

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ACCELIGHT TECHNOLOGIES, INC.,

Petitioner, v.

APPLIED OPTOELECTRONICS, INC.,

Patent Owner.

Case IPR2025-01567
Patent No. 10,379,301

PATENT OWNER'S PRELIMINARY RESPONSE

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EXHIBITS

Exhibit No.	Description
2010	In IPR2025-00434 filed by Cambridge Industries USA, Inc.: Board's Decision denying Request for Rehearing dated December 19, 2025
2011	Declaration of Dr. Alan E. Willner

I. INTRODUCTION

Patent Owner Applied Optoelectronics, Inc. (“AOI”) submits this Preliminary Response to the Petition of Accelight Technologies, Inc. (“Accelight”) challenging the patentability of Claims 1-4 (the “Challenged Claims”) of U.S. Patent No. 10,379,301 (the “’301 Patent”) (Ex. 1001). The Director should deny institution because Accelight has not established a reasonable likelihood that it will prevail on any claim in any Ground raised in the Petition.

Accelight presents two grounds of invalidity against the Challenged Claims.

In Ground 1, Accelight challenges independent claim 1 and dependent claims 2-4 under an obviousness theory. Accelight contends that claims 1-4 are obvious over Kim (U.S. Patent Application Publication No. 2014/0169389, Ex. 1004).

In Ground 2, Accelight challenges independent claim 1 and dependent claims 2-4 under an obviousness theory. Accelight contends that claims 1-4 are obvious over Ho (U.S. Patent Application Publication No. 2014/0341578, Ex. 1005) in view of Lee (U.S. Patent Application Publication No. 2014/0183344, Ex. 1006).

As set forth below, Accelight fails to show that the prior art references render obvious any of the Challenged Claims. Thus, Accelight has not established a reasonable likelihood that it will prevail on any claim on either Ground raised in

the Petition. Accordingly, AOI respectfully requests that the Director decline to institute *inter partes* review.

II. BACKGROUND

A. '301 Patent

The '301 Patent, entitled "Multi-channel parallel optical receiving device," and issued on August 13, 2019. The '301 patent claims priority to U.S. Patent Application No. 15/432,242, filed February 14, 2017, which claims priority to an earlier filed China patent application, CN App. No. 2016 1 03460078, filed May 23, 2016. *See* '301 Patent (Exhibit 1001), Abstract; *See also* Exhibit 2011 (Declaration of Dr. Alan E. Willner) at ¶¶ 56-60.

The '301 Patent provides a multi-channel parallel optical receiving device, including a carrier, a light receiving chip, a plurality of optoelectronic diodes disposed on a top surface of an end of the carrier, an optical fiber connector disposed in another end of the carrier, and an arrayed waveguide grating disposed on the top surface of the carrier. *See id.*

Figure 1 (reproduced below) shows an example embodiment of the multi-channel parallel optical receiving device disclosed in the '301 patent which includes a carrier 8 and a light receiving chip 2. A plurality of optoelectronic

diodes 3 may be disposed on a top surface of an end of the carrier 8, and the plurality of optoelectronic diodes 3 may be electrically connected to the light receiving chip 2. The light receiving chip 2 may be a trans-impedance amplifier (TIA) chip, and the optoelectronic diodes 3 and the trans-impedance amplifier (TIA) chip may be connected by bonding wires. An optical fiber connector 4 may be disposed at another end of the carrier 8, and an arrayed waveguide grating 6 may be further disposed on the top surface of the carrier 8. Exhibit 1001 at Col. 2:66-3:13; Exhibit 2011 at ¶ 58.

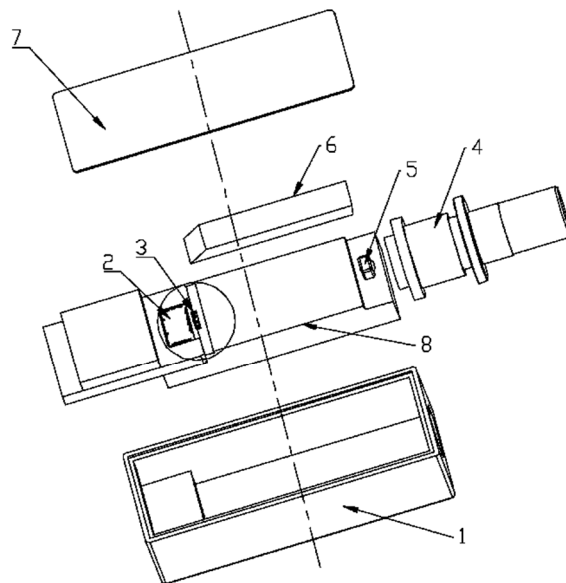


FIG. 1

Figure 3 (reproduced below) then shows an input end 61 of the arrayed waveguide grating 6 may be connected to the optical fiber connector 4 for receiving an optical signal from the optical fiber. The optical signals may be divided into multi-channel optical signals in parallel by the arrayed waveguide grating 6 based on their wavelengths. The top surface 63 of an output end 62 of the arrayed waveguide grating 6 may be designed to be at a predetermined angle, allowing for the multi-channel optical signals to be reflected by the top surface 63 to the photosensitive surfaces of the plurality of optoelectronic diodes 3 arranged in array. Exhibit 1001 at 3:13-3:22; Exhibit 2011 at ¶ 59.

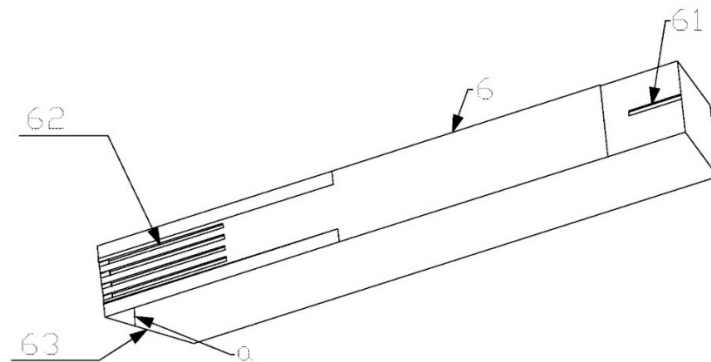


FIG. 3

Figure 4 (reproduced below) shows an embodiment of the '301 patent in which first lens 5, for coupling the optical fiber, may be disposed between the input end 61 of the arrayed waveguide grating 6 and the optical fiber connector 4. In this embodiment, the first lens 5 disposed on the carrier 8 may be located on the optical path of the optical fiber connector 4 and the arrayed waveguide grating 6, for the optical coupling to be realized. Exhibit 1001 at Col. 4:21-28; Exhibit 2011 at ¶ 60.

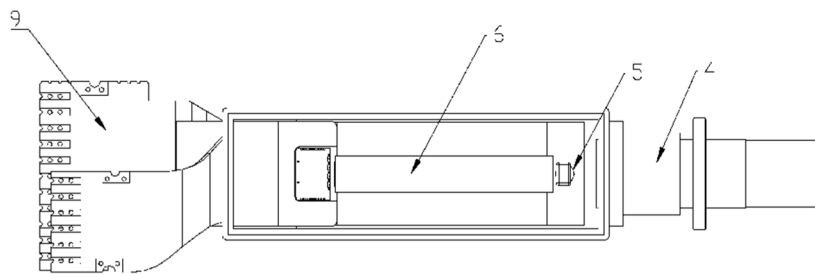


FIG. 4

B. Relevant File History

The application for the '301 Patent was filed on February 14, 2017 as application no. 145/432,242 with seven claims, including one independent claim. See “File History”, Exhibit 1002; *see also* Exhibit 2011 at ¶¶ 61-71.

On August 29, 2017, in a non-final Office Action, the PTO (“Office”) rejected claims 1-4 and 6 as anticipated by U.S. Patent Application Publication No.

2017/0168252 to Pezeshki et al, and as obvious over U.S. Patent Application Publication No 2016/0349451 to Shen et al in view of Pezeshki. The Office also rejected claims 5 and 7 as obvious over Pezeshki in view of U.S. Patent Application Publication No. 2003/0174964A1 to Gao, et al.

On February 28, 2018, AOI filed an amendment, amending claim 1 to include the subject matter of claim 4, cancelling claim 4, and adding new independent claim 8 which included the subject matter of claims 1 and 5.

On April 13, 2018, the Office mailed a final Office Action, rejecting all of the claims as either anticipated or obvious over various combinations of six different references.

On August 13, 2018, AOI filed an amendment and RCE.

On September 13, 2018, the Office mailed a non-final Office Action repeating several of the prior obviousness rejections and asserting new obviousness rejections based on various combinations of the six previously cited references.

On December 12, 2018, AOI conducted an interview with the Office, and, on December 13, 2018, filed a reply.

The Office mailed a non-final Office Action on January 28, 2019 in which all of the claims were rejected under as indefinite or lacking antecedent basis under 35 U.S.C. § 112(b), but withdrawing the obviousness rejections.

On April 29, 2019, AOI filed an amendment, amending independent claims 1 and 8 and several dependent claims to address the § 112 rejections.

On May 13, 2019, the Office mailed a Notice of Allowance, which included a Notice of Allowability stating that “the closest prior art of record does not expressly teach or reasonably suggest, in combination, each claim limitation as embodied by amended independent claims 1 and/or 8.” File History, Exhibit 1002, pp. 36-37. The Notice of Allowability further stated that “the Examiner is unable to make a prima facie case for obviousness” *Id.*

The '301 Patent issued on August 13, 2019 with seven claims, including two independent claims.

C. Prior and Pending Petitions for IPR Filed Against AOI Patents

The '301 Patent was the subject of a prior petition for IPR filed by another party, Cambridge Industries USA, Inc. (“CIG”). CIG’s petition, IPR2025-00434, was filed on January 17, 2025. In that proceeding, AOI filed a request for discretionary denial, and then a Preliminary Response. On July 29, 2025, the Board denied CIG’s petition for IPR on substantive grounds. *See* Exhibit 2003.

Specifically, the three-Judge panel of the Board was “not persuaded that Petitioner demonstrates a reasonable likelihood of prevailing on its anticipation challenge to independent claim 1” because, at a minimum, the art identified by

CIG “does not disclose ‘the plurality of optoelectronic diodes electrically connected to the light receiving chip via bonding wire,’ as recited in limitation [1d]” of independent claims 1 and 7 the ’301 Patent. *See id.* at p. 18; *see also id.* at p. 26. The Board also found some of the art “does not disclose ‘an arrayed waveguide grating further disposed on a top surface of the carrier that defines a midpoint of the carrier’ and that ‘the top surface of the carrier underlies the middle of the arrayed waveguide grating,’ as recited in limitation [1f]” of the ’301 Patent. *Id.* at p. 25. Thus, the Board has already denied IPR of the ’301 Patent on substantive grounds.

On January 17, 2025, CIG also filed petitions for IPR for U.S. Patent No. 10,042,116 (’116 Patent); U.S. Patent No. 9,523,826 (’826 Patent); U.S. Patent No. 10,313,024 (’024 Patent); and U.S. Patent No. 10,788,690 (’690 Patent). Two of those petitions were discretionarily denied by the Acting Director (for the ’116 and ’826 patents). And, like the petition for IPR of the ’301 Patent, the petition for IPR of the ’024 Patent was denied by the Board on substantive grounds. Thus, only one of the five IPR petitions filed by CIG was instituted (for the ’690 patent).

Similar to CIG, Petitioner, in addition to this petition for IPR of the ’301 Patent, has also filed petitions for IPR of four other AOI patents: the ’116 Patent, ’826 Patent, ’690 Patent, and U.S. Patent No. 9,448,367 (’367 Patent) (which is the

only patent that has not been the subject of a prior IPR petition). AOI has separately filed and is filing Requests Discretionary Denial of Petitioner's petitions for IPR of the '301, '116, '826, and '367 patents.

Thus, of the five AOI patents challenged by Petitioner in IPRs, three are the subject of prior petitions for IPR that were denied, including the previous petition for IPR of the '301 Patent.

D. The Litigation Between AOI and Petitioner Accelight

On December 13, 2024, AOI filed a lawsuit against Accelight for patent infringement in the case captioned *Applied Optoelectronics, Inc. v. Accelight Technologies, Inc.*, case no. 4:24-cv-09041-HSG (N.D. CA) (the "Accelight Litigation"). The complaint alleges infringement of six AOI patents, including the '301 Patent. In the Accelight Litigation, Accelight alleges that each of the six patents-in-suit is invalid. Accelight has filed petitions for IPR of five of the six patents.

On April 15, 2025, AOI served its infringement contentions, stating that Petitioner infringes claims 1-4 of the '301 Patent. On May 30, 2025, Accelight served its invalidity contentions. *See* Exhibit 2004. In its invalidity contentions, Accelight contends that claims 1-4 are invalid under either § 102 or § 103 based on four grounds that each rely on one or more of five different references. The

following grounds are relevant here: (1) anticipated by or obvious over U.S. Patent No. 9,110,260 to Lee, or obvious over Lee in view of U.S. Patent Application Publication No. 2014/0169389 to Kim; (2) anticipated by or obvious over Kim, or obvious over Kim in view of another reference. *See* Exhibit 2004, p. 9.

Pursuant to the District Court’s Scheduling Order, between May 30, 2025 and October 7, 2025, Accelight served invalidity contentions and documents; the parties exchanged proposed terms for claim construction, preliminary constructions and extrinsic evidence, and damages contentions; and the parties filed a Joint Claim Construction Statement and Prehearing Statement, and opening, responsive, and reply claim construction briefs. *See, e.g.* Exhibit 2005.

On October 9, 2025, the District Court granted the parties’ joint motion to stay the case based on Petitioner’s petitions for IPR. *See* Exhibit 2006. The Court ordered the parties to regularly file joint status reports, including after any PTAB decision on any of Accelight petitions for IPR.

E. The Litigation Between AOI and CIG

On February 20, 2024, AOI filed a lawsuit against CIG for patent infringement in the case captioned *Applied Optoelectronics, Inc. v. Cambridge Industries, Inc.*, case no. 3:24-cv-01010-JD (N.D. CA) (the “CIG Litigation”). The complaint alleges that Petitioner infringes eight of AOI’s patents, including the

'301 Patent. In the CIG Litigation, CIG alleges that each of the eight patents-in-suit is invalid. CIG has filed petitions for IPR of five of the eight patents.

Pursuant to the District Court's Scheduling Order, between May 2024 and March 2025, AOI and CIG exchanged initial disclosures, infringement and invalidity contentions, proposed terms for claim construction, preliminary claim constructions, and extrinsic evidence; filed a Joint Claim Construction Statement and Prehearing Statement; exchanged damage contentions; and filed opening, responsive, and reply claim construction briefs. *See* Exhibit 2007.

On March 19, 2025, AOI and CIG notified the District Court that CIG had filed petitions for IPR of five of the eight patents-in-suit. On April 4, 2025, the District Court issued an order staying the case, ordering the parties to regularly file joint status reports on the status of CIG's petitions for IPR.

F. The Petition for *Inter Partes* Review

On September 26, 2025, nine months after AOI filed its complaint in the Accelight Litigation, Petitioner filed its Petition for IPR of the '301 Patent.

In the Petition, Petitioner challenges claims 1-4 of the '301 Patent. Petitioner asserts two grounds of invalidity: (1) claims 1-4 are obvious over Kim (U.S. Patent Application Publication No. 2014/0169389, Ex. 1004); and (2) claims 1-4 are obvious over Ho (U.S. Patent Application Publication No. 2014/0341578, Ex. 1005)

in view of Lee (U.S. Patent Application Publication No. 2014/0183344, Ex. 1006).

The Petition relies on the declaration of Petitioner's expert, Dr. Michael Lebby.

See Exhibit 1003.

On October 7, 2025, the PTAB issued its Notice of Filing Date Accorded to Petition and Time for Filing Patent Owner Preliminary Response (Paper 3).

AOI has timely filed Requests to the Director for Discretionary Denial of Acceight's Petitions for IPR of the '301 Patent (on December 4, 2025), the '116 Patent (on December 4, 2025), and the '367 Patent (on December 16, 2025). AOI will timely filed a Request to the Director for Discretionary Denial of Acceight's Petition for IPR of the '826 Patent (by January 13, 2026),

G. Alleged Prior Art References

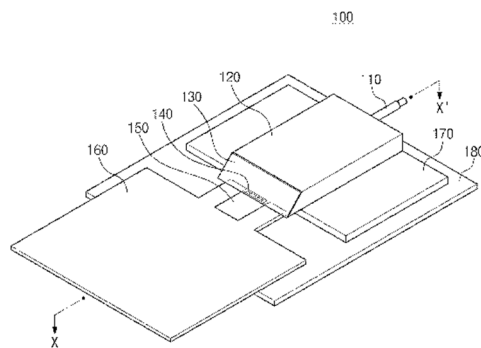
1. Kim, U.S. Patent App. Pub. No. U.S. 2014/0169389 (Exhibit 1004)

Kim discloses an optical receiver module that includes a demultiplexer, an optical device including a right-angled mirror reflecting individual optical signals transmitted from the demultiplexer and a plurality of lenses receiving the reflected optical signals, and a plurality of photodetectors spaced apart from the plurality of lenses by a predetermined distance. The plurality of photodetectors converts the individual optical signals into electrical signals. The optical device and the

demultiplexer are formed into a united structure. A distance between the lenses is equal to a distance between the photodetectors. *See* Exhibit 1004 at Abstract; *see also* Exhibit 2011 at ¶¶ 78-80.

As shown in Figure 1, the optical receiver module 100 includes an optical connector 110, a demultiplexer 120, an optical device 130, a photodetector 140, a pre-amplifier 150, a printed circuit board 160, a first supporting part 170, and a second supporting part 180. *Id.* at ¶22.

Fig. 1



Figures 3 and 4 (Figure 4 is an enlarged view of a portion of Figure 3) then illustrates that one channel optical signal divided by the demultiplexer 120 is optically coupled to the photodetector 140 through the lens 132. *Id.* at ¶38.

Fig. 3

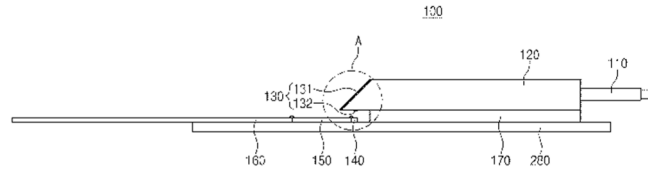
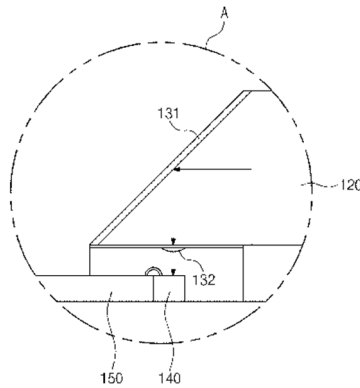


Fig. 4



2. Ho, U.S. Patent App. Pub. No. U.S. 2014/0341578 (Exhibit 1005)

Ho discloses a multi-channel receiver optical subassembly (ROSA) such as an arrayed waveguide grating (AWG), with outputs directly optically coupled to respective photodetectors such as photodiodes. In one embodiment, an AWG may be configured such that optical components of the AWG do not interfere with

direct optical coupling, and the wire bonding points on the photodiodes may also be configured such that wire bonding does not interfere with direct optical coupling. The photodetectors may also be mounted on a photodetector mounting bar with a pitch sufficiently spaced to allow connection to floating grounds. A passive alignment technique may be used to determine the mounting locations on the photodetector mounting bar such that the photodetectors are aligned with the optical outputs. *See* Exhibit 1005 at Abstract; *see also* Exhibit 2011 at ¶ 92.

3. Lee, U.S. Patent App. Pub. No. U.S. 2014/0183344 (Exhibit 1006)

Lee discloses a hybrid optical coupling module and a manufacturing method thereof. The hybrid optical coupling module includes an optical unit configured to include an optical transmission means that transmits an optical signal, and an array lens that is bonded at a point where the optical signal of the optical transmission means is output and focuses the output optical signal, and an electrical unit configured to receive the optical signal focused through the array lens and convert the received optical signal into an electrical signal. An alignment mark is formed on the optical transmission means and the array lens so that the array lens is bonded at the point where the optical signal of the optical transmission means is output. Exhibit 1006 at Abstract; *see also* Exhibit 2011 at ¶ 93.

III. DEFINITION OF A PERSON OF ORDINARY SKILL IN THE ART

For the purposes of this Preliminary Response only, AOI applies Accelight's proposed level of skill in the art: A person of ordinary skill in the art ("POSITA") knowledgeable of the technical field of the '301 Patent would have had "(1) a Bachelor's degree in electrical or electronics engineering or an equivalent degree, and (2) two-four years of work experience in optoelectronics, optical networking, optical communications, or a closely-related field." Exhibit 1003 at ¶39; *see also* Exhibit 2011 at ¶¶ 36-40.

AOI reserves the right to further address Accelight's formulation of a POSITA if trial is instituted.

IV. CLAIM CONSTRUCTION

Accelight identifies a dispute over the term "carrier" based on claim construction positions taken by the parties in the Accelight Litigation. Petition at pp. 13-15. Accelight argues that "carrier" should be "construed as "the supporting structure that is contained within the multichannel parallel optical receiving device." *Id.* However, the specification is clear that a "carrier" may be any supporting structure on which other claim elements could be disposed. *See, e.g., See '301 Patent (Exhibit 1001) at Col. 1:38-43 ("A plurality of optoelectronic*

diodes may be disposed in an array on a top surface of an end of the carrier...[a]n optical fiber connector may be disposed in another end of the carrier. An arrayed waveguide grating may be further disposed on the top surface of the carrier....”). Similarly, Claim 1 simply requires “[a] multi-channel parallel optical receiving device, comprising: a carrier; ...”. *Id.* at Claim 1; *See* Exhibit 2011 at ¶¶ 73-77.

However, Accelight’s proposed construction includes limitations that the specification never mentions. In this case, Accelight includes the extra limitation “that is contained within the multi-channel parallel optical receiving device.” But, neither the specification nor Claim 1 require that the carrier “*is contained within* the multi-channel parallel optical receiving device.” Claim 1 simply requires that the multi-channel parallel optical receiving device *comprises*, or includes, a carrier. *Id.* at Claim 1. Again, it appears that Accelight wishes to improperly change and potentially narrow the meaning of the term “comprising” in the preamble through a construction of another claim limitation – in this case, through the term “carrier.” *See, e.g.* MPEP §2111.03; *Mars Inc. v. H.J. Heinz Co.*, 377 F.3d 1369, 1377 (Fed. Cir. 2004) (the transitional term “comprising” is synonymous with and well understood as “including,” “containing,” or “characterized by,” and is inclusive or open-ended).

Because Accelight’s proposal conflicts with the plain meaning of this term in light of the claims and specification and improperly attempts to construe the

preamble’s standard term “comprising” as part of the limitation “carrier,” it should be rejected.

Regardless, the term “carrier” does not require construction because claim construction is not necessary to resolve the controversy presented by Accelight’s Petition. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms ... in controversy, and only to the extent necessary to resolve the controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). Accelight has not demonstrated a reasonable likelihood of prevailing on any Challenged Claim whether using “plain and ordinary meaning” or Accelight’s proposed claim constructions. *See* Exhibit 2011 at ¶ 77.

**V. ACCELIGHT HAS NOT ESTABLISHED A REASONABLE
LIKELIHOOD OF PREVAILING FOR ANY CHALLENGED CLAIM**

Accelight bears the burden on institution of “demonstrating a reasonable likelihood that it will prevail in showing the unpatentability of at least one claim.” *SMIC, Ams. v. Innovative Foundry Techs., LLC*, IPR2020-00837, Paper 13, 13–14 (PTAB Oct. 9, 2020) (citing 35 U.S.C. §§ 314(a) and 312(a)(3)). In making this showing, Accelight’s Petition must identify “the evidence that supports the grounds for the challenge to each claim.” *Id.* Accelight has not met that burden here.

Here, Accelight has not shown a reasonable likelihood of success for any challenged claim under either ground of unpatentability. The Director should thus deny institution.

VI. GROUND 1: ACCELIGHT HAS NOT SHOWN A REASONABLE LIKELIHOOD THAT KIM RENDERS OBVIOUS CLAIMS 1-4

Accelight fails to show to a reasonable likelihood that Kim renders obvious any Challenged Claim in Ground 1. *See* Exhibit 2011 at ¶¶ 81-91.

- A. Kim fails to disclose “a plurality of optoelectronic diodes disposed on the top surface of the end of the carrier, and the plurality of optoelectronic diodes electrically connected to the light receiving chip via bonding wire, wherein the optoelectronic diodes and the light receiving chip are disposed directly on the same top surface of the end of the carrier;”**

Kim does not disclose the “the plurality of optoelectronic diodes electrically connected to the light receiving chip via bonding wire.” For example, there is no mention or clear disclosure of a “bonding wire” in Kim. Petitioner does point to a feature in Figure 4 of Kim that could be taken as a bonding wire. However, neither the figure nor any part of the specification designates this clearly as a bonding wire. Kim does disclose that “the pre-amplifier 150 is electrically connected to an end of the photodetector 140.” *See* Exhibit 1004 at ¶ 29. Although this is correct, a POSITA would well know that there are various ways to electrically connect these

elements besides using wire bonding. Indeed, by relying on an obvious argument related to a POSITA, Petitioner seems to recognize that Kim fails to explicitly disclose the “bonding wire” limitation as required by claim 1. *See, e.g.*, Petition at pp. 25-26 (“wire bonding of components on a circuit board has been a routine and standard practice in the electronics and optoelectronics industries long before the effective filing date of the ’301 patent. It would thus have been obvious to a POSITA based on Kim’s disclosure that photodetectors (optoelectronic diodes) 140 and pre-amplifier (light receiving chip) 150 of Kim are electrically interconnected through wire-bonding.”). *See* Exhibit 2011 at ¶ 82.

Indeed, the PTAB has already considered and rejected this almost exact same argument regarding a POSITA understanding a disclosed “electrical connection” to specifically disclose a wire bonding. This was done for a different piece of cited prior art (Soldano) in a different *inter partes* review proceeding filed by a different petitioner involving the ’301 Patent. *See* Exhibit 2010 at p. 8. In that IPR, the a three-judge panel of the Board found in a decision denying a rehearing request filed by petitioner that “[p]etitioner’s original showing that Soldano [the cited art] described limitation 1d [requiring a wire bond] fatally failed to demonstrate that Soldano ‘expressly or inherently’ described an optical diode being electrically connected to a light receiving chip ‘via wire bonding.’” *Id.* The

Board then reasoned the petitioner’s expert in that IPR, “Dr. Kirk’s opinion that an ordinarily skilled artisan ‘would have understood’ that such a connection ‘could be accomplished via wire bonds’ is insufficient to establish that Soldano expressly or inherently discloses such a connection. *Id.* The Board continued, “[t]he cited portion of Soldano, Ex. 1009, 10:10–19, merely states that a ‘photodetector would be then electrically connected to the transimpedance amplifier’ without describing or even suggesting that such connection would be made ‘via wire bonding’ as recited in limitation 1d.” *Id.* Thus, the Board concluded, “[w]e discern no error in our conclusion that Petitioner failed to demonstrate that Soldano described limitation 1d and thus failed to anticipate claim 1.”). *Id.*; *see also* Exhibit 2011 at ¶ 83.

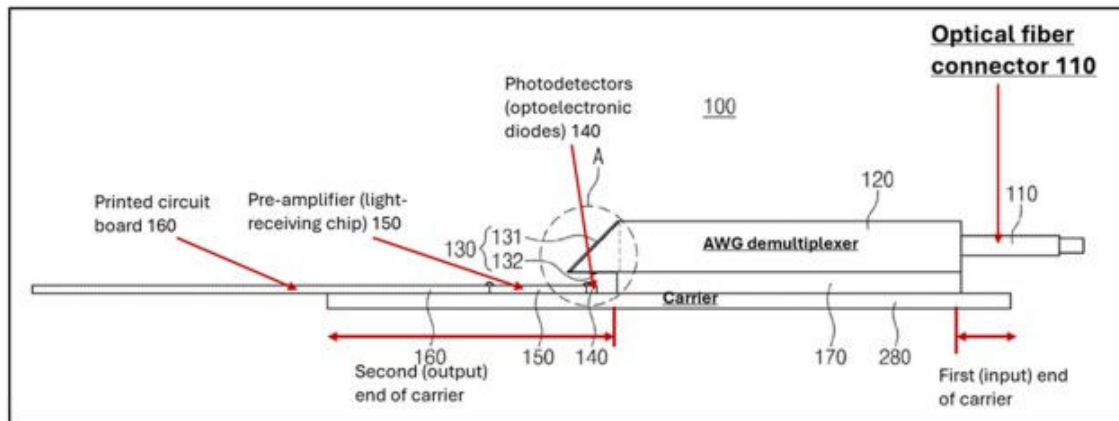
Finally, such an approach using “general knowledge”—a broad category encompassing AAPA, expert declarations, common sense, and other non-patent or non-printed publication evidence—*cannot be used* to supply a missing claim limitation in an IPR. *See* Exhibit 2008 at p. 1, July 31, 2025 Memorandum from Acting Director Stewart (emphasis added). Thus, as here, if a prior art reference admittedly lacks a specific element, petitioners can no longer argue that a person of ordinary skill in the art (POSITA) would inherently understand or fill that gap based on background knowledge, and the IPR should be denied. *See id.* (“As a

practical matter, enforcement of Rule 104(b)(4) means that applicant admitted prior art (AAPA), expert testimony, common sense, and other evidence that is not ‘prior art consisting of patents or printed publications’ (collectively, ‘general knowledge’) may not be used to supply a missing claim limitation. Per 35 U.S.C. § 312(a)(4), the Board shall deny an IPR petition that fails to comply with Rule 104(b)(4).”).

B. Kim fails to disclose “an optical fiber connector disposed in an end of the carrier;”

Kim also fails to disclose the “optical fiber connector disposed on an end of the carrier” limitation. Instead, Kim discloses the optical connector 110 is disposed above what Petitioner identifies as the carrier 180/280, and is connected to the AWG 120. Thus, Kim does not disclose optical fiber connector 110 disposed *on an end of the carrier* 180/280, as required in the challenged claims of the ’301 Patent. Instead, optical connector 110 as disclosed in Kim is connected to AWG 120 and is above the carrier 180/280. Furthermore, optical connector 110 in Kim is not at the “end of the carrier” 180/280. *See* Exhibit 2011 at ¶ 84.

This is shown in Petitioner’s annotated Figure 3 from Kim:



Furthermore, Petitioner admits that Kim does not directly disclose the “optical fiber connector disposed on an end of the carrier” limitation. Instead, Petitioner argues a POSITA would inherently understand the limitation only required an optical connector disposed *at an end region of the carrier*. See Petition at p. 27 (“As shown in Figure 3 [of Kim] optical connector 110 is coupled to the input end of AWG demultiplexer 120, with optical connector 110 being disposed at the first (input) end of carrier 180/280. A POSITA would have understood that the claim element ‘an optical fiber connector disposed in an end of the carrier’ does not mean that the connector is coupled directly to the end of the carrier; rather, it means that the connector is disposed at an end region of the carrier.”). However, a POSITA would not necessarily have understood that the claim element “an optical fiber connector disposed in an end of the carrier” only requires that the connector is disposed at an end region of the carrier since it is a deviation from the plain

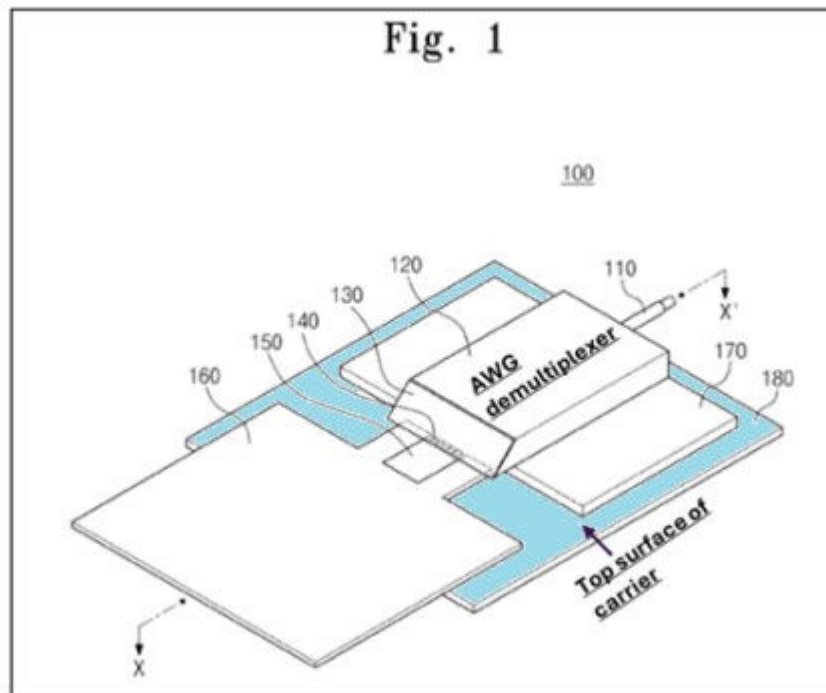
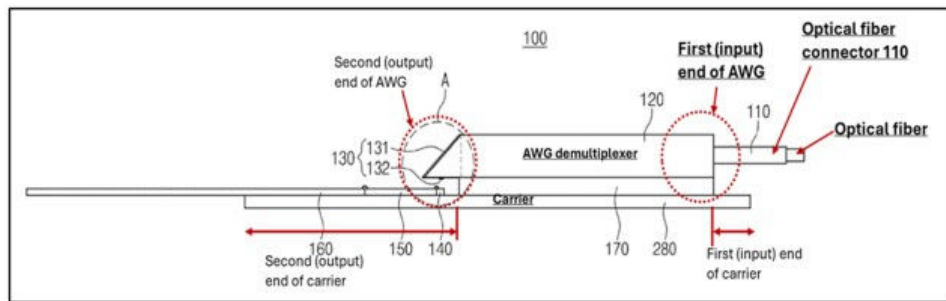
language of claim 1, which clearly requires “an optical fiber connector disposed in an end of the carrier.” *See* Exhibit 2011 at ¶ 86.

Finally, as noted, such “general knowledge cannot be used to supply a missing claim limitation in an IPR. *See* Exhibit 2008.

C. Kim fails to disclose “an arrayed waveguide grating further disposed on a top surface of the carrier that defines a midpoint of the carrier”

Kim also fails to disclose the “an arrayed waveguide grating further disposed on a top surface of the carrier that defines a midpoint of the carrier” limitation. Specifically, Kim discloses what Petitioner has identified as the AWG 120 is mounted on supporting part 170 from Kim, and not what Petitioner has identified as carrier 180/280 from Kim. Kim then specifically discloses that “the first supporting part 170 may be disposed under the multiplexer 120 [i.e. what Petitioner has identified as the ‘AWG’] to support the multiplexer [‘AWG’] 120.” *See* Exhibit 1004 at ¶31. In contrast, “[t]he second supporting part 180 [i.e. what Petitioner has identified as the ‘carrier’] may be disposed at the lowermost part of the optical receiver module 100 to entirely support the optical receiver module 100.” *Id.*; *see also* Exhibit 2011 at ¶ 87.

This is clearly shown in Petitioner's further annotated Figures 3 and 1 from Kim, which show the AWG 120 is disposed on supporting part 170, and not on carrier 180/280:



Indeed, Petitioner admits that Kim “discloses an arrayed waveguide grating (AWG) demultiplexer 120 mounted on a supporting part 170, which is [then]

disposed on a top surface of carrier 180/280.” See, Petition at p. 28 (emphasis added). Instead, Petitioner again relies on an obvious argument related to a POSITA to assert “[i]t would have been obvious to a POSITA that because AWG demultiplexer 120 is mounted on supporting part 170, which is then mounted on carrier 180/280, AWG demultiplexer 120 is disposed on a top surface of carrier 180/280.” *See* Petition at pp. 40-41. However, a POSITA would not necessarily have understood this since Petitioner’s argument is contrary to and deviates from the teachings of Kim, which discloses “the first supporting part 170 may be disposed under the multiplexer 120 to support the multiplexer 120,” while “[t]he second supporting part 180 may be disposed at the lowermost part of the optical receiver module 100 to entirely support the optical receiver module 100.” *See* Exhibit 1004 at ¶31; *see also* Exhibit 2011 at ¶ 89.

Further, as noted, such “general knowledge” cannot be used to supply a missing claim limitation in an IPR. *See* Exhibit 2008.

Finally, as is clear from Petitioner’s annotated Figures 3 and 1 from Kim, the identified “AWG” 120 does not appear to define a midpoint of the identified “carrier” 180/280, as required by the claim. *See* Exhibit 2011 at ¶ 90.

D. Kim fails to disclose Claims 2-4

Claims 2-4 of the '301 Patent depend from Claim 1. Because Petitioner has not shown that Kim renders obvious Claim 1, Petitioners also have not shown that Kim renders obvious Claims 2-4. *See* Exhibit 2011 at ¶ 91.

VII. GROUND 2: ACCELIGHT HAS NOT SHOWN A REASONABLE LIKELIHOOD THAT HO IN VIEW OF LEE RENDERS OBVIOUS CLAIMS 1-4

Accelight fails to show to a reasonable likelihood that Ho in view of Lee renders obvious any Challenged Claim in Ground 2.

A. The Ho-Lee Combination fails to disclose the “an arrayed waveguide grating further disposed on a top surface of the carrier that defines a midpoint of the carrier” limitation

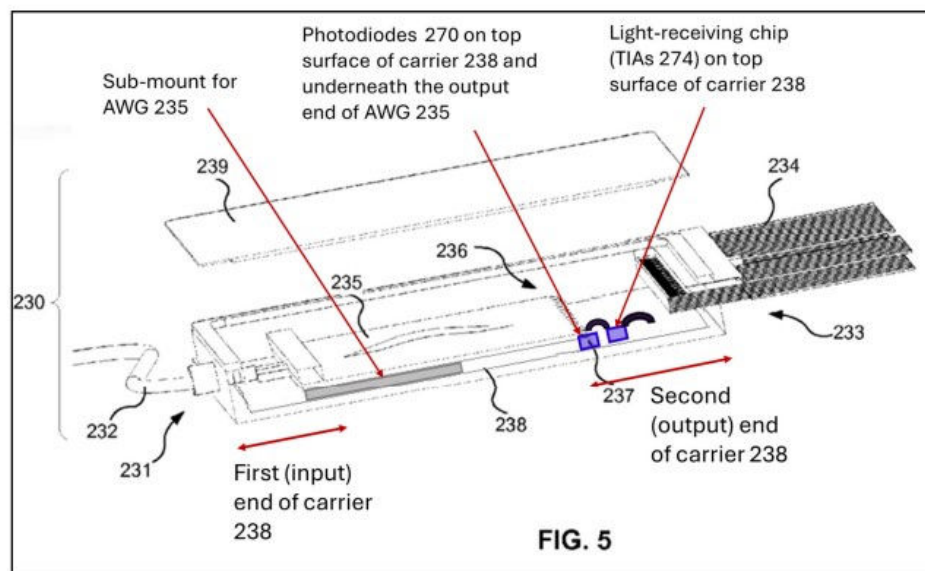
The Ho-Lee Combination fails to disclose the “an arrayed waveguide grating [AWG] further disposed on a top surface of the carrier that defines a midpoint of the carrier” limitation. *See* Exhibit 2011 at ¶ 95.

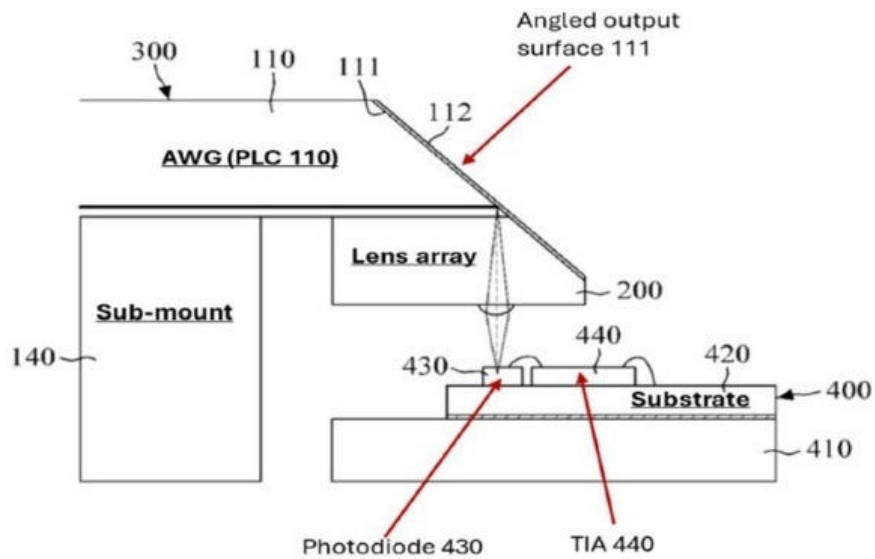
First, PLC 110 in Lee is not clearly an AWG chip. PLC 110 is a generic planar lightwave circuit that can take many different forms, and none of the embodiments clearly show that an AWG is an example. *See* Ex. 1006 at ¶ 34 (“an optical fiber array using a planar lightwave circuit (PLC) in which an optical output is established in the form of multi-core process or a V-groove of a silicon optical bench (SiOB) is widely used in the ROSA module.”). Furthermore, PLC

110 in Lee is not disposed on what Petitioner has identified as substrate 400 (as required by Claim 1 of the '301 Patent), but instead on sub-mount 140 and lens array 200. *See, e.g., id.* at Fig. 2; *see also* Exhibit 2011 at ¶ 96.

Similarly, Petitioner admits that the AWG is not disposed on the top surface of the carrier. *See* Petition at p. 62 (“It would have been obvious to a POSITA that because AWG 235 is mounted on a submount, which is then mounted on carrier 238, AWG 235 is *indirectly* disposed on the top surface of carrier 235.” emphasis added). Further, as shown in the figures pasted below, neither Ho nor Lee disclose the AWG defining a midpoint of the carrier. *See* Exhibit 2011 at ¶ 97.

This is shown in Petitioner’s annotated Figure 5 of Ho and Figure 2 of Lee:





Furthermore, there would have been no meaningful motivation to modify Ho in view of Lee in order to have Ho's AWG 235 disposed on a sub-mount and then disposed on a top surface of carrier 238, nor to do so in a way defines a midpoint of the carrier at the output end of Ho's AWG 235. Petitioner argues that "[i]n Ho modified in view of Lee, AWG 235 would have been mounted on a sub-mount disposed on a top surface of carrier 238 that defines a midpoint of the carrier." Petition at pp. 61-62. Petitioner and Dr. Lebby further state that a POSITA will directly mount AWG 236 and TIA 274 on carrier 238 in order to reduce the number of sub-mounts or substrates on Ho's carrier 238 and thus reduce manufacturing complexities and costs. See Exhibit 1003 at ¶100; *see also* Exhibit 2011 at ¶ 99.

However, if a mount is provided on the carrier 238 in Ho to elevate AWG 235, the mount will be an additional submount/substrate on Ho's carrier 238. A motivation to reduce the number of submounts/substrates (the objective asserted by the Petitioner) would find the elevation of Ho's AWG 235 undesirable since it adds an additional submount element. Thus, Petitioner's combination or modification is contradictory. Similarly, if the PD 270 and TIA 274 are mounted on a circuit board instead of directly on the carrier 238, this circuit board will also be an additional submount/substrate on Ho's carrier 238. *See* Ex. 1003 at ¶116. The intended purpose of Ho is to minimize the size and complexity of the connections. *See, e.g.*, 1005 at ¶¶ 5-6 ("To provide the coupling efficiency needed for a desired receiver sensitivity, these optical couplings are often made using a fiber array and/or lenses. The limited space within a smaller sized ROSA housing, however, may not be sufficient to accommodate fiber arrays and lenses used for such optical couplings.") Thus, in short, the proposed modification of Ho in view of Lee as proposed by Petitioner renders Ho inconsistent for its intended purpose. *See* Exhibit 2011 at ¶ 100; *see also* MPEP §2143.01 ("if a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification," and the obviousness argument fails).

B. The Ho-Lee Combination also fails to disclose the “an optical fiber connector disposed in an end of the carrier” limitation

The Ho-Lee Combination also fails to disclose the “an optical fiber connector disposed in an end of the carrier” limitation. Again, Petitioner incorrectly argues a POSITA would understand the limitation only required an optical connector disposed *at an end region of the carrier*. See Petition at p. 60 (“A POSITA would have understood that the claim element ‘an optical fiber connector disposed in an end of the carrier’ does not mean that the connector is coupled directly to the end of the carrier; rather, it means that the connector is disposed at an end region of the carrier.”). See Exhibit 2011 at ¶ 101.

However, a POSITA would not necessarily have understood that the claim element ‘an optical fiber connector disposed in an end of the carrier’ only requires that the connector is disposed at an end region of the carrier since the plain language of claim 1 clearly requires “an optical fiber connector disposed in an end of the carrier.” See *id.* at ¶ 102. And, as noted, such “general knowledge cannot be used to supply a missing claim limitation in an IPR. See Exhibit 2008.

- C. The Ho-Lee Combination also fails to disclose the “wherein the optical signal is divided into multi-channel optical signals in parallel by the arrayed waveguide grating based on their wavelengths, a top surface defined by an output end of the arrayed waveguide grating is at a predetermined angle, causing the multi-channel optical signals reflected by the top surface defined by the output end of the arrayed waveguide grating to be reflected to a photosensitive surface of the plurality of optoelectronic diodes arranged in parallel, wherein the predetermined angle of the top surface defined by the output end of the arrayed waveguide grating is in a range of 41 to 46 degrees such that the top surface provides the reflection.”**

A POSITA would not have been motivated to modify Ho in view of Lee to provide “the multi-channel optical signals reflected by the top surface defined by the output end of the arrayed waveguide grating to be reflected to a photosensitive surface of the plurality of optoelectronic diodes arranged in parallel, wherein the predetermined angle of the top surface defined by the output end of the arrayed waveguide grating is in a range of 41 to 46 degrees such that the top surface provides the reflection.” *See* Exhibit 2011 at ¶ 103.

Petitioner and Dr. Lebby argue “in Ho modified in view of Lee, the output end of Ho’s AWG 235 would have been modified to have an inclined surface cut at a 45-degree angle, such as surface 111 of Lee, to vertically reflect the demultiplexed outputs 237 to the photosensitive surfaces of photodiodes 270 provided below the angled surface...[because] a POSITA would have been

motivated to modify Ho in view of Lee to use the more efficient and reliable direct coupling technique disclosed in Lee.” Petition at p. 65; *see also* Exhibit 2011 at ¶ 104.

However, there would have been no meaningful motivation to modify the output end of Ho’s AWG 235 in view of Lee to have an inclined surface cut at a 45-degree angle to vertically reflect the demultiplexed outputs 237 to the photosensitive surfaces of photodiodes 270 given that Ho already discloses an effective and efficient way to couple the AWG 235 to the photodetectors 236. *See* Exhibit 1005 at ¶¶43-44. Indeed, if Ho is modified by using the coupling technique of Lee, lens will be bonded to Ho’s AWG 235 in view of Lee. This would result in Petitioner's combination or modification changing the principle operation of Ho and render it unsatisfactory for its intended purpose, which is direct coupling without any intermediate optical components such as lenses or fiber arrays. *See* Exhibit 2011 at ¶ 105; *see also* MPEP §2143.01 (“if the proposed modification ... would change the principle of operation of the prior art invention being modified, then the teachings of the reference are not sufficient to render the claims *prima facie* obvious.”).

Indeed, Ho specifically teaches that “[t]he term ‘directly optically coupled’ refers to an optical coupling *without any intermediate optical components such as*

*lenses or fiber arrays.” Id. at ¶ 19 (emphasis added). And, Ho then teaches “the outputs of the demultiplexer 132 may be aligned with and *directly optically coupled* to the photodetectors 134 to provide a relatively high coupling efficiency.” *Id.* at ¶ 30 (emphasis added); Exhibit 2011 at ¶ 106.*

As explained, the intended purpose of Ho is the direct optical coupling of vertical photodetectors 236 to the AWG 235. See *id.* at ¶¶ 18-19, 30. The optical unit 300 of Lee includes an array lens 200 for focusing an optical signal output from the optical transmission means, and the electrical unit 400 receives the optical signal focused through the array lens 200 and converts the received optical signal into an electrical signal. See, e.g., Exhibit 1006 at Fig. 2, ¶ 33. If the AWG 235 in Ho is modified in view of Lee’s PLC 110, such combination or modification would be a change in the basic principle under which Ho’s AWG 235 was designed to operate, which is its direct coupling. See Exhibit 2011 at ¶ 107.

In other words, the modification of Ho in view of the coupling technique described in Lee as argued by Petitioner and Dr. Lebby results in an unsatisfactory result for Ho’s intended purpose and is in opposite to its teachings. See Exhibit 2011 at ¶ 108.

D. The Ho-Lee Combination fails to disclose Claims 2-4

Claims 2-4 of the '301 Patent depend from Claim 1. Because Petitioner has not shown that the Ho-Lee Combination discloses Claim 1, Petitioner also has not shown that The Ho-Lee Combination discloses Claims 2-4. *See* Exhibit 2011 at ¶ 109.

VIII. RESERVATION OF RIGHTS

Should the Director decide to institute an *inter partes* review, Applied Optoelectronics, Inc. reserves all rights to make additional arguments in, and present claim constructions and evidence with, its Patent Owner Response. Applied Optoelectronic's silence on any particular claim or limitation at this time is not a concession that the Petition's discussion of that claim or limitation is properly based. Applied Optoelectronics, Inc. also reserves the right to dispute the level of ordinary skill in the art if the Director decides to institute *inter partes* review. Accordingly, Applied Optoelectronics, Inc. reserves the right to submit additional or alternative arguments of patentability, and nothing in this Preliminary Response acts or should be construed to act as an admission, acquiescence, or estoppel on the merits of the Petition.

IX. CONCLUSION

For the reasons set forth above, Applied Optoelectronics, Inc., respectfully requests that the Director deny institution of the Petition for all Challenged Claims of the '301 Patent.

Dated: January 7, 2026

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CERTIFICATE OF WORD COUNT

Under the provisions of 37 C.F.R. § 42.24(d), the undersigned hereby certifies that the Microsoft Office word count including all footnotes for the foregoing Patent Owner's Preliminary Response, excluding the table of contents, table of authorities, certificate of word count, appendix and certificate of service, totals 6,773 words, which is less than the 14,000 words allowed under 37 C.F.R. § 42.24(b)(1).

Dated: January 7, 2026

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CERTIFICATE OF SERVICE

The undersigned hereby certifies service on the Petitioner, pursuant to 37 C.F.R. § 42.6(e) and by agreement of counsel, by electronic (e-mail) delivery of a true copy of the foregoing **PATENT OWNER'S PRELIMINARY RESPONSE**, which was served on January 7, 2026 to the following Counsel for Petitioner via e-mail:

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