

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.,
Petitioner,

v.

LED WAFER SOLUTIONS, LLC,
Patent Owner.

IPR2021-01526
Patent 9,786,822 B2

Before LYNNE E. PETTIGREW, JEFFREY W. ABRAHAM, and
TERRENCE W. McMILLIN, *Administrative Patent Judges*.

PETTIGREW, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Petitioner, Samsung Electronics Co., Ltd., filed a Petition for *inter partes* review of claims 1, 2, and 5–10 of U.S. Patent No. 9,786,822 B2 (Ex. 1001, “the ’822 patent”). Paper 1 (“Pet.”). Patent Owner, LED Wafer Solutions, LLC, filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). With our authorization, Petitioner filed a Reply to the Preliminary Response (Paper 7) and Patent Owner filed a Sur-reply (Paper 8).

Under 35 U.S.C. § 314 and 37 C.F.R. § 42.4(a), we have authority to institute an *inter partes* review if “the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a). After considering the parties’ briefing and the evidence of record, we conclude the information presented does not show there is a reasonable likelihood that Petitioner would prevail in establishing the unpatentability of at least one of the challenged claims of the ’822 patent. Accordingly, we do not institute an *inter partes* review.

II. BACKGROUND

A. Real Parties-in-Interest

Petitioner identifies Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Samsung Semiconductor, Inc. as real parties-in-interest. Pet. 1. Patent Owner identifies LED Wafer Solutions, LLC as the real party-in-interest. Paper 4, 1 (Patent Owner’s Mandatory Notices).

B. Related Matters

The parties identify the following pending district court proceeding related to the ’822 patent: *LED Wafer Solutions, LLC v. Samsung Electronics Co., Ltd.*, Case No. 6:21-cv-292 (W.D. Tex.). Pet. 1; Paper 4, 1.

Petitioner asserts that the '822 patent is related to U.S. Patent No. 8,941,137 (“the '137 patent”) and identifies IPR2021-01506, challenging claims of the '137 patent, as a related matter. Pet. 1. Patent Owner further identifies the following related matters in which additional patents owned by Patent Owner are challenged: IPR2021-01479, IPR2021-01491, IPR2021-01504, IPR2021-01516, and IPR2021-01554. Paper 4, 1–2.

C. Overview of the '822 Patent

The '822 patent is titled “Light Emitting Diode Package and Method of Manufacture.” Ex. 1001, code (54). The '822 patent explains that “[a] light emitting diode (LED) is a semiconductor device configured to receive electrical power or stimulation and to output electromagnetic radiation,” and that “[t]he output energy or light is determined by the band gap of the semiconductor materials and operating conditions of the LED.” *Id.* at 1:23–32. The '822 patent explains that LEDs “compare favorably to other sources of light” and provide advantages such as energy efficiency and long-lasting designs, but “conventional LED devices can be relatively costly to manufacture by some metrics when compared to other light sources” due to their exacting packaging requirements. *Id.* at 1:33–48. The '822 patent provides an LED device and packaging for the same in which “the LED is manufactured by epitaxial growth or other chemical or physical deposition techniques of a plurality of layers” and has certain layers which “act to promote mechanical, electrical, thermal, or optical characteristics of the device.” *Id.* at 2:6–11. According to the '822 patent, its device “avoids design problems, including manufacturing complexities, costs and heat dissipation problems found in conventional LED devices.” *Id.* at 2:11–13.

Figure 6 of the '822 patent, reproduced below, shows a cross sectional view of an exemplary LED device. *Id.* at 2:63–64, 4:55–56.

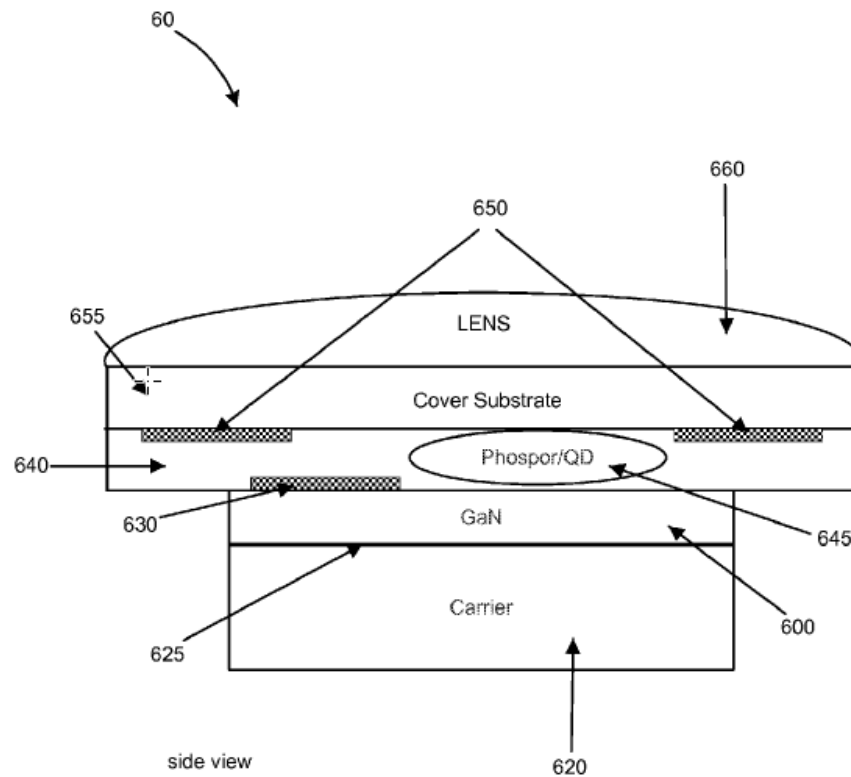


Figure 6 above depicts LED device 60 having GaN LED layer 600, carrier layer 620, metallic interface 625, metal pad 630, optically transparent or transmissive adhesive layer 640, region 645 containing phosphor and/or quantum dot material, alignment marks 650, optically transparent or transmissive cover substrate 655, and lens 660. *Id.* at 4:55–5:25. As shown in Figure 6, one face of LED 600 is proximal to carrier layer 620 and the opposite face of LED 600 is proximal to transparent adhesive layer 640. *Id.* at 4:60–65. The '822 patent explains “[i]n operation, photons emitted from LED layer 600 travel through said optically transparent adhesive layer 640 and the region containing the phosphor and/or quantum dots 645. This causes color (wavelength) control and emission of selective desired light out

of the LED device.” *Id.* at 5:11–16. The ’822 patent further explains that cover substrate 655 provides “structural presence and mechanical coupling for elements of the LED device 60,” and optical lens 660 “can act to spread, diffuse, collimate, or otherwise redirect and form the output of the LED.” *Id.* at 5:21–30.

D. Challenged Claims

Petitioner challenges claims 1, 2, and 5–10 of the ’822 patent. *See* Pet. 2–3. Of the challenged claims, claim 1 is an independent apparatus claim, and the other challenged claims depend directly or indirectly from claim 1. *Id.* at 8:28–56, 9:4–21. Claim 1 is illustrative and recites:

1. A light emitting device, comprising:
 - an optically transparent cover substrate;
 - an optically transparent layer attached to a bottom surface of said optically transparent cover substrate, said optically transparent layer including an optically definable material;
 - a semiconductor LED including a positively-doped region, an intrinsic region, and a negatively-doped region, wherein said intrinsic region is between said positively-doped region and said negatively-doped region, and a first surface of said semiconductor LED contacts a first portion of a bottom surface of said optically transparent layer;
 - a carrier layer proximal to a second surface of said semiconductor LED, said first and second surfaces on opposing sides of said semiconductor LED;
 - a passivation layer disposed on said carrier layer and on an exposed portion of said bottom surface of said optically transparent layer;
 - a first electrical contact disposed on said carrier layer in a first contact hole defined in said passivation layer; and

a second electrical contact disposed in a second contact hole defined in said passivation layer, said carrier layer, and said semiconductor LED, said second electrical contact in electrical communication with said first surface of said semiconductor LED.

Ex. 1001, 8:28–53.

E. Asserted Grounds of Unpatentability

Petitioner asserts that the challenged claims are unpatentable based on the following grounds (Pet. 2–4):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1, 2, 5–9	103(a) ¹	Wirth ²
10	103(a)	Wirth, Lin ³
1, 2, 5–9	103(a)	Wirth, Applicant Admitted Prior Art (AAPA)
10	103(a)	Wirth, AAPA, Lin
1, 2, 5–9	103(a)	Wirth, Camras ⁴
10	103(a)	Wirth, Camras, Lin

In support of its contentions, Petitioner relies on the Declaration of Dr. R. Jacob Baker. (Ex. 1002).

III. DISCUSSION

A. Principles of Law

A claim is unpatentable under § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a

¹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 285–88 (2011), revised 35 U.S.C. § 103 effective March 16, 2013. Because the ’822 patent has an effective filing date prior to the effective date of the applicable AIA amendment, we refer to the pre-AIA version of § 103.

² U.S. Patent No. 8,835,937 B2 (Ex. 1007, “Wirth”).

³ U.S. Patent No. 6,562,709 B1 (Ex. 1012, “Lin”).

⁴ U.S. Patent No. 7,419,839 B2 (Ex. 1006, “Camras”).

person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in evidence, objective indicia of non-obviousness.⁵ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art at the time of the alleged invention of the '822 patent “would have had a bachelor’s degree in electrical engineering, material science, or the equivalent, and two or more years of experience with light emitting diodes (LEDs).” Pet. 4 (citing Ex. 1002 ¶¶ 20–21). Patent Owner asserts that a person of ordinary skill in the art “would have had a bachelor’s degree in electrical engineering or a similar field, and at least . . . two years of professional experience, or its equivalent, in the *manufacture of light sources* using light emitting diodes.” Prelim. Resp. 4.

On the present record, we agree with Patent Owner that the parties’ “positions are substantially similar.” *Id.* However, for the purposes of this institution decision, we determine that Petitioner’s slightly broader proposed level of ordinary skill in the art is consistent with the '822 patent and asserted prior art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir.

⁵ With respect to the fourth *Graham* factor, the parties do not present arguments or evidence regarding objective indicia of non-obviousness. Therefore, the obviousness analysis at this stage of the proceeding is based on the first three *Graham* factors.

2001). Therefore, we adopt Petitioner’s proposal for purposes of deciding whether to institute *inter partes* review.

C. Claim Construction

In an *inter partes* review, we apply the same claim construction standard that would be used in a civil action under 35 U.S.C. § 282(b), following the standard articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). 37 C.F.R. § 42.100(b) (2019). In applying this standard, we generally give claim terms their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art, at the time of the invention and in the context of the entire patent disclosure. *Phillips*, 415 F.3d at 1312–14.

Petitioner contends that no claim terms require express construction for purposes of applying the prior art. Pet. 11–12. Patent Owner submits that, at this stage of the proceeding, the Board should adopt the ordinary and customary meaning of the claim terms as understood by one of ordinary skill in the art. Prelim. Resp. 21. For purposes of this decision, we determine that no claim terms require express construction. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (holding that only claim terms in controversy need to be construed, and only to the extent necessary to resolve the controversy (citing *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

D. Asserted Obviousness over Wirth

Petitioner contends that claims 1, 2, and 5–9 of the ’822 patent are unpatentable under 35 U.S.C. § 103 as obvious over Wirth. Pet. 12–35. Patent Owner opposes. Prelim. Resp. 23–43. For the reasons discussed below, we conclude that Petitioner has not demonstrated a reasonable

likelihood that it would prevail in showing that claims 1, 2, and 5–9 are unpatentable on this asserted ground.

1. Overview of Wirth

Wirth is directed to optoelectronic components “comprising a semiconductor function region with an active zone and a lateral main direction of extension.” Ex. 1007, 1:20–24. Wirth aims to provide a simplified, low-cost method for producing these optoelectronic components. *Id.* at 1:58–62.

Wirth illustrates one embodiment of an optoelectronic component in Figure 2, reproduced below:

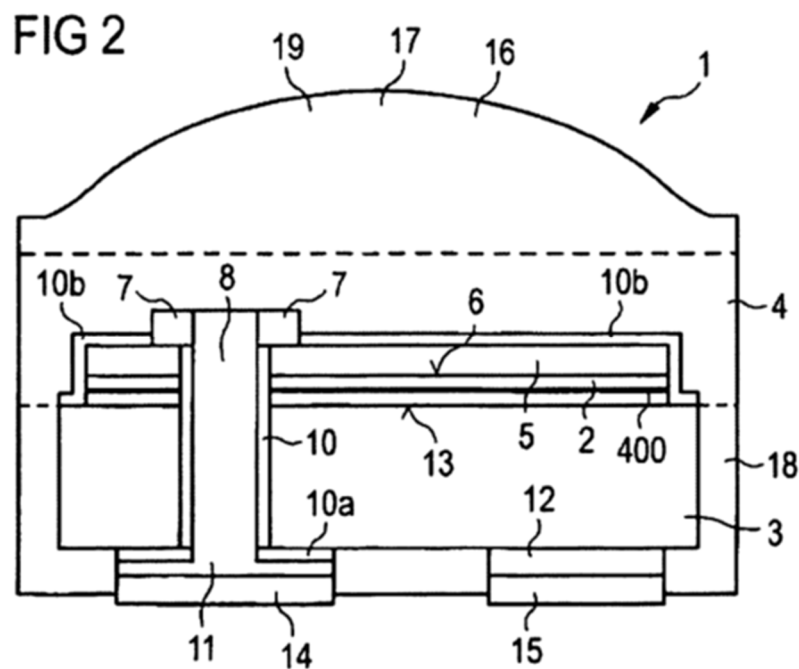


Figure 2 of Wirth shows a schematic sectional view of an optoelectrical component comprising semiconductor function region 2 including active zone 400, carrier 3, envelope 4, current spreading layer 5, first contact layer 7, connecting conducting material 8, isolation material 10, 10a,

and 10b, first interconnect 11, second interconnect 12, first solder layer 14, second solder layer 15, and encapsulation 16 including window 17. *Id.* at 17:45–46, 18:55–22:46. Wirth explains that semiconductor function region 2 has first main face 6 and second main face 13. *Id.* at 21:62–64. Wirth further explains that current spreading layer 5 is disposed on the side of semiconductor function region 2 facing away from carrier 3, and contact layer 7 is “[d]isposed after, preferably immediately after, the current spreading layer 5 as viewed from the first main face 6 of the semiconductor function region.” *Id.* at 19:35–39.

2. Analysis

Independent claim 1 of the ’822 patent recites, *inter alia*, “an optically transparent cover substrate” and “an optically transparent layer attached to a bottom surface of said optically transparent cover substrate.” Ex. 1001, 8:29–31. With reference to Wirth’s Figure 2, Petitioner contends that window 17 is an “optically transparent cover substrate” and envelope 4 is an “optically transparent layer” attached to the bottom of the cover substrate. Pet. 14–17 (citing Ex. 1007, 22:29–35, 22:58–65, 23:5–24, 18:55–58, 23:47–50, 22:67–23:4, 23:51–59).

Claim 1 also recites “a semiconductor LED including a positively-doped region, an intrinsic region, and a negatively-doped region.” Ex. 1001, 8:34–38. Referring again to Wirth’s Figure 2, Petitioner argues that semiconductor function region 2, comprising active zone 400 between a p-conducting layer and an n-conducting layer, is part of a “semiconductor LED” as claimed. Pet. 17–19 (citing, e.g., Ex. 1007, 40:36–43). Petitioner further argues that a person of ordinary skill in the art “would have understood that the claimed ‘semiconductor LED’ would include current spreading layer 5, which can be formed of semiconductor material, in

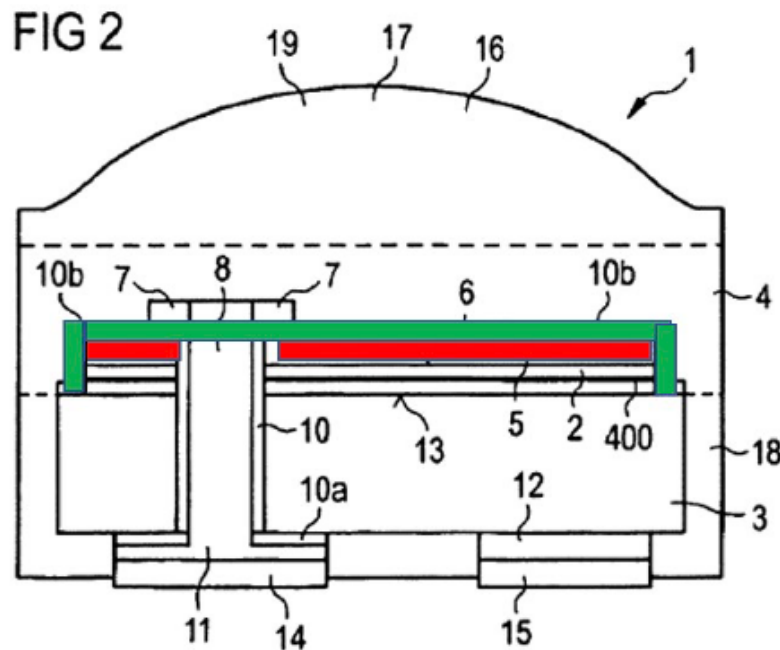
addition to semiconductor function region 2.” *Id.* at 19 (citing Ex. 1007, 25:33–37; Ex. 1002 ¶¶ 73–74). Petitioner contends that because the claim language is open-ended (“a semiconductor LED including . . .”), a person of ordinary skill in the art “would have understood that the claimed ‘semiconductor LED’ is not limited to just the doped and intrinsic layers” explicitly recited in the claim. *Id.* at 20 (citing Ex. 1002 ¶ 74).

Claim 1 further recites “a first surface of said semiconductor LED contacts a first portion of a bottom surface of said optically transparent layer.” Ex. 1001, 8:38–40. Recognizing that “the optoelectronic component 1 shown in figure 2 of Wirth includes an isolation material 10b that separates the semiconductor LED (the combination of semiconductor function region 2 and the current spreading layer 5) and envelope 4 (‘an optically transparent layer’),” Petitioner contends that “Wirth discloses that isolation material 10b is optional.” Pet. 21 (citing Ex. 1002 ¶ 76). In support of this assertion, Petitioner points to Figure 1 of Wirth, in which isolation material 10b is not present. *Id.* (citing Ex. 1007, 21:54–59; Ex. 1002 ¶ 76). According to Petitioner, Wirth suggests an implementation of Figure 2 without isolation material 10b, or at a minimum it would have been obvious to a person of ordinary skill in the art to configure the device in Figure 2 without isolation material 10b. *Id.* at 21–24 (citing, e.g., Ex. 1002 ¶¶ 77–81).

Patent Owner argues that Petitioner has not shown sufficiently that Wirth teaches or suggests “a first surface of said semiconductor LED contacts a first portion of a bottom surface of said optically transparent layer” for two reasons. Prelim. Resp. 35–39. First, Patent Owner contends that Petitioner has failed to show that isolation material 10b in Wirth’s Figure 2 is optional or can be removed. *Id.* at 38. Second, Patent Owner

argues that, even if the isolation material were removed, Petitioner has not shown that a person of ordinary skill in the art would have understood current spreading layer 5 to be part of the claimed “semiconductor LED.” *Id.* at 35–36, 38–39.

Patent Owner illustrates its arguments with an annotated version of Wirth’s Figure 2, reproduced below:



Id. at 38. Annotated Figure 2 above highlights current spreading layer 5 (in red) and isolation material 10b (in green). According to Petitioner’s mapping of Wirth to the limitations of claim 1, the device in Figure 2 satisfies the claim limitation requiring a first surface of the semiconductor LED to contact a first portion of a bottom surface of the optically transparent layer (i.e., envelope 4) *only if* (1) current spreading layer 5 is part of the claimed “semiconductor LED” together with semiconductor function region 2, *and* (2) isolation material 10b is not present. *See* Pet. 19–25.

We agree with Patent Owner that Petitioner has not made an adequate showing with respect to this limitation, at least because Petitioner has not shown sufficiently that a person of ordinary skill in the art would have understood Wirth's current spreading layer 5 to be part of the claimed "semiconductor LED." As Patent Owner points out, Wirth discloses that current spreading layer 5 is disposed on, and functionally distinct from, semiconductor function region 2. *See* Prelim. Resp. 36 (citing Ex. 1007, 18:60–62). For instance, Wirth discloses that "the current spreading layer further is preferably distinguished by high transparency to a radiation to be generated in or received by the semiconductor function region 2." *Id.* (emphasis omitted) (quoting Ex. 1007, 19:4–7). Furthermore, although Wirth discloses that current spreading layer 5 can comprise a semiconductor material, as Petitioner contends, Wirth explains that a TCO (Transparent Conducting Oxide) material is preferred. Ex. 1007, 25:37–41. More specifically, Wirth explains that a TCO material is preferred due to its high conductivity in the lateral direction, which facilitates uniform current inflow into the semiconductor region, and its high radiation-transparency over a broad range of wavelengths. *Id.* at 18:65–19:3, 19:10–19.

On this record, we determine that Petitioner has not explained adequately why a person of ordinary skill in the art would have considered Wirth's current spreading layer to be part of the claimed "semiconductor LED" in view of Wirth's teachings, not addressed by Petitioner, that current spreading layer 5 is separate from semiconductor function region 2 and preferably made of a conducting material rather than a semiconductor material. *See* Pet. 19–20. As Patent Owner points out, and as shown in Wirth's Figure 2, current spreading layer 5 completely covers the top surface (the claimed "first surface") of semiconductor function region 2 (the

“semiconductor LED”) and therefore prevents the semiconductor LED from contacting the bottom surface of envelope 4 (the “optically transparent layer”), even if isolation material 10b is removed. Prelim. Resp. 38–39. Thus, for at least this reason, we determine that Petitioner has not demonstrated sufficiently that Wirth teaches or suggests “a first surface of said semiconductor LED contacts a first portion of a bottom surface of said optically transparent layer,” as recited in claim 1.

Accordingly, based on the present record, we determine that the information presented does not show a reasonable likelihood that Petitioner would prevail in establishing that independent claim 1 and dependent claims 2 and 5–9 are unpatentable as obvious over Wirth.

E. Additional Grounds

Petitioner further contends that claims 1, 2, and 5–9 are unpatentable under 35 U.S.C. § 103 as obvious over Wirth and AAPA and over Wirth and Camras. Pet. 37–44. Petitioner does not direct us to any portions of AAPA or Camras that cure the deficiency discussed above with respect to Wirth. *See id.* Accordingly, we determine that the information presented does not show a reasonable likelihood that Petitioner would prevail in establishing that claims 1, 2, and 5–9 are unpatentable over Wirth and AAPA or over Wirth and Camras.

Petitioner also contends that dependent claim 10 is unpatentable under 35 U.S.C. § 103 as obvious over Wirth and Lin, over Wirth, AAPA, and Lin, and over Wirth, Camras and Lin. *Id.* at 35–37, 39, 44. Petitioner does not direct us to any portion of Lin that cures the deficiency discussed above with respect to Wirth. Accordingly, we determine that the information presented does not show a reasonable likelihood that Petitioner would prevail in

establishing that claim 10 is unpatentable over Wirth and Lin, over Wirth, AAPA, and Lin, or over Wirth, Camras and Lin.

IV. CONCLUSION

After considering the parties' evidence and arguments, we determine that the information presented does not show a reasonable likelihood that Petitioner would prevail in establishing that at least one of claims 1, 2, and 5–10 of the '822 patent is unpatentable based on any ground asserted in the Petition.

V. ORDER

Accordingly, it is

ORDERED that the Petition is *denied*, and no *inter partes* review is instituted.

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Patent 9,786,822 B2

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