the other limitations of claims 1–5 and 7–9, are taught or suggested by Sharp. Pet. 16–46. Petitioner asserts that Sharp teaches a light source with an LED chip similar to the claimed light source. Pet. 17 (citing, e.g., Ex. 1004 ¶ 1). Petitioner notes that Sharp teaches “an insulating substrate in which a through-hole has been formed.” *Id.* at 18 (quoting Ex. 1004, Claim 1). Petitioner provides color-coded mark-ups of Sharp Figures 1 and 4⁸ depicting the substrate 10⁹ and the aperture 12, extending through the substrate 10. *Id.* at 13–14, 18–19. Petitioner’s color-coded mark-up of Sharp Figure 1, showing an LED package, is reproduced below.

⁸ Petitioner’s marked-up version of Figure 4 shows in green an area above the substrate and outside of the aperture, which is incorrectly indicated as being part of the aperture. Prelim. Resp. 18–19.

⁹ In the interest of clarity, we only include reference numbers with respect to Petitioner’s position regarding Sharp Figure 1.



Petitioner states that the LED package of the marked-up version of Sharp's Figure 1 shows a substrate 10 in purple, an aperture 12 in green, an LED chip 1 in blue, a platform in red, and a transparent resin 11 in yellow. *Id.* at 13–14. We note that the transparent resin 11 also extends into the aperture 12.

Petitioner also asserts that Sharp’s aperture has a tapering side wall. *Id.* at 13, 23–24 (citing, e.g., Ex. 1004, Claim 2). Petitioner asserts that Sharp discloses a platform (e.g., metal layer 5 and coating 15) that covers an opening of the aperture outside of the aperture, while also extending over a side wall of the aperture. *Id.* at 13–14, 19–21, 24–26 (citing, e.g., Ex. 1004 ¶¶ 12, 29). Petitioner also argues that Sharp shows an LED 1 mounted on the platform 5 within the aperture 12 and encapsulated by a transparent encapsulant material 11 in the aperture. *Id.* at 13–14, 21–23 (citing, e.g., Ex. 1004 ¶ 30, Claim 3). We agree with and adopt Petitioner’s contentions regarding the undisputed limitations of claims 1–5, and 7–9. Pet. 16–36, 39–45; Ex. 1003 ¶¶ 55–90, 96–102. The disputed limitations are addressed below.

Patent Owner argues that Sharp's LED chip 1 "is mounted on a layer that is not 'located outside said aperture' as required by claims 1-5 and 7-8. Rather, the layer on which LED chip 1/21 is mounted on is located within the through-hole, and therefore cannot constitute the claimed 'platform' of these claims." PO Resp.

21. Patent Owner states that “Petitioners collectively characterize thin metal sheet 5 **and** wiring pattern 9 as the alleged ‘platform,’” but “wiring pattern 9 is clearly located within Sharp’s through-hole 12, and therefore is not ‘located outside of said aperture’ as required of the claimed ‘platform.’” *Id.* at 21–22. However, Patent Owner’s reasoning relies on Patent Owner’s proposed claim construction of the term “platform,” rejected above, in which the platform must be completely outside of the aperture. *See supra* § II.C. As discussed above, we determine that the claim limitation “said platform being located outside of said aperture” only requires that a portion of the platform be outside of the aperture; and we find that this limitation is met by metal sheet 5, as alleged by Petitioner.

Patent Owner also argues that the LED chip 1 is mounted on the wiring pattern 9 and “is not mounted on the thin metal sheet 5 located outside of the through-hole 12.” PO Resp. 22. Thus, “Sharp’s LED chip 1 is not ‘mounted on the platform’ ‘located outside of said aperture,’ as required.” *Id.*

Patent Owner does not offer any persuasive explanation of why it is improper for Petitioner to consider the combination of different metallic layers (5 & 9) to be a platform. In response to questioning during the oral hearing, counsel for Patent Owner admitted that the platform does not have to be a single layer. Tr. 31:8–11.¹⁰ Further, the method of manufacturing the platform disclosed in the ’771 patent involves creating the platform from a plurality of layers.¹¹ *See, e.g.*, Ex. 1001, 6:8–11 (“The original copper plating 410B and the later copper plating

¹⁰ “JUDGE DOUGAL: So is your platform a single layer? MR. HELGE: I would say it doesn’t have to be . . .” Tr. 31:8–11.

¹¹ Independent claim 6, though not argued here, specifically requires the platform to be made of “layers of different metals.” Ex. 1001, 9:9–10.

800 are integrally joined at the lower opening of the aperture in the substrate [thereby starting to form the pad 270], as illustrated by the dashed line in FIG. 8.”). Thus, Patent Owner’s argument does not persuade us that there are deficiencies in Petitioner’s position as to this claim limitation.

Patent Owner also argues that the “Petition is unclear regarding how the various aspects of Sharp are being relied upon in Ground 1.” PO Resp. 18; *see also id.* at 27–28. Though we agree that Petitioner has not offered a reason why a person of ordinary skill in the art would have combined Sharp’s embodiments as presented in Figure 1 and Figure 4, we determine that Petitioner has shown that the features of claims 1–5 and 7–9 are taught or suggested by Sharp Figure 1 alone, as well as by Figure 4 alone. Pet. 16–36, 39–45; Ex. 1003 ¶¶ 55–90, 96–102. Thus, a reason to combine the different embodiments in Figures 1 and 4 is unnecessary in this respect.

Concerning claim 2, Patent Owner states that claim 2 also “requires that the platform presents ‘a reflective surface to the light emitting diode.’” PO Resp. 25. Patent Owner argues that Petitioner does not identify a “‘platform’ located outside the alleged aperture of Sharp’s configurations for such a reflective surface. Rather, they only point to the layer formed within this aperture as the alleged ‘reflective surface.’” *Id.*

Patent Owner’s reasoning relies on Patent Owner’s proposed claim construction of the term “said platform being located outside of said aperture,” rejected above, which would require that the platform must be completely outside of the aperture. Further, Patent Owner again does not explain why it is improper for Petitioner to consider the combination of different metallic layers (5 & 9) to be a platform.

In view of the foregoing, we find Petitioner has made a persuasive showing that Sharp teaches and/or suggests all of the limitations of claims 1–5 and 7–9. Pet. 16–36, 39–45; Ex. 1003 ¶¶ 55–90, 96–102. On this record, and having considered all arguments raised by both parties, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–5 and 7–9 are unpatentable as obvious over Sharp.

F. Obviousness over Sharp – Claim 6

Petitioner asserts that independent claim 6 would have been obvious over Sharp, citing record evidence. Pet. 36–39. Because of the overlap between claim 6 and the other independent claims, Petitioner relies on many of the same teachings of Sharp discussed above. *See id.* at 36–37. Claim 6 also requires that “the platform is made of metal, wherein the metal platform is plated onto the substrate and wherein the metal platform comprises layers of different metals.” Ex. 1001, 9:6–10. Petitioner asserts that, among other things, Sharp teaches or suggests a “platform is plated onto the substrate” and “a platform having at least layers of at least two different metals (copper and at least one layer of at least one of nickel, silver, gold, and palladium).” Pet. 37–38. We agree with and adopt Petitioner’s contentions concerning the undisputed limitations of claim 6. Pet. 36–39; Ex. 1003 ¶¶ 92–95.

Patent Owner argues that

Petitioners have not shown that the layers of different metals are found everywhere on Sharp’s wiring pattern. In particular, Sharp’s wiring pattern 9 is covered by a resist layer 16 “for ensuring insulation during soldering.” Sharp, [0035]. Petitioners do not account for this resist, which would eliminate the need “to protect the metal surfaces or for connectivity with the metal wire” in the portion of the wiring pattern covered by the resist layer. Accordingly, Petitioners have failed to

make a sufficient showing of regarding all of features of the platform of claim 6.

PO Resp. 26.

However, claim 6 does not require “that the layers of different metals [be] found everywhere on” the platform as asserted by Patent Owner. *See* Reply 19. Rather, claim 6 merely states that the “metal platform comprises layers of different metals.”

In view of the foregoing, we find Petitioner has demonstrated persuasively that Sharp teaches and/or suggests all of the limitations of claim 6. Pet. 36–39; Ex. 1003 ¶¶ 92–95. On this record, and having considered all arguments raised by both parties, we determine that Petitioner has shown by a preponderance of the evidence that claim 6 is unpatentable as obvious over Sharp.

G. Obviousness over Stanley – Claims 1–5, 7, 8

Petitioner asserts that claims 1–5, 7, and 8 would have been obvious over Stanley, citing record evidence. Pet. 47–63. Patent Owner identifies that independent claims 1–5, 7, and 8 share many common elements, and thus addresses these claims together. PO Resp. 29.

Patent Owner identifies that independent claims 1–5, 7, and 8 have at least the following common limitations, a light source including:

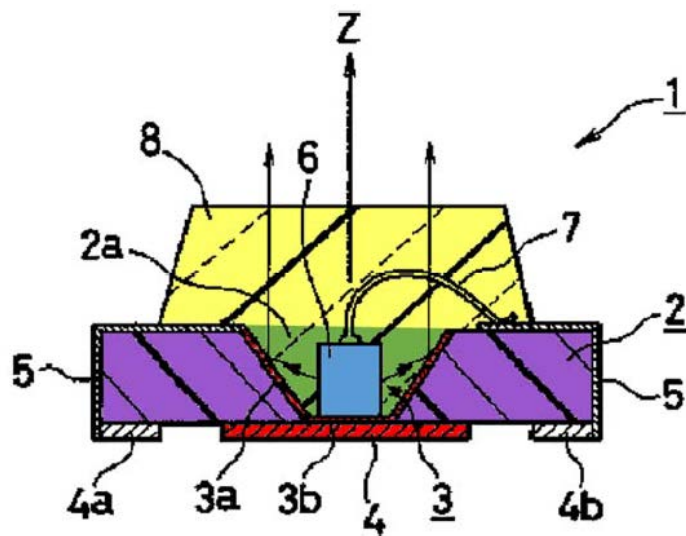
[b] a platform covering said first opening, said platform being located outside of said aperture,

[c] a light emitting diode mounted on the platform within the aperture, . . .

Id.

Petitioner asserts that these limitations, as well as the other limitations of the claims 1–5, 7, and 8, are taught or suggested by Stanley. Pet. 47–63. Petitioner

asserts that Stanley teaches a light source with an LED chip similar to the claimed light source. *Id.* at 47 (citing, e.g., Ex. 1005 ¶ 1). Petitioner notes that Stanley teaches a substrate 2 with a through-hole or aperture 2a therein. *Id.* at 15, 48 (citing Ex. 1005 ¶ 9). Petitioner provides a color-coded mark-up of Stanley Figure 1 depicting the substrate and the aperture defined by the substrate. *Id.* Petitioner's color-coded mark-up of Stanley Figure 1, showing an LED package, is reproduced below.



Petitioner states that the LED package of the marked-up version of Stanley Figure 1 shows a substrate 2 in purple, an aperture 2a in green, an LED chip 6 in blue, a platform in red, and a transparent resin 8 in yellow. *Id.* at 15. We note that the transparent resin 8 also extends into the aperture 2a.

Petitioner also asserts that Stanley's aperture 2a has a tapering side wall. *Id.* at 50 (citing Ex. 1005 ¶ 14). Petitioner asserts that Stanley discloses a platform 3a, 3b, 4 that covers an opening of the aperture 2a outside of the aperture 2a, while also extending over a side wall of the aperture. *Id.* at 15, 48–49, 51 (citing Ex. 1005 ¶¶ 10, 12). Petitioner also argues that Stanley shows an LED 6 mounted on the platform within the aperture and encapsulated by a transparent encapsulant

material 8 in the aperture. *Id.* at 15, 49–50 (citing Ex. 1005 ¶¶ 8, 13). We agree with and adopt Petitioner’s contentions regarding the undisputed limitations of claims 1–5, 7, and 8. Pet. 47–56, 58–63; Ex. 1003 ¶¶ 107–129, 135–142. The disputed limitations are addressed below.

Patent Owner argues that Stanley does not teach or suggest all of the features of the “platform” as claimed. PO Resp. 29. Petitioner relies on the combined elements of copper foil 4 and horn 3, including the reflective face 3a and bottom face 3b, as teaching the claimed platform. Pet. 15, 48–49, 51. Patent Owner argues that “Petitioners [need to justify] this unexplained characterization” of a combination of elements as a “platform.” PO Resp. 31. Patent Owner further argues that “Stanley provides no reason why a POSITA would have interpreted multiple disparate elements, including copper foil 4 and the conductive part 5 (which includes reflective face 3a and bottom face 3b, *see* Stanley, [0012]), as a single ‘platform.’” *Id.* at 32. Patent Owner further identifies that Stanley discusses the copper foil 4 and conductive part 5 as distinct elements. *Id.*

This argument is similar to Patent Owner’s prior argument that it is improper for Petitioner to consider the combination of different metallic layers to be a platform. As discussed above, Patent Owner has admitted that the claimed platform need not be formed of a single layer. Tr. 31:8–11. Further, the method of manufacturing the platform disclosed in the ’771 patent involves creating the platform from a plurality of layers, similar to Stanley’s copper foil 4 and conductive part 5. *See, e.g.*, Ex. 1001, 6:8–11 (“The original copper plating 410B and the later copper plating 800 are integrally joined at the lower opening of the aperture in the substrate [thereby starting to form the pad 270], as illustrated by the dashed line in FIG. 8.”); *see also* Reply 21–22.

Petitioner offers testimony from Dr. Pecht, who explains that the copper foil 4 and plated reflective surface 3a and 3b together form a platform. Ex. 1003 ¶ 111 (describing the plating), ¶ 115 (explaining that “the plating is connected to the metal foil, forming a metal platform under the light emitting diode and providing a thermal and electrically conductive connection”); *see also* Pet. 49, 51; Reply 21. We give substantial weight to Dr. Pecht’s testimony because it is consistent with the description in the specification of the ’771 patent as to the elements that constitute the “platform.”

Patent Owner also argues that Stanley’s conductive part 5 is within the aperture, rather than outside of it. PO Resp. 33. Patent Owner also argues that Stanley’s LED chip 6 is not mounted on a layer that is “located outside of said aperture” as required by claims 1–5, 7, and 8. *Id.* With respect to claim 2, Patent Owner argues that Petitioner does not identify a platform located outside the alleged aperture of Stanley’s configurations that provides a reflective surface. *Id.* at 35.

Each of these arguments relies on Patent Owner’s proposed construction of “said platform being located outside of said aperture,” which we have rejected. *See supra* § II.C. Here, Petitioner has shown by a preponderance of the evidence that Stanley’s copper foil 4 and conductive part 5 are a platform of the type required by the claims. Pet. 48–49, 51–58; Ex. 1003 ¶¶ 107, 111–112, 115–129.

In view of the foregoing, we find Petitioner has demonstrated persuasively that Stanley teaches and/or suggests all of the limitations of claims 1–5, 7, and 8. Pet. 47–56, 58–63; Ex. 1003 ¶¶ 107–129, 135–142. On this record, and having considered all arguments raised by both parties, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–5, 7, and 8 are unpatentable as obvious over Stanley.

H. Obviousness over Stanley – Claim 6

Petitioner asserts that independent claim 6 would have been obvious over Stanley, citing record evidence. Pet. 56–58. Because of the overlap between claim 6 and the other independent claims, Petitioner relies on many of the same teachings of Stanley discussed above. *See id.* at 56. Claim 6 also requires that “the platform is made of metal, wherein the metal platform is plated onto the substrate and wherein the metal platform comprises layers of different metals.” Ex. 1001, 9:6–10. Petitioner asserts that, among other things, Stanley teaches or suggests a “platform [that] is plated onto the substrate” and “a metal platform comprised of two parts.” Pet. 56–57. Petitioner asserts that “it would have been obvious to a person having ordinary skill in the art that the metals used may comprise multiple layers of different metals or that each may comprise a single layer different from the other.” *Id.* at 57. Petitioner also cites to the Pecht Declaration in support of this reasoning. *Id.* (citing Ex. 1003 ¶ 133), 58 (citing Ex. 1003 ¶ 134). For example, Petitioner cites that certain metals are well suited for heat dissipation, whereas others are well suited for light reflectivity, and thus it would have been obvious to have two or more metal layers. *Id.* at 57–58. We agree with and adopt Petitioner’s contentions concerning the undisputed limitations of claim 6. *Id.* at 56–58; Ex. 1003 ¶¶ 130–34.

Patent Owner argues that, at his deposition, Dr. Pecht admitted that the two parts of Stanley’s metal platform “would be formed of the same metal: ‘So I think a person of ordinary skill in the art would probably say that it would be, 5 would be copper because you would want to bond the copper to the copper [foil 4].’” PO Resp. 37 (quoting Ex. 2002, 53:1–13). Patent Owner continues:

While Dr. Pecht also spoke of “typically put[ting] on another coating over the copper” to improve reflectivity of the reflective face

3a/bottom face 3b, this logic does not comport with Petitioners' theories of obviousness as asserted in the Petition. Ex. 2002, 54:10-17. Petitioners suggest ***substituting*** silver for copper in full, rather than plating silver on copper, for its reflectivity (Pet., 57), or alternatively, covering the copper for protection or improved connectivity (Pet., 58).

Id.

This argument mischaracterizes Petitioner's "theories of obviousness." The Petition discusses "multiple layers of different metals," a "reflective metal coating" such as silver on copper, and covering "copper with nickel, silver, gold or palladium." Pet. 57–58. Further the Petition relies on and cites to the Pecht Declaration, which specifically states that "A person having ordinary skill in the art seeking for plate [sic] a reflective metal, therefore, would have found it obvious to utilize a metal other than copper, or to *plate the copper with another metal.*" Ex. 1003 ¶ 133 (emphasis added); *see also id.* ¶ 134. We give substantial weight to Dr. Pecht's testimony because it is supported by record evidence.

In view of the foregoing, we find Petitioner has demonstrated persuasively that Stanley teaches and/or suggests all of the limitations of claim 6. Pet. 56–58; Ex. 1003 ¶¶ 130–34. On this record, and having considered all arguments raised by both parties, we determine that Petitioner has shown by a preponderance of the evidence that claim 6 is unpatentable as obvious over Stanley.

I. Obviousness over Konishi and either Sharp or Stanley – Claim 9

Claim 9 depends from claim 8 and requires "wherein the transparent encapsulant material is molded to form a focusing dome over the light emitting diode." Ex. 1001, 10:3–5. Petitioner asserts that Sharp and Stanley both teach sealing the LED with a transparent sealing material. Pet. 64, 65. Petitioner further asserts that "[t]o the extent that apparatus claim 9 is interpreted to require a specific method of lens formation (*i.e.*, molding), then claim 9 is rendered obvious

by Sharp [or Stanley] in view of Konishi.” *Id.* at 64. Petitioner states that “[i]t would have been well within the skill of a person of ordinary skill in the art to use this known molding process.” *Id.* at 65 (citing Ex. 1003 ¶ 144).

Patent Owner does not contest Petitioner’s assertions other than to rely on their prior arguments. PO Resp. 38–39 (“Ground 3 fails for the same reasons as Ground 1.” “Ground 4 fails for the same reasons as Ground 2.”). Patent Owner also does not dispute that a skilled artisan would have had reason to combine the teachings of Sharp and Konishi, and Stanley and Konishi, in the manner proposed by Petitioner. Patent Owner’s arguments regarding Grounds 1 and 2 are not persuasive for the reasons set forth above.

In view of the foregoing, we find Petitioner has demonstrated persuasively that Sharp and Konishi teach or suggest all limitations of claim 9, and that Stanley and Konishi teach or suggest all limitations of claim 9. Pet. 56–58; Ex. 1003 ¶¶ 143–46. We also agree with and adopt Petitioner’s rationales for why a person skilled in the art would have combined the teachings of Sharp and Konishi, and the teachings of Stanley and Konishi, in the manner set forth in the Petition. Pet. 65–57; Ex. 1003 ¶¶ 143–146. In particular, we find that a skilled artisan would have realized that using a molding process to form transparent encapsulant material, as taught by Konishi, to manufacture the devices of Sharp and Stanley, advantageously would have simplified the manufacturing process (*see* Ex. 1003 ¶ 143) and permitted the designer to focus or spread the light generated by the LED (*see id.* ¶ 146).

On this record, and having considered all arguments raised by both parties, we determine that Petitioner has shown by a preponderance of the evidence that claim 9 is unpatentable as obvious both over Sharp and Konishi, and over Stanley and Konishi. Pet. 64–67; Ex. 1003 ¶¶ 143–46.

J. The Institution Decision

Patent Owner asserts that the Institution Decision does not conform to the agency rules and therefore amounts to an improper ad hoc approach. PO Resp. 39–44. This argument repeats, almost word for word, one of Patent Owner’s arguments from its Request for Panel Rehearing (Paper 13, “Reh’g Req.”) of our Decision instituting *inter partes* review in the present case.

We fully addressed this argument in our Decision Denying Patent Owner’s Request for Rehearing (Paper 24), and we reject this argument again now for the same reasons.

K. Constitutionality of Inter Partes Review

Patent Owner states that “[a]t the time Patent Owner’s patent was applied for and issued, the express provisions of the Patent Act did not make patents revocable through *inter partes* review.” PO Resp. 44. Thus, Patent Owner argues that “[r]etroactively subjecting Patent Owner’s vested patent rights to new qualifications . . . presents a constitutional concern sufficient to preclude invalidation of the claims.” *Id.* at 44–45.

The Board previously has declined to consider constitutional challenges because “generally, ‘administrative agencies do not have jurisdiction to decide the constitutionality of congressional enactments.’” *Square Inc. v. Unwired Planet LLC*, Case IPR2014-01165, slip op. at 25 (PTAB Oct. 30, 2015) (Paper 32) (quoting *Riggin v. Office of Senate Fair Emp’t Practices*, 61 F.3d 1563, 1569 (Fed. Cir. 1995)). We likewise decline to consider the merits of Patent Owner’s constitutional challenge.

III. CONCLUSION

Based on the information presented, we conclude that Petitioner has shown by a preponderance of the evidence that claims 1–9 of the '771 patent are unpatentable under 35 U.S.C. § 103.

IV. ORDER

For the reasons given, it is

ORDERED that claims 1–9 of U.S. Patent 6,949,771 B2 are unpatentable under 35 U.S.C. § 103; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the Decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

IPR2018-00265
Patent 6,949,771 B2

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