

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VIZIO, INC.,
Petitioner,

v.

NICHIA CORPORATION,
Patent Owner.

Case IPR2017-01623
Patent 8,530,250 B2

Before BRIAN J. McNAMARA, STACEY G. WHITE, 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

I. INTRODUCTION

A. Background

Vizio, Inc. (“Petitioner”) filed a Petition (Paper 2, “Pet.”) to institute an *inter partes* review of claims 1, 7, 17, 19, and 21 (the “challenged claims”) of U.S. Patent 8,530,250 B2 (the “’250 patent”). 35 U.S.C. §§ 311–319. Nichia Corporation (“Patent Owner”) filed a Preliminary Response (Paper 8, “Prelim. Resp.”). Applying the standard set forth in 35 U.S.C. § 314(a), we granted Petitioner’s request and instituted an *inter partes* review of all challenged claims. Paper 11 (“Dec.”).

Patent Owner filed a Patent Owner’s Response (Paper 39, “PO Resp.”), Petitioner filed a Reply (Paper 49, “Reply”), and Patent Owner filed a Patent Owner’s Sur-Reply (Paper 58, “Sur-Reply”). An oral hearing was held on October 4, 2018, and a copy of the transcript was entered into the record. Paper 71 (“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 based 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 determine that Petitioner has not shown, by a preponderance of the evidence, that claims 1, 7, 17, 19, and 21 of the ’250 patent are unpatentable.

B. Related Proceedings

Petitioner states the ’250 patent is asserted in *Nichia Corp. v. VIZIO, Inc.*, No. 2:16-cv-246 (E.D. Tex.), consolidated with Nos. 2:16-cv-615-JRG (lead), 2:16-cv-613-JRG, 2:16-cv-616-JRG, 2:16-cv-875-JRG (in which

Patent Owner asserted the '250 patent against other defendants). Pet. 6. The '250 patent was involved in *Nichia Corp. v. Everlight Electronics Co.*, No. 2:13-cv-702-JRG (E.D. Tex.); Appeal Nos. 16-1585, 16-1618 (Fed. Cir.). *Id.* In addition, Petitioner has filed, concurrent with the present Petition, additional petitions for *inter partes* review of the '250 patent (IPR2017-01608; IPR2018-00893). *Id.*

C. The '250 patent

The '250 patent is a National Stage application of PCT/JP2009/004170, filed August 27, 2009, which claims priority to Japanese application JP 2008-225408, filed September 3, 2008. Ex. 1101, 1:10–13.

The '250 patent generally relates to a simple and low-cost method for manufacturing multiple light emitting devices in a short time. Ex. 1101, Abstract. For example, resin can be molded on lead frame in such a way that after singulation (i.e. cutting), multiple light emitting devices are formed. *Id.* A light emitting device is illustrated in Figure 1, reproduced below. *Id.* at 5:53–55.

Fig. 1

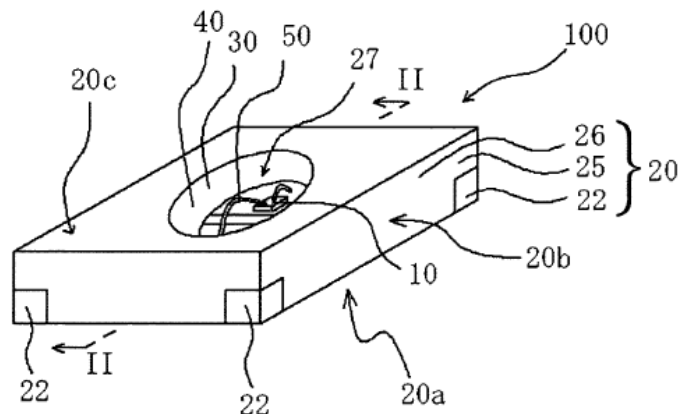


Figure 1 is a perspective view of a light emitting device showing various components thereof. A cross-sectional view taken along line II-II of

the light emitting device is shown in Figure 2, reproduced below. *Id.* at 5:55–58.

Fig. 2

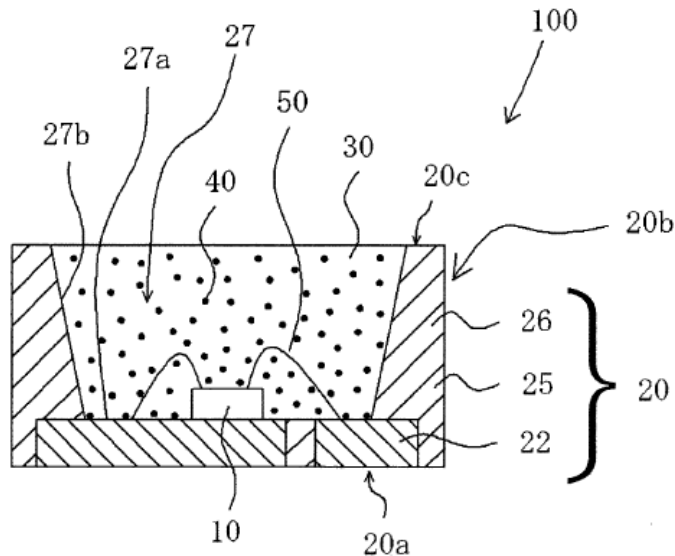


Figure 2 better illustrates various internal components of the light emitting device.

The '250 patent describes a “resin package 20 [that] is formed with the resin part 25 which mainly contains a light reflecting material 26, and the leads 22.” *Id.* at 6:7–9, Figures 1 and 2. “The resin package 20 has the outer bottom surface 20a in which the leads 22 are arranged, outer side surfaces 20b in which part of the leads 22 are exposed, and the outer upper surface 20c in which an opening concave part 27 is formed.” *Id.* at 6:9–12. The concave part 27 has an inner bottom surface 27a and inner side surface 27b, with “leads 22 . . . exposed in the inner bottom surface 27a of the resin package 20” and “[t]he light emitting element 10 is electrically connected with the leads 22 through wires 50.” *Id.* at 6:15–16, 6:20–21. “[A] sealing member 30 . . . covers the light emitting element 10” in the concave part 27. *Id.* at 6:18–19.

The specification states that notch parts are provided in a lead frame, and “the lead frame 21 is cut along the notch parts 21a and, therefore, the cut part of the lead frame 21 is a part which is exposed from the resin package 20.” *Id.* at 6:29–31.

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

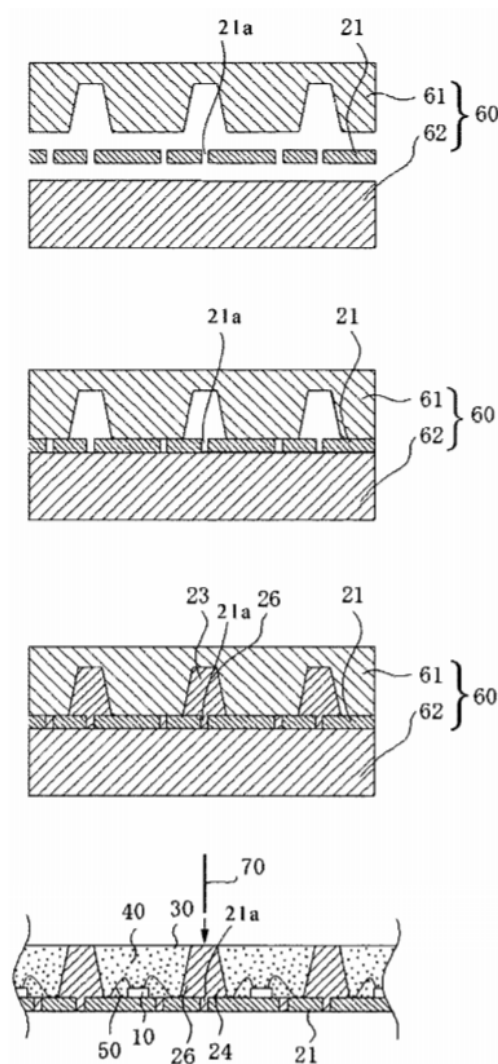


Figure 4 of the '250 patent illustrates a method of manufacturing a light emitting device.

The method for 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. *Id.* at 11:5–16.

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.

D. Illustrative Claim(s)

Of the challenged claims, claims 1 and 17 are independent, claim 7 depends from claim 1, and claims 19 and 21 depend from claim 17. Claim 1, reproduced below, is illustrative of the claimed subject matter:

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.

E. Level of Ordinary Skill

Petitioner states that a person of ordinary skill “on or before September 3, 2008 would have a minimum of a Bachelor’s degree in Physics, Electrical Engineering, Material Science, or a related field, and approximately 5 years of professional experience in the field of semiconductor technology, including manufacturing and packaging

processes for light emitting devices.” Pet. 20–21 (citing Ex. 1103, Declaration of Petitioner’s proffered expert, Dr. Stanley Shanfield, (“Shanfield Decl.”) ¶¶ 16–18). Petitioner contends that “[a]dditional graduate education could substitute for professional experience, or significant experience in the field could substitute for formal education.” *Id.* at 21.

Patent Owner requests that we adopt Petitioner’s definition of the level of ordinary skill consistent with our determination in IPR2017-01608. PO Resp. 5. We have reviewed the subject patent and relevant art and we agree that that definition is correct. Accordingly, we adopt Petitioner’s definition above.

F. Claim Construction

In this *inter partes* review, the Board interprets the claims of the unexpired patent using the broadest reasonable construction. *See* 37 C.F.R. § 42.100(b) (2016); *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)).

Petitioner includes a chart of claim terms that were in dispute in *Nichia Corp. v. Everlight Electronics Co.*, No. 2:13-cv-702-JRG (E.D. Tex.) (“the Everlight litigation”), including the District Court’s ultimate construction of those terms. Pet. 18–20. At the same time, Petitioner states that no claim terms require construction. *Id.* at 18, 20; *see also* Reply 1. Similarly, Patent Owner acknowledges that its “arguments . . . do not rely on the adoption of any particular claim construction.” PO Resp. 6.

We decline to provide an express construction for any terms in the ’250 patent because we determine that no such construction is required for

the purposes of this Decision. *See Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011) (“[C]laim terms need only be construed to the extent necessary to resolve the controversy.” (internal quotation marks omitted)).

G. Instituted Grounds

Petitioner contends that the challenged claims are unpatentable under 35 U.S.C. § 103(a) based on the following grounds (Pet. 8–64):¹

Reference(s)	Claim(s) challenged
Koung and Urasaki	1 and 7
Koung, Urasaki, and Oshio	1 and 7
Koung	17, 19, and 21
Koung and Oshio	17, 19, and 21
Koung and Suenaga	19
Koung, Oshio, and Suenaga	19

As further support, Petitioner proffers the Declaration of Dr. Stanley R. Shanfield. Ex. 1103.

II. ANALYSIS

Before we reach the question of obviousness, we must determine whether Koung qualifies as prior art. All of Petitioner’s asserted grounds of

¹ U.S. Pat. Pub. 2008/0261339 A1 (Ex. 1105) (“Koung”); Japanese Pat. Pub. JP2007-235085 (Ex. 1107) (“Urasaki”); U.S. Pat. Pub. 2005/0280017 A1 (Ex. 1108) (“Oshio”); Japanese Pat. Pub. JP2001-36154 (Ex. 1109) (“Suenaga”).

unpatentability rely, at least in part, on Koung, which Patent Owner asserts is not prior art to the '250 patent. PO Resp. 1.

In an *inter partes* review, the burden of persuasion is on the petitioner to prove “unpatentability by a preponderance of the evidence,” 35 U.S.C. § 316(e), and that burden never shifts to the patentee. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). A petitioner also has the initial burden of production, or the burden of going forward with evidence. *Id.* at 1379. Petitioner met its initial burden of production by offering Koung into evidence and arguing that Koung is prior art under 35 U.S.C. § 102(e) to the '250 patent. *See* Pet. 21. The burden of production then shifted to Patent Owner to produce evidence supporting a date of invention before Koung. *See Dynamic Drinkware*, 800 F.3d at 1379–80; *Mahurkar v. C.R. Bard, Inc.*, 79 F.3d 1572, 1576–77 (Fed. Cir. 1996).

In order to show prior invention, Patent Owner must either prove: (1) a conception and reduction to practice before the filing date of Koung; or (2) a conception before the filing date of Koung combined with diligence and reduction to practice after that date. *See REG Synthetic Fuels, LLC v. Neste Oil Oyj*, 841 F.3d 954, 958 (Fed. Cir. 2016) (citing *Taurus IP, LLC v. DaimlerChrysler Corp.*, 726 F.3d 1306, 1323 (Fed. Cir. 2013)).

Both parties agree that Koung is entitled to its April 3, 2008, filing date. Pet. 21; PO Resp. 7; *see also* Ex. 1105, (22) (indicating the filed date as April 3, 2008). Here, Patent Owner contends that Koung is not prior art to the '250 patent because the claimed invention was conceived of before the earliest claimed priority date for Koung and thereafter diligently reduced to practice. PO Resp. 1. Thus, Patent Owner must establish that conception

occurred prior to April 3, 2008, and that the inventors diligently reduced the invention to practice thereafter.

A. Conception

Conception is “the formation, in the mind of the inventor of a *definite and permanent idea of the complete and operative invention, as it is thereafter to be applied in practice.*” *Coleman v. Dines*, 754 F.2d 353, 359 (Fed. Cir. 1985) (emphasis in original) (quoting *Gunter v. Stream*, 573 F.2d 77, 80 (C.C.P.A. 1978)). A party claiming conception must show possession of every feature or limitation of the claimed invention. *Davis v. Reddy*, 620 F.2d 885, 889 (C.C.P.A. 1980). “Conception must be proved by corroborating evidence which shows that the inventor disclosed to others his ‘completed thought expressed in such clear terms as to enable those skilled in the art’ to make the invention.” *Coleman*, 754 F.2d at 359 (quoting *Field v. Knowles*, 183 F.2d 593, 601 (C.C.P.A. 1950)). An inventor’s testimony, standing alone, is insufficient to prove conception—some form of corroboration must be shown. *Price v. Symsek*, 988 F.2d 1187, 1194 (Fed. Cir. 1993); *see also Mahurkar*, 79 F.3d at 1577 (the corroboration requirement “arose out of a concern that inventors testifying in patent infringement cases would be tempted to remember facts favorable to their case by the lure of protecting their patent or defeating another’s patent”).

Patent Owner asserts that the subject matter of the claims of the ’250 patent was conceived of on or before April 2, 2008. PO Resp. 15. In support of conception on or before April 2, 2008, Patent Owner provides declaration testimony, including but not limited to, declarations from the four inventors (Ichikawa, Sasaoka, Miki, Hayashi, Exs. 2712–15), declarations from two witnesses who supervised the work of the inventors

(Exs. 2716–17), and declarations from three witnesses who were involved in the design and manufacture of prototypes or testing (Exs. 2720–21), or their supervision (Ex. 2718). Patent Owner also provides declaration testimony from the member of the IP department who drafted the Japanese patent application to which the '250 patent claims priority (Ex. 2719).

The testimony on conception is further corroborated by a substantial amount of physical evidence including, but not limited to: reports (Exs. 2349, 2256), email (Ex. 2310), pages of a laboratory notebook (Ex. 2350), presentations (Exs. 2309, 2356), meeting notes (Exs. 2467, 2471), drawings (Exs. 2399, 2363, 2407), invention disclosure documents (Exs. 2469, 2473), photographs (Ex. 2605), and patent application drafts including drawings (Exs. 2463, 2406, 2464).

In support of its assertions, Patent Owner provides charts summarizing where the subject matter of the limitations of each challenged claim of the '250 patent is found in the evidence. *See e.g.*, PO Resp. 22–37; Ex. 2726, App. II; Ex. 2712, App. B; Ex. 2714, App. B.

Concerning conception, Petitioner only contests that Patent Owner does not establish conception before April 3, 2008 of the “plating limitations” in claims 1 and 17. Reply 2. Petitioner summarizes these limitations as requiring “the lead frame to be plated ***before*** the mold is applied” for claim 1 and “plating the lead’s upper and lower surface . . . below resin—*e.g.*, before resin is molded” for claim 17. *Id.* The relevant claim limitations from claims 1 and 17 are, respectively: “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 “wherein a plating is disposed on an upper surface and a lower surface of the

at least one lead . . . 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.” Ex. 1101, 19:41–43, 20:62–63, 66–67; *see also* Reply 2.

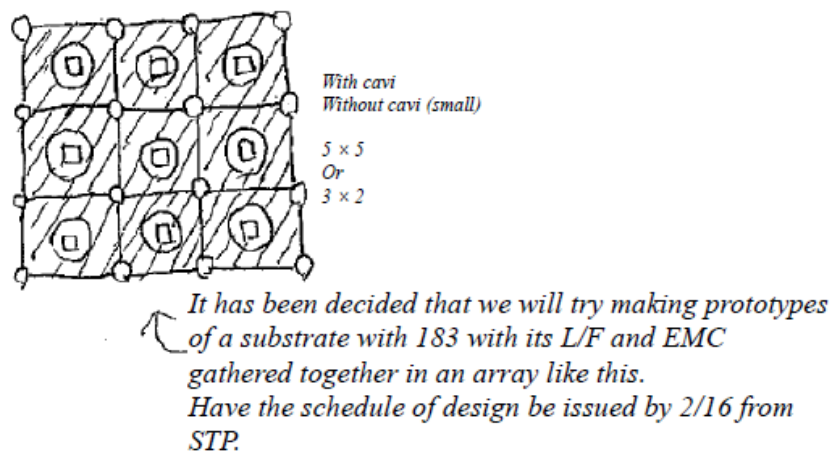
Patent Owner states that the inventions claimed in the ’250 patent were “built on work that had been done on another LED device Nichia was developing called the ‘183 product.’” PO Resp. 18. Patent Owner further states that “[f]abrication of the 183 product included transfer-molding the [epoxy molding compound (‘EMC’), a type of thermosetting resin] onto a copper lead frame plated with silver on the top and bottom surfaces.” *Id.* at 19; *see*, Ex. 2717, Declaration of Tamaki ¶ 11 (stating that “Nichia had a 183 product in development at the time which included a copper lead frame plated on top and bottom with silver.”). Patent Owner states that “Ichikawa raised the idea of using a MAP [molded array packaging] process² to make LEDs with a new design. He proposed using a 183-type lead frame as the substrate and a 183-type EMC to fabricate an array of devices onto a lead frame in one molding step.” *Id.* (citing Ex. 2712 ¶¶ 9–14; Exs. 2349, 2310).

The evidence shows that one of the inventors, Hirofumi Ichikawa, prepared a report for his supervisors, dated January 29, 2008, discussing the MAP process generally and comparing the MAP process to the 183 product and another of Nichia’s products. Ex. 2349, 2; *see also* Ex. 2712 ¶¶ 9–11.

² According to Patent Owner, a molded array packaging (“MAP”) process can be used “to produce LEDs in large numbers at low cost” where “[i]nstead of molding devices individually, the new process called for fabrication of multiple LED devices as a single resin-molded body on a plated lead frame configured with notches” to “then be singulated through the notches to form individual packages.” PO Resp. 3.

Though the report includes a schematic drawing of a MAP lead frame, specific details are not provided. Ex. 2349, 2–3. The report further states that a new lead frame will be created. *Id.* Ichikawa’s email of January 30, 2008 discussing the MAP process states: “We discussed creating a prototype of the LED . . . using the 183 lead frame” and requests that a prototype using the MAP process be created. Ex. 2310, 3. At the same time, the email later states: “It is necessary to design a new lead frame and mold.” *Id.*

The inventors testify that they met on or around February 13, 2008 to discuss Ichikawa’s idea. *See e.g.*, Ex. 2712 ¶ 15; Ex. 2713 ¶ 11. Ichikawa’s laboratory notebook includes the below entry on February 13, 2008 (shown as a certified translation), which Patent Owner identifies, among other proof, as evidence of conception of “plating the lead frame.” PO Resp. 23.



Ex. 2350, 53.

Ichikawa testifies that “[t]he term ‘L/F’ is short for lead frame” and that the “lead frame for Nichia’s 183-model products was made of a copper alloy, and was plated with silver on the top and bottom surfaces.” Ex. 2712 ¶ 18. Ichikawa continues: “[t]he reference to a 183-type lead-frame in my notebook therefore referred to a plated lead frame, where plating was

applied to the top and bottom of the lead frame.” *Id.*; *see also* (similar statements from other inventors) Ex. 2713 ¶ 13–16; Ex. 2714 ¶ 26; PO Resp. 23, 34. Miki similarly testifies that:

We decided that we wanted to retain features we considered desirable in the 183 product, including the use of a lead frame plated on both sides and the use of a thermosetting resin . . . , but to improve upon other aspects of the 183 product, like the manufacturing process (*i.e.*, using a MAP process greatly increased output while decreasing costs) and package design (e.g., thin side walls to increase light output).

Ex. 2714 ¶ 11.

Petitioner argues that the “reference to ‘183 with its LF’ does *not* show conception of the specific Plating Limitations of the ’250 [patent].” Reply 6. Petitioner does not, however, attempt to explain what we should understand by “183 with its L/F.”

As can be seen from the evidence, and admitted by Petitioner, one of the main changes between the 183 product and the new design was that the LED packages would be arranged on a lead frame in arrays using the MAP process, rather than being individually molded on a lead frame. *See* Reply 8 (citing Ex. 2349; Ex 2717 ¶ 11; Ex. 2350, 55); *see also id.* at 8–9. This required a new lead frame architecture be designed, resulting in a new lead frame where multiple individual LED packages could be formed in an array, where, when singulated, form individual LED packages. *Id.* at 8; *see also* Sur-Reply 5. However, we find that Ichikawa’s laboratory notebook refers to the arrangement of individual LED packages prior to singulation. Ex. 2350, 53 (“183 with its L/F and EMC gathered together in an array like this”). Thus, we find “183 with its L/F” to mean that *once singulated*, the individual LED packages would each have the same lead frame as the 183

product when it is singulated.³ This finding is consistent with the other evidence, such as Ichikawa’s email of January 30, 2008, which discusses both “using the 183 lead frame” while also stating: “It is necessary to design a new lead frame and mold.” Ex. 2310, 3.

Reviewing the evidence, we find that the lead frame for the 183-products were made of metal with plating on the top and bottom surfaces and that the lead frame is plated before the mold is applied and below the resin. As discussed below, this finding is supported by declaration testimony from the inventors, as well as others at Nichia. This finding is further supported, and the inventor testimony is further corroborated by evidence from the dicing study, and the invention disclosures, among other evidence.

For example, Ichikawa testifies that “[t]he leadframe for Nichia’s 183-model products was made of a copper alloy, and was plated with silver on the top and bottom surfaces.” Ex. 2712 ¶ 18; *see also* Ex. 2714 ¶ 26 (“I understood Mr. Ichikawa’s reference to 183 to mean that the lead frame would be plated on upper and lower sides, as was the 183 lead frame.”), Ex. 2713 ¶¶ 13–14, Ex. 2714 ¶ 11, 26–29, Ex. 2717 ¶¶ 8, 15, Ex. 2718 ¶¶ 9, 12. Plating on the entire top surface of the lead frame means that the lead frame would be plated before the mold is applied and also that the plating is below the resin. *See also* Ex. 2714 ¶ 28 (Miki testifying that “if the side of the castellation had silver plating (as depicted [in Ex. 2350, 55]), then the top

³ It would not be possible for the new design to have the same lead frame as the 183 product before singulation because the LED packages of the 183 product are not arranged in an array. *See* Reply 8.

and bottom of the lead frame would have also been silver plated,” some of which is shown below the resin).

Sasaoka testifies that the 083A-series and 183-series “lead frames were selected [for the dicing study] because they were both copper lead frames, plated with silver on the entirety of both top and bottom surfaces, which is also what we had envisioned for the MAP concept.” Ex. 2713 ¶ 13. Sasaoka further explains that: “The purpose of our dicing study was to determine whether we could dice a molded lead frame through both the metal portion and the package resin material, as our MAP concept required.” *Id.* ¶ 14. Sasaoka further testifies that the photographs of the 183 product shown in the Dicing Report (Ex. 2256, 3) show that “the upper surface and lower surface of the 183 lead frame in these photographs is also silver plated” and therefore below the resin. *Id.* ¶ 16. Shirahama testifies that the dicing studies were performed under his direction and that the lead frames in the dicing study were plated as shown in the photographs and that the dicing was “through both resin and a lead (plated with silver on top and bottom surfaces) at the same time.” Ex. 2718 ¶¶ 9–12. Shirahama further testifies that “[t]he cross-sectional view pictures of the diced 083A product also show that, once cut, the silver-plated copper lead has exposed copper on the cutting surface.”⁴ *Id.* ¶ 12.

⁴ Petitioner would have us consider Shirahama’s (and Tamura’s) testimony as unreliable because of the alleged “fact that the contemporaneous evidence contradicts the[ir] testimony.” Reply 14. We disagree that the contemporaneous evidence contradicts their testimony. At the same time, we do recognize that Shirahama (and Tamura) is (are) employees of Nichia and that a decade has passed since the relevant events. At the same time, we also recognize the value of the contemporaneous evidence (reports, emails,

This testimony and corroborating evidence supports Patent Owner's contention that the lead frame for the 183 products was made of metal with plating on the top and bottom surfaces and that the lead frame was plated before the mold was applied and below the resin. More significantly, this testimony and corroborating evidence provides substantial support for Patent Owner's contention that before April 2, 2008 the inventors conceived of a MAP process of making products with a lead frame made of metal with plating on the top and bottom surfaces and that the lead frame is plated before the mold is applied and below the resin.⁵

Petitioner's arguments to the contrary improperly focus on individual pieces of evidence, without considering or addressing the evidence as a whole. For example, Petitioner's focus on the draft patent application is misguided. Reply 3–5. Petitioner argues that Patent Owner did not include “the Plating Limitations to their draft specifications until July 22, 2008” and thus did not adequately conceive of the invention until that time. *Id.* at 4.

presentations, and other documents) relied upon to support Shirahama's (and Tamura's) testimony, as with all of the declarants. We further note that Petitioner did not cross-examine any of Nichia's employees and offers no credible evidence to call into question their credibility other than the fact that they are employees of Nichia and time has passed.

⁵ This finding is further supported by Miki's testimony that Ichikawa's laboratory notebook shows “the process of manufacturing the LED packages, that is manufacturing the lead frame, then plating the lead frame, and then molding the resin on top of the lead frame.” Ex. 2714 ¶ 29 (citing Ex. 2350, 77–78, dated March 9 and 10, 2008).

However, the initial draft invention disclosure includes the statement “*The lead for LED in (2) is not plated on all surfaces, but some are cut off the surface from the base material such as copper, so it is susceptible to oxidization*” (Ex. 2348, 3) implying that the lead frame is plated on some surfaces. This implication applies to both caster and non-caster embodiments. *See id.* at 2–4; *see also* Ex. 2347. This also means that the plated surface is cut so as to expose the base material. *See also* Ex. 2469 (where this sentence was revised to emphasize that the cut surface is not plated, but also discussing a “plated lead frame”). Though the disclosure is not as clear as it could be, it does support Patent Owner’s contention that even in the invention disclosures, the inventors’ statements corroborate their conception of a plated lead frame (in a MAP process) before April 2, 2008. The fact that the patent drafts did not emphasize this feature in greater detail until later, in the face of the other evidence discussed above does not support Petitioner’s position that Patent Owner had not yet conceived of a plated lead frame with plating under the resin, or the like.

Petitioner also argues that “the reference to ‘183’ was merely part of a research plan where Applicants were to ‘try making prototypes.’” Reply 7 (citing Ex. 2350, 53 and quoting Ex. 1117 ¶ 29). Petitioner’s argument straddles the line between conception and reduction to practice. Though Patent Owner worked to make prototypes and run various studies, such as the dicing study, substantial evidence shows that Patent Owner conceived of the idea to use a lead frame that, when singulated is the same as the 183 product, not an undefined idea to create a product that would be “like” 183 product. *See* Reply 7–8 (quoting *Dawson v. Dawson*, 710 F.3d 1347, 1352–

56 (Fed. Cir. 2013) (“An ‘idea to develop a product that was ‘like’ another product does not establish that [Applicants] had a ‘specific, settled idea [or] a particular solution’ for [their] invention.”)).

Petitioner also argues that Patent Owner improperly relies on a castellated embodiment for the plating limitations while relying on non-castellated embodiments for every other feature of the invention. Reply 10–11. Thus, Petitioner argues, Patent Owner has not shown possession of every feature of the claimed invention in a single embodiment and must rely on obviousness to combine embodiments in order to show conception. *Id.* at 10. In particular, Petitioner argues that Patent Owner does not show conception of a non-castellated embodiment with plating until after April 3, 2008. *Id.* at 11.

We first note from Ichikawa’s initial discussions of the invention that castellated and non-castellated embodiments are included. *See e.g.*, Ex. 2350, 54–55. Though details of the castellations are provided, no distinctions between the lead frame materials are identified. *Id.* Rather, both embodiments refer to “cut copper” for the exposed portions of the lead, highlighting the fact that that portion is not plated. *Id.*; *see also* Ex. 2473, 3 (discussing or at least implying use of a plated lead frame with respect to both castellated and non-castellated embodiments); Sur-Reply 6. This is consistent with the other evidence discussed previously where the lead frame is based on the 183 product design. Thus, we do not agree with Petitioner that the plated lead frame is limited to castellated embodiments prior to April 3, 2008.

In view of the evidence of record, we find that the inventors conceived of the “plating limitations” on or before April 2, 2008. We

further find that Patent Owner has provided evidence sufficient to establish that the subject matter of the claims of the '250 patent was conceived of on or before April 2, 2008.

B. Diligent Reduction to Practice

Patent Owner asserts that, following conception, the inventors worked diligently to reduce the invention to practice. PO Resp. 38–55. In particular, Patent Owner outlines and provides evidence concerning the “formulation of a suitable resin and preparation of lead frames and molds” and “the making and testing of the prototypes.” *Id.* at 38. Patent Owner also states, and provides evidence to support, that:

After having demonstrated in the initial prototypes that their ideas could be reduced to practice, the inventors focused on developing additional prototypes, including prototypes that had other claimed features, including steps on the lead, and two-level leads in various forms. The inventors also worked with Nichia’s IP Department to prepare and refine the final patent application, which was filed on September 3, 2008.

Id. at 55.

Petitioner does not contest that Patent Owner shows diligence during the critical period from before Koung’s filing date (April 3, 2008) to the filing of the Japanese priority document (September 3, 2008). In a footnote, Petitioner does state that Patent Owner “does not show diligence in reducing claims 19 and 21 to practice” and that “Petitioner also does not concede that the '250 claims are entitled to a September 2008 priority date.” Reply 2 n. 3. However, Petitioner does not provide any reasoning why.

After consideration of the evidence, we determine that Patent Owner has established reasonable diligence from the inventors’ conception of the invention to their constructive reduction to practice.

Because Patent Owner shows conception of the invention claimed in the '250 patent before the filing date of Koung combined with diligence in reduction to practice, we determine Koung is not prior art to the '250 patent. Accordingly, we do not address Petitioner's challenges based on Koung.

III. CONCLUSION

We conclude Petitioner has not demonstrated, by a preponderance of the evidence, that any of the challenged claims would have been obvious as Koung is not prior art to the '250 patent.

IV. ORDER

For the reasons given, it is

ORDERED that claims 1, 7, 17, 19, and 21 of the '250 patent have not been shown to be 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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