UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CAMBRIDGE INDUSTRIES USA, INC.,

Petitioner

v.

APPLIED OPTOELECTRONICS, INC.,

Patent Owner

Case: IPR2025-00434

U.S. Patent No. 10,379,301

PETITIONER'S REQUEST FOR REHEARING OF THE BOARD'S NON-INSTITUTION DECISION UNDER 37 C.F.R. § 42.71(d)

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Ex. 1001	’301 Patent	U.S. Patent No. 10,379,301
Ex. 1002	’301 File History	File History of U.S. Patent No. U.S. Patent No. 10,379,301
Ex. 1003	Kirk Declaration	Declaration of Dr. Andrew G. Kirk
Ex. 1004	Kirk CV	*Curriculum Vitae* of Dr. Kirk
Ex. 1005	Viswanadham	ESSENTIALS OF ELECTRONIC PACKAGING, P. Viswanadham, ASME (2011), pp. 7-9.
Ex. 1006	Pecht	HANDBOOK OF ELECTRONIC PACKAGE DESIGN, M. Pecht, Ed., Marcel Dekker, Inc. (1991), pp. 76-83, 173-178, 515-517.
Ex. 1007	Shen	U.S. Patent Pub. No. US 2016/0349451
Ex. 1008	Shen provisional	U.S. prov. patent appln SN 62/166015
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Ex. 1010	Scheduling Order	Scheduling Order dated August 7, 2024, in *Applied Optoelectronics, Inc. v. Cambridge Industries USA, Inc.*, No. 3:24-cv-01010-JD (N.D. Cal.)
Ex. 1011	Claim Terms	Joint Claim Construction and Pre-Hearing Statement in *Applied Optoelectronics, Inc. v. Cambridge Industries USA, Inc.*, No. 3:24-cv-01010-JD (N.D. Cal.)

I. INTRODUCTION

Cambridge Industries USA Inc. ("Petitioner") respectfully requests rehearing of the Board's decision Denying Institution of *Inter Partes* Review of U.S. Patent No. 10,379,301 (the "'301 patent"). *See* Paper 12 ("Decision"). The Board's denial is based on a misapprehension of both the prior art and the claimed invention.

The Petition expressly adopts the "plain and ordinary" meanings of the claim terms as employed in ***Patent Owner's*** parallel litigation infringement contentions and explains how straight-forward application of those constructions to the prior art proves invalidity. The Decision, however, erroneously attributes to the Petitioner "first" and "second" "alternative" claim constructions, concludes no claim construction is necessary, and yet concludes the undefined limitations are absent in the prior art.

The Decision also misapprehends the prior art. It finds in Shen a teaching that is not contained in that reference, overlooks express disclosures of structure taught in Shen and Soldano, and faults those references for not expressly disclosing other structure that every POSITA would understand to be necessarily present. The cumulative result of these errors leads inevitably to an erroneous denial of the institution. Petitioner respectfully requests reconsideration and issuance of a revised institution decision that is based on an accurate understanding of the prior art, the proposed grounds and the relevant law.

II. SUMMARY OF THE BOARD'S ERRORS

1. The Board's Analysis of the Shen Prior Art

The Petition proffers a definition of "carrier" based on the disclosure of the '301 patent and the prosecution history, but did not apply that construction in its invalidity analyses. Instead, Petitioner ***explicitly adopted*** Patent Owner's construction for the term "carrier" as urged by Patent Owner in the parallel proceeding: "one or more components for supporting ROSA components such as an AWG."[1] The Petition also explains, based on the patent prosecution history of the '301 patent, that the term "same top surface" should be construed to mean "the topmost surface of the carrier," which may include multiple elevations. Paper No. 2 at 11. Those constructions align with the Patent Owner's infringement theory as set forth in its infringement contentions. *Id.* ("In its infringement claim charts exchanged in the pending district court litigation, Patent Owner has identified as the claimed 'carrier' the printed circuit board employed in Petitioner's products." Ex. 1003, ¶¶ 65-66.)

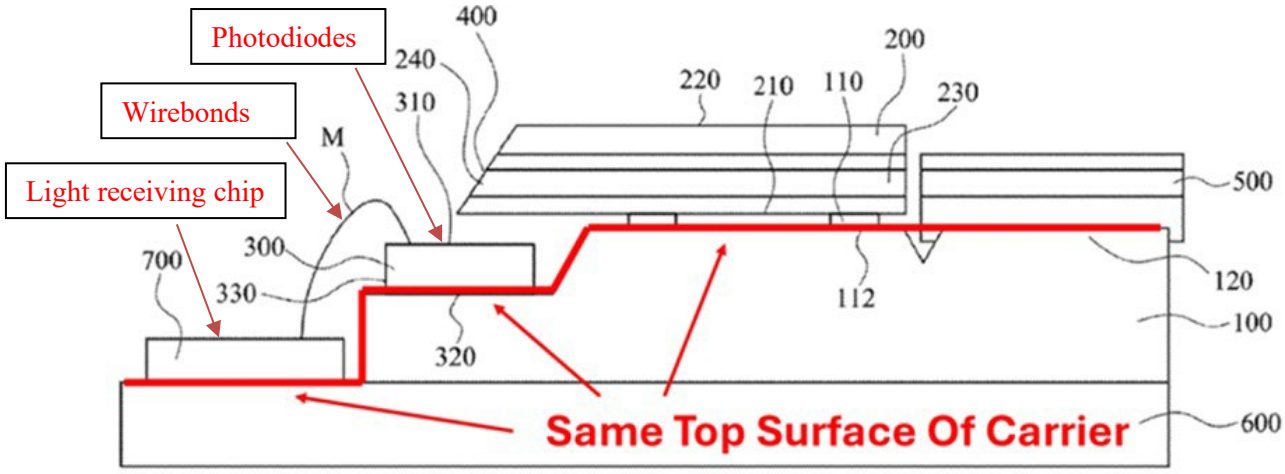
The Decision credits Patent Owner's contention that no claim construction is needed, stating "[w]e do not find it necessary to construe the claims at this stage of the

[1] "Because the term 'carrier' should be construed consistently for invalidity as for infringement, Petitioner and its expert has adopted for purposes of this Petition Patent Owner's construction for carrier as 'one or more components for supporting ROSA components such as an AWG.' Ex. 1003, ¶ 66." Paper No. 2 at 11, *see also* Ex. 1011.

proceedings." Paper No. 12 at 10. Notwithstanding the Petition's **explicit** adoption of Patent Owner's construction, the Decision discusses "first" and "second" alternative constructions for the term "carrier" that it incorrectly attributes to Petitioner. Due to this focus on "alternative" theories, the Decision fails to address the arguments put forth in the Petition, instead determining that the claimed limitations are ***not*** met by the prior art without explaining what those undefined claim limitations encompass.

For example, in analyzing limitation [1c] of claim 1 with respect to Shen, the Decision states that "Petitioner's *first*, alternative argument [that the carrier may consist of multiple components] runs afoul of Petitioner's *first*, alternative claim construction theory [that the carrier is a ceramic component]." Yet the Petition adopts only a ***single*** definition of carrier as constituting "substrate 100 and PCB 600" of Shen, reflecting Patent Owner's litigation construction. *See*, Paper No. 2 at 16, *see also, id.* at 17 (identifying "carrier" as "substrate 100 + PCB 600"). Petitioner's invalidity argument is entirely consistent with this adopted construction. The observation in the Petition that the Shen provisional application mentions both the photodetector and TIA IC ("light receiving circuit") may be located on the SiOB substrate merely demonstrates that there was nothing novel or non-obvious about such an arrangement – it was not made in support of any "alternative" construction.

The confusion created by the Board's "alternative constructions" dichotomy leads to further error with respect to limitation [1d]. Despite failing to explain what constitutes the "the top surface," the Decision concludes Shen's optical detector (300) is not located on the ***top surface*** of the end of the carrier. Yet the arrangement depicted



in Shen plainly meets Patent Owner's litigation construction (and proves invalidity, as set forth in the Petition), in which the "carrier" is "***the substrate 100 and PCB 600***."

The Decision further cites to the Patent Owner's Preliminary Response, ***with emphasis added***, as stating that Shen "discloses that '[t]he **driver 700 is disposed on the circuit board 600**, and the driver 700 is configured to drive the optical detector 300 or provide the optical detector 300 with an electric signal.'" Yet "driver 700" in the Shen provisional application is identified as "TIA IC" – a transimpedance amplifier integrated circuit – the ***exact same structure*** described in the '301 patent for the light receiving circuit: "The light receiving chip **2** of this embodiment 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." Ex. 1001, 3:5-9. The Decision's choice to seize upon Patent Owner's "driver" language suggests that the Board did not appreciate that the "light receiving circuit" in the '301 patent ***is*** a TIA IC and that the same component is described in both Shen and the '301 patent.[2]

The Decision at 16 states that "we determine that Petitioner's *first*, alternative argument [that the 'carrier' is substrate 100 and PCB 600] is deficient because it does not show driver 700 on what Petitioner points to teaching the claimed 'carrier'– that is, the *combination* of Shen's substrate 100 and circuit board 600 – and thus does not sufficiently show that Shen discloses 'the optoelectronic diodes and the light receiving chip are disposed directly on the same top surface of the end of the carrier,' as recited in limitation [1d]" (emphasis in original). The Board's conclusion is inscrutable. Is the Board's saying that ***both*** the diodes and light receiving circuit must be on the ***same portion*** of the "carrier" if the carrier comprises multiple supporting components? Or has the Board imported into its concept of "same top surface" that both components of

[2] The Board chides Petitioner for using the '301 patent's claim term instead of Shen's "own terminology" in its invalidity analysis as misleading: "*See*, *e.g.*, Pet. 17 (Petitioner referring to Shen's driver 700 as 'light receiving chip (700)')." Yet there should be no confusion about identifying Shen's components based upon ***what Shen itself calls those components***; the confusion lay entirely in the Board's misapprehension.

the top surface comprise ***a single supporting surface*** regardless of elevation? The conclusion at page 16 of the Decision lacks support in the '301 patent and its prosecution history. Moreover, the Decision appears to be based on an understanding of the "same top surface" that the ***Board expressly refused to provide.*** *See,* Paper No. 12 at 10. The Decision is internally inconsistent and in every permutation incorrect.

The Decision compounds its error by crediting as "persuasive" Patent Owner's speculation that if the light receiving chip (700) and photodiodes were both located on the SiOB, "they would no longer be electrically connected via bonding wire as required by the claim." Decision at 17. Patent Owner and the Board offer ***no*** evidence that locating both components on the SiOB substrate would ***eliminate*** the use of wire bonds. Indeed, when the Shen provisional was filed, it would have been unusual for a SiOB substrate to include wire traces instead of conventional wire bonds. Shen merely states that placing both components on the SiOB would "minimize wire bonds" – because the wires would cover a shorter distance – not because wire bonds would be eliminated. Dr. Kirk's declaration, Ex. 1003, ¶ 81, likewise refers to ***minimizing*** [reducing] the wire bonds, not dispensing with them altogether. The Decision is based on unfounded speculation and factual error, which constitute an abuse of discretion.

2. The Board's Analysis of the Soldano Prior Art

The Board's analysis of Soldano also misapprehends that prior art reference and the applicable law. Specifically, the Decision overlooks that key limitations of claim 1 of the '301 patent, e.g., the light receiving circuit and photodiodes, are ***expressly described in Soldano.*** While the Decision at 23 faults Petitioner for not pointing to where in Soldano's figures the claimed features are present, the features are expressly described in the text. Moreover, as explained by Dr. Kirk, a POSITA would understand the light receiving circuit ***must necessarily be present***, or the Soldano prior art would not be functional.[3]

For example, the Decision states in footnote 6, with respect to limitation [1c], that "[i]t is not clear which element in Soldano Petitioner is citing as teaching the 'light receiving chip.'" Yet the Petition, Paper No. 2 at 24-25, identifies silicon photonics chip 301 of Soldano, which is ***explicitly described*** as including a transimpedance amplifier: "For each channel, the light then goes into an integrated photodetector on the silicon photonics chip and is converted into an electrical signal and electrically

[3] The Board appears to have jumped the gun by rejecting undisputed expert evidence regarding what a person of skill in the art would have understood from Soldano's disclosure. Under the PTAB's July 31, 2025, memorandum ("Enforcement and Non-Waiver of 37 C.F.R. § 42.104(B)(4) and Permissible Uses of General Knowledge in Inter Partes Reviews.") ("the July 31 Memo"), its refusal to accept such evidence is supposed to apply only to IPR petitions filed after September 1, 2025.

amplified by a subsequent TIA (transimpedance amplifier)." *See, e.g.*, Ex. 1009 at 8:14-24, cited at page 25 of the Petition. As discussed above with respect to Shen, the "light receiving circuit" of the '301 patent ***is a TIA chip***. Ex. 1001, 3:5-9. There can be no doubt that Soldano has a "light receiving circuit."

The Decision displays similar confusion as to whether in Soldano elements 505 may be photodetectors/photodiodes instead of grating couplers. For example, footnote 7 of the Decision says it is "at best confusing, and at worse, misleading" for Petitioner to refer to element 505 as photodetectors. But the Decision ignores or misapprehends that in an alternative embodiment of Soldano, photodetectors are substituted for grating couplers 505 (Ex. 1009, 10:10-19):

> Depending on the silicon technology, the light in the glass PLC **302** could be deflected down by the side polish **409** and instead of hitting a grating coupler **505** and entering a waveguide **506,** ***could instead hit a photodetector that would be placed in lieu of the grating coupler 505. The photodetector would then be electrically connected to the transimpedance amplifier.***

The above passage, cited in the Petition at 25, shows there is nothing confusing or misleading about Petitioner's analysis that the photodiodes of limitation [1d] are described in Soldano. Rather, the criticism in footnote 7 of the Decision is unfounded, demonstrates a factual misunderstanding of the prior art, and is an abuse of discretion.

Still further with respect to limitation [1d], the Board questions the statement that the photodetectors of Soldano would be understood to be "electrically connected"

to the light receiving chip by wire bonds. Soldano, Ex. 1009, 10:10-19, states that the "***photodetector would then be electrically connected to the transimpedance amplifier.***" As explained by Dr. Kirk, a POSITA would have understood that photodiodes conventionally are coupled to integrated chips via wire bonds, such a universally understood concept in integrated circuits that it need not be explained.

The Board further erred in misapprehending that for anticipation a prior art reference must teach every limitation of claim, no matter how rudimentary in the field. The Board's position here is contrary to established case law.[4] Where a POSITA would ***necessarily have understood*** an element to be present in a prior art reference, the prior art need not specifically provide such details. *See, e.g.*, *Sage Prods., LLC v. Stewart*, 133 F.4th 1376, 1384, fn. 5 (Fed. Cir. 2025) ("An anticipation analysis is undertaken from the perspective of the person of ordinary skill in the art and, therefore, must take account of the knowledge of such a person); *Arthrocare Corp. v. Smith & Nephew, Inc.,* 406 F.3d 1365, 1373-74 (Fed. Cir. 2005) ("[E]ven if a piece of prior art does not expressly disclose a limitation, it anticipates if a person of ordinary skill in the art would understand the prior art to disclose the limitation ..."); *In re Graves*, 69 F.3d 1147, 1152 (Fed. Cir. 1995)(same). The noted above, Soldano states that "[***t***]***he***

[4] As noted footnote 3, the PTAB's decision to disregard Federal Circuit law pursuant to the July 31 Memo applies only to IPR petitions filed after September 1, 2025.

photodetector would then be electrically connected to the transimpedance amplifier."
It need not also include the phrase "via wire bonds" as that feature would have been ***universally*** understood, as explained by Dr. Kirk.

Further, the Board states that "the dispositive inquiry is whether the reference, Soldano, discloses that the connection method between grating couplers 505 and light receiving chip employs a bonding wire." This "dispositive inquiry" makes no sense. A grating coupler is an ***optical – not electrical – component***, and as such grating coupler 505 could never be electrically "connected" to a light receiving chip via a wire bond. Instead, as disclosed in Soldano, the grating coupler ***optically*** connects the AWG to individual wavelength waveguides. *See* Ex. 1009, 9:52-63, 10:26-36. The nonsensical analysis set forth at page 23 of the Decision is an abuse of discretion.

The Board errs still further in crediting Patent Owner's contention that the photodiodes in Soldano's alternative embodiment are not located at "the end of the carrier." The Board refused to construe the term "carrier," and thus has no basis whatsoever to determine what constitutes the carrier's "end." Further, the term "midpoint" used in limitation [1f] is not described in the specification of the '301 patent, having been introduced during prosecution. Without having construed the term "carrier," it is an abuse of discretion to conclude that Soldano does not show that portion of the "carrier" which is not even described in the '301 patent.

III. STANDARD OF REVIEW

The Board reviews a non-institution decision for an abuse of discretion. 37 C.F.R. § 42.71(c). "An abuse of discretion occurs when a decision is based on an erroneous interpretation of law or clearly erroneous factfinding, or if that 'decision represents an unreasonable judgment in weighing relevant factors.'" *In re Gartside*, 203 F.3d 1305, 1315–16 (Fed. Cir. 2000). Misapprehending or overlooking a significant fact or argument is an abuse of discretion. *See Merial Ltd. v. Virbac*, IPR2014-01279, Paper 18 at 7, 8, 14 (P.T.A.B. Apr. 15, 2015).

IV. ARGUMENT

1. The Board's Refusal To Address Claim Construction Issues Was An Abuse Of Discretion

The Decision is internally inconsistent, first by concluding that no construction of "top surface" is needed and then *sub silentio* adopting an unstated construction that ignores the Patent Owner's arguments to secure allowance of the '301 patent, in which "the same top surface" extends to multiple elevations. *See* Petition at 10-11. Likewise, it was an abuse of discretion for the Board to refuse to construe the term "carrier," and then determine that the carrier limitations are not met in the prior art references.

It was a further abuse of discretion for the Board to misstate Petitioner's contentions as to what constitutes the claimed "carrier," when the Petition ***explicitly adopted*** the Patent Owner's construction from the parallel proceedings. Moreover,

Shen includes additional teachings that locating multiple components on a surface does not constitute an invention, as alleged in the '301 patent, but merely highlights the trivialness of those alleged inventions of the '301 patent.

For all these reasons, the Board should reconsider its flawed institution decision.

2. The Board's Analysis Of Shen Is Fatally Flawed

The Board's failure to understand that "driver 700" of Shen is ***identical*** to the "light receiving circuit" of the '301 patent – both are described as transimpedance amplifiers – demonstrates the Board's misreading of the disclosures of the '301 patent and the prior art. That failure caused the Board to be led astray by Patent Owner's specious argument that Shen's TIA IC was different than a "light receiving circuit."[5]

The Decision also erroneously credits Patent Owner's unsubstantiated speculation that locating the light receiving circuit and photodiodes on a Silicon Optical Bench ("SiOB") somehow eliminates the need to electrically connect those components. The Shen provisional application states that if both the transimpedance amplifier and photodiodes were located on the SiOB board, wire bonding could be "minimized," which means reduced in amount, not eliminated entirely. There is no disclosure in Shen, and certainly no expert or extrinsic evidence, that the wire bonds could be completely eliminated, as the Board believes. The Board's adoption of Patent

[5] Indeed, so much different as to warrant the Board's added emphasis!

Owner's speculation is a further abuse of discretion, requiring rehearing of the Petition and an informed analysis of the Shen prior art, including application of properly construed claims in accordance with the '301 patent's prosecution history.

3. The Board's Analysis Of Soldano Is Fatally Flawed

Beyond demonstrating a lack of appreciation of the teachings of Soldano, the Decision further displays a lack of even a rudimentary understanding of integrated circuits and photonics modules, culminating in a non-sensical "dispositive inquiry." The Decision purports to determine that the Petition does not sufficiently establish that limitations [1d] and [1f] are present in Soldano, yet provides no logical rationale for that determination.

For example, in footnote 6 of the Decision, the Board fails to see where the claimed "light receiving chip" is located in Soldano. But as explained in the passages of the Petition discussed *infra* at 7-8, that element is located in silicon photonics chip 301. And as in the '301 patent itself, the "light receiving circuit" is a transimpedance amplifier. *Cf.* Ex. 1009 at 8:14-24 to Ex. 1001, 3:5-9 (both describing TIA chips coupled to the photodiodes/photodetector). The Decision faults the Petition for not identifying where in Soldano's figures the light receiving circuit is located, yet Soldano expressly describes that element is present. Failure to apprehend that fact constitutes an abuse of discretion.

The Board further errs in failing to understand that in an alternative embodiment of Soldano, described at Ex. 1009, 10:10-19, photodetectors ***are substituted*** for grating couplers 505, and are electrically coupled to the TIA chip ("light receiving circuit"). The caselaw is plain that a patent specification need not describe components that are basic to a disclosed invention, especially in light of expert evidence such as Dr. Kirk's Declaration. Contrary to the assertion in the Decision (which lacks caselaw support), the caselaw imposes **no** requirement on a patentee to describe or illustrate a well-known and well-understood component that is basic to the functionality of an invention. The Board's determination that Soldano does not anticipate because it fails to ***explicitly state*** that which every POSITA would have understood, that the photodetector is electrically connected to the TIA chip by wire bonds, is contrary to law and an abuse of discretion.

Rather than credit Dr. Kirk's evidence of this fundamental use of wire bonds in integrated circuits, the Board denigrated that evidence as "mirroring" the Petition. If anything, the Petition reflects content of the Kirk Declaration, not the other way around. Still further, the Board's literal interpretation of FIG. 5 instead of considering that figure in light of the alternative embodiment expressly described in Soldano at 10:10-19, demonstrates the Board's refusal to fairly interpret the teachings of Soldano. The Board's refusal to credit Dr. Kirk, or properly read Soldano, were improper.

The portion of the Decision recasting the "dispositive issue" as whether a grating coupler (an optical component) would have been wire bonded to an integrated circuit is nonsensical. The answer has no relevance to the disclosure of Soldano and demonstrates a profound lack of understanding of the reference and the law.

Finally, the Decision determines, after refusing to construe the term "carrier" that the location of the "midpoint of the carrier" is not where it should be in Soldano. The word "midpoint" appears only in the amended claims of the '301 patent, not in the specification, and is not defined. Because the Board refused to construe the term "carrier" the Board's determination that the "end" and "midpoint" of the carrier in Soldano are as required by the claim is mere *ipsit dixit*, lacks any rational basis, and constitutes a further abuse of discretion.

V. CONCLUSION

For the reasons set forth above, the Board's non-institution of IPR2025-00434 was an abuse of discretion. Petitioner requests that IPR2025-00434 be instituted.

Date: August 28, 2025 By: */Nicola A. Pisano/*

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6(e), 42.105, the undersigned hereby certifies that true and correct copies of the above-captioned PETITIONER'S REQUEST FOR REHEARING OF THE BOARD'S NON-INSTITUTION DECISION UNDER 37 C.F.R. § 42.71(d) was served in its entirety on August 28, 2025, upon the Patent Owner at the correspondence address of record for the subject patent as listed on the USPTO's Patent Center via Priority Mail Express®:

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Date: August 28, 2025

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