

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VIZIO, INC.,
Petitioner

v.

NICHIA CORPORATION
Patent Owner

Case IPR2017-01608
Patent 8,530,250 B2

Before BRIAN J. McNAMARA, STACEY G. WHITE, and
BRENT M. DOUGAL, *Administrative Patent Judges*.

McNAMARA, *Administrative Patent Judge*.

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

BACKGROUND

On January 10, 2018, we instituted an *inter partes* review of all claims challenged in a Petition (Paper 2, “Pet.”) filed by VIZIO, Inc. (“Petitioner”), i.e., claims 1, 7, 17, 19, and 21, of U. S. Patent No. 8,530,250 B2 (“the ’250 patent”). Paper 10 (“Dec. to Inst.”). Nichia Corporation (“Patent Owner”) filed a Patent Owner Response (Paper 38, “PO Resp.”), Petitioner filed a Petitioner Reply (Paper 45, “Pet. Reply”) and Patent Owner filed a Sur-Reply (Paper 53, “PO Sur-reply”). Patent Owner filed a Motion to Exclude exhibits 1004, 1053, 1055–57, and the portion of the record relying on these exhibits. Paper 56 (“Mot. To Exclude”). Petitioner filed an Opposition to Patent Owner’s Motion to Exclude (Paper 64 “Opp. To Mot. To Exclude”) and Patent Owner filed a Reply to Petitioner’s Opposition (Paper 66, “Reply to Opp. To Mot. To Exclude”). Patent Owner also filed a Motion to Seal Exhibits 2683–2685 and containing confidential financial data. Paper 37 (“Mot. To Seal”). A transcript of an oral hearing held on October 4, 2018 (Paper 71, “Hr’g. Tr.”) has been entered into the record.

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). We base our decision on the preponderance of the evidence. 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 conclude that Petitioner has not demonstrated by a preponderance of the evidence that challenged claims 1 and 7 are unpatentable and that Petitioner has demonstrated that challenged claims 17, 19, and 21 are unpatentable.

THE '250 PATENT (EXHIBIT 1001)

The '250 patent concerns light emitting devices and seeks to provide a simple and low cost method of manufacturing multiple light emitting devices with high adhesion between a lead frame and a thermosetting resin compound. Ex. 1001, 2:49–53. According to the method, a plated lead frame having a notch is sandwiched between an upper and lower mold. Ex. 1001, 3:1–3; 20–23. Transfer molding a thermosetting resin containing a light reflective material into the mold forms a resin molded body in the lead frame. *Id.* at 3:3–7. The resin molded body and lead frame are then cut along the notch. *Id.* at 3:7–8.

Figures 1 and 2 of the '250 patent, reproduced on the left and right below respectively, illustrate one embodiment of a light emitting device produced according one embodiment of the method.

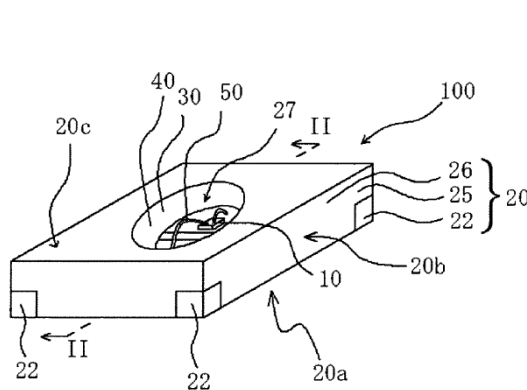


Figure 1 of the '250 patent is a perspective view of an embodiment of a light emitting device.

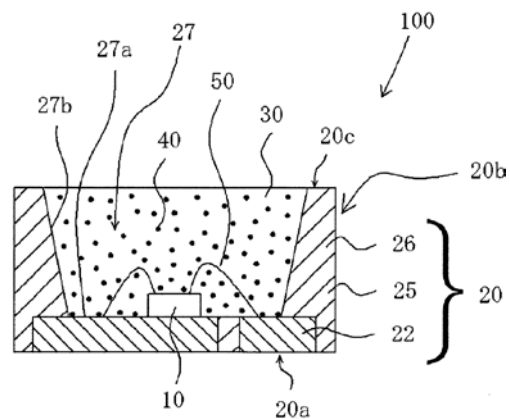


Figure 2 of the '250 patent is a sectional view of an embodiment of a light emitting device.

As shown in Figures 1 and 2 above, light emitting device 100 includes resin package 20 in which resin part 25 contains light reflecting material 26. Ex. 1001, 6:7–9. The preferred resin is a translucent thermosetting resin

filled with light reflecting material. *Id.* at 6:55–59. Leads 22 are formed in substantially the same plane in outer surfaces 20b of resin package 20. *Id.* 5:63–65. Extending down into resin package 20 from outer upper surface 20c is concave part 27 having an inner bottom surface 27a and side surfaces 27b. *Id.* at 6:1, 11–14. Plating can be applied to outer bottom surface 20a and inner bottom surface 27a, but not outer side surfaces 20b, where leads 22 are exposed from the corners of resin package 20. *Id.* at 5:65–6:6, 34–35. Leads 22 are exposed in the inner bottom surface 27a of resin package 20 and light emitting device 10 is placed on leads 22 and connected with the leads using wires 50. *Id.* at 6:14–17, 20–21. Sealing material 30 includes fluorescent material 40 and covers light emitting device 10.

Figure 4 below is a sectional view illustrating a method for manufacturing the light emitting device of the embodiment in Figures 1 and 2. Ex. 1001, 18:41–43.

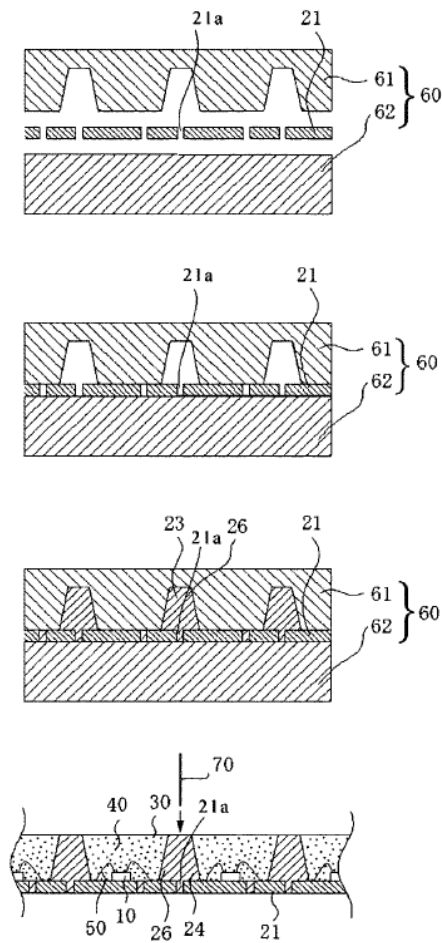


Figure 4 of '250 patent illustrates a method of manufacturing a light emitting device.

The method of manufacturing a light emitting device shown in Figure 4 of the '250 patent includes sandwiching a lead frame 21 with notch parts 21a between upper and lower molds 61 and 62 respectively, transfer molding thermosetting resin 23 containing light reflecting material 26 to mold 60 to form resin molded body 24 in lead frame 21, and cutting the resin molded body 24 and lead frame 21 along notch parts 21a. Ex. 1001, 11:5–15.

Using the method, multiple devices can be manufactured at the same time. Upper mold part 61 has flat projecting parts, preferably formed in one

direction at equal intervals that contact lead frame 21 to prevent thermosetting resin 23 injected through a hole from flowing in the contacting parts, so as to form concave shaped parts. *Id.* at 11:16–52. After notch parts 21a are provided in lead frame 21, lead frame 21 is metal plated. *Id.* at 11:62–63. The plated lead frame with notch parts is sandwiched between molds 61 and 62 providing space in mold 60. *Id.* at 11:62–67.

Thermosetting resin 23 is then transfer molded—notch parts 21a are in positions where concave parts 27 are formed, such that notch parts 21a are sandwiched by the projecting parts of upper mold 61 and lower mold 62 to prevent flip-flopping of lead frame 21 and to reduce burrs in inner bottom surface 27a. *Id.* at 12:1–20. By inserting a pin, resin molded body 24 can be removed from upper mold 61 during curing. *Id.* at 12:21–26. Next, light emitting elements 10 are placed on lead frame 21 of inner bottom surface 27a of concave part 27 and electrically connected to lead frame 21 with wires 50; then concave part 27 is filled with sealing member 30 containing fluorescent material 40 and cured. *Id.* at 12:37–39. Resin molded body 24 and lead frame 21 are then cut along notch parts 21a in the longitudinal and lateral directions using a singulation saw, such that the sidewalls between adjacent concave parts are separated in the center and resin molded body 24 and lead frame 21 are in substantially the same plane with lead frame 21 exposed. *Id.* at 12:40–49.

ILLUSTRATIVE CLAIMS

Independent claim 1 reproduced below is illustrative of the claimed method:

1. A method of manufacturing a light emitting device, the method comprising:
 - providing a lead frame comprising at least one notch;
 - plating the lead frame;
 - after plating the lead frame, providing an upper mold on a first surface of the plated lead frame and a lower mold on a second surface of the plated lead frame, and transfer molding a thermosetting resin containing a light reflecting material in a space between the upper mold and the lower mold to form a resin-molded body; and
 - cutting the resin-molded body and the plated lead frame along the at least one notch to form a resin package, the resin package comprising a resin part and at least one lead, and the cutting step being performed such that an outer surface of the resin part and an outer surface of the at least one lead are planar at an outer side surface of the resin package;
 - wherein the plated lead frame is cut so as to form an unplated outer side surface on the lead.

Independent claim 17 reproduced below is illustrative of the claimed light emitting device:

17. A light emitting device comprising:
 - a resin package comprising a resin part and at least one lead, wherein an outer surface of the resin part and an outer surface of the at least one lead are planar at an outer surface of the resin package,
 - wherein a plating is disposed on an upper surface and a lower surface of the at least one lead,
 - wherein an outer side surface of the at least one lead is unplated, and
 - wherein a portion of the resin part is disposed over a portion of the plating on the upper surface of the at least one lead.

GROUND OF INSTITUTION

In our Decision to Institute, we instituted trial on the following challenges to patentability:

Claims 1, 7, 17, 19, and 21 as obvious under 35 U.S.C. § 103(a) over Park '697¹;

Claim 1 as obvious under 35 U.S.C. § 103(a) over the combination of Park '697 and Park '486²;

Claims 1 and 7 as obvious under 35 U.S.C. § 103(a) over the combination of Park '697 and Urasaki³; and

Claims 1, 7, 17, 19, and 21 as obvious under 35 U.S.C. § 103(a) over the combination of Park '697 and Oshio⁴;

Claim 1 as obvious under 35 U.S.C. § 103(a) over the combination of Park '697, Park '486, Urasaki, and Oshio.

Although we instituted review on all claims, we did not initially institute on the following grounds: Claim 1 and 7 as obvious over Park '697, Park '486 and Oshio; Claims 1 and 7 as obvious over Park '697, Urasaki and Oshio; and claims 1 and 7 as obvious Park '697, Park '486, Urasaki and Oshio. Dec. to Inst. 31–32, *but see* Paper 32 (where we revised the Dec. to Inst. to institute on all grounds). Consistent with the Office's policy to consider all grounds and all claims after the Supreme Court's

¹ Japanese Patent Publication No. JP2006-093697, published Apr. 6, 2006 (Ex. 1004).

² PCT Patent Publication No. WO2007/055486, published May 18, 2007 (Ex. 1006).

³ Japanese Patent Publication No. JP2007-235085, published Sep. 13, 2007 (Ex. 1007).

⁴ U.S. Patent Publication No. 2005/0280017, published Dec. 22, 2005 (Ex. 1008).

decision in *SAS Inst., Inc. v. Iancu*, 138 S. Ct 1348, 1354–55 (2018), we address all grounds in this Decision.

CLAIM CONSTRUCTION

For Petitions filed before November 13, 2018, we apply the broadest reasonable construction. In this case, the Petition asserts that we should apply the claim constructions adopted by the district court, regardless of whether those constructions are the broadest reasonable constructions, because “the cited references and combinations disclose them [the outer boundaries of these term] under the constructions adopted by the District Court and under the constructions proposed by both Patent Owner and Everlight in the Everlight litigation.”⁵ Pet. 18. Having reviewed the record we agree with Petitioner’s acknowledgement that the district court constructions are appropriate constructions for purposes of this proceeding, and in view of Patent Owner’s decision not to contest Petitioner’s proposal that we use the district court constructions, we adopt the following constructions applied by District Court:

Term	Claims	Construction
A method of manufacturing a light emitting device, the method comprising:	1	The preamble is a claim limitation.
A light emitting device comprising:	17	The preamble is a claim limitation.

⁵ *Nichia Corp. v. Everlight Elecs. Co., Ltd. et.al.*, No. 2:13-cv-702 (E.D. Tex.); Appeal Nos. 16-1585, 16-1618 (Fed. Cir.).

Term	Claims	Construction
lead	1, 7, 17, 19, 21	The portion of the device that conducts electricity.
a portion of the resin part is disposed over a portion of the plating on the upper surface of the at least one lead	17	A portion of the resin part is located over a portion of the plating on the upper surface of the at least one lead.
notch	1	An opening that penetrates the lead frame.
planar	1, 17	In a substantially same plane.
the at least one lead comprises a step on a bottom surface or outer surface thereof	19	Plain and ordinary meaning.

Petitioner proposes that no other terms require express construction: they should simply be accorded their plain and ordinary meaning. Pet. 20. Patent Owner also does not propose any other terms be construed. Upon review of the claims, we agree with the parties that, for this decision, no other terms require express construction.

MOTION TO EXCLUDE

We begin with Patent Owner's Motion to Exclude Exhibits 1004 and 1055–57 (“the Park ’697 exhibits”) as unreliable and prejudicial under FRE 403 because Park ’697 is common to all of Petitioner's challenges. In response to Patent Owner's objections to Exhibits filed with the Petition (Paper 13), Petitioner filed a certified copy of Park ’697 (Ex. 1056), a certified translation of Park ’697 accompanied by the declaration of translator Carl Sullivan (Ex. 1055) and a certified translation of the Japanese certification of Exhibit 1056 (Ex. 1057). Patent Owner filed objections to Exhibits 1055–1057 and now moves under FRE 403 to exclude them. Mot.

to Exclude 2–3; see Paper 48, 36–38. Patent Owner also moves under FRE 901 to exclude the translation filed as Exhibit 1004 as unauthenticated. Mot. to Exclude 14. Patent Owner also moves to exclude Exhibit 1053 as unauthenticated under FRE 901 and as lacking an affidavit attesting to the accuracy of the translation as required by 37 C.F.R. § 42.63(b). *Id.*

Although the Patent Owner Response argues that Park ’697 is ambiguous as to its disclosure of “sawing,” “trimming,” and “forming,” (PO Resp. 18–19), Patent Owner does not rely on these alleged ambiguities in its Motion to Exclude. In any case, Petitioner notes that all the translations in the record agree that Park ’697 discloses a sawing process for individualizing or singulating the device. Pet. Reply 20–21 (citing Ex. 1004 ¶ 12, Ex. 2040, Ex. 2038, Ex. 1017 ¶¶ 19–20).

In its Motion to Exclude Patent Owner contends that the Park ’697 exhibits are materially ambiguous because there are multiple plausible translations for at least one phrase important to Petitioner’s contentions concerning silver plating. Mot. To Exclude 1. Underlining the relevant disputed portions, Patent Owner points to the following translations of paragraph 12 of Park ’697:

a Geotext Translation (Exhibits 1004, 1055) by Mr. Sullivan that reads: “on the bottom surface of the die pad for an electrostatic discharge protection element of silver plated lead frame having a plurality of rows;”

a Japanese Interface Translation (Ex. 2038) obtained by Patent Owner that reads: “at the bottom faces of multiple columns/rows of silver plated die pads for the electrostatic discharge shock protection elements in a lead frame; and

a TransPerfect Translation (Ex. 2040) also obtained by Patent Owner that reads: “on the bottom faces of the die pads for

electrostatic discharge impact protection elements of multiple rows of silver plated lead frames.”

Id. at 3–4. Although Petitioner cites the English language translation of Park ’697 from Japanese, the Japanese language Park ’697 is itself a translation of a Korean priority application number 20-2004-0026925 (’925 Korean Priority Appl. See Ex. 1004, 1, 14; Ex. 1055, 2, 15; Ex. 1056, 2; Ex. 2038, 2, 13. As evidence that Petitioner’s translation of Park ’697 is wrong, Patent Owner cites a translation of the ’925 Korean Priority Appl. that in relevant part reads:

wherein an electrostatic discharge (ESD) impact protection device {semiconductor resistance device (varistor) or voltage regulator diode (Zener-Diode) is mounted on the bottom of the die pad for the electrostatic discharge (ESD) impact protection device with a number of silver-plated rows with cream solder.

Mot. to Exclude 4, Ex. 2041, 4.⁶ Petitioner points out that the Korean priority document is irrelevant because the issues before us are what the Japanese language Park ’697 discloses to one of ordinary skill and the English translation of Park ’697. Pet. Reply 19, n. 8.

Patent Owner acknowledges that the translations it obtained first from TransPerfect (Ex. 2040) and then from Japanese Interface (Ex. 2038) are inconsistent with each other. PO Resp. 16. Both Patent Owner’s TransPerfect translation (Ex. 2040) and Petitioner’s translation by Mr. Sullivan (Ex. 1004, 1055) can be read to mean that the lead frames are silver plated. Patent Owner’s translation by Japanese Interface (Ex. 2038) indicates that the bottom faces of the die pads are silver plated. Patent

⁶ Page 4 is the page number of Exhibit 2038, which is page 3 of the translated document.

Owner contends that the translation inconsistency is important because the challenged claims recite that the lead frame is silver plated and because of the translation inconsistency it is not clear that Park '697 teaches this feature to one of ordinary skill in the art.

Patent Owner obtained the Declaration of Dr. Natsuko Tsujimura, who testified that the relevant original Japanese phrase is “subject to multiple interpretations due to structural ambiguity.” Ex. 2034 ¶ 14. According to Dr. Tsujimura the following three meanings are syntactically possible:

- A. Die pad of multi-row lead frame that is silver-plated [lead frame is silver-plated]
- B. Multi-row die pad in/of lead frame that is silver-plated [die pad is silver-plated]
- C. Silver-plated die pad of/in multi-row lead frame [die pad is silver-plated]

Ex. 2034 ¶ 15–16. In the bracketed material above, for each translation, Dr. Tsujimura offers his view as to the English language implications of the translation with respect to plating the lead frame. According to Dr. Tsujimura, in translation possibility A “silver-plated” modifies “lead frame,” but in translation possibility B “silver-plated” modifies “die pad(s).” *Id.* ¶ 19. Dr. Tsujimura acknowledges that “[g]enerally, it is preferable for a modifier to be placed as closely as possible to the modified word, and the interpretation in which a modifier is most proximate to its modified element constitutes the most natural and preferable interpretation, as in A.” *Id.* ¶ 16. Dr. Tsujimura also states that “interpretations B and C would be preferable if some overriding factors, including contextual or area-specific (e.g. technological details) information are additionally available or relevant.” *Id.*

Dr. Tsujimura asserts that because “multi-row” appears several times and because lead frames are less likely to be set in multiple rows, translation B is “the most preferable of the three in this particular context.” *Id.* ¶ 19. We note that translation possibility A ends with the expression “lead frame that is silver plated” and translation possibility B ends with the expression “in/of lead frame that is silver plated.” It is not clear how Dr. Tsujimura, whose expertise is in linguistics rather than technology (*see id.* at ¶¶ 4–10), infers that the difference in the beginning of translation possibilities A and B (“Die pad of multi-row lead frame” and “Multi-row die pad in/of lead frame”) implies that in the context of translation B the die pads and not the lead frame are silver plated.

Petitioner contends that the similarities between its Geotext translation (Ex. 1004, 1055–1057) and Patent Owner’s TransPerfect translation (Ex. 2040) are sufficient to resolve the issue in Petitioner’s favor, at least because the interpretation in which a modifier is most proximate to its modified element is the most preferable interpretation—meaning in this case that Park ’497 states it is the “lead frame that is silver plated.” Pet. Reply 17–18, Opp. to Mot. to Exclude 5–7 (citing the Declaration of Patent Owner’s expert Dr. Tsujimura, Ex. 2034, 7). The certification date of Patent Owner’s TransPerfect translation by Marie Cochrane is April 5, 2018 (Ex. 2040, 1) and the certification date of Patent Owner’s Japan Interface translation by Asami Isomichi is May 8, 2018 (Ex. 2038, 1). Patent Owner deposed Mr. Sullivan, who prepared Petitioner’s Geotext translation on May 1, 2018. Ex. 2036, 2. Ms. Isomichi attended Mr. Sullivan’s deposition. Opp. To Mot. To Exclude 6. During the deposition, Patent Owner provided Mr. Sullivan an alternate translation (Ex. 2036, Transcript of Deposition of Carl Sullivan

(“Sullivan Tr.”) Exhibit 1) and asked Mr. Sullivan if “it’s plausible that the silver-plated multiple rows could be modifying die pads.” *See*, Ex. 2036, 55:13–56:5, 57:17–19. Mr. Sullivan stated that “the original translation is accurate” (*id.* at 56:21–57:1) and that although “it’s plausible that it could be interpreted - - translated - - in a different way . . . (*id.* at 57:13–14) “[m]ore likely it’s lead frame but there some possibility it could be applied to the die pad” (*id.* at 58:4–6). Although Patent Owner contends that Ms. Isomichi provided her translation to Patent Owner’s counsel before Mr. Sullivan’s deposition (Reply to Opp. To Mot. To Exclude 3–4), the fact remains that it was only after Mr. Sullivan’s deposition that Ms. Isomichi of Japan Interface provided a certified translation explicitly stating Patent Owner’s asserted translation. In any case, during his deposition Mr. Sullivan repeatedly maintained that, although the relevant sentence of Park ’697 is complex, based on its structure, and the “typical construct that you would see,” it is more likely his original translation is accurate. *Id.* at 56:21–57:1, 57:7–8, 58:4–6, 58:12–15.

Petitioner further asserts that the remaining portions of Park ’697 concerning the technology are consistent with its translation. Opp. to Mot. To Exclude 7–8. In support of its contention that the term “silver plated” modifies lead frame, Petitioner notes that Park ’697 discloses bonding the LED chip to the lead frame using high temperature eutectic bonding without using a silver resin epoxy (Ex. 1017 (“Shanfield Rebuttal Decl.”) ¶ 15), an approach in which silver plating underneath does not melt when heated but eutectic metals (a mixture of metals) seep into the silver plating to form a solid bond with the silver plating. (Ex. 2738, Transcript of 8/22/18 Afternoon Deposition of Dr. Stanley Shanfield (“8/22/18 Shanfield PM Tr.”))

39:1–8. Patent Owner argues that Park ’697’s reference to eutectic bonding does not resolve the ambiguity because Dr. Shanfield acknowledged that other metals may be used for eutectic bonding and because Park ’697 does not disclose using silver plating as a eutectic material or the other metal in the eutectic. Reply to Opp. To Mot. To Exclude 2–3. However, Patent Owner does not identify any other metals in Park’s discussion of eutectic bonding.

Patent Owner asserts that Mr. Sullivan acknowledged the presence of ambiguities in the translation of the Japanese language Park ’697 and argues that Petitioner did not proffer an expert to confirm Mr. Sullivan’s translation. Mot. to Exclude 4 (citing Ex. 2036, 55:13–58:15),⁷ Reply to Opp. to Mot. to Exclude 1–2. We are not persuaded that the imprecision of the translation rises to the level of “material ambiguity” argued by Patent Owner. *See generally* Mot. to Exclude. Patent Owner’s witness Dr. Tsujimura testified that in his opinion the best translation is “Multi-row die pad in/of lead frame that is silver-plated.” Ex. 2034 ¶¶ 15–16. A reasonable interpretation of Dr. Tsujimura’s favored translation is consistent with Petitioner’s translation—i.e., that the lead frame is silver plated. Patent Owner initially obtained a translation that referred to silver plated lead frames (Ex. 2040) and did not provide a certified translation that is different until a later date (Ex. 2038). Moreover in *Appl. of Hughes*, 345 F.2d 184, 186–87 (CCPA 1965), cited by Patent Owner, the court noted that the very imprecision as to the particulars of the reference would apprise a person of ordinary skill of the possibilities.

⁷ Although the transcript of Mr. Sullivan’s deposition was filed as Exhibit 2036 in this proceeding, the document itself is labeled as Exhibit 2636. For purposes of this Decision, we use the designation Exhibit 2036.

In consideration of all the evidence of record, we are persuaded that Park '697 discloses silver plating the lead frame to a person of ordinary skill in a manner that is sufficient to deny Patent Owner's Motion to Exclude the reference. Thus, we deny Patent Owner's Motion to Exclude Exhibits 1055–1057. We understand the translations in these exhibits to be same as that in Exhibit 1004. Therefore, we dismiss Patent Owner's Motion to Exclude Exhibit 1004.

Patent Owner also moves to exclude Exhibit 1053 under FRE 901. Ex. 1053 is a translation of Japanese patent Publication No. 2005-243857. Patent Owner contends that the document should be excluded because Petitioner “merely downloaded the translation from an Information Disclosure Statement from the Public PAIR website” and did not submit a certification and “[t]he translation contains no identifiable information as to how, when, or who translated the publication.” Mot. to Exclude 15–16 (citing Ex. 1060 ¶ 35). The declaration of Mary Oros stating that Exhibit 1053 is a true and correct copy of the translation she downloaded from the Office operated Public PAIR site, altered only to include the exhibit number and page numbers, is sufficient evidence for us to conclude that the document is what it appears to be and complies with the authenticity requirements of FRE 901. Ex. 1060 ¶ 35. Patent Owner does not dispute the authenticity of the document to the extent that it was downloaded from Public PAIR. Instead, Patent Owner's Motion to Exclude asserts only that Petitioner did not submit a declaration under 37 C.F. R. § 42.63(b) as to the accuracy of the translation. Mot. to Exclude 14, Reply to Opp. to Mot. to Exclude 5. Patent Owner's motion is curious, as Patent Owner does not dispute Petitioner's contention that Exhibit 1053 is taken from an

Information Disclosure Statement submitted by Patent Owner during prosecution of U.S. Patent No. 9,287,476 (“the ’476 patent”). Opp. to Mot. to Exclude 14. As Petitioner points out, Patent Owner’s Motion to Exclude Exhibit 2053 challenges the source and accuracy a translation Patent Owner itself filed with the Office. *Id.* In the absence of an admission by Patent Owner that it knowingly submitted a false translation when prosecuting the ’476 patent, we decline to allow Patent Owner to challenge its own translation. Thus, we deny Patent Owner’s Motion to Exclude Exhibit 2053.

PATENT OWNER’S CHALLENGE TO THE TESTIMONY OF DR.
SHANFIELD

Patent Owner acknowledges that our Decision to Institute addresses Patent Owner’s initial challenge to Dr. Shanfield’s testimony based on his qualifications. PO Resp. 53 (citing Dec. to Inst. 17–20, 24–26). We do not revisit that issue.

Patent Owner now asserts that we should give Dr. Shanfield’s testimony minimal weight because on cross examination, Dr. Shanfield was intentionally difficult, unresponsive and evasive. *Id.* at 53–54. Without providing any detail, Patent Owner points out eighteen instances over two days of testimony where Dr. Shanfield requested further clarification of a question. It is not clear from the information in the Patent Owner Response that, given the subject matter before us and how counsel phrased the questions, eighteen clarification requests over two days of testimony is excessive. Patent Owner also raises issues about Dr. Shanfield’s cautious responses to questions concerning the terms “resin-molded body” and “resin package,” and his refusal to acknowledge that Urasaki discloses spot-plating. *Id.* at 56–57. As these topics concern claim construction issues and, as

discussed further herein, Urasaki is not cited for the plating limitations, (and there is no dispute that spot plating was known), we are not persuaded that Dr. Shanfield's testimony is evasive. In any case, Patent Owner has not moved to exclude Dr. Shanfield's testimony. As discussed further herein, the testimony of Dr. Shanfield and Dr. Schubert often is contradictory. We weigh expert's testimony on each specific issue in accordance with the content of the testimony and the supporting documentation.

ANALYSIS OF PRIOR ART CHALLENGES

Introduction

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved 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. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

Claim 1 As Obvious Over Park '697

Park '697 discloses a high luminance light emitting diode resistant to electrostatic discharge. Ex. 1004 ¶ 11.⁸ Figure 1b reproduced below illustrates a cross section of the device disclosed in Park '697.

⁸ All references are to the English translation of foreign language documents.

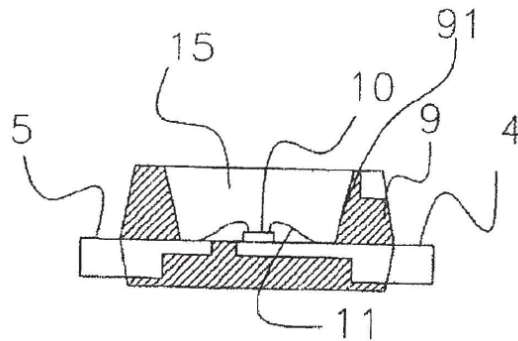


Figure 1b of Park '697

As shown above, the light emitting device of Park '697 includes light emitting diode (LED) chip 10 in a concave shaped reflection cup 91. Ex. 1004 ¶¶ 12–13. Reflection cup 91 has a reflector on its wall surfaces and is formed by transfer molding a TiO₂-based white thermosetting resin 9 that is trimmed and formed to be individualized using a sawing process. *Id.* Park '697 explicitly describes the use of thermosetting resin “without a white thermoplastics injection material.” *Id.* ¶ 21. LED chip 10 is mounted to a silver plated lead frame using a solder paste on the bottom surface of the die pad; conducting wires 11 provide connectivity to cathode 4 and anode 5. *Id.* ¶¶ 12–13. The reflection cup is filled with light transmitting epoxy resin 15. *Id.* ¶ 13.

Park '697 discloses producing the device by (i) mounting an electrostatic discharge impact protection element, such as semiconductor resistance element or electrostatic voltage diode, using a solder paste on the bottom surface of a die pad on a silver plated lead frame having a plurality of rows, (ii) subsequently forming a reflection cup having a reflector in its surface with a TiO₂ white thermosetting resin using the transfer molding method, (iii) die bonding and wire bonding a light emitting diode chip to a light emitting diode pad, which is disposed inside the reflector cup,

(iv) filling the reflector cup with light transmitting epoxy resin and
(v) performing a sawing or trimming process as well as a forming process to singulate the device. Ex. 1004, Abstract, ¶ 12.

In support of its contention that claim 1 is obvious over Park '697
Petitioner provides the following annotated version of Figure 5 of Park '697:

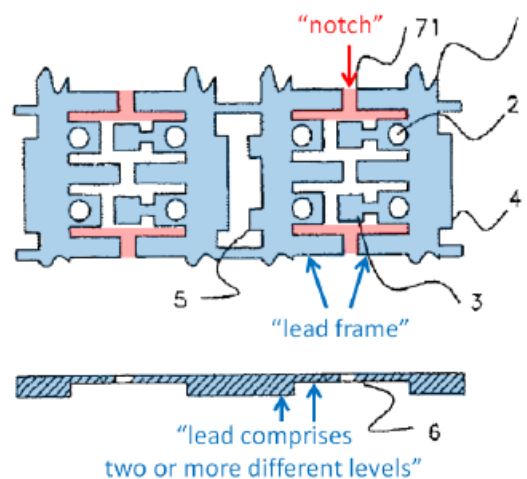


Figure 5 of Park '697 as Annotated By Petitioner.

Petitioner cites the plane diagram and front diagram in Figure 5 of
Park '697 as disclosing a silver plated lead frame (highlighted in blue) with
portions for anode and cathode leads having notches (highlighted in red)
used for cutting the lead frame and the transfer molded resin body. Pet. 21–
22. Petitioner also provides an annotated version of the partial cross
sectional plane view shown in Figure 1a of Park '697, reproduced below:

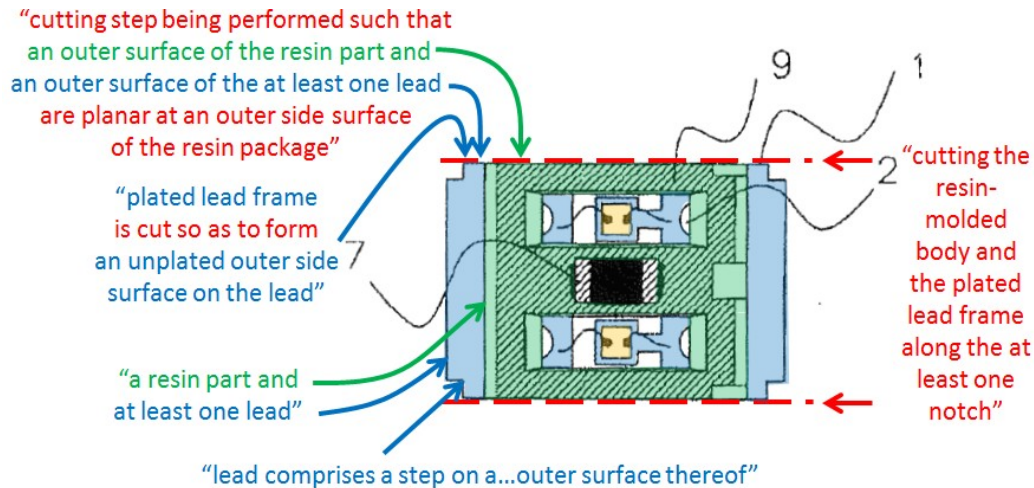


Figure 1a of Park '697 As Annotated By Petitioner.

Referencing annotated Figure 1a, Petitioner argues that Park '697 discloses performing a sawing or trimming process to singulate or individualize the light emitting devices. Pet. 23–24. According to Petitioner, as shown in Figure 1a, in Park '697 transfer molded resin body 9 and cathode and anode leads 4 and 5 are cut along notches in lead frame 1 after the lead frame is plated, resulting in an un-plated outer side surface on each lead. Pet. 24.

Turning to the specific elements of claim 1, citing the abstract and paragraphs 10–14, 19–21, 24–31, and 36–39 of Park '697, Petitioner contends that the reference discloses a method of manufacturing a light emitting diode as recited in the preamble of claim 1. Pet. 41 (citing Ex. 1003, Shanfield Decl. ¶ 71). Petitioner identifies as claim element 1.A the limitation reciting “providing a lead frame comprising at least one notch” and cites lead frame 1 shown in Figure 5 of Park '697 as disclosing this limitation. *Id.* (citing Ex. 1004, Fig. 5, ¶¶ 1, 12, 25; Ex. 1003, Shanfield Decl. ¶ 72). Although Petitioner’s annotated version of Figure 5 points to a notch, Petitioner does not explicitly cite a passage in Park '697 that

describes the claimed “notch.” *Id.*, see also Ex. 1003, Shanfield Decl. ¶¶ 56, 84. As discussed above, for purposes of this proceeding, we apply the constructions applied by the District Court in the *Everlight* case, where the District Court construed “notch” to mean “an opening that penetrates the lead frame.” Although Park ’697 does not use the term “notch”, Petitioner’s annotated version of Figure 5 points out openings in the lead frame that, for example, separate the anode lead from the cathode lead and reduce the cutting area of the leads. Ex. 1003, Shanfield Decl. ¶ 84.

Petitioner identifies as claim element 1.B the recitation “plating the lead frame” and cites Park’s disclosure of a “silver plated lead frame” as disclosing this claim limitation. Pet. 43 (citing Ex. 1004 ¶ 12). Patent Owner acknowledges that Park ’697 discloses the lead frame may be plated, but Patent Owner’s expert, Dr. E. Fred Schubert, argues that Park ’697 does not disclose plating all the surfaces of the lead frame, as asserted by Dr. Shanfield. Ex. 2001, Declaration of Dr. E. Fred Schubert (“Schubert Decl.”) ¶ 135. Petitioner contends that it was well known and conventional to plate all surfaces of a lead frame, for example to improve solderability, decrease electrical resistance when connecting to other elements or to improve thermal conductivity of the lead frame. Pet. 56–57 (citing Ex. 1003, Shanfield Decl. ¶ 91). Petitioner also notes that Park ’697 does not disclose spot plating or masking any part of the lead frame in the plating process. *Id.* at 57–58.

Petitioner identifies as claim element 1.C the limitation that recites “after plating the lead frame, providing an upper mold on a first surface of the plated lead frame and a lower mold on a second surface of the plated lead frame, and transfer-molding a thermosetting resin containing a light

reflecting material in a space between the upper mold and the lower mold to form a resin molded body” and cites Figures 1b and 7 (annotated in the Petition) as disclosing this limitation. *Id.* at 23, 43–44. Petitioner notes the explicit disclosure in paragraphs 12 and 25 of Park ’697 of forming a transfer mold type reflector with a white thermosetting resin and additional supporting disclosures in Park ’697 at paragraphs 1, 13, 14, 18, 22, 27, 29, 35 37–39, 43, and claims 1, 3, and 6, the Abstract, and Figures 1(b)–(c), 2(a)–(b), 3(a)–(c), 4(a)–(c), 7, 8(a)–(b). *Id.* at 44–45 (Ex. 1003, citing Shanfield Decl. ¶¶76–79). Petitioner argues that it would have been known to a person of ordinary skill that the TiO₂ (titanium dioxide) based white thermosetting resin described in Park ’697 is the same light reflecting material described in the ’250 patent and that using an upper mold on a first surface of the plated lead frame and a lower mold on a second surface of the plated lead frame to transfer thermosetting resin in a space between the molds is a conventional technique for forming a resin molded package, as that in Park ’697. *Id.* at 46–47.

Petitioner identifies as claim element 1.D the limitation reciting “cutting the resin-molded body and the plated lead frame along the at least one notch to form a resin package, the resin package comprising a resin part and at least one lead, and the cutting step being performed such that an outer surface of the resin part and an outer surface of the at least one lead are planar at an outer side surface of the resin package.” *Id.* at 49–50.

Petitioner cites Figures 1a and 12 (as annotated in the Petition) and the disclosure in paragraph 12 of Park ’697 of performing a sawing process or trimming process as well as a forming process to individualize the light emitting devices, as disclosing claim element 1.D. *Id.*

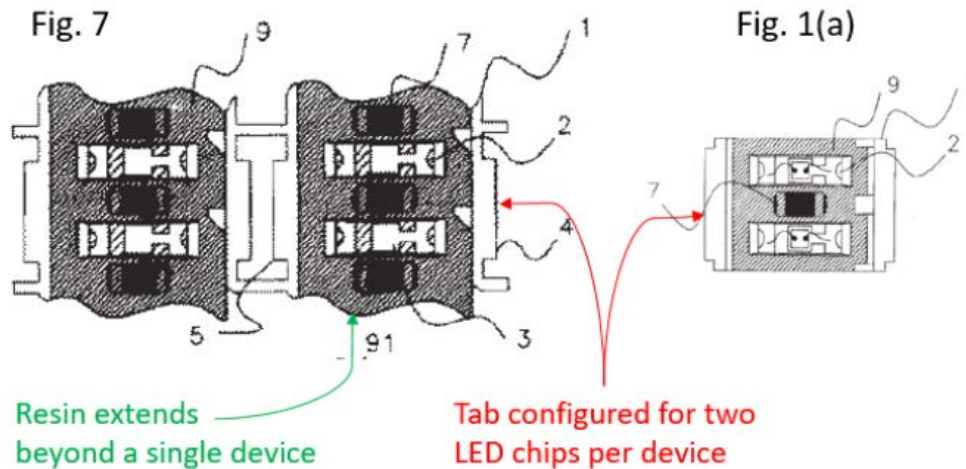
Petitioner identifies as claim element 1.E the limitation that recites “the plated lead frame is cut so as to form an unplated outer side surface on the lead.” Pet. 54. Petitioner argues that Park ’697 discloses performing a sawing process or a trimming process as well as a forming process to individualize the resin/lead frame packages. Pet. 54–55 (citing Ex. 1001, Fig 1a (as annotated by Petitioner), ¶ 12). As discussed above, Petitioner further argues that it would have been known to one of ordinary skill to plate the entirety of the lead frame, such that cutting the lead frame would result in an unplated outer surface on the lead, as claimed. *Id.* at 56–58

Having reviewed each of the limitations of claim 1 we are persuaded that Petitioner has demonstrated the undisputed limitations are disclosed in the prior art. *See*, Dec. to Inst. 14–23. The primary issue in dispute concerning claim 1 of the ’250 patent is whether it would be obvious in view of Park ’697 to cut along the notch. Patent Owner contends that Park ’697 discloses a fundamentally different process in which LEDs are individually molded, such that “there is not both a ‘resin molded body’ formed by molding, and a ‘resin package’ that is formed by cutting the resin-molded body along a notch, as required by claim 1.” PO Resp. 2. According to Patent Owner “there is no identification of a ‘resin-molded body’ in Park ’697, with a ‘resin package’ **formed from that resin-molded body**, or any description of such a process.” *Id.* at 30. Patent Owner argues that Petitioner and Petitioner’s expert, Dr. Shanfield, “**assume** the presence of this step” based on the disclosure in Park ’697 of “performing a sawing process or a trimming process as well as a forming process in order to individualize the same.” *Id.* According to Patent Owner “the Park ’697 process cuts only metal and does not teach or suggest cutting any resin at

all,” i.e., there is no singulation in Park ’697 and the only sawing, trimming, and forming occurs next to the package to remove extraneous metal. *Id.* at 2, 24.

Petitioner’s Reply contends that the ’250 patent does not define a resin molded body to require a pre-singulation array of molded devices, nor does claim 1 recite such a pre-singulation array of multiple devices. Pet. Reply 5. Although claim 1 is not limited explicitly to a multiple device configuration, claim 1 recites “cutting the resin-molded body and the plated lead frame along at least one notch to form a resin package” that comprises “a resin part and at least one lead.” The ’250 patent specification states that “[t]he notch parts are formed such that a pair of positive and negative leads are provided when the resin molded-body is singulated to the resin package.” Ex. 1001, 9:7–9. The ’250 patent specification further states that the notch parts are preferably formed vertically and horizontally or linearly in an oblique direction “[t]o singulate the resin-molded body using a singulation saw.” *Id.* at 9:18–20. Thus, we understand the ’250 patent to describe and claim singulating a resin-molded body into individual resin packages.

Nevertheless, according to Petitioner, even under Patent Owner’s interpretation of the ’250 patent, “the devices of Park-697 are not individually molded and the resin-molded body and lead frame are cut during singulation.” Pet. Reply 5–5 (citing Ex. 1017, Shanfield Rebuttal Decl. ¶ 17) Petitioner does not point to a specific statement in Park ’697 that explicitly refers to “singulation,” but provides the following annotated figure showing wavy lines in Figure 7 as evidence that the resin molded body extends beyond tabs of a post-singulation device of Figure 1.



Figures 7 and 1a As Annotated by Petitioner

Pet. Reply 6.

Patent Owner's sur-reply argues that Petitioner's Reply improperly introduces a new argument, i.e., that Figure 1a is a single device and that this argument is inconsistent with Dr. Shanfield's testimony (PO Sur-Reply 2). Patent Owner takes Petitioner's argument out of context. First, Petitioner is responding to Patent Owner's assertions that Park '697 discloses resin packages that do not require singulation, and second, Dr. Shanfield stated that Figure 1a of Park '697 illustrates an internal configuration and is "not intended to relay information about how many devices there are" (Ex. 2710 Transcript of Morning Deposition of Dr. Stanley Shanfield on May 21, 2018 ("May 21, 2018 AM Shanfield Tr."), 97:17–18), but the presence of wavy lines in Figure 7 "suggests there's many more above and below of the kinds of pattern that's portrayed in that figure" (*id.* at 98:6–13).

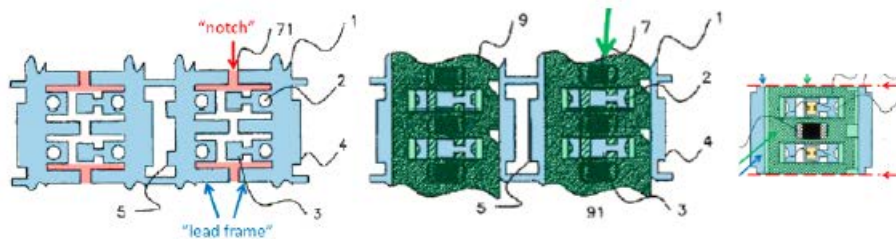
We now turn to the merits of Petitioner's argument that Figure 7 of Park '697 discloses devices that require singulation by cutting along a notch in the lead frame, as opposed to a pattern in which additional LEDs and ESDs are part of a single individually formed device. As discussed above,

Park '697 aims to provide a high luminance light-emitting diode with electrostatic discharge (ESD) protection. Ex. 1004 ¶ 11. Park '697 discloses it was conventional to place an ESD next to or under an LED on a die pad and subsequently form a reflector cup, leaving the ESD in a position where it could interfere with light transmission in the reflector cup. Ex. 1004, Figs 8a, 8b, ¶¶ 2–7. In contrast to the conventional assembly method, in Park '697 an ESD protection device is first solder pasted to the top or bottom surface of a lead frame die pad, then a reflector cup of white thermosetting resin is transfer molded around the ESD. *Id.* at ¶ 12, ¶21 (“mounting an electrostatic discharge impact protection element [semiconductor resistance element of electrostatic voltage diode] on the inside of the TiO₂-based white thermosetting resin”). Subsequent to transfer molding the reflector cup, an LED is die bonded and wire bonded to the die pad on the lead frame inside the reflector cup and the reflector cup is filled with light transmitting epoxy resin. *Id.* at ¶¶ 12, 42, Figs. 1a–c, 2b. The final step in Park '697 is “a sawing process or trimming process as well as a forming process in order to individualize the same.” *Id.* at ¶ 12. Park '697 does not articulate details of the sawing process nor does it state explicitly what is being sawed, trimmed or formed.

Park '697 discloses embodiments in which the assembled light emitting device includes two LEDs (*see, e.g.*, Ex. 1004 Figs. 1a–3c) and three LEDs (*see id.*, at Fig. 4a–d). Park '697 discloses LEDs 10 and ESDs 7 configured in a plurality of between 1 and 4 rows. Ex. 1004 ¶ 31, Figs 3, 4. Park '697 also discloses embodiments with differently shaped lead frames. *See, e.g.*, Figs. 1a–3d, Fig. 4a–d, Fig. 5, Figs. 6–7. Park '697 describes Figures 1a–4d as illustrating different embodiments of a light-emitting diode

and Figures 5–7 as illustrating “critical original secondary materials used in the production process to configure” different embodiments of the invention. *Id.* at ¶ 42.

Figures 5–7 illustrate lead frames that, when cut vertically along a line between matching sections, form separate lines of devices (although the lead frames in Figures 6 and 7 have a shape in the center that resembles the letter “I” and the shape in the center of Figure 5 is slightly different, the reason for this discrepancy is not explained, and we understand the ESD pads 71 of Figure 5 to adhere the ESDs in Figures 6 and 7 using solder paste 8. Ex. 1004 ¶¶ 32–35. Petitioner argues that Figure 7, which shows the lead frames with one ESD and two LEDs assembled on them, must be cut horizontally through the resin and metal lead frame to individualize the devices. Pet. Reply 4. Acknowledging that the drawing is not precisely to scale, Dr. Shanfield provides the following annotated version of Figures 5, 7 and 1a as illustrative of the manufacturing process in Park ’697 to individualize by sawing through the resin molded body and the lead frame along a notch line.



Dr. Shanfield’s Annotated Version of Figures 5, 7, and 1a

Ex. 1017, Shanfield Supp. Decl. ¶ 34, *see also*, Ex. 1003, Shanfield Decl. ¶¶ 82–85. Petitioner notes that the shape of the outer leads (“tabs”) in Figure 7 is consistent with the shape of the tabs in Figure 1a. Pet. Reply 6.

During the trial hearing, Petitioner noted that Figure 4 has a larger tab because it has three LEDs and two ESDs, but the same production process

would apply. Hr'g. Tr. 77:25–78:4. The description of Figure 4 in Park'697 states that there can be one to four rows of LEDs and ESDs. Ex. 1004, ¶¶30–31. Petitioner did not address directly our question concerning the devices remaining in the pattern shown in Figure 7 after the first cut proposed by Petitioner. At the hearing, we noted that “in the cutting arrangement that you’ve discussed, it seems like you would end up with an ESD, and LED and an ESD. And so you would end up with ESDs at the edge of the device as opposed the LEDs in the device.” *Id.* at 78:15–18. When confronted with the fact that the cutting arrangement Petitioner proposes in Dr. Shanfield’s annotated figure above (Ex. 1017, Shanfield Suppl. Decl. ¶ 34) would produce “two ESDs that look like they don’t belong,” Petitioner answered “it could very well be that they are configured on a different device,” but did not explain how that would be achieved. *Id.* at 8–13. Petitioner did not argue, and the cross sectional drawing of the devices in Figures 1–4 do not suggest, devices that have more ESDs than LEDs.

Patent Owner contends that Park '697 shows multiple devices going left to right in Figure 7 and that “Figure 7 is basically showing that you can have up to four rows of LEDs and ESDs and that’s still a single device,” so that the only cutting that takes place is of the lead frame between the devices and there is no need to cut, form or modify the resin bodies. Hr'g Tr. 54:7–9. *See*, Ex. 2030, Second Decl. of Dr. E. Fred Schubert “Schubert Suppl. Decl.”) ¶¶ 140–42. Patent Owner does not explain the jagged edges at the top and bottom of the lead frames shown in Figures 5 and 6 of Park '697 and how these would be trimmed off to arrive at the shape in Figure 1a.

Park '697 does not indicate whether the lead frames in Figures 5–7 represents two lead frames in a longer series of production lead frames running horizontally in the drawings. It is unclear if the wavy lines in Figure 7 are intended to mean that the vertical pattern could be repeated for additional LEDs in a single device or is intended to mean the pattern is repeated for multiple devices. Petitioner did not address directly our questions concerning how the pattern could be repeated vertically for multiple devices. Hr'g Tr. 78:12–79:4.

Although Park '697 states that “a sawing process or a trimming process as well as a forming process in order individualize the same [the LED semiconductor element according to the present invention]” (Ex. 1004 ¶ 12), Park does not discuss what elements are sawed, trimmed or otherwise formed. Thus, Park '697 is susceptible to multiple interpretations. In consideration of the above, we are not persuaded that Petitioner has satisfied the standard of proving by a preponderance of the evidence its challenge to claim 1 as obvious over Park '697.

Claim 1 As Obvious Over Park '697 and Park '486

As discussed above, we are not persuaded that Petitioner has shown by a preponderance of the evidence that Park '697 discloses cutting the resin molded body and lead frame along a notch in the lead frame to form a resin package.

In this challenge, Petitioner cites Park '697 in combination with Park '486. Petitioner cites Park '486 as disclosing claim elements 1.A and 1.D, i.e., providing a lead frame with at least one notch and cutting the resin molded body and plated lead frame along the notch to form a resin package with a resin part and at least one lead that are planar at an outer side of the

resin package. Pet. 41–42 (citing Ex. 1006, Figs. 6, 7, 10:1–4, 17:17–20), 50–5 (citing Ex. 1006, Figs. 7, 12, 13:4–11, 15:12–16, 16:10–11). As to claim element 1.A, Petitioner notes that Park '486 discloses a method of manufacturing multiple light emitting diodes and expressly teaches providing a lead frame having at least one notch, forming a reflector in the form of a resin-molded body on the lead frame, and cutting the lead frame and resin to individualize the LED packages. *Id.* at 25–27, 42–43. Petitioner annotates Figure 6 of Park '486 to illustrate notches in lead frame 111a, b as shown below.

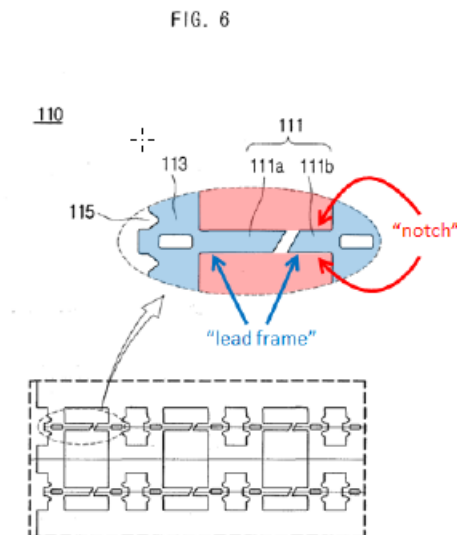


Figure 6 of Park '486 As Annotated By Petitioner

Id. at 26; Ex. 1006, Fig. 6.

Petitioner notes that the final step in the manufacturing process, as shown in Figure 7 of Park '486, is to saw the lead frame plate and resin reflector walls along cutting lines C, resulting in individual resin packages that have a planar outer side surface with an unplated lead. *Id.* at 27 (citing Ex 1006, 15:12–16, 16:10– 18, Figs. 6–12). Petitioner's annotated version of Figure 7 of Park '486 is shown below.

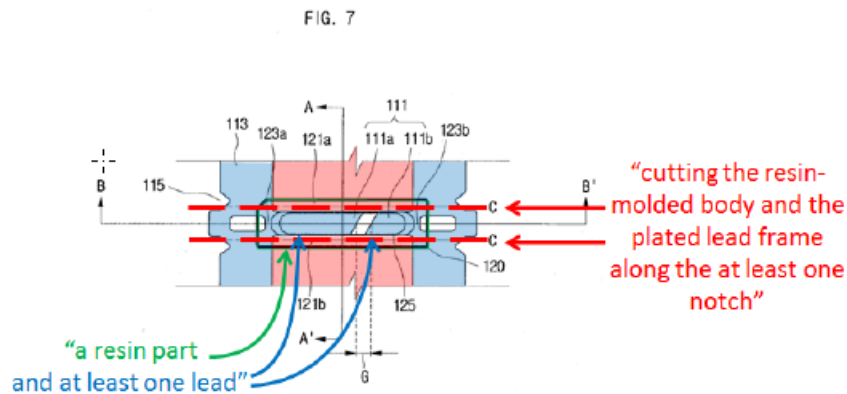


Figure 7 of Park '486 As Annotated By Petitioner

Id. at 27; Ex. 1006, Fig 7.

Thus, according to Petitioner, Park '486 discloses providing a notch and cutting along the notch to separate the devices as recited in claim elements 1.A and 1.D in the '250 patent.

Patent Owner contends that Petitioner's reliance upon Park '486 to teach those features of claim 1 not taught in Park '697 is not supported by plausible rationale and constitutes impermissible hindsight. PO Resp. 36–40. Petitioner contends that a person of ordinary skill would have been motivated to combine the teachings of Park '697 with express teachings in Park '486 of cutting a resin molded body along a notch in the lead frame in order to improve the adhesion and stability of the resin package around the lead frame, provide anode and cathode leads of the lead frame, and reduce the cutting area of the leads when individualizing an LED package. Pet. 33–34 (citing Ex. 1003, Shanfield Decl. ¶¶ 74, 89). Dr. Shanfield further cites Park '486 as disclosing openings or notches in the lead frame, so that a portion of the inner sides of the lead frames has a narrower width than that of either outer end to allow the plastic mold forming reflector 120 to surround the lead frames and be vertically connected providing stably

supported lead frames. Ex. 1003, Shanfield Decl. ¶ 89. In view of this express teaching, Dr. Shanfield opines that a person of ordinary skill would be motivated to use the teaching in Park '486 of cutting a resin molded body and plated lead frame along at least one notch in the lead frame in implementing the manufacturing process taught by Park '697 to stably support the lead frames with the resin molded body by vertically connecting the upper and lower portions of the resin molded body in the lead frame. *Id.*

Patent Owner responds that Park '697 already has a resin filled notch that stably supports the leads and that cutting along the notch would reduce rather than improves adhesion and stability. PO Resp. 38 (citing Pet. 34, Ex. 2030, Second Schubert Decl., ¶¶186–7). Patent Owner also refutes Petitioner's argument that a combination of Park '697 with Park '486 is motivated by a desire to provide anode and cathode leads by noting that anode and cathode leads already are present in Park '697. PO Resp. 38 (citing Pet. 34). According to Patent Owner, the only motivation for cutting leads when individualizing or singulating an LED package actually comes from the challenged '250 patent. *Id.* at 38–39.

Patent Owner notes that the sawing step in Park '486 (step "S6") is performed to thin side walls 121a, 121, along cutting line C for side-view mounting, but that Park '697 is a top-view device that has no need for such side wall thinning. PO Resp. 35 (citing Ex. 1006, 13:12–14:6, 2:12–19 (discussing the need for thinner side wall devices), 5:2–6). According to Patent Owner, Park '486 requires side wall thinning because Park '486 uses plastic injection molding. *Id.* In contrast, Park '697 uses transfer molding of a thermosetting resin, and does not need sidewall thinning. *Id.* (citing Schubert Decl. ¶ 181). Thus, Patent Owner persuasively argues that a

person of ordinary skill would not have been motivated to utilize the teachings of Park '486 to produce devices such as those disclosed in Park '697.

Petitioner also states that a person of ordinary skill would recognize that providing the notch results in higher cutting speeds, extending cutting plate lifetime, reducing lead frame heating, and reducing resin cracking and delamination. Pet. 34. Petitioner notes that both Park '697 and Park '486 relate to manufacturing multiple LED packages by forming a resin molded body on a lead frame and that a person of ordinary skill would have recognized that sawing the resin along notches in the lead frame avoids “blade loading,” i.e., a condition that results from cutting through portions of plated metal lead frames causing metal debris to accumulate on the saw reducing its effectiveness and inducing heating that can lead to local delamination. *Id.* at 34–35 (citing Ex. 1003, Shanfield Decl. ¶ 89). Such generalized arguments do not overcome Patent Owner’s arguments that a person of ordinary skill would not find the teachings of Park '486 applicable to producing the types of devices disclosed in Park '697.

Having considered the evidence and arguments above, we are not persuaded that, in the absence of impermissible hindsight, Petitioner has shown that a person of ordinary skill would have been motivated to combine the teachings of Park '486 with those of Park '697 in the manner specified in the Petition. Thus, we are not persuaded that Petitioner has demonstrated by a preponderance of the evidence that claim 1 is unpatentable over the combination of Park '486 and Park '697.

Claim 1 As Obvious Over Park '697 and Urasaki

As discussed above, the manufacturing process in Park '697 uses transfer molding, but Park '697 does not provide details about the molds. Petitioner cites Urasaki, which is referenced as background art in the '250 patent (Exhibit 1001, 2:13–43), as disclosing a method of manufacturing a package substrate for mounting an optical semiconductor element, using an upper and lower mold on first and second surfaces of a lead frame as recited in claim element 1.C. Pet. 45 (citing Ex. 1007, Fig. 1, Fig. 2a (annotated by Petitioner), ¶¶ 23–25, 34. Urasaki discloses:

A method of manufacturing a package substrate for mounting an optical semiconductor element, the package substrate thereof having, on a wiring board, a thermosetting resin composition layer for reflecting light, the layer thereof being formed with two or more concave parts serving as optical semiconductor element mounting regions, wherein the thermosetting resin composition layer for reflecting light is formed by transfer molding.

Ex. 1007, Abstract. Urasaki also teaches that “a plurality of steps that were conventionally necessary can be performed in a single step of transfer molding” (Ex. 1007 ¶ 21) and that a “printed wiring board having metal wiring 401 as shown by FIG. 1a is used, the printed wiring board is arranged in a mold 411 of a prescribed shape as shown in FIG. 1(b), and a thermosetting resin composition for reflecting light is injected into the mold 411 through resin injection port 410.” (Ex. 1007 ¶ 24). As Petitioner notes, Urasaki discloses “the upper mold includes a plurality of convex portions to form a resin-molded body with a plurality of concave portions, wherein each of the concave portions has an inner bottom surface at which a portion of the lead frame is exposed.” Pet. 29 (citing Ex. 1007 ¶¶ 11, 17, 24, 37, Figs. 1–2); *see also* Pet. 45–46 (citing Ex. 1007 ¶¶ 23, 24, 25, 34, Figs. 1, 2

(annotated)). Petitioner further cites Urasaki as disclosing providing an optical semiconductor element in a concave portion of the resin package, and cutting to form individual light emitting diode packages with an outer surface of a resin part and outer surface of at least one lead plain or at an outer side surface of the package. *Id.* at 29 (citing Ex. 1007 ¶¶ 1, 23, 36, 38, Figs. 1–6).

As discussed above, Petitioner contends that a person of ordinary skill in the art would have been motivated to employ an upper mold and a lower mold. Petitioner cites Urasaki as expressly teaching using such a mold in a manufacturing process involving transfer molding a thermosetting resin and a lead frame in the same field of the art. Pet. 35–36.

Petitioner does not cite any teaching in Urasaki of the claimed feature in claim 1 of cutting through the resin and lead frame along a notch in the lead frame. As we determined that Petitioner has not shown by a preponderance of the evidence that Park '697 discloses this feature, we conclude that Petitioner has not shown by a preponderance of the evidence that claim 1 is unpatentable over the combination of Park '697 and Urasaki.

Claim 1 As Obvious Over Park '697 and Oshio

Petitioner cites Oshio as disclosing a method for manufacturing multiple semiconductor lighting devices that includes providing a metal lead frame plated on all surfaces to increase the light reflectance at the sidewall of a cup-shaped recess. Pet. 31. Petitioner also notes that Oshio discloses plating to increase the bonding strength of solder on the rear face of the outer lead sections and of the lead directly below the chip, thus teaching the sides and lower surfaces of the lead frame are plated. *Id.* at 31–33 (citing Ex. 1008 ¶¶ 69, 113, Figs. 1–4). Oshio discloses an embodiment with

connecting portion 300 that is formed narrower in width than leads 20 and 30, such that when a semiconductor light emitting device is manufactured from a lead frame a device is separated by cutting it off from the lead frame at the narrowed width of connecting portion. Ex. 1008 ¶¶ 113–114. Oshio states that if the lead frame is plated with silver or the like, an unplated surface of the base material is exposed at the cut section. *Id.* at ¶ 114. Thus, Petitioner cites Oshio as explicitly disclosing a lead frame having a notch and claim element 1.E. Pet. 32, 55–56.

Although Petitioner contends that it was well known to those of ordinary skill in the art to plate all the surfaces of a lead frame, Petitioner cites Oshio as providing this express disclosure in the context of manufacturing an LED package. Pet. 38. Petitioner notes that Oshio itself provides the motivation for the combination, as it discloses the advantages in terms of increasing light reflectance and bonding strength of the solder as a result of plating the entire surface of the lead. *Id.* at 38–39. Petitioner further states that those of ordinary skill would recognize the advantages and thermal conductivity resulting from plating the entire lead frame. *Id.* at 39.

Petitioner does not cite any teaching in Oshio of the claimed feature in claim 1 of cutting through the resin and lead frame along a notch in the lead frame. As we determined that Petitioner has not shown by a preponderance of the evidence that Park '697 discloses this feature, we conclude that Petitioner has not shown by a preponderance of the evidence that claim 1 is unpatentable over the combination of Park '697 and Oshio.

Claim 1 As Obvious Over Other Combinations of Park '697, Park '486, Urasaki, and Oshio

In addition to the above grounds based on Park '697 alone and on the combination of Park '697 with the individual references, Park '486, Urasaki,

and Oshio, Petitioner challenges claim 1 as obvious over the following combinations of the references: Park '697, Park '486 and Oshio; Park '697, Urasaki and Oshio; and Park '697, Park '486, Urasaki and Oshio. Pet. 8–9. The Petition does not provide specific analysis as to the combination of these multiple references or the motivation to combine the multiple references, other than the combinations discussed above concerning the combination of Park '697 with Park '486, Park '697 with Urasaki, and Park '697 with Oshio. Although Petitioner has discussed motivation for combining the pairs of references disclosed above, Petitioner did not provide an explicit basis for combining the references in the other combinations on which Petitioner challenged patentability. Although we instituted in the combination of Park '672, Park '486, Oshio and Urasaki, in view of Petitioner's failure to discuss explicitly its challenges based on Park '697, Park '486 and Oshio, Park '697, Urasaki and Oshio; and Park '697, Park '486, Urasaki and Oshio, initially we did not institute on those grounds individually. Dec. to Inst. 31–32. In view of the Office's implementation of the Supreme Court's decision that a final written decision under 35 U.S.C. § 318(a) must decide the patentability of all claims challenged in the petition, *SAS Inst.*, 138 S. Ct. at 1344–5 (2018), we turn to the grounds on which we initially denied institution.

As discussed above, we are not persuaded that Petitioner has established unpatentability of claim 1 by a preponderance of the evidence based on Park '697 alone because Petitioner was unable to demonstrate that a Park '697 discloses the claimed feature of “cutting the resin molded body and the plated lead frame along the at least one notch to form a resin package.” We are also not persuaded that Petitioner has established by a

preponderance of the evidence that a person of ordinary skill would have been motivated to employ the teachings of Park '486 to producing devices such as those disclosed in Park '697. As neither Oshio nor Urasaki is cited as disclosing “cutting the resin-molded body and the plated lead frame along the at least one notch to form a resin package” as recited in claim 1, we conclude that Petitioner has not demonstrated that claim 1 is unpatentable on the basis of any of its challenges.

Claim 7

Claim 7 of the '250 patent depends from claim 1 and further recites (i) providing the light emitting element in a concave portion of the resin package (claim element 7.A), and (ii) the transfer molding step forms a plurality of concave portions corresponding to convex portions of the upper mold, each of the concave portions comprising an inner bottom surface at which a portion of the lead frame is exposed (claim element 7.B).

Petitioner challenges claim 7 applying the same references Petitioner asserts against claim 1. Petitioner cites Figure 1b of Park '697 as disclosing reflection cup 91 as the concave portion of the resin package recited in claim element 7.A. Pet. 59.

In view of our conclusion that Petitioner has not demonstrated by a preponderance of the evidence that claim 1 is unpatentable on the same references, we conclude that Petitioner has not demonstrated by a preponderance of the evidence that claim 7, which depends from claim 1 is unpatentable.

*Claims 17, 19 and 21 As Obvious Over Park '697 Alone
And Park '697 In View of Oshio*

Claim 17

Independent claim 17 of the '250 patent is an apparatus claim drawn to a light emitting device. Being drawn to the light emitting device itself, claim 17 does not recite limitations concerning assembly methods, such as transfer molding with an upper and lower mold or cutting the resin package and the lead frame along a notch provided in the lead frame, as recited in claim 1. Petitioner identifies as claim element 17.A, the limitation reciting “a resin package comprising a resin part and at least one lead” and cites its discussion of claim elements 1.A (“providing a led frame comprising at least one notch”), 1.C (“after plating the lead frame . . . transfer molding a thermosetting resin containing light reflecting material . . .”), and 1.D (“cutting the resin-molded body and the plated lead frame . . . to form a resin package comprising at least one lead . . . such that an outer surface of the resin part and an outer surface of the at least one lead are planar at an outer side surface of the resin package”) in support of its contention that this element is disclosed by Park '697. Pet. 64.

Petitioner identifies as claim element 17.B the limitation reciting “wherein an outer surface of the resin part and an outer surface of the at least one lead are planar at an outer surface of the resin package.” *Id.* Petitioner cites its discussion of element 1.D in support of its contention that this element is disclosed by Park '697.

Petitioner identifies as claim element 17.C the limitation reciting “wherein a plating is disposed on an upper surface and a lower surface of the at least one lead.” *Id.* As to claim element 17.C, Petitioner cites its discussion of claim element 1.E (“wherein the plated lead frame is cut so as

to form an unplated outer surface on the lead)” in support of its contention that this element is disclosed by Park ’697 (citing the silver plated lead frame disclosed in Park ’697 ¶ 12) and by Oshio (citing Ex. 1008 Fig. 13). *Id.*

Petitioner identifies as claim element 17.D the limitation reciting “wherein an outer side surface of at least one lead is unplated.” *Id.* As to claim element 17.D Petitioner cites its discussion of claim elements 1.B and 1.E. *Id.*

Petitioner identifies as claim element 17.E the limitation reciting “wherein a portion of the resin part is disposed over a portion of the plating on the upper surface of the at least one lead.” As evidence that this feature is disclosed by Park ’697 alone, Petitioner cites Figure 1b of Park ’697 (annotated by Petitioner) as disclosing a portion of resin 9 disposed over a silver plated upper surface of the lead frame (leads 4 and 5). Pet. 64–65 (citing Ex. 1004 ¶ 12). Petitioner also cites its discussion of claim element 1.E in support of its contention that this feature is disclosed by Oshio.

Having reviewed each of the limitations of claim 17 we are persuaded that Petitioner has demonstrated the undisputed limitations are disclosed in the prior art. *See*, Dec. to Inst. 32–33. The primary dispute concerning claim 17 focuses on the plating limitations 17.C and 17.E. Having denied Patent Owner’s Motion to Exclude Park ’697 as translated by Petitioner, we are now called upon to consider the implications of its disclosure of a silver plated lead frame.

Patent Owner contends that neither Park ’697 nor Oshio discloses or suggests that “a portion of the resin part is disposed over a portion of the plating on the upper surface of the at least one lead.” PO Resp. 41.

Although Patent Owner also argues that Urasaki discloses spot plating, Petitioner does not rely upon Urasaki to disclose the plating limitations of claim 17. Ex. 1017, Rebuttal Declaration of Dr. Stanley R. Shanfield (“Shanfield Rebuttal Decl.”) ¶ 59. As Dr. Shanfield did not rely upon Urasaki to disclose plating, we are not persuaded by Dr. Schubert’s criticism of Dr. Shanfield’s deposition testimony on that subject. Ex. 2030, Second Declaration of Dr. E. Fred Schubert (“Second Schubert Decl.”) ¶¶ 210–212.

Patent Owner argues that to the extent Park ’697 discloses a silver plated lead frame at all, Park ’697 does not disclose explicitly where the lead frame is plated. PO Resp. 42–44 (arguing Petitioner assumes plating on all surfaces of the lead frame, but that Fig. 1b of Park ’697 does not show any plating below the resin), PO Sur-Reply 5–6 (citing Ex. 1004 ¶ 12).

Petitioner replies that because Park ’697 discloses forming a transfer mold type reflector with a white thermosetting resin in a silver plated lead frame, the silver plating is performed before the molding step. Pet. Reply 12 (citing Ex. 1004 ¶ 12). Thus, taken in context, a person of ordinary skill would have understood from Park ’697 that the entire lead frame, including the top and bottom, is plated before molding. *Id.*

Noting Dr. Shanfield testified that an early draft of the ’250 patent referring to leads as “characterized by plating” was insufficient to describe plating the top and bottom of the lead frame, Patent Owner also argues the Petitioner’s expert acknowledged that mere references to plating, without more, could refer to spot plating, as opposed to plating an entire lead frame. PO Sur-Reply 5–6 (citing Ex. 2737, Transcript of Morning Session of August 22, 2018 Deposition of Dr. Stanley Shanfield (“8/22/18 AM Shanfield Tr.”), 57:1–7). Thus, Patent Owner argues that Petitioner’s expert

agrees with Patent Owner's expert that a bare reference to plating is insufficient to convey to a person of ordinary skill in the art that an entire lead frame is plated.

Although Park '697 refers to a "silver plated lead frame" Park '697 does not provide any explicit detail as to how or where the plating is applied. Petitioner contends that it was well known in the art to plate all surfaces, and taken in context, it would have been an obvious design choice to plate all surfaces of a lead frame in implementing the plating and cutting steps of the manufacturing process taught by Park '697. Ex. 1017, Shanfield Rebuttal Decl. ¶ 70. Thus, according to Petitioner, one of ordinary skill would have recognized that plating all the surfaces of the lead frame would result in plating all the portions of the lead frame recited in claim 17.

Park '697 discloses that it was conventional to bond an LED and electrostatic voltage diode chip to the die pad using a conductive silver adhesive agent before molding them in the light transmitting epoxy resin while keeping the edges of the cathode and anode lead exposed to the outside. Ex. 1004 ¶¶ 3–5. Park '697's description of this conventional process makes no mention of a silver plated lead frame. Park '697 states explicitly that it aims to "enable the production process by the high temperature eutectic bonding method without bonding the InGaN/GA/N-based light-emitting chip using a silver resin (epoxy)." *Id.* ¶ 10. Thus, Park '697 seeks to eliminate bonding the LED using a silver adhesive agent.

The first step in the process described by Park '697 is "mounting an electrostatic discharge impact protection element (semiconductor resistance element or electrostatic voltage diode) using solder paste on the bottom surface of the die pad for an electrostatic discharge impact protection

element of silver plated lead frame having a plurality of rows.” *Id.* ¶ 12. Then the transfer mold type reflector with white thermosetting resin is formed. *Id.* The next step in the process is die bonding and wire bonding the LED chip to the die pad part inside the reflector. *Id.* To be consistent with paragraph 10 of Park ’697 the LED must be adhered to the die pad using high temperature eutectic bonding, rather than by silver epoxy. According to Petitioner’s expert, Dr. Shanfield, in order to accomplish the eutectic bonding, the lead frame under the LED is silver-plated. Ex. 1017, Shanfield Rebuttal Decl. ¶ 58.

Dr. Schubert disagrees with Dr. Shanfield’s position that because a reference discloses the use of a eutectic solder paste, a person of ordinary skill would understand that the entire lead frame is silver plated and instead asserts that such a disclosure only reinforces that a person of ordinary skill would have understood that spot plating is used. Ex. 2030, Second Schubert Decl. ¶¶ 209 (citing Ex. 2710, Transcript of May 21, 2018 Moring Deposition of Dr. Stanley Shanfield (“5/22/18 AM Shanfield Tr.”) 63:13–64:4, 69:6–17).

Dr. Schubert argues that plating beneath the resin would negatively impact the adhesion and bonding properties of the thermosetting resin to the lead frame when a noble metal such as silver is used (as opposed to a non-noble metal, such as copper). *Id.* at ¶ 216(a). In contrast, Dr. Shanfield testifies that a person of ordinary skill would recognize it is undesirable to have a thermoset resin in direct contact with an unplated lead frame, e.g., bare copper, because residual moisture and water vapor that diffuse from the environment through the resin oxidizes copper at the resin/copper interface

rendering the underlying copper mechanically weak and fragile. Ex. 1017, Shanfield Rebuttal Decl. ¶¶ 61–62.

Dr. Shanfield and Dr. Schubert also disagree about numerous other issues—for example, about whether silver plating the lead frame results in a smoother surface that is more or less adhesive with thermoset resin. *See* Ex. 2030, Second Schubert Decl., ¶¶ 223, Ex. 1017 Shanfield Rebuttal Decl., ¶¶ 63–68. In another example of substantial disagreement between the experts, Dr. Shanfield testifies that silver plating all surfaces of a lead frame provides an advantage by increasing thermal conductivity (Ex. 1017, Shanfield Rebuttal Decl., ¶ 70), but Dr. Schubert testifies that improvements to electrical or thermal conductivity would not be significant and that silver plating the entire lead frame would have the opposite effect by increasing thermal resistance (Ex. 2030, Second Schubert Decl., ¶ 219–220).

Petitioner argues that Oshio’s disclosure that the lead frame is coated by plating “to increase the light reflectance at the sidewall of the cup-shaped recess 20C” confirms the upper surface of the lead frame is plated and Oshio’s disclosure that of plating “to increase . . . the bonding strength of the solder on the rear face of the outer lead sections 20A and 30A and of the lead 20 directly below the chip 10” confirms the sides and the lower surface of the lead frame are plated. Pet. Reply 16 n.6 (citing Ex. 1008, Figs. 1–4, ¶¶ 69, 114); *see*, Ex. 1017, Shanfield Rebuttal Decl., ¶ 77.

Patent Owner argues that Petitioner’s assertion it would have been obvious to plate all surfaces is inconsistent with disclosures in Oshio concerning the use of spot plating and the disadvantages of plating all surfaces. PO Sur-Reply 5–6. Patent Owner contends that the reference to “coating” in Oshio, cited by Petitioner (Pet. Reply 16) does not mean plating

an entire lead frame and that Oshio teaches spot plating. *Id.* at 6 (citing Ex. 2030, Supp. Schubert Decl. ¶¶ 206, 209). Dr. Schubert repeats many of the same arguments against silver plating the entire lead frame as those he presented in his discussion of Park '697. Ex. 2030, Second Schubert Decl., ¶¶ 226–227. For example, Dr. Schubert testifies that adhesion is reduced when all surfaces of a lead frame are plated and that Oshio cautions against such an approach by teaching the desirability of using a structure with increased bonding strength to avoid peeloff of the leads from the embedding resin. *Id.* at ¶ 227 (citing Ex. 1008 ¶ 76). Patent Owner also argues that spot plating is more cost effective in Oshio, where the difference in the area plated for spot plating in cup shaped recess 20C compared to the plating the entire lead frame is substantial. *Id.*

Petitioner argues that Patent Owner's "spot plating" argument is irrelevant because plating all surfaces was well known at the time. Pet. Reply 13. The conflicting testimony of the expert witnesses indicates that there are advantages and disadvantages to both spot plating and plating the entire lead frame. The issue before us, however, is whether a person of ordinary skill would have understood Park '697 alone or Park '697 in combination with Oshio to teach or suggest plating the lead frame of Park '697 such that "a plating is disposed on an upper surface and a lower surface of the at least one lead" (claim limitation 17.C) and "a portion of the resin part is disposed over a portion of the plating on the upper surface of the at least one lead" (claim limitation 17.E). Petitioner points out that Park '697 refers to a "silver plated lead frame" and does not mention spot plating. Pet. Reply 12. Park 697's disclosure of departing from the conventional approach that uses silver resin (epoxy) to adhere the LED to the die pad and

its identification of a silver plated lead frame is not sufficiently specific for Petitioner to meet its burden of proving by a preponderance of the evidence that Park '697 alone discloses the features of claim element 17.C (plating on an upper and lower surface of at least one lead) and 17.E (a portion of the resin part disposed over a portion of the plating on an upper surface of the at least one lead).

Paragraph 69 of Oshio refers to coating the surface of a pair of leads by plating. Ex. 1008 ¶ 69. Patent Owner argues that Oshio is silent as to plating the entirety of the lead frame, but instead explicitly discloses spot plating (1) where the light reflects, i.e., the cup shaped recess, and (2) where soldering occurs, e.g., localized plating to improve self-alignment using solder bumps 81 and 82 that align with landing pad sites 90A–C. PO Resp. 51–53; Ex. 2030, Supp. Schubert Decl. ¶ 228. Oshio describes forming a pair of leads 20, 30 using a copper based alloy for high thermal conductivity and “[c]oating its surface by plating” in order to “increase light reflectance at the sidewall of the cup-shaped recess 20C [i.e. on the upper surface] and the bonding strength of solder on the rear face [i.e. lower surface] of the outer lead sections 20 A and 30A and of the lead 20 directly below the chip 10.” Ex. 1008 ¶ 69. Although Dr. Schubert may be correct that spot plating is an option, his assertion that Oshio discloses spot plating is not supported by the record. Oshio does not mention spot plating, and taken in context of its disclosure of “coating the surface” of the metal by plating Oshio suggests that the entire lead is plated.

Plating the entire lead, or at least the upper surface and lower surface, would result in a lead that meets the limitations of claim 17. Figure 4 of Oshio illustrates a device similar to that described in Park '697. Thus, we

are persuaded that Petitioner has demonstrated a person of ordinary skill would have been motivated to combine the teachings of Park '697 and Oshio and that the combination of Park '697 and Oshio discloses the features of claim 17.

Claims 19 and 21

Claim 19 of the '250 patent depends from claim 17 and recites “wherein the at least one lead comprises a step on a bottom surface or outer surface thereof.” Claim 21 depends from claim 17 and recites “wherein the at least one lead comprises two or more different levels.” Annotating Figures 1b and 5, Petitioner contends that Park '697 illustrates the step on the bottom or outer surface of the lead recited in claim 19 and the two or more levels of the lead recited in claim 21. Pet. 22 (citing Ex. Figs 1b, 3b, 4b, 5), 66–67 (citing Ex. 1004, Fig. 1b). Dr. Shanfield, also references Figure 1a, noting that anode and cathode leads 4, 5 “include a step such that the lead slightly projects from the resin part (shown n green n Figs 1a, 1b below) as seen from the upper surface.” Ex. 1003, Shanfield Decl. ¶ 110–112. The Patent Owner Response does not dispute Petitioner’s assertions that the additional limitations of claims 19 and 21 are disclosed by Park '697. We agree with Dr. Shanfield that Park '697 discloses this feature.

Objective Criteria

As discussed above, we are not persuaded that Petitioner has proved unpatentability of method claims 1 and 7 by a preponderance of the evidence based on the prior art, but has demonstrated that the elements of product claims 17, 19, and 21 are disclosed in the prior art. That does not end our inquiry. Objective criteria (evidence of commercial success of the invention, long felt need solved by the invention, copying by others, and

industry praise) constitutes independent evidence of non-obviousness and can “play an important role as a guard against the statutorily proscribed hindsight reasoning in the obviousness analysis.” *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1071 (Fed. Cir. 2018). Noting that there is a presumption of nexus between the claimed invention and the objective criteria where the patentee shows that the asserted objective evidence is tied to a specific product, *Polaris Indus.*, 882 F. 3d at 1072, Patent Owner contends that its series “‘x57’” line of products, such as Nichia’s 157 product and Nichia’s 757 product” are manufactured according to the method of claim 1 and have the same structures and features as the device of claim 17 and that “all practice and embody our invention”. PO Resp. 61, Ex. 2030 Supp. Schubert Dec. ¶¶ 254–264, Ex. 2033, Declaration of Tomohide Miki (“Miki Decl.”) ¶ 9. Patent Owner notes that Petitioner does not dispute explicitly that Patent Owner’s 757 series of products analyzed by Dr. Schubert practice claims 1 and 17 of the ’250 patent and were commercially successful, praised in the industry and met a long felt need, but that Petitioner argues only the issue of nexus. PO Sur-Reply 8.

Petitioner argues the evidence demonstrates that among the factors that contributed to the alleged success of the Patent Owner’s products are the implementation of government regulations banning incandescent bulbs that shifted the entire lighting industry to LEDs and other pre-existing market trends indicating exceptional growth. Pet. Reply 24–26. Petitioner argues that any “long-felt need” is based on a generic need for an alternative to incandescent lighting by the introduction of LEDs long before the ’250 patent. *Id.* at 27. We note, however, that the implementation of government regulations merely accelerated the need for an incandescent lamp substitute

with improved performance and lower cost to satisfy the market and that LEDs represent one such substitute. *See*, Ex. 2030, Second. Schubert Decl. ¶ 240 (discussing government regulations and compact fluorescent lights (CFLs) and LEDs as substitutes for incandescent lights).

Petitioner argues that features such as brightness, durability, reliability, cost, economies of scale, and manufacturing yields are unclaimed and generally can be attributed to LEDs in the prior art. *Id.* at 23 (citing Ex. 1017 ¶¶86, 93-98; Ex. 2025, 5; Ex. 2003, 112; Ex. 2030 ¶77; Ex. 1059, 3; Ex. 1052, 12, 75; Ex. 1023, 14, 74; Ex. 1035, 5-6; Ex. 1021, 1, 19).

More persuasive is Petitioner's argument that Patent Owner's marketing materials differentiate Patent Owner's products on the basis of features that are not claimed in the '250 patent. Pet. Reply 23–24. These differentiating features include “good color rendering,” “outstanding thermal droop,” “3-step MacAdam Ellipses,” “ideal for LCD backlighting requirements,” “different drive current available to meet you specific needs,” “Pb-free reflow soldering operation,” “built-in ESD protection device,” “RoHS compliant,” and “complies with JEDEC MSL 3 or equivalent.” Ex. 1017, Shanfield Rebuttal Decl. ¶ 92 (citing Ex. 1052, 12, 75; Ex. 1023, 14, 74, Ex. 1035, 5–6, Ex. 1021, 1, 19).

Petitioner notes that Patent Owner's marketing materials state that a “***The fundamental difference*** between previous LED package designs and Nichia 757 series LED design . . . [is that] Nichia 757 series LEDs are ***free from plastics containing benzene ring structures.***” Pet. Reply 24 (quoting Ex. 2675, 2 (emphasis by Petitioner)). Petitioner also cites Patent Owner's marketing materials as touting proprietary thermoset composite packaging materials paired with high efficiency LED chips and specially blended

phosphors. *Id.* at 24 (citing Ex. 2675). Petitioner further notes that in the *Everlight* litigation involving different patents, Patent Owner attributed its commercial success to these unclaimed features, i.e., a YAG phosphor combined with a blue LED chip. *Id.* at 24.

Patent Owner contends that the relevant inquiry is the invention as a whole and that the presumption of nexus applies even if the product has additional unclaimed features. PO Sur-Reply 9. Patent Owner also argues the Dr. Schubert explained that the benefits of the invention flow from the '250 patent invention. *Id.* (citing Ex. 2030, Second Schubert Decl., ¶¶ 235–39, Ex. 2031 ¶¶ 31, 32). We note, however, that Dr. Schubert cites the very same “proprietary thermoset composite materials” Patent Owner touts in its marketing literature as those referenced by Petitioner. Ex. 2030 ¶ 238 (citing Ex. 2675, 1). Exhibit 2675 states that Patent Owner’s “small-die LED package with proprietary thermoset composite materials delivers efficacy and value beyond current highpower LED capabilities and performance above other commercially available mid-power LEDs, which regularly demonstrate rapid lumen depreciation and big color shifts over short periods of time.” Ex. 2675, 1. None of these features is discussed or claimed in the '250 patent.

Patent Owner argues it is not required to show the benefits of the invention are the result of individual elements where the successful invention is a claimed combination of elements. PO Sur-Reply 10 (citing *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1331-32 (Fed. Cir. 2016)). In this case, the evidence cited by Petitioner, i.e., marketing materials differentiating the 757 series products from other LEDs and touting the performance of Patent Owner’s products in the x57 series for reasons that

are unrelated to the subject matter recited in the challenged claims overcomes any presumption of nexus between the challenged claims and objective consideration of patentability.

CONCLUSION

In consideration of the above, we conclude that Petitioner has not demonstrated by a preponderance of the evidence that challenged claims 1 and 7 are unpatentable. We further conclude that by a preponderance of the evidence, Petitioner has demonstrated that challenged claims 17, 19, and 21 are unpatentable over the combination of Park '697 and Oshio.

ORDER

In consideration of the above, it is

ORDERED that claims 17, 19, and 21 of the '250 patent are unpatentable; 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.

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Patent 8,530,250 B2

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