

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BOE TECHNOLOGY GROUP CO., LTD.,
Petitioner,

v.

OPTRONIC SCIENCES, LLC,
Patent Owner.

IPR2024-01133
Patent 9,263,509 B2

Before THU A. DANG, BENJAMIN D. M. WOOD, and
KEVIN W. CHERRY, *Administrative Patent Judges*.

DANG, *Administrative Patent Judge*.

JUDGMENT

Final Written Decision

Determining All Challenged Claims Unpatentable

Denying Patent Owner's Motion to Exclude

35 U.S.C. § 318(a); 35 U.S.C. § 312(a); 37 C.F.R. §§ 42.8(b)(1), 42.64(c)

I. INTRODUCTION

A. *Background*

In response to a Petition (Paper 1, “Pet.”) filed by BOE Technology Group Co., Ltd. (“Petitioner”), we instituted *inter partes* review of claims 1–13 (the “challenged claims”) of U.S. Patent No. 9,263,509 B2 (Ex. 1001, “the ’509 patent”). See Paper 16 (“Dec. Inst.”).

During trial, Optronix Sciences LLC (“Patent Owner”) filed a Response (Paper 24 (“PO Resp.”)), to which Petitioner filed a Reply (Paper 28 (“Pet. Reply”)). In turn, Patent Owner filed a Sur-reply. Paper 31 (“PO Sur-reply”). An oral hearing was held with the parties on October 27, 2025. A transcript of the hearing has been entered into the record. Paper 41 (“Tr.”).

Patent Owner also filed a motion to exclude certain evidence. Paper 34 (“Exclude Mot.”). Petitioner filed an opposition (Paper 35, “Exclude Opp.”), and Patent Owner filed a reply to the opposition (Paper 36, “Exclude Reply”).

Patent Owner filed a motion to dismiss the proceeding, alleging that Petitioner failed to disclose all real parties-in-interest. Paper 38 (“Dismiss Mot.”). Petitioner filed an opposition (Paper 39, “Dismiss Opp.”).

We have jurisdiction under 35 U.S.C. § 6. This Decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of the claims on which we instituted trial. Based on the record before us, Petitioner has shown by a preponderance of the evidence that claims 1–13 of the ’509 patent are unpatentable under 35 U.S.C. §§ 102 and 103.

B. Related Proceedings

The parties identify the following litigation as involving the '509 patent: *Optronic Sciences, LLC v. BOE Technology Group Co., Ltd.*, No. 2:23-cv-00549 (E.D. Tex.). Pet. 83; Paper 3, 1. Patent Owner further indicates the following litigation and proceedings are related to this proceeding or “may affect, or be affected by, a decision in these proceedings”: *Optronic Sciences, LLC v. BOE Technology Group Co., Ltd.*, No. 2:24-cv-00577 (E.D. Tex.); *Paneltouch Technologies, LLC v. BOE Technology Group Co., Ltd.*, No. 2:25-cv-00245 (E.D. Tex.); IPR2024-01130; IPR2024-01131; IPR2024-01132; IPR2024-01133; IPR2024-01134; IPR2024-01315; IPR2025-00238; IPR2025-00239; IPR2025-01245; IPR2025-01246; IPR2025-01267; IPR2025-01482; and IPR2025-01483. Paper 40, 1.

C. The '509 Patent

The '509 patent, titled “Pixel Structure Having Light Emitting Device Above Auxiliary Electrode,” issued on February 16, 2016, from Application No. 14/447,620, with a filing date of July 31, 2014. Ex. 1001, codes (54), (45), (21), (22). The '509 patent observes that “[s]ince the luminance of each pixel of the electroluminescent device is related to the current that flows through the pixel, the overall luminous uniformity of the electroluminescent device is low.” *Id.* at 1:41–44. The '509 patent seeks to solve this problem of traditional electroluminescent devices by providing “a pixel structure capable of improving the overall luminous uniformity of a display panel.” *Id.* at 1:18–19, 1:48–50.

Figure 1, reproduced below, illustrates an equivalent circuit diagram of a pixel structure. Ex. 1001, 2:37–38.

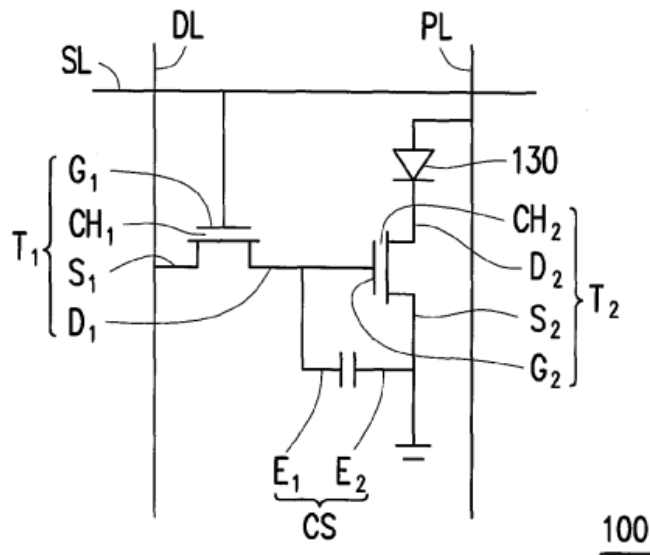


FIG. 1

As shown in Figure 1, “pixel structure 100 includes a data line DL, a scan line SL, at least one active device T₁ and T₂, a capacitor CS, a power line PL, and a light emitting device 130.” *Id.* at 2:65–3:1.

Figure 2, reproduced below, illustrates a schematic cross-sectional view of pixel structure 100, but omits certain commonly known components. Ex. 1001, 3:32–42.

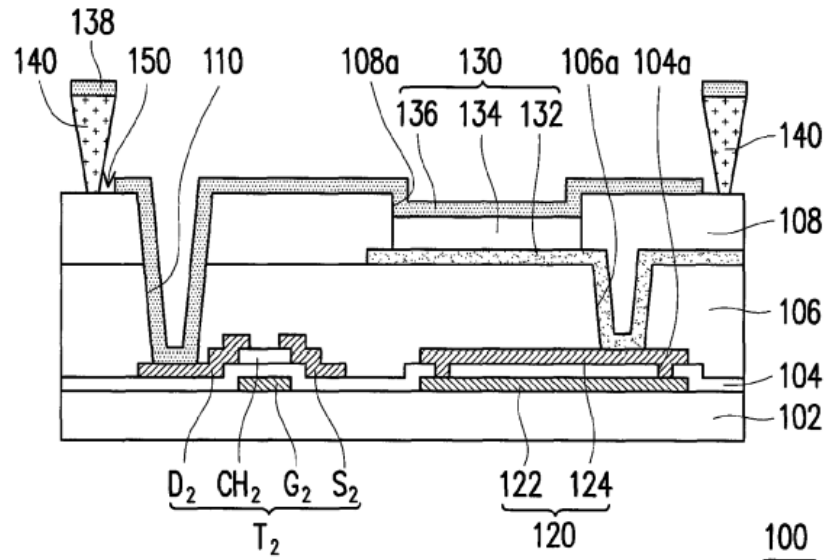


FIG. 2

As shown in Figure 2, active device T₂ of pixel structure 100 is located on substrate 102. Ex. 1001, 3:43–44, Fig. 2. Active device T₂ includes source S₂ and drain D₂ disposed on an etch-stop layer (not shown), channel layer CH₂ located under source S₂ and drain D₂, and gate G₂ located under channel layer CH₂. *Id.* at 3:50–53, 3:65–4:2. Pixel structure 100 also includes first auxiliary electrode 120, which is electrically insulated from active device T₂. *Id.* at 4:5–6. In the Figure 2 embodiment, first auxiliary electrode 120 comprises bottom electrode layer 122 and top electrode layer 124, which are separated from each other by insulating layer 104. *Id.* at 4:6–8, 4:12–13. In other embodiments, the first auxiliary electrode can be a single layer, for example, solely a bottom electrode layer or top electrode layer. *Id.* at 6:16–32, 6:44–47. Insulating layer 106 covers active device T₂ and first auxiliary electrode 120. *Id.* at 4:26–27.

Light emitting device 130, which may be “a top-emission organic electroluminescent device,” is located above first auxiliary electrode 120 in

the Figure 2 embodiment and comprises first electrode layer 132, light emitting layer 134, and second electrode layer 136. Ex. 1001, 4:35–40. “[T]he first electrode layer 132 and the second electrode layer 136 serve as an anode and a cathode respectively.” *Id.* at 4:40–42. Further, first electrode layer 132 is disposed on first insulating layer 106, but is electrically connected to top electrode layer 124 of first auxiliary electrode 120 by way of first contact window opening 106a through insulating layer 106. *Id.* at 4:43–56. And second electrode layer 136 is disposed on second insulating layer 108, but is electrically connected to drain D₂ of active device T₂ by way of second contact window opening 110 through insulating layers 108 and 106. *Id.* at 4:63–5:3, 5:25–36.

D. The Challenged Claims

Of the challenged claims, claim 1 is independent. Independent claim 1 is illustrative of the challenged claims, and is reproduced below:

1. A pixel structure, comprising:

a data line and a scan line;

at least one active device electrically connected with the data line and the scan line, and each active device comprising a gate, a channel layer, a source, and a drain;

a first auxiliary electrode electrically insulated from the active device; and

a light emitting device disposed above the first auxiliary electrode, wherein the light emitting device comprises:

a first electrode layer electrically connected with the first auxiliary electrode;

a light emitting layer disposed on the first electrode layer; and

a second electrode layer disposed on the light emitting layer, wherein the second electrode layer is electrically connected with the active device.

Ex. 1001, 8:42–57.

E. Asserted Grounds of Unpatentability

We instituted *inter partes* review of all challenged claims, claims 1–13, on all challenges in the Petition. Petitioner asserts that claims 1–13 of the '509 patent are unpatentable based on the following grounds (Pet. 1):

Claim(s) Challenged	35 U.S.C. § ¹	Reference(s)/Basis
1–5, 9, 12, 13	102	Weaver ²
6–8	103	Weaver, Lee '053 ³
6–8	103	Weaver, Song ⁴
10, 11	103	Weaver, Lee '149 ⁵
10, 11	103	Weaver, Bae ⁶

¹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102 and 103, effective March 16, 2013. Because the application from which the '509 patent issued has an earliest effective filing date after this date, the AIA versions of §§ 102 and 103 apply. *See* Ex. 1001, codes (22), (30).

² U.S. Patent Publication No. 2004/0079945 A1, published Apr. 29, 2004, filed Oct. 28, 2002 (Ex. 1004, “Weaver”).

³ U.S. Patent Publication No. 2012/0162053 A1, published June 28, 2012, filed Dec. 22, 2011 (Ex. 1005, “Lee '053”).

⁴ U.S. Patent Publication No. 2014/0183502 A1, published July 3, 2014, filed Dec. 26, 2013 (Ex. 1006, “Song”).

⁵ U.S. Patent Publication No. 2009/0015149 A1, published Jan. 15, 2009, filed July 9, 2008 (Ex. 1011, “Lee '149”).

⁶ U.S. Patent Publication No. 2006/0119259 A1, published June 8, 2006, filed Nov. 29, 2005 (Ex. 1012, “Bae”).

Claim(s) Challenged	35 U.S.C. § ¹	Reference(s)/Basis
1–5, 9, 12, 13	103	Weaver, Gupta ⁷ or Han ⁸
6–8	103	Weaver, Lee '053, Gupta or Han
6–8	103	Weaver, Song, Gupta or Han
10, 11	103	Weaver, Lee '149, Gupta or Han
10, 11	103	Weaver, Bae, Gupta or Han

Petitioner relies on declarations of R. Jacob Baker, Ph.D., P.E. Ex. 1003 (in support of the Petition); Ex. 1020 (in support of Petitioner's Reply). Patent Owner moves to exclude Dr. Baker's declarations as discussed further below. *See generally* Exclude Mot.

Patent Owner relies on the declaration of Eric Bretschneider, Ph.D. in support of the Patent Owner Response. Ex. 2026.

II. ANALYSIS

A. *Level of Ordinary Skill in the Art*

In determining whether an invention would have been obvious at the time it was made, we consider the level of ordinary skill in the pertinent art at the time of the invention. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966). In our analysis, various factors may be considered, including the “type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re*

⁷ U.S. Patent No. 9,088,003 B2, published July 21, 2015, filed Mar. 6, 2013 (Ex. 1009, “Gupta”).

⁸ U.S. Patent Publication No. 2011/0248309 A1, published Oct. 13, 2011, filed Apr. 1, 2011 (Ex. 1010, “Han”).

GPAC, Inc., 57 F.3d 1573, 1579 (Fed. Cir. 1995) (quotation marks omitted). Furthermore, the prior art itself can reflect the appropriate level of ordinary skill in the art. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001).

Relying on the declaration of Dr. Baker, Petitioner contends that a person of ordinary skill in the art (POSITA) at the time of the invention of the '509 patent would have had “a Bachelors’ degree in electrical engineering or a comparable field of study, plus approximately one or more years of professional experience with electronic and optoelectronic system design,” wherein “[a]dditional graduate education could substitute for professional experience, and significant experience in the field could substitute for formal education.” Pet. 4 (citing Ex. 1003 ¶ 46).

Patent Owner relies on the declaration of Dr. Bretschneider and contends that a POSITA at the time of the invention of the '509 patent would have had “at least a Bachelors’ degree in a field of engineering or physics and at least two years of professional experience related to the design and manufacture of LED or OLED pixels for flat panel displays,” wherein “[a]dditional graduate education, provided it included relevant semiconductor manufacturing or flat panel display technology, could reduce but not eliminate the time requirement for professional experience.” PO Resp. 10 (citing Ex. 2026 § V).

Petitioner responds that Patent Owner’s definition of a POSITA should be rejected because it “incorrectly encompasses engineering fields clearly having nothing to do with displays, such as biomedical, civil, chemical or environmental engineering.” Pet. Reply 1. Petitioner argues that a POSITA “would have knowledge in the design of optoelectronic circuits at least at the system level where components such as LEDs and

transistors are put together to form a working optoelectronic circuit (i.e., one that converts current flow to generated light)” (*id.*), but would not necessarily have experience “focused on the design of LED or OLED pixels for flat panel displays” because the alleged novelty of the ’509 patent “is not the design of the light emitting portion of the pixel, but rather adding an auxiliary electrode electrically connected to the pixel’s anode (i.e., adding a connected wire), which can be coordinated through parallel connection to reduce the resistance of the anode” (*id.* at 3).

Patent Owner responds that the definition of a POSITA includes “chemical engineering because fabrication at the device-level is inherently a chemical process” that “involves the interaction between layers of metals, polymers, glass, quartz, insulators, organic materials, inorganic materials, etches, silicon oxide, silicon nitride, oxynitride, and combinations thereof.” PO Sur-reply 1–2. Patent Owner argues that experience with LED or OLED pixels is necessary because it is sophisticated technology requiring “a deep technical understanding in areas unique to LEDs, OLEDs, and displays.” *Id.* at 3 (quoting Ex. 2026 ¶ 60).

We consider the level of ordinary skill in the art to be reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1354–55 (Fed. Cir. 2001) (holding that absent evidence to the contrary, “the prior art itself [may] reflect[] an appropriate level” of ordinary skill in the art). In general, we agree with the areas of agreement in the parties’ proposals. In particular, Patent Owner proposes “at least a Bachelors’ degree in a field of engineering or physics,” which includes “electrical engineering or *a comparable field of study*” as Petitioner proposes. Pet. 4 (emphasis added); PO Resp. 10. We agree with Petitioner that by defining the engineering field as “electrical” or

“comparable,” we can exclude engineering fields “having nothing to do with displays, such as biomedical, civil, chemical or environmental engineering.” Pet. Reply 1.

Petitioner also proposes approximately “one or more years of professional experience” which includes Patent Owner’s “at least two years of professional experience.” Pet. 4; PO Resp. 10. Furthermore, both parties agree that “[a]dditional graduate education could [reduce . . . the time requirement] for professional experience.” *Id.* Thus, we adopt both parties’ proposed POSITA of having a Bachelors’ degree in electrical engineering or a comparable field of study, plus at least two years of professional experience, wherein additional graduate education could reduce the time requirement for professional experience. *Id.* Such proposal comports with the level of ordinary skill in the art reflected in the prior art of record.

Additionally, claim 1 recites a “pixel structure,” comprising a “data line,” a “scan line,” at least one “active device,” a first “auxiliary electrode,” and a “light emitting device” comprising first and second “electrode layer[s],” and a “light emitting layer.” Ex. 1001, 8:42–57. Thus, we agree with Petitioner that “professional experience with electronic and optoelectronic system design” (Pet. 4) is sufficient. Patent Owner has not explained sufficiently why professional experience “related to the design and manufacture of LED or OLED pixels for flat panel displays” (PO Resp. 10) is necessary, when “LED or OLED pixels for flat panel displays” (*id.*) is not even claimed.

Similarly, Patent Owner has not explained sufficiently why professional experience with “relevant semiconductor manufacturing for flat panel display technology” is necessary. PO Resp. 10. Here, the claims are

not limited to manufacturing flat panel display, and as Petitioner points out, the alleged novelty of the '509 patent “is not the design of the light emitting portion of the pixel, but rather adding an auxiliary electrode electrically connected to the pixel’s anode (i.e., adding a connected wire).” Pet. Reply 3.

Accordingly, we determine that a person of ordinary skill would have a Bachelors’ degree in electrical engineering or a comparable field of study, plus at least two years of professional experience with electronic and optoelectronic system design, wherein additional graduate education could reduce the time requirement for professional experience.

B. Claim Construction

We construe each claim “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R. § 42.100(b). Under this standard, claim terms are generally given their plain and ordinary meaning as would have been understood by a POSITA at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc).

Only those terms in controversy need to be construed, and only to the extent necessary to resolve the controversy. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

1. “auxiliary electrode”

Petitioner proposes construing “auxiliary electrode” recited in claims 1, 2, 5, 6, 10, 11, and 13 “either broadly as ‘supplemental electrode’ or

narrowly as ‘supplemental electrode to reduce the total resistance of the pixel structure.’” Pet. 5 (citing Ex. 1003 ¶¶ 61–65). According to Petitioner, “[t]he claims do not explicitly state what the ‘auxiliary electrode’ is auxiliary to,” i.e., “the claims do not explicitly recite what function or characteristic existed without the auxiliary electrode that has been supplemented with the auxiliary electrode.” *Id.*; *see also* Pet. Reply 9. Thus, Petitioner argues that “the plain meaning of ‘auxiliary’ is ‘supplemental’ and is not limited to any particular type of supplemental functionality.” Pet. 6 (citing Ex. 1013, 51). Petitioner further contends that, although the Specification contains statements describing the term, “it should be noted that each of the two statements . . . is followed by the explicit disclaimer that ‘the invention is not limited thereto.’” *Id.* at 6–7 (citing Ex. 1001, 6:8–9, 7:56–57).

Patent Owner contends “‘auxiliary’ should be afforded its plain and ordinary meaning,” which is “subsidiary or supplemental to another thing that is primary.” PO Resp. 22; PO Sur-reply 7–8. According to Patent Owner, “[a]n auxiliary electrode cannot itself provide a primary, essential connection.” PO Resp. 22; PO Sur-reply 8. Patent Owner argues that “the specification describes the ‘auxiliary electrodes’ as providing supplemental functionality to the first electrode layer” such that an auxiliary electrode “is not simply an additional electrode.” *Id.* at 23. Patent Owner contends that “[t]he claims, when read in the context of the plain meaning of ‘auxiliary’ and the specification, tell a POSITA that the ‘function or characteristic’ being supplemented by the ‘auxiliary electrode’ is the ‘function or characteristic’ of the first electrode layer.” *Id.* at 24.

Further, Patent Owner asserts that “the term ‘electrode’ should be afforded its plain and ordinary meaning, which means end structure of a conductor for making electrical contact,” but does not include “an entire intermediary structure, like a bus line.” PO Resp. 25–26; PO Sur-reply 9. Patent Owner argues that the definition of “electrode” from the dictionary cited by Petitioner is consistent with Patent Owner’s construction and defines the term as “an electrical conductor that ‘provides the path for current entering or leaving a medium such as a dielectric [or] semiconductor.’” PO Resp. 25–26 (citing Ex. 2012, 237). Patent Owner contends that “[i]n the claims, the ‘electrode’ layers and auxiliary ‘electrode’ are electrically connected to each other, and the first ‘electrode’ layer is electrically connected to the active device. Like its plain and ordinary meaning, ‘electrode’ is used as an end point, not the road to get to an end point.” *Id.* at 26.

Petitioner disputes Patent Owner’s construction of “electrode” as being limited to the end structure of a conductor because it contradicts the use of the term in the ’509 patent. Pet. Reply 11–12. Petitioner contends “[t]he 509 patent uses the term ‘electrode’ for entire conductors, not just end structures for making electrical contact,” such as in the description of the light emitting device 130 shown in Figure 2. *Id.* at 12–13. Petitioner argues that the light emitting device 130 includes a “‘second electrode layer 136’ that extends between and electrically connects to the light emitting layer 134 and the drain D₂ of the active device T2” and is not limited to only the end structures of the second electrode layer 136. *Id.* Petitioner argues further that the ’509 patent refers to “an electrode end E1” and “an electrode end E2,” such that “[i]f ‘electrode’ was only an end structure, then the 509 patent

would not use the term ‘electrode end.’” *Id.* at 14 (citing Ex. 1001, 3:26–31).

The plain language in claim 1 of “auxiliary electrode” does not preclude that the “electrode” may be a power line, bus line, or resistor. Ex. 1001, 8:47–52. Nothing in the Specification clearly precludes “auxiliary electrode” from being a “bus line” or “power line,” as Patent Owner proposes. PO Resp. 25–27. We are unpersuaded by Patent Owner’s contention that the Specification discloses that “the power line ‘PL’ is shown in Figure 1, but the power line PL is not an electrode that is shown in Figure 2.” *Id.* at 26–27. Here, Patent Owner points to no portions in the Specification that provide the requisite “reasonable clarity, deliberateness, and precision” to warrant interpreting the claim language at issue as supporting Patent Owner’s contention that an auxiliary electrode cannot be a power line, bus line, or resistor. *Id.*; *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1984). That is, although Patent Owner points to Figures 1 and 2 of the Specification for support of its contention, Figures 1 and 2 of the Specification merely show various examples of power line and an auxiliary electrode. PO Resp. 26–27. Thus, although the referenced portions of the Specification discuss various examples wherein an auxiliary electrode may be implemented, nothing in these referenced portions of the Specification clearly precludes the “auxiliary electrode” from being a power line or any electrode that is “the road to get to an end point,” as Patent Owner contends. *Id.* Patent Owner points to no special definition, implicit or explicit, for “auxiliary electrode” that is set forth in the Specification which supports Patent Owner’s construction with reasonable clarity, deliberateness, and precision. *Paulsen*, 30 F.3d at 1480.

Instead, as Petitioner points out, the '509 patent doesn't just use the term "electrode" to describe end structures for making electrical contact, but rather, the patent describes the entire light emitting device 130 shown in Figure 2 as an "electrode layer." Pet. Reply 2–13. In particular, as the Petitioner points out, the '509 patent describes light emitting device 130 as comprising a "'second electrode layer 136' that extends between and electrically connects to the light emitting layer 134 and the drain D2 of the active device T2," i.e., not just the end structures of second electrode layer 136. *Id.*

Further, nothing in the Specification supports Patent Owner's contention that the "auxiliary electrodes" are limited to providing supplemental functionality to the first electrode layer. PO Resp. 23. As Petitioner points out, "[t]he claims do not explicitly state what the 'auxiliary electrode' is auxiliary to." Pet. 5.

In view of the plain language of the claims and the Specification, we determine that the term "auxiliary electrode" recited in claim 1 is neither limited to an anode or cathode, nor precludes "a power line, bus line, or resistor" or any electrode that provides "a primary, essential connection." We determine no further explicit construction of this term is necessary to resolve the controversy. *See Vivid Techs.*, 200 F.3d at 803.⁹

⁹ We note that the district court construed "auxiliary electrode" as "electrode that works in unison with another electrode." Ex. 2030, 32–35. We do not discern a substantive difference between the district court's construction and our construction of this term.

C. Principles of Law

To establish anticipation, each and every element in a claim, arranged as recited in the claim, must be found in a single prior art reference. *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1371 (Fed. Cir. 2008).

There is no requirement that the prior art must use the same words to describe a claim element in order to teach or disclose that claim element. Identity of terminology is not required for a claim element to be anticipated by the prior art without resort to obviousness. *See In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009); *In re Bond*, 910 F.2d 831, 832 (Fed. Cir. 1990).

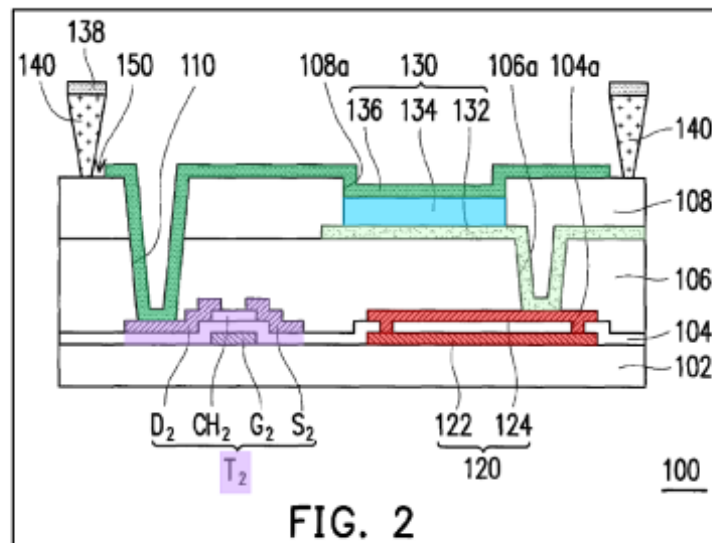
It is proper to take into account not only the literal and specific teachings of the reference, but also the inferences which one skilled in the art would reasonably be expected to draw therefrom. *In re Preda*, 401 F.2d 825, 826 (CCPA 1968). For anticipation, the dispositive question is whether one skilled in the art would reasonably understand or infer from a prior art reference that every claim element is disclosed in that reference. *Eli Lilly and Co. v. Los Angeles Biomedical Research Inst. at Harbor-UCLA Med. Ctr.*, 849 F.3d 1073, 1074–75 (Fed. Cir. 2017).

A patent claim is unpatentable under 35 U.S.C. § 103 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 before the effective filing date of the claimed invention to a person having ordinary skill in the art to which said subject matter pertains. 35 U.S.C. § 103; *see 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 non-obviousness. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

D. *Claims 1–5, 9, 12, and 13 as Allegedly Anticipated by Weaver; Claims 6–8 as Allegedly Obvious over Weaver In View of Lee '053 or Song; Claims 10 and 11 as Allegedly Obvious over Weaver In View of Lee '149 or Bae*

Petitioner contends that the '509 patent is directed to a “pixel structure for solving the purported problem of poor overall luminous uniformity that occurs in traditional electroluminescent devices.” Pet. 2 (citing Ex. 1001, 1:48–50). According to Petitioner, “[t]he purported novelty is the inclusion of a first auxiliary electrode . . . that is electrically connected with the first electrode layer . . . , with the light emitting device . . . located above the first auxiliary electrode.” *Id.* (citing Ex. 1001, 4:35–36, 47–49, Fig. 2). Petitioner provides an annotated Figure 2 of the '509 patent, reproduced below, to illustrate its contentions.



The above annotated Figure 2 of the '509 patent in the Petition shows pixel structure 100 that includes active device T2 (purple), first auxiliary electrode

120 (red), light emitting device 130 comprising first electrode layer 132 (light green), light emitting layer 134 (blue), and second electrode layer (dark green). Pet. 2–3; *see also* Ex. 1001, 4:35–38, 47–49, Fig. 2.

Petitioner then contends that claims 1–5, 9, 12, and 13 are anticipated by Weaver. Pet. 11–28. Petitioner further contends that claims 6–8 would have been obvious over Weaver and Lee ’053 (*id.* at 29–42) or over Weaver and Song (*id.* at 42–55), and that claims 10 and 11 would have been obvious over Weaver and Lee ’149 (*id.* at 55–63) or over Weaver and Bae (*id.* at 63–71).

In response, Patent Owner contends Petitioner has not shown the challenged claims are unpatentable because Weaver does not disclose an auxiliary electrode as claimed. PO Resp. 27–33.

We briefly summarize Weaver, Lee ’053, Song, Lee ’149, and Bae below.

1. Weaver

Weaver, titled “Device Including OLED Controlled By N-Type Transistor,” published on April 29, 2004, with a filing date of October 28, 2002. Ex. 1004, codes (54), (43), (22). Weaver describes a device with “an n-type transistor fabricated over a substrate” as well as “non-inverted organic light emitting device [OLED] fabricated over the substrate,” where the cathode of the OLED is connected to an electrode of the n-type transistor. *Id.* ¶ 4.

Figure 4, reproduced below, illustrates “an OLED and a thin film transistor.” Ex. 1004 ¶ 8.

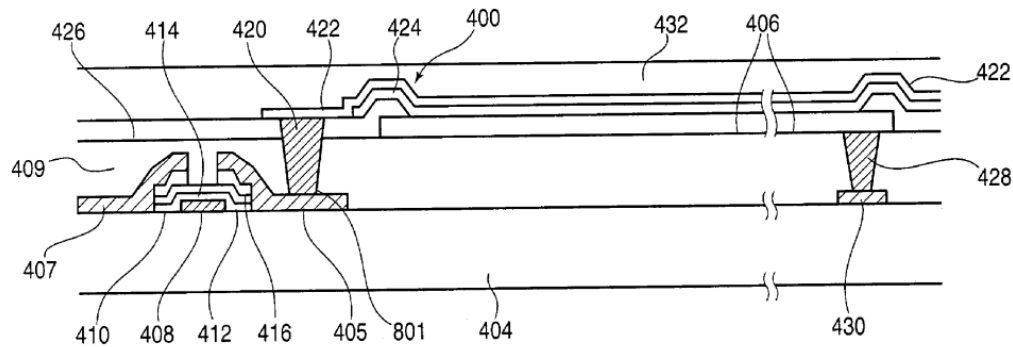


Fig. 4

As shown in Figure 4, transistor 410 is formed over substrate 404 and includes gate 408, source region 405, and drain region 407. *Id.* ¶ 24. OLED 400 includes anode 406, organic layer 424, and cathode 422. *Id.* ¶ 26. “Organic layer 424 may be any suitable organic material that emits light when sufficient current is passed between anode 406 and cathode 422.” *Id.* ¶ 27. Anode 406 is connected to bus line 430 by way of via 428, and cathode 422 is connected to source region 405 of transistor 410, by way of via 420. *Id.* ¶¶ 25–26.

2. *Lee '053*

Lee '053, titled “Organic Light Emitting Diode Display Device and Fabrication Method Thereof,” published on June 28, 2012, with a filing date of December 22, 2011. Ex. 1005, codes (54), (43), (22). *Lee '053* specifically relates to “an OLED display device capable of reducing a bezel width.” *Id.* ¶ 3.

3. *Song*

Song, titled “Organic Light Emitting Diode Display,” published on July 3, 2014, with a filing date of December 26, 2013. Ex. 1006, codes (54), (43), (22). Song seeks “to provide an organic light emitting diode (OLED) display that can reduce or minimize a voltage drop of power passing through a thin and large-sized electrode for driving of an organic emission layer.” *Id.* ¶ 11.

4. *Lee ’149*

Lee ’149, titled “Organic Electroluminescent Device and Method for Fabricating the Same,” published on January 15, 2009, with a filing date of July 9, 2008. Ex. 1011, codes (54), (43), (22). In particular, Lee ’149 aims to prevent “infiltration of moisture or outgas into an organic electroluminescent layer” “by forming a plurality of passivation layers on a substrate on which the electroluminescent layer is formed.” *Id.* ¶ 18.

5. *Bae*

Bae, titled “Organic Electro-Luminescence Display Device and Method for Fabricating the Same,” published on June 8, 2006, with a filing date of November 20, 2005. Ex. 1012, codes (54), (43), (22). Bae seeks to “obviate one or more problems due to limitations and disadvantages of the related art” in part by providing “an organic electro-luminescence display device . . . in which electrodes can be separated from one another in sub-pixels without using a conventional reverse-taper-shape separator.” *Id.* ¶¶ 15–16.

6. *Analysis of Claims 1–5, 9, 12, and 13 over Weaver*

We begin by addressing in detail Petitioner’s contentions and Patent Owner’s arguments with respect to the limitations of representative claim 1.

i. Preamble, “A pixel structure”

Petitioner contends that, “[t]o the extent that the preamble is limiting, Weaver discloses ‘a pixel structure (Weaver’s circuit/array 300).’ Pet. 11 (citing Ex. 1003 ¶¶ 78–79). Patent Owner does not present arguments addressing the specific merits of Petitioner’s contentions with respect to the preamble. See generally PO Resp. 27–33.¹⁰

Having reviewed all of Petitioner’s assertions regarding this claim limitation, as well as the supporting evidence, we determine that Petitioner has made a sufficient showing that Weaver teaches a “pixel structure.”

ii. “a data line and a scan line,” “at least one active device electrically connected with the data line and the scan line,” “each active device comprises a gate, a channel layer, a source and a drain”

Petitioner contends that “Weaver discloses ‘a data line (data line 304) and a scan line (select line 306),’” wherein “each circuit . . . is connected to a data line 304 and a select line 306.” Pet. 12 (citing Ex. 1004 ¶¶ 19, 21, Figs 2–3; Ex. 1003 ¶¶ 80–82). Petitioner further contends that “Weaver discloses ‘at least one active device (transistor 208/308 and transistor 210/310/410) electrically connected with the data line (204/304) and the scan line (206/306),’” with “each active device comprising a gate (gate 408), a channel layer (a-Si layer 414), a source (source 220/405), and a drain (drain 218/407).” *Id.* at 12–13 (citing Ex. 1003 ¶¶ 83–88).

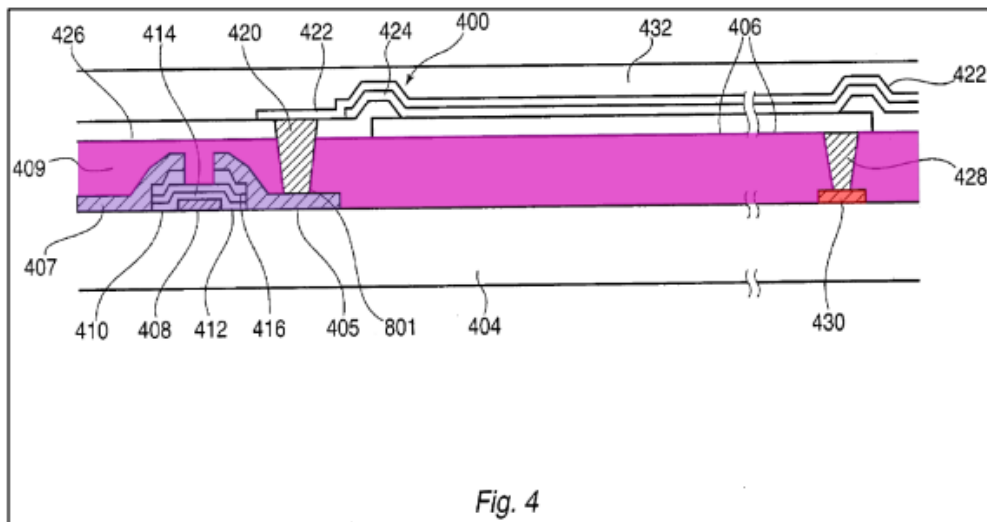
¹⁰ Because there is no dispute between the parties that Weaver teaches a pixel structure, as recited in the preamble, we need not decide whether the preamble is limiting. See *Nidec*, 868 F.3d at 1017.

Patent Owner does not present arguments addressing the specific merits of Petitioner's contentions with respect to these claim limitations. *See generally* PO Resp. 27–33.

Having reviewed all of Petitioner's assertions regarding these claim limitations, as well as the supporting evidence, we determine that Petitioner has made a sufficient showing that Weaver teaches “a data line and a scan line,” and “at least one active device electrically connected with the data line and the scan line,” wherein “each active device comprises a gate, a channel layer, a source and a drain.”

- iii. *“first auxiliary electrode electrically insulated from the active device,” “a light emitting device disposed above the first auxiliary electrode,” “the light emitting device comprises a first electrode layer electrically connected with the first auxiliary electrode”*

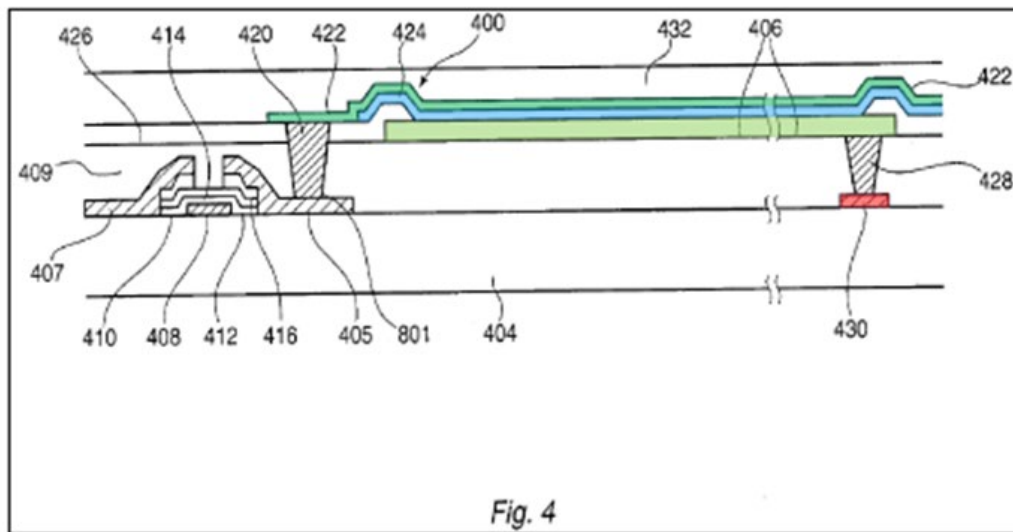
Petitioner contends that, like the '509 patent, Weaver discloses “a first auxiliary electrode . . . electrically insulated from the active device.” Pet. 16 (citing Ex. 1003 ¶¶ 89–94). Petitioner provides an annotated Figure 4 of Weaver, shown below, to illustrate its contentions.



The above annotated Figure 4 of Weaver, according to Petitioner, illustrates “bus line 430 [red] electrically insulated from transistor 410 [purple] by passivation layer 409 [pink].” Pet. 16 (citing Ex. 1004 ¶ 26, Fig. 4).

According to Petitioner, “Weaver discloses that bus line 430 is an electrode that is supplemental to other electrodes in the structure.” *Id.* at 18 (citing Ex. 1004 ¶ 26, Fig. 4; Ex. 1003 ¶ 92). Relying on Dr. Baker’s testimony, Petitioner further contends that a POSITA would have understood that “the plural electrical connections provided by vias 428 between anode 406 and bus line 430 means that the anode 406 and bus line 430 are connected in parallel,” which means that “bus line 430 is a supplemental electrode that reduces the total resistance of the pixel structure.” *Id.* at 19 (citing Ex. 1003 ¶ 94).

Petitioner then contends that Weaver discloses “a light emitting device (OLED 202, 302, 400) disposed above the first auxiliary electrode (bus line 430).” Pet. 19 (citing Ex. 1003 ¶¶ 95–96). Petitioner provides an annotated Figure 4 of Weaver, shown below, to illustrate its contentions.



The above annotated Figure 4 of Weaver, according to Petitioner, illustrates “OLED 400 [which] includes three layers (cathode 422 [dark green], organic layer 424 [blue], anode 406 [light green]), which are disposed above bus line 430 [red].” Pet. 20 (citing Ex. 1004 ¶ 26, Fig. 4). According to Petitioner, “Weaver discloses that OLED 400 includes anode 406 [light green], which is electrically connected to bus line 430 [red] by via 428.” *Id.*

Patent Owner responds that Weaver’s bus line 430 is not a “first auxiliary electrode” because it is primary and essential to the pixel structure (not auxiliary) and includes more than the end structure of a conductor for making electrical contact (not an electrode). PO Resp. 28–33. Patent Owner contends Weaver’s bus line 430 is not auxiliary because it is the “sole mechanism for transporting electricity to the pixel structure.” *Id.* at 28. More specifically, Patent Owner argues that “Weaver’s bus line 430 is connected in series with anode 406—the electricity flows from bus line 430 to anode 406 through point contacts (vias 428)” such that Weaver’s device would cease to function if bus line 430 were removed because “the diode would be deprived of its primary power source.” *Id.* at 28–29. Patent

Owner contends Weaver's bus line 430 is not an electrode because it encompasses the entirety of the bus line, not just the end structure. *Id.* at 32.

We find Patent Owner's arguments unavailing. In particular, we find unavailing Patent Owner's contention that "'bus line 430' is not an 'auxiliary electrode'" (PO Resp. 28–33), because Patent Owner is relying on a claim construction of "auxiliary electrode" as precluding "essential" elements and requiring "more than the end structure of a conductor" (*id.*), that is not adopted by our construction discussed above.

Here, we are persuaded by Petitioner's reliance on Weaver's bus line 430 for providing the claimed "electrode," that is "supplemental to other electrodes in the structure." Pet. 18; *see also* Ex. 1004 ¶ 26, Fig. 4; Ex. 1003 ¶ 92. We find availing Petitioner's contention, supported by Dr. Baker's testimony, that a POSITA would have understood that "anode 406 and bus line 430 are connected in parallel," which means that "bus line 430 is a supplemental electrode that reduces the total resistance of the pixel structure." Pet. 19; Ex. 1003 ¶ 94. Thus, we find availing Petitioner's contention, supported by Dr. Baker's testimony, that Weaver's bus line 430 is an electrode supplemental to other electrodes in the structure that is electrically insulated from transistor 410 by passivation layer 409, wherein OLED 400, which includes cathode 422, organic layer 424, and anode 406, is disposed above bus line 430, and wherein anode 406 of OLED 400 is electrically connected to bus line 430 by via 428. Pet. 16–19; Ex. 1003 ¶¶ 89–94. That is, we find availing Petitioner's contention that, like the '509 patent's auxiliary electrode 120, bus line 430 is electrically insulated from transistor 410, wherein OLED 400 is disposed above bus line 430 and anode 406 electrically connected with bus line 430. *Compare* Pet. 2–3 (annotated

Figure 2 of the '509 patent) *with id.* at 16, 20 (annotated Figure 4 of Weaver).

Having reviewed all of Petitioner's assertions regarding these claim limitations, as well as the supporting evidence, we determine that Petitioner has made a sufficient showing that Weaver teaches "first auxiliary electrode electrically insulated from the active device," "a light emitting device disposed above the first auxiliary electrode," "the light emitting device comprises a first electrode layer electrically connected with the first auxiliary electrode."

- iv. *the light emitting device further comprises "a light emitting layer disposed on the first electrode layer," "a second electrode layer disposed on the light emitting layer, wherein the second electrode layer is electrically connected with the active device"*

Petitioner contends that "Weaver discloses that OLED 400 includes organic layer 424, which is disposed on anode 406," and thus "Weaver discloses 'a light emitting layer (organic layer 424) disposed on the first electrode layer (anode 406).'" Pet. 21 (citing Ex. 1004 ¶ 26, Fig. 4; Ex. 1003 ¶¶ 99–100). Petitioner further contends that "Weaver discloses 'a second electrode layer (cathode 422) disposed on the light emitting layer (organic layer 424), wherein the second electrode layer is electrically connected with the active device (transistor 410).'" *Id.* at 21–22 (citing Ex. 1003 ¶¶ 101–03).

Patent Owner does not present arguments addressing the specific merits of Petitioner's contentions with respect to these claim limitations. *See generally* PO Resp. 27–33.

Having reviewed all of Petitioner’s assertions regarding these claim limitations, as well as the supporting evidence, we determine that Petitioner has made a sufficient showing that Weaver teaches that the light emitting device further comprises “a light emitting layer disposed on the first electrode layer,” and “a second electrode layer disposed on the light emitting layer,” wherein “the second electrode layer is electrically connected with the active device.”

v. *Claim 1 Conclusion*

Based on the complete record presented, we determine Petitioner has shown by a preponderance of the evidence that Weaver anticipates claim 1.

vi. *Claims 2–5, 9, 12, and 13*

Petitioner provides detailed explanations as to how Weaver anticipates claims 2–5, 9, 12, and 13, depending from claim 1, citing Dr. Baker’s testimony for support. Pet. 22–29 (citing Ex. 1004 ¶¶ 25–29, 35–37, Figs. 4, 7–8; Ex. 1003 ¶¶ 104–20). Patent Owner merely contends that “[c]laims 2–5, 9, and 12–13 depend from claim 1 and are not anticipated for at least the same reasons.” See PO Resp. 33.

We have reviewed Petitioner’s explanations and supporting evidence regarding the limitations of claims 2–5, 9, 12, and 13 (Pet. 22–29). Based on the complete record presented, we determine Petitioner has shown by a preponderance of the evidence that Weaver anticipates claims 2–5, 9, 12, and 13.

vii. *Ground 1 Conclusion*

Based on the complete record presented, we determine that Petitioner has demonstrated that Weaver anticipates claims 1–5, 9, 12, and 13.

7. *Analysis of claims 6–8 over Weaver and Lee '053 or over Weaver and Song; of claims 10 and 11 over Weaver and Lee '149 or over Weaver and Bae*

Petitioner provides detailed explanations as to how the combination of Weaver and Lee '053 allegedly renders obvious claims 6–8 of the '509 patent, how the combination of Weaver and Song allegedly renders obvious claims 6–8 of the '509 patent, how the combination of Weaver and Lee '149 allegedly renders obvious claims 10 and 11 of the '509 patent, and how the combination of Weaver and Bae allegedly renders obvious claims 10 and 11 of the '509 patent, citing Dr. Baker's testimony for support. Pet. 29–71 (citing Ex. 1004 ¶¶ 17, 24, 30, 34, 36, Figs. 2, 4, 6; Ex. 1005 ¶¶ 8, 69, 71, 73–74, 76–77, 81, 85, 89, 91–93, Figs. 2, 7; Ex. 1006 ¶¶ 59, 69, 90–91, 98, Fig. 5; Ex. 1011 ¶¶ 25, 27, 38, Fig. 1; Ex. 1012 ¶¶ 37, 41–43, 48, 59, Figs. 3–4; Ex. 1003 ¶¶ 122–46, 148–73, 175–92, 194–212).

As to claims 6–8, Petitioner contends that it would have been obvious to a POSITA to combine the teachings of Weaver and Lee '053 to reconfigure the bus line 430 of Weaver with “a bottom electrode layer (akin to Lee['053's dummy wiring 120) that is electrically connected with a top electrode layer (akin to Lee['053's second power wiring 135).” Pet. 31. Petitioner contends that Weaver and Lee '053 are analogous prior art to the '509 patent, whereas a POSITA would have understood the problem involved, namely that “higher resistance between the power or ground line to the light emitting device would consume more power and require higher operating voltages,” and “can require larger wiring widths in order to achieve a desired performance.” *Id.* at 32–33 (citing Ex. 1005 ¶¶ 85, 93; Ex. 1003 ¶ 128). According to Petitioner, to overcome this problem, Lee '053 discloses the solution of “providing the auxiliary electrode, (electrically

connected to one of the LED electrodes) configured as two electrode layers (top electrode layer and bottom electrode layer),” wherein doing so “reduces resistance, and can allow for reduced wiring widths,” as disclosed in Lee ’053. *Id.* Thus, according to Petitioner, a POSITA would have been motivated “to implement the solution of Lee[’]053 in the Weaver device to lower the resistance between node 406 and the voltage source VDD,” and/or “allow for reduced wiring widths that enables scaling down the size of the circuit.” *Id.*

Similarly, Petitioner contends that it would have been obvious to combine the teachings of Weaver and Song to reconfigure the bus line 430 of Weaver with “a top electrode layer (akin to Song’s top electrode layer of first auxiliary electrode portion SE1) that is electrically connected with a bottom electrode layer (akin to Song’s bottom electrode layer of first auxiliary electrode portion SE1).” Pet. 46. Petitioner contends that Weaver and Song are analogous prior art to the ’509 patent, wherein Song discloses “providing the auxiliary electrode, (electrically connected to one of the LED electrodes) configured as two electrode layers (top electrode layer and bottom electrode layer),” which, similar to Lee ’053, also “reduces resistance and voltage drop.” *Id.* at 46–47 (citing Ex. 1006 ¶ 98; Ex. 1003 ¶ 155). Thus, according to Petitioner, a POSITA would similarly have been motivated “to implement the solution of Song in the Weaver device to lower the resistance and voltage drop between anode 406 and the voltage source VDD of Weaver.” *Id.* at 47.

As to claims 10 and 11, Petitioner contends that it would have been obvious to a POSITA to combine the teachings of Weaver and Lee ’149 “to add a second auxiliary electrode to the side of the OLED 400 of Weaver

(akin to Lee[']149's electrode pattern." Pet. 57. Petitioner contends that Weaver and Lee '149 are analogous prior art to the '509 patent, and similarly contends that a POSITA would have understood that "higher sheet resistance between the power or ground line to the light emitting device would consume more power and require higher operating voltages." *Id.* at 58 (citing Ex. 1011 ¶¶ 25, 38; Ex. 1003 ¶ 182). According to Petitioner, Lee '149 discloses "providing the second auxiliary electrode (electrode pattern 45) disposed at a side of the light emitting device and electrically connected to the light emitting device's first electrode layer (first electrode 41)," and "explicitly teaches that 'the electrode pattern 45 serves to lower the resistance of the first electrode 41." *Id.* (citing Ex. 1011 ¶ 38). Thus, according to Petitioner, a POSITA would similarly have been motivated "to implement the solution of Lee[']149 in the Weaver device to lower the resistance and voltage drop between anode 406 and the VDD line of Weaver." *Id.*

Petitioner then similarly contends that it would have been obvious to a POSITA to combine the teachings of Weaver and Bae "to add a second auxiliary electrode to the side of the OLED 400 of Weaver (akin to Bae's auxiliary electrode 139." Pet. 66. According to Petitioner, Bae discloses "providing the second auxiliary electrode (auxiliary electrode 139) disposed at a side of the light emitting device and electrically connected to the light emitting device's first electrode layer (first electrode 132)," wherein Bae "explicitly teaches that the "auxiliary electrodes 139 contact the first electrode 132 to commonly apply a voltage to the sub-pixels" and "reduces the resistance of the first electrode." *Id.* (citing Ex. 1012 ¶¶ 37, 59). Thus, according to Petitioner, a POSITA would similarly have been motivated "to

implement the solution of Bae in the Weaver device to lower the resistance and voltage drop between anode 406 and the VDD line of Weaver.” *Id.* at 67.

Patent Owner contends that none of Lee ’053, Song, Lee ’149, or Bae “cure[s] the fact that Weaver’s bus line 430 is not an auxiliary electrode under the plain and ordinary meaning of the terms.” *See* PO Resp. 33, 35–36, 39, 43.

Patent Owner also contends a person of ordinary skill in the art would not have combined Weaver with Lee ’053, Song, Lee ’149, or Bae without the use of hindsight. *See* PO Resp. 33–45. In particular, Patent Owner argues a person of ordinary skill in the art would not have combined Weaver with Lee ’053 because the proposed modifications to Weaver would involve changing the process as “Weavers bus line 430 is an etch stop, meaning it cannot be etched without changing the process,” and Lee ’053 uses “dummy wiring,” wherein “[t]here is no structure in Weaver that corresponds to the ‘dummy wiring’ of Lee[’]053 that can be used.” *Id.* at 33–34. Similarly, Patent Owner argues a person of ordinary skill in the art would not have combined Weaver with Song because it also involves changing the process, and that “Song’s auxiliary electrode AE plainly involves a multifaceted structure that extends over a portion of the anode, which is a complex and completely different design from that of Lee, which teaches using ‘dummy wiring’ that is not part of a larger, complex structure.” *Id.* at 37–39.

Patent Owner further argues that Petitioner and its expert do not illustrate how the combination of Weaver and Lee ’149 would be implemented, and that “Petitioner fails to explain why a POSITA who could increase the width of bus line 430 (and thus, already lowered the bus line

resistance) would further need to include an ‘additional electrode layer’” as proposed by Lee ’149. PO Resp. 39–43. Patent Owner similarly argues that Petitioner and its expert do not illustrate how the combination of Weaver and Bae would be implemented, and that Petitioner fails to explain why a POSITA would have changed the structure and process in Weaver. *Id.* at 43–45.

We are unpersuaded by Patent Owner’s contention that Lee ’053, Song, Lee ’149, and Bae do not cure “the fact that Weaver’s bus line 430 is not an auxiliary electrode.” PO Resp. 33, 35–36, 39, 43. As discussed *supra*, we determine that Petitioner has made a sufficient showing that Weaver teaches the “auxiliary electrode” as claimed.

We also find unavailing Patent Owner’s contention that the proposed modifications to Weaver would involve changing the process. PO Resp. 33–34. We agree with Petitioner, whose contentions are supported by Dr. Baker’s testimony, that “to provide additional components from the same layer is a layout change that a POSITA would have been able to perform without changing the process.” Pet. Reply 17–18 (citing Ex 1003 ¶ 157; Ex. 1020 ¶ 45).

Further, contrary to Patent Owner’s contention that POSITA would not have combined Weaver with Lee ’053, Song, Lee ’149, or Bae without the use of hindsight (PO Resp. 33–45), as Petitioner points out, Lee ’149, for example, “explicitly teaches that ‘the electrode pattern 45 serves to lower the resistance of the first electrode 41.’” Pet. Reply 58 (citing Ex. 1011 ¶ 38). Similarly, Bae “explicitly teaches that the “auxiliary electrodes 139 contact the first electrode 132 to commonly apply a voltage to the sub-pixels” and “reduces the resistance of the first electrode.” *Id.* at 66 (citing Ex. 1012

¶¶ 37, 59). As such, Petitioner’s proposed combinations are supported by at least by Lee ’149’s and Bae’s teachings of applying a second electrode to lower the resistance and voltage drop between anode 406 and the VDD line of Weaver. *See, e.g.*, Ex. 1011 ¶ 38; Ex. 1012 ¶¶ 37, 59.

We are persuaded by Dr. Baker’s testimony that a POSITA would have understood that higher resistance between the power or ground line to the light emitting device would consume more power and require higher operating voltages, and thus, would have been motivated to implement the solutions of Lee ’053, Song, Lee ’149, or Bae to lower the resistance between anode 406 and voltage source VDD in Weaver. Ex. 1003 ¶¶ 145, 158, 184, 203. We agree with Petitioner, supported by Dr. Baker’s testimony, that a POSITA would have had a reasonable expectation of success the combining the references as suggested, wherein such modification “involves modifications of only routine skill in the art,” which “involve known method,” and “would have yielded predictable results. Pet. 42, 48–49, 59, 67–68; Ex. 1003 ¶¶ 145, 158, 184, 203. That is, we determine that Petitioner has set forth reasoning with rational underpinning explaining why it would have been obvious to combine the teachings with a reasonable expectation of success.

Based on the complete record presented, we determine Petitioner has shown by a preponderance of the evidence that claims 6–8 would have been obvious over the combination of Weaver and Lee ’053 or alternatively over the combination of Weaver and Song, and that claims 10 and 11 would have been obvious over the combination of Weaver and Lee ’149 or alternatively over the combination of Weaver and Bae.

E. Claims 1–5, 9, 12, and 13 as Allegedly Obvious over Weaver and Gupta or Han; Claims 6–8 as Allegedly Obvious over Weaver, Lee '053 and Gupta or Han or Weaver, Song and Gupta or Han; Claims 10 and 11 as Allegedly Obvious over Weaver, Lee '149 and Gupta or Han or over Weaver, Bae and Gupta or Han

Petitioner contends that claims 1–5, 9, 12, and 13 would have been obvious over Weaver and Gupta or Han. Pet. 71–78. Petitioner further contends that claims 6–8 would have been obvious over Weaver, Lee '053 and Gupta or Han (*id.* at 78–79) or over Weaver, Song and Gupta or Han (*id.* at 79); and that claims 10 and 11 would have been obvious over Weaver, Lee '149 and Gupta or Han (*id.* at 79–80) or over Weaver, Bae and Gupta or Han (*id.* at 80–81).

In response, Patent Owner contends that, for these grounds, “[n]either Gupta nor Han cure the fact that Weaver’s bus line 430 is not an auxiliary electrode under the plain and ordinary meaning of the terms,” and a person of ordinary skill in the art would not have combined Gupta or Han with the other prior art references. *See* PO Resp. 46–55.

We briefly summarize Gupta and Han below.

1. Gupta

Gupta, titled “Reducing Sheet Resistance for Common Electrode in Top Emission Organic Light Emitting Diode Display,” issued on July 21, 2015, with a filing date of March 6, 2013. Ex. 1009, codes (54), (45), (22). Gupta relates to “top emission AMOLED displays having a conductive mesh(es) or conductive strips coupled to a common electrode to reduce sheet resistance,” which “helps save power consumption in operating the AMOLED displays.” *Id.* at 4:55–60.

2. *Han*

Han, titled “Organic-Light-Emitting-Diode Flat-Panel Light-Source Apparatus and Method of Manufacturing the Same,” published on October 13, 2011, with a filing date of April 1, 2011. Ex. 1010, codes (54), (45), (22). Han relates to “improv[ing] the uniformity of electrical and optical properties of a large-area OLED flat-panel light-source apparatus required for an illumination system and a display device.” *Id.* ¶ 3.

3. *Analysis of claims 1–5, 9, 12, and 13 over Weaver and Gupta or Han*

Petitioner contends that if the Board were to conclude that “Weaver does not disclose an auxiliary electrode under the narrow construction (‘supplemental electrode to reduce the total resistance of the pixel structure’),” then “Weaver in combination with Gupta or Han renders obvious ‘a first auxiliary electrode (Weaver’s bus line 430 modified with a parallel connection with anode 406) electrically insulated from the active device (Weaver’s transistor 410).” Pet. 72 (citing Ex. 1003 ¶¶ 218–28). In particular, Petitioner argues that Gupta discloses “resistor 238 . . . added to be in parallel with the anode sheet resistance 234B to reduce the total resistance between anode 230 and VDD 202,” wherein “resistor 238 may be formed of a conductive mesh or strip,” and “is a supplemental electrode that reduces the total resistance of the pixel structure.” *Id.* at 73–74 (citing Ex. 1009, 4:55–60, 5:8–9, 7:42–43, 8:3–14, Figs. 2A–2C). Petitioner also contends that “Han discloses a solution that includes the addition of ‘first and third subsidiary electrodes 750 and 770, which may be bonded to the anode 720 and function to reduce a resistance component of the anode

720.”” *Id.* at 74–75 (citing Ex. 1010 ¶¶ 8–9, 30–33, Fig. 7A; Ex. 1003 ¶ 222).

Petitioner then contends that “[a] POSITA would have had a reasonable expectation of success in combining Weaver with Gupta or Han, as all [of] these references disclose the various electrodes and connections for operating an organic light emitting device.” Pet. 77 (citing Ex. 1003 ¶ 228). In particular, Petitioner contends that it would have been obvious to a POSITA to combine the teachings of Weaver and either Gupta or Han “so that bus line 430 of Weaver is connected in parallel with anode 406 to voltage supply line VDD,” in order to “recue the overall resistance of the pixel structure that includes OLED 400.” Pet. 75.

Petitioner contends that Gupta, Han and Weaver are analogous prior art to the ’509 patent, whereas a POSITA “would have understood the problem involved.” Pet. 75 (citing Ex. 1009, 1:58–61; Ex. 1010 ¶ 9; Ex. 1003 ¶ 225). According to Petitioner, to overcome this problem, Gupta and Han disclose the solution of “connecting the auxiliary electrode and the anode in parallel so as to reduce the total resistance of the pixel structure that includes the OLED.” *Id.* at 75–76. Thus, according to Petitioner, a POSITA would have been motivated “to implement the solution of Gupta or Han in the Weaver device to lower the resistance and voltage drop between anode 406 and the VDD line of Weaver.” *Id.* at 76.

Patent Owner argues Petitioner has not adequately shown why a person of ordinary skill in the art would have combined Weaver with Gupta or Han because Petitioner’s expert relies on hindsight, and Petitioner fails to explain why a POSITA would have changed the structure or fabrication process in Weaver. PO Resp. 46–49.

Regarding Gupta, Patent Owner argues that modifying Weaver's non-electrode bus line 430 to be in parallel with Gupta's non-electrode resistor merely results in two non-electrode components in parallel that do not meet the "electrode" of independent claim 1. PO Resp. 53 (citing Ex. 2026 ¶ 160). Patent Owner argues further that Petitioner does not explain why a person of ordinary skill in the art would have combined Gupta's resistor 238 with Weaver's bus line because Gupta's resistor 238 is a mesh (rather than a discrete resistor) that "looks nothing like Weaver's design and looks nothing like Petitioner's proposed result." *Id.* at 53–55.

Regarding Han, Patent Owner argues that "Han is directed towards the use of OLEDs in light sources, which are much larger than pixels in a display," wherein "[t]he vastly larger size and different purpose of flat panel light sources led to different engineering problems" and solutions. PO Resp. 49–51 (citing Ex. 1003 ¶ 3). According to Patent Owner, a person of ordinary skill in the art would not have modified Weaver by adding Han's branched electrodes because of the differences in size scale, and attempts to do so would have resulted in modifications that are very different from those proposed by Dr. Baker. *Id.* at 51–52.

We are unpersuaded by Patent Owner's contention that POSITA would not have combined Weaver with Gupta or Han without the use of hindsight. PO Resp. 46–49. As Petitioner points out, Han, for example, explicitly teaches "subsidiary electrodes 750, 770 electrically connected to anode 720 'in parallel' to reduce IR drop." Pet. Reply 26–27 (citing Ex. 1010 ¶ 33). As such, Petitioner's proposed combinations are supported by at least by Han's teachings of "connect[ing] the anode and bus line in parallel to lower IR drop." *Id.* As discussed above, we find availing Petitioner's

contentions that POSITA would have been able to perform a layout change without changing the process.

Although Patent Owner argues that a POSITA would not have combined Gupta's resistor 238 with Weaver's bus line because Gupta's resistor 238 is a mesh (PO Resp. 53–55), as Petitioner points out, "Gupta expressly discloses: 'The resistor 238 may be formed of a conductive mesh or *strip*.'" Pet. Reply 27 (citing Ex. 1009, 7:42–43).

We find availing Petitioner's contention, as supported by Dr. Baker's testimony, that a POSITA would have understood that "higher resistance between the power or ground line to the light emitting device would increase the IR-drop and power consumption to operate the OLEDs" wherein, the POSITA would have implemented the solutions in Gupta and Han. Pet. 75–76 (citing Ex. 1009, 1:58–61, Ex. 1010 ¶ 9; Ex. 1003 ¶¶ 225–226).

Based on the complete record presented, we determine Petitioner has shown by a preponderance of the evidence that claims 1–5, 9, 12, and 13 would have been obvious over the combination of Weaver and Gupta or Han.

4. *Analysis of claims 6–8 over Weaver, Lee '053 and Gupta or Han or over Weaver, Song and Gupta or Han; of claims 10 and 11 Weaver, Lee '149 and Gupta or Han, or over Weaver, Bae and Gupta or Han*

Petitioner contends that claims 6–8 would have been obvious over Weaver, Lee '053 and Gupta or Han (Pet. 78–79) or over Weaver, Song and Gupta or Han (*id.* at 79); and that claims 10 and 11 would have been obvious over Weaver, Lee '149 and Gupta or Han (*id.* at 79–80) or over Weaver, Bae and Gupta or Han (*id.* at 80–81). Petitioner references the above discussed detailed explanations as to how the combination of Weaver and Lee '053

allegedly renders obvious claims 6–8 of the ’509 patent, how the combination of Weaver and Song allegedly renders obvious claims 6–8 of the ’509 patent, how the combination of Weaver and Lee ’149 allegedly renders obvious claims 10 and 11 of the ’509 patent, and how the combination of Weaver and Bae allegedly renders obvious claims 10 and 11 of the ’509 patent, citing Dr. Baker’s testimony for support. *See above* Section II(D)(7). Patent Owner contends that these combinations of references fail for the same reasons discussed above. *See* PO Resp. 55.

For the same reasons discussed above in Section II(D)(7), we find Patent Owner’s contentions unavailing. Based on the complete record presented, we determine Petitioner has shown by a preponderance of the evidence that claims 6–8 would have been obvious over the combination of Weaver, Lee ’053, and Gupta or Han, or alternatively over the combination of Weaver, Song, and Gupta or Han; and that claims 10 and 11 would have been obvious over the combination of Weaver, Lee ’149, and Gupta or Han, or alternatively over the combination of Weaver, Bae, and Gupta or Han.

F. Secondary Considerations of Nonobviousness

“[E]vidence rising out of the so-called ‘secondary considerations’ must always when present be considered en route to a determination of obviousness.” *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349 (Fed. Cir. 2012) (quoting *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538 (Fed. Cir. 1983)). “For objective evidence of secondary considerations to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention.” *In re Huai-Hung Kao*,

639 F.3d 1057, 1068 (Fed. Cir. 2011) (quoting *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1246 (Fed. Cir. 2010)).

“[T]here is no nexus unless the evidence presented is ‘reasonably commensurate with the scope of the claims.’” *ClassCo, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1220 (Fed. Cir. 2016) (quoting *Rambus Inc. v. Rea*, 731 F.3d 1248, 1257 (Fed. Cir. 2013)). The patentee “bears the burden of showing that a nexus exists.” *WMS Gaming, Inc. v. Int’l Game Tech.*, 184 F.3d 1339, 1359 (Fed. Cir. 1999).

The Board employs a two-step analysis in evaluating whether a patentee has established a nexus between the evidence concerning objective indicia of non-obviousness and the merits of the claimed invention. *See Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 33 at 32–33 (PTAB Jan. 24, 2020) (precedential). Initially, the Board considers whether the patentee has demonstrated that the “products are coextensive (or nearly coextensive) with the challenged claims,” resulting in a rebuttable presumption of nexus. *Id.* at 33. Absent a presumption of nexus, the Board considers whether the patentee has demonstrated “a legally and factually sufficient connection” between the evidence and the claimed invention. *See Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019); *Lectrosonics*, IPR2018-01129, Paper 33 at 33.

Patent Owner merely alleges the amount of time Dr. Baker spent preparing his declaration and preparing for his deposition is “affirmative evidence that it is not obvious how Weaver can be modified” because Dr. Baker “could not describe how to draw the device that would result from his allegedly ‘obvious’ combination.” PO Resp. 20–21. However, as Petitioner points out, Patent Owner “does not identify a single objective indicia of

nonobviousness that applies to the 509 patent.” Pet. Reply 8. In particular, Patent Owner does not even attempt to establish a nexus between this “affirmative evidence” and the merits of the claimed invention. *Id.*; see *In re Huai-Hung Kao*, 639 F.3d 1057, 1068 (Fed. Cir. 2011). Thus, we do not find Patent Owner’s “affirmative evidence” (PO Resp. 20–21) to be sufficient.

On this record, we find that the value that Patent Owner’s objective evidence possesses in establishing non-obviousness is weak in comparison to the evidence regarding the prior art under the first three *Graham* factors. See *Graham*, 383 U.S. at 36 (holding that alleged secondary considerations of commercial success and long-felt need did not “tip the scales of patentability” where the invention “rest[ed] upon exceedingly small and quite non-technical mechanical differences in a device which was old in the art”).

III. PATENT OWNER’S MOTION TO EXCLUDE

Patent Owner moves to terminate the proceeding or to exclude Dr. Baker’s declarations (Exs. 1003, 1020) because 1) Dr. Baker does not qualify as a POSITA; 2) Dr. Baker’s “opinion is not ‘the product of reliable principles and methods’” as required by Fed. R. Evid. 702(c); and 3) Dr. Baker’s opinion “does not reflect ‘a reliable application of the principles and methods to the facts of the case’” as required by Fed. R. Evid. 702(d). Exclude Mot. 1.

Patent Owner argues that Dr. Baker does not qualify as a POSITA because “he does not have experience in the design and manufacture of LED or OLED pixels for flat panel displays.” Exclude Mot. 2–4; Exclude Reply 1–2. Patent Owner then argues that Dr. Baker’s opinion should be excluded

under Fed. R. Evid. 702(c) and (d) because he “openly and impermissibly relies on hindsight to reconstruct the language of the claims.” Exclude Mot. 4. Further, Patent Owner argues that Dr. Baker’s opinion should be excluded as unreliable because his testimony contained “pervasive inconsistencies surrounding what a person of ordinary skill in the art would or would not be able to do.” *Id.* at 7. According to Patent Owner, Dr. Baker fundamentally misunderstood the technology described in the ’509 patent. *Id.* at 7–11.

Petitioner responds by arguing that Patent Owner’s arguments rely on the wrong definition of a POSITA, and Dr. Baker is a POSITA under the correct definition. Exclude Opp. 1–4. Petitioner argues that Dr. Baker’s opinions should not be excluded because he did not engage in hindsight and did not take contradictory positions regarding changes to Weaver’s process. *Id.* at 4–7.

As an initial matter, we agree with Petitioner that Patent Owner’s arguments rely on the wrong definition of a POSITA. Exclude Opp. 1. That is, by arguing that Dr. Baker does not qualify as a POSITA because “he does not have experience in the design and manufacture of LED or OLED pixels for flat panel displays” (Exclude Mot. 2), Patent Owner is relying on its proposed definition for POSITA that we rejected above.

Nevertheless, although Patent Owner argues that Dr. Baker’s opinion should be excluded because he “openly and impermissibly relies on hindsight to reconstruct the language of the claims” wherein his testimony contained “pervasive inconsistencies surrounding what a person of ordinary skill in the art would or would not be able to do” (Exclude Mot. 4, 7), such arguments are directed to Dr. Baker’s testimony’s weight, rather than its

admissibility. As the Board has previously indicated, “there is a strong public policy for making all information filed in an administrative proceeding availing to the public.” *See Liberty Mut. Ins. Co. v. Progressive Cas. Ins. Co.*, CBM2012-00010, Paper 59 at 40 (PTAB February 24, 2014). Here, as to Dr Baker’s testimony, the Board, sitting as a non-jury tribunal with administrative expertise, is well positioned to determine and assign appropriate weight to evidence presented. *See, e.g., Donnelly Garment Co. v. NLRB*, 123 F.2d 215, 224 (8th Cir. 1941) (“One who is capable of ruling accurately upon the admissibility of evidence is equally capable of sifting it accurately after it has been received”). Thus, in this proceeding, the better course is to have a complete record of the evidence to facilitate public access as well as appellate review. *See id.* (“If the record on review contains not only all evidence which was clearly admissible, but also all evidence of doubtful admissibility, the court which is called upon to review the case can usually make an end of it, whereas if evidence was excluded which that court regards as having been admissible, a new trial or rehearing cannot be avoided.”).

On this record, we deny Patent Owner’s Motion to Exclude.

IV. CONCLUSION¹¹

For the foregoing reasons, we determine on the record at hand that Petitioner has demonstrated by a preponderance of the evidence that challenged claims 1–13 of the ’509 patent are unpatentable.

¹¹ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 Notice Regarding Options for Amendments by Patent Owner Through Reissue or

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–5, 9, 12, 13	102	Weaver	1–5, 9, 12, 13	
6–8	103	Weaver, Lee '053	6–8	
6–8	103	Weaver, Song	6–8	
10, 11	103	Weaver, Lee '149	10, 11	
10, 11	103	Weaver, Bae	10, 11	
1–5, 9, 12, 13	103	Weaver, Gupta or Han	1–5, 9, 12, 13	
6–8	103	Weaver, Lee '053, Gupta or Han	6–8	
6–8	103	Weaver, Song, Gupta or Han	6–8	
10, 11	103	Weaver, Lee '149, Gupta or Han	10, 11	
10, 11	103	Weaver, Bae, Gupta or Han	10, 11	
Overall Outcome			1–13	

V. ORDER

For the reasons given, it is

ORDERED that, based on the preponderance of the evidence, claims 1–13 of the '509 patent have been shown to be unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Exclude is *denied*; and

Reexamination During a Pending AIA Trial Proceeding. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

IPR2024-01133
Patent 9,263,509 B2

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

IPR2024-01133
Patent 9,263,509 B2

FOR PETITIONER:

Alan A. Limbach
Brian Erickson
DLA PIPER LLP (US)
alan.limbach@us.dlapiper.com
brian.erickson@us.dlapiper.com

FOR PATENT OWNER:

Qi (Peter) Tong
RUSS AUGUST & KABAT
ptong@raklaw.com