

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD., AND
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioners

v.

SINOTECHNIX LLC,
Patent Owner

Case IPR2025-00333

U.S. Patent No. 7,748,873

PATENT OWNER'S PRELIMINARY RESPONSE

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Ex. 2001	Docket Report for <i>Sinotechnix LLC v. Samsung Electronics Co., Ltd., et al.</i> , 2:24-cv-544-JRG (E.D. Tex. Jul. 17, 2024)
Ex. 2002	<i>Sinotechnix LLC v. Samsung Electronics Co., Ltd., et al.</i> , 2:24-cv-544-JRG-RSP, Dkt. No. 48, Amended Docket Control Order
Ex. 2003	<i>MyPort, Inc. v. Samsung Elecs. Co., Ltd.</i> , Case No. 2:22-cv-00114-JRG, Order, Dkt. No. 73 (E.D. Tex. June 13, 2023)
Ex. 2004	<i>General Access Solutions, Ltd. v. Cellco Partnership</i> , Case No. 2:22-cv-00394-JRG, Order, Dkt. No. 225 (E.D. Tex. May 22, 2024)
Ex. 2005	Excerpts of Petitioners' Amended Invalidity Contentions served in <i>Sinotechnix LLC v. Samsung Electronics Co., Ltd., et al.</i> , 2:24-cv-544-JRG (E.D. Tex. Jul. 17, 2024) (highlighting added)
Ex. 2006	Petitioners' Subpoena to Lumileds, LLC dated February 5, 2025 (trimmed)
Ex. 2007	Petitioners' Subpoena to Carclo US Holdings, Inc. dated March 31, 2025 (trimmed)
Ex. 2008	Collection of Petitioners' Notices of Subpoenas
Ex. 2009	Minutes Entry for April 10, 2025 Hearing (<i>Sinotechnix LLC v. Samsung Electronics Co., Ltd., et al.</i> , 2:24-cv-544-JRG, Dkt. No. 102 (E.D. Tex. Jul. 17, 2024))
Ex. 2010	Minutes Entry for April 15, 2025 Hearing (<i>Sinotechnix LLC v. Samsung Electronics Co., Ltd., et al.</i> , 2:24-cv-544-JRG, Dkt. No. 120 (E.D. Tex. Jul. 17, 2024))

Ex. 2011	Email from Y. Ha, counsel for Petitioners, to the Board dated April 17, 2025 (highlighting added)
Ex. 2012	Petitioners' Motion to Transfer Venue (<i>Sinotechnix LLC v. Samsung Electronics Co., Ltd., et al.</i> , 2:24-cv-544-JRG, Dkt. No. 53 (E.D. Tex. Jul. 17, 2024)) (highlighting added)
Ex. 2013	U.S. Patent No. 6,607,286
Ex. 2014	U.S. Patent No. 6,679,621
Ex. 2015	U.S. Patent Application Publication No. 2002/0044454
Ex. 2016	Declaration of Thomas William Kennedy Jr.
Ex. 2017	Excerpts of McGraw-Hill Dictionary of Scientific and Technical Terms (6th ed. 2003)

I. INTRODUCTION

Pursuant to 35 U.S.C. § 313 and 37 C.F.R. § 42.107, Patent Owner Sinotechnix LLC (“Patent Owner”) submits this Preliminary Response to the Petition for *Inter Partes* Review (“Petition,” Paper 1) filed by Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (“Petitioners”) challenging claims 1-8 and 10-13 of U.S. Patent No. 7,748,873 (the “’873 Patent”) (Ex. 1001).

For at least the reasons detailed below, Petitioners have not met their burden of showing a reasonable likelihood of prevailing on any of their proposed grounds of unpatentability, and the Board should not institute *inter partes* review.

II. THE ’873 PATENT AND THE CHALLENGED CLAIMS

A. Overview of the ’873 Patent

The ’873 Patent relates to “a side illumination lens utilizing total internal reflection and a luminescent device using the lens.” ’873 Patent, Ex. 1001 at 1:6-9. Total internal reflection is “[a] phenomenon in which electromagnetic radiation in a given medium which is incident on the boundary with a less-dense medium (one having a lower index of refraction) at an angle less than the critical angle is completely reflected from the boundary.” McGraw-Hill Dictionary of Scientific and Technical Terms, Ex. 2017 at 2166 (total internal reflection). The ’873 Patent describes the concepts of total internal reflection and critical angles in connection with Figure 3:

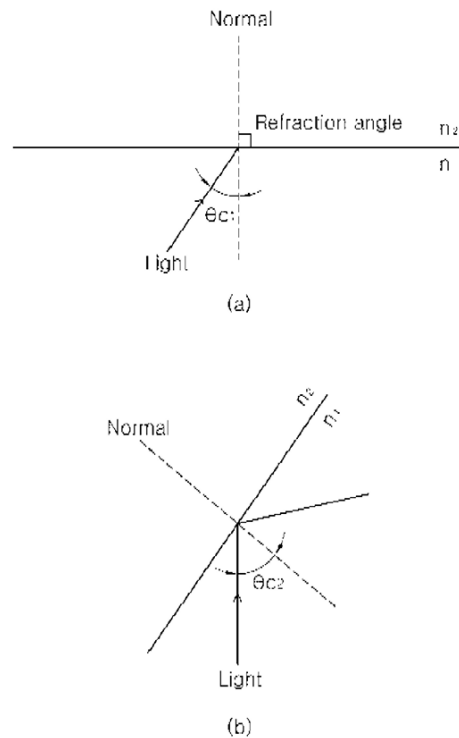
Referring to FIG. 3, the critical angle refers to the smallest incidence angle θ_c of at which total internal reflection occurs at a refractive

boundary when light travels from a material with a high refractive index n_1 to another material with a low refractive index n_2 . That is, if light meets and is refracted on the other material ($n_2 < n_1$) as shown in FIG. 3 (b), the incidence angle that results in a refraction angle of 90 degrees is referred to as the critical angle. At this time, the incidence angle refers to an angle θ_{c1} measured with respect to the normal at the refractive boundary. If an incidence angle is greater than the critical angle, total internal reflection occurs.

In a case where light is vertically incident from one medium n_1 on another medium n_2 in the two different media ($n_2 < n_1$) as shown in FIG. 3 (b), if a boundary surface of the medium n_1 has a certain slope, an angle defined between the incident light and the normal perpendicular to the boundary surface becomes greater than the critical angle ($\theta_{c2} > \theta_{c1}$). As a result, the light is not transmitted through the other medium n_2 after passing through the medium n_1 but is reflected toward the inside of the medium n_1 . With the use of the total internal reflection phenomenon of light, the light is not transmitted but reflected even on a transparent surface. Here, one of the media may be a material with superior transmittancy, and the other medium may be air.

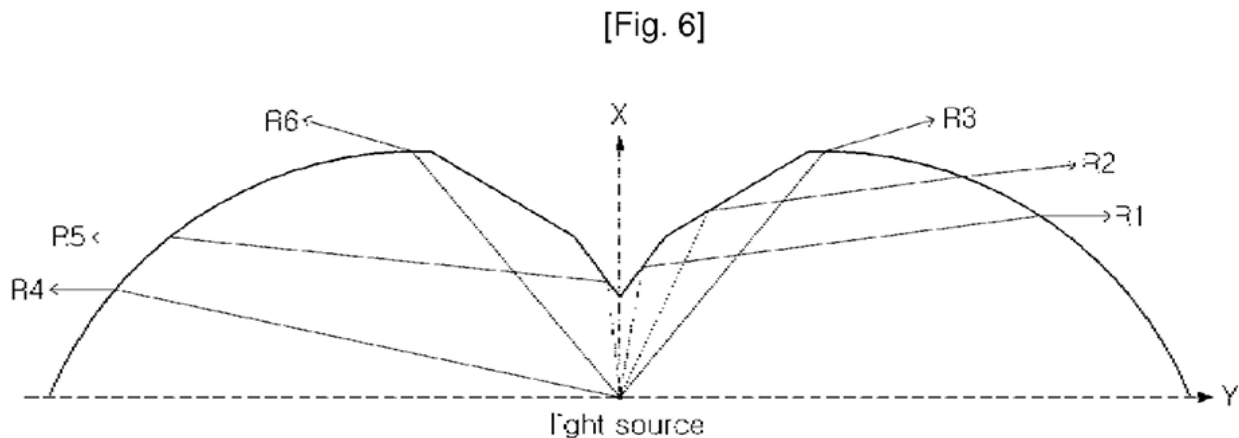
'873 Patent, Ex. 1001 at 4:65-5:22.

[Fig. 3]



Id. at Fig. 3.

According to the '873 Patent, conventional “device[s] capable of emitting light in side directions of a lens ... using the total internal reflection (TIR) property of light” are complicated and costly. *Id.* at 1:42-59. According to the invention of the '873 Patent, “a lens with total internal reflection surfaces with different slopes, and a linear and/or curved refractive surface(s) allows light emitted forward from a luminescent chip to be guided to a side of the lens ... thereby reducing a defective rate and fabrication costs of the lens.” *Id.* at 3:13-22. “With the use of the total internal reflection phenomenon of light, the light is not transmitted but reflected even on a transparent surface.” *Id.* at 5:18-20. “FIG. 6 is a conceptual view illustrating the operation of the total internal reflection lens according to the first embodiment[:.]”



Id. at 3:49-51, Fig. 6.

The '873 Patent innovatively uses total *internal* reflection to redirect light toward the side of the lens using carefully angled internal surfaces and a refractive boundary. This structure offers efficient light control, simple manufacturing, and broad application in illumination and display systems.

B. Challenged Claims

The Petition challenges claims 1-8 and 10-13 of the '873 Patent. Claims 1, 8, and 12 are independent claims. Claims 2-7 depend from claim 1, claims 10 and 11 depend from claim 8, and claim 13 depends from claim 22. The challenged claims reflect the embodiments disclosed by the '873 Patent.

Independent claim 1 recites:

1. A lens, comprising:

a body;

a total reflection surface with a total reflection slope with respect
to a central axis of the body; and

at least one of a linear refractive surface and a curved refractive surface formed to extend away from the central axis and beyond a periphery of the total reflection surface.

Claim 1 is directed to a lens using total internal reflection and a refractive surface.

Independent claims 8 and 12 similarly require a lens having a total reflection surface and a refractive surface but further claim additional structural elements: a package, lead terminal(s), and heat sink element(s).

Independent claim 8 recites:

8. A luminescent device, comprising:

a package housing with an opening and a through-hole exposed by the opening;

a lead terminal having an inner portion exposed within the opening of the package housing and an outer portion extending from the inner portion and protruding to the outside of the package housing;

a heat sink coupled to a lower portion of the package housing and having a portion exposed through the opening; and

a lens including a total reflection surface encapsulating the package housing and having a total reflection slope with respect to a central axis of a body of the lens, and a refractive surface formed to extend away from the central axis and beyond a periphery of the total reflection surface.

Independent claim 12 recites:

12. A luminescent device, comprising:

a heat sink support ring;

a heat sink inserted into the support ring;

at least two lead terminals arranged at both sides of the support ring while being spaced apart from the support ring and the heat sink;

a package body for molding the heat sink and the lead terminals to support them, the package body having an opening through which an upper portion of the heat sink and portions of the lead terminals are exposed; and

a lens including a total reflection surface encapsulating the package body and having a total reflection slope with respect to a central axis of a body of the lens, and a refractive surface formed to extend away from the central axis and beyond a periphery edge of the total reflection surface.

C. Prosecution History of the '873 Patent

During prosecution, the examiner issued one office action on the merits rejecting the pending claims on anticipation and obviousness grounds citing to West (Ex. 1005) and Carey (Ex. 1013), two references that discuss total *internal* reflection. *See* '873 Prosecution History, Ex. 1003 at 392-401. In response, the applicant amended the independent claims (claim 1, 8, and 12) to further clarify that the

refractive surface “extend away from the central axis and beyond a periphery of the total reflection surface.” *Id.* at 412-424 (underlining in original showing amendments). The applicant overcame the rejection by successfully arguing West alone or in combination with Carey does not disclose every feature of the claims as amended which ultimately resulted in allowing the claims to issue. *Id.* at 412-424, 1441-1443.

III. LEVEL OF ORDINARY SKILL

For the limited purpose of this Preliminary Response, Patent Owner does not contest Petitioners’ definition of a person of ordinary skill in the art, but it reserves the right to do so in the event that trial is instituted.

IV. CLAIM CONSTRUCTION

Patent Owner submits that the Board needs to construe “total reflection surface,” a term found in every challenged independent claim, to arrive at the conclusion that the Petition is substantively deficient. *See Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011) (“claim terms need only be construed ‘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)). Patent Owner expressly reserves the right to address any and all other claim constructions in the Petition whether explicit or implicit if trial were to be instituted or in any other or subsequent proceedings.

A. “total reflection surface”

The ’873 Patent *exclusively* discusses total reflection surfaces to have a **total internal reflection (TIR)** property and does not disclose non-internal reflection, i.e., mirror reflection or mirror-like coatings or lining, of a reflection surface. *See, inter alia*, ’873 Patent, Ex. 1001 at Abstract, 1:6-9, 1:42-59, 1:66-2:5, 3:13-17, 4:65-5:9, 5:18-20, 5:29-31, 16:6-8, 18:25-27, 19:50-52, 21:9-11 (Abstract, Technical Field, Background Art, Disclosure of Invention, Advantageous Effects, and Best Mode for Carrying Out the Invention, including 5 different embodiments, all disclose “total internal reflection”).

The proper construction of “total reflection surface” is “total internal reflection surface,” which is supported by the disclosures of the specification. The ’873 Patent relates to “a side illumination lens utilizing total *internal* reflection and a luminescent device using the lens.” ’873 Patent, Ex. 1001 at 1:6-9 (emphasis added). Conventional “device[s] capable of emitting light in side directions of a lens ... using the total *internal* reflection (TIR) property of light” are complicated and costly. *Id.* at 1:42-59 (emphasis added). According to the invention of the ’873 Patent, “a lens with total *internal* reflection surfaces with different slopes, and a linear and/or curved refractive surface(s) allows light emitted forward from a luminescent chip to be guided to a side of the lens.” *Id.* at 3:13-17 (emphasis added). “With the use of the total *internal* reflection phenomenon of light, the light is not transmitted but reflected even on a transparent surface.” *Id.* at 5:18-20 (emphasis added). “FIG. [6/31/35/39/43] is a conceptual view illustrating the operation of the

total *internal* reflection lens according to the [first/second/third/fourth/fifth] embodiment[.]” *Id.* at 5:29-31, 16:6-8, 18:25-27, 19:50-52, 21:9-11 (emphasis added). In sum, the ’873 Patent requires total *internal* reflection to redirect light toward the side of the lens using carefully angled internal surfaces and a refractive boundary.

Where “a patent . . . describes the features of the ‘present invention’ as a whole, this description limits the scope of the invention,” *Verizon Servs. Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1308 (Fed. Cir. 2007); *see also Techtronic Indus., Inc. v. International Trade Comm’n*, 944 F.3d 901, 907-08 (Fed. Cir. 2019). A patentee may disavow claim scope based on limiting statements such as “the present invention includes ...” or “the present invention is ...” or “all embodiments of the present invention are” *Luminara Worldwide, LLC v. Liown Elecs. Co.*, 814 F.3d 1343, 1353 (Fed. Cir. 2016). Here, as noted above, the specification repeatedly and consistently describes the invention as a lens with total internal reflection surfaces. *See* ’873 Patent, Ex. 1001 at 1:6-9 (“The present invention relates to ... a side illumination lens utilizing total internal reflection”); 1:66-2:5 (“An object of the present invention is to provide illumination lens, which comprises a total internal reflection surface with a total reflection slope and a linear and/or curved refraction surface(s) extending therefrom, thereby achieving side luminescence”); 3:13-17 (“according to the present invention, a lens with total internal reflection surfaces with different slopes ... allows light emitted forward from a

luminescent chip to be guided to a side of the lens”). Consequently, the term “total reflection surface” should be construed to mean a “total *internal* reflection surface.”

Construing “total reflection surface” to mean a “total internal reflection surface” is consistent with the use of the term “total reflection surface” in the specification. Indeed, the specification only uses the term to refer to “a total internal reflection surface,” evidencing that the patentee defined “total reflection surface” as total internal reflection surface by implication. *See Homeland Housewares, LLC v. Whirlpool Corp.*, 865 F.3d 1372, 1377 (“[W]hen a patentee uses a claim term throughout the entire patent specification, in a manner consistent with only a single meaning, he has defined that term ‘by implication.’”) (quoting *Bell Atl. Network Servs., Inc. v. Covad Comm’ns Grp., Inc.*, 262 F.3d 1258, 1271 (Fed. Cir. 2001)). The patent describes each disclosed embodiment as a “total internal reflection lens” having a “total reflection surface” *See* ’873 Patent, Ex. 1001 at 5:23-6:20 (Embodiment 1), 16:1-64 (Embodiment 2), 18:20-19:21 (Embodiment 3), 19:45-20:51 (Embodiment 4); 21:5-22:3 (Embodiment 5).

In further support of construing “total reflection surface” to be limited to internal reflection, the ’873 Patent discusses a “critical angle,” a concept of internal reflection, throughout the specification and for each disclosed embodiment. *Id.* at 4:65-5:22 (“the critical angle refers to the smallest incidence angle θ_c of at which total internal reflection occurs...”); 6:44-50, 6:59-65, 17:26-32, 19:12-18, 20:41-47, 21:61-67 (“an angle defined by the first total reflection surface [] and light emitted from the luminescent chip [was] greater than the critical angle”); 6:1-15, 16:55-17:3.

Indeed, in each disclosed embodiment, the specification explains that the angle defined by the first total reflection surface and the light emitted from the luminescent chip is greater than the critical angle (i.e., the specification explains that the “total reflection surface” provides total internal reflection). *Id.* at 6:1-20 (Embodiment 1), 16:55-17:11 (Embodiment 2), 19:12-21 (Embodiment 3), 20:41-51 (Embodiment 4), 21:61-22:3 (Embodiment 5). Surfaces that utilize non-internal reflection, such as a mirror, do not have critical angles as total reflection occurs at all angles.

Further, the prosecution history of the '873 Patent is consistent with construing “total reflection surface” as “total internal reflection surface.” Petitioners cannot point to any evidence in the prosecution history to support an argument that “total reflection surface” does not have an internal reflection limitation. In fact, the examiner relied on prior art references in an office action rejection that disclose a total internal reflection surface. '873 Prosecution History, Ex. 1003 at 394-400; West, Ex. 1005 at 4:12 (“[total internal reflection] [f]unnel portion 58 is designed as a TIR surface”); Carey, Ex. 1013 at 3:28-31 (“the walls may be formed by the uncoated surface of the optical plastic lens shell arranged such that the exterior optical surface presents a reflective surface by Total Internal Reflection”). The examiner understood the importance of an internal reflection limitation and chose to assert prior art references that disclose a total internal reflection surface as opposed to prior art references that do not as Petitioners have done here discussed in further detail below.

V. APPLICABLE LEGAL STANDARDS

The Board may only grant a petition for *inter partes* review where “the information presented in the petition ... 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); 37 C.F.R. § 42.108(c). Petitioners bear the burden of showing that this statutory threshold has been met. *See* Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756 (Aug. 14, 2012) (“The Board ... may institute a trial where the petitioner establishes that the standards for instituting the requested trial are met”).

A. Anticipation

“Anticipation requires that a single reference disclose each and every element of the claimed invention. [] Prior art that must be modified to meet the disputed claim limitation does not anticipate the claim.” *Enplas Display Device Corp. v. Seoul Semiconductor Co.*, 909 F.3d 398, 405 (Fed. Cir. 2018) (citations omitted). “A patent claim is anticipated ‘only if each and every element is found within a single prior art reference, arranged as claimed.’” *In re Smith Int’l., Inc.*, 871 F.3d 1375, 1381 (Fed. Cir. 2017) quoting *Summit 6, LLC v. Samsung Elecs., Co.*, 802 F.3d 1283, 1294 (Fed. Cir. 2015).

“[I]t is well established that patent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes if the specification is completely silent on the issue.” *Hockerson-Halberstadt, Inc. v. Avia Group Inter., Inc.*, 222 F.3d 951, 956 (Fed. Cir. 2000); *see also Nystrom v. Trex Co.*,

Inc., 424 F.3d 1136, 1149 (Fed. Cir. 2005), *cert. denied*, 547 U.S. 1055 (2006) (“Hockerson-Halberstadt indicated our disfavor in reading precise proportions into patent drawings which do not expressly provide such proportions”); *Krippelz v. Ford Motor Co.*, 667 F.3d 1261, 1268 (Fed. Cir. 2012) (“This court has repeatedly cautioned against overreliance on drawings that are neither expressly to scale nor linked to quantitative values in the specification.”)

When a party does not identify any disclosure in a prior art reference demonstrating that a claim element is explicitly present, a party may attempt to demonstrate that the “missing” element is “necessarily present” and is therefore inherently anticipated. *HTC Corp. v. Cellular Commc’ns Equip., LLC*, 877 F.3d 1361, 1368 (Fed. Cir. 2017). A party seeking to establish the inherent disclosure of an element “must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill.” *Cont’l Can Co. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991). “A party must ... meet a high standard in order to rely on inherency to establish the existence of a claim limitation in the prior art in an obviousness analysis.” *Par Pharm., Inc. v. Twi Pharms., Inc.*, 773 F.3d 1186, 1195-96 (Fed. Cir. 2014); *see also HTC Corp.*, 877 F.3d at 1369 (affirming the Board’s finding that IPR petitioner had failed to show inherent anticipation). To be inherent, “the limitation at issue necessarily must be present, or the natural result of the combination of elements explicitly disclosed by the prior art.” *Par Pharm.*, 773 F.3d at 1196. “Inherency, however, may not be established by probabilities or possibilities. The

mere fact that a certain thing *may* result from a given set of circumstances is not sufficient.” *Cont’l Can Co.*, 948 F.2d at 1269 (citing *In re Oelrich*, 666 F.2d 578, 581 (C.C.P.A. 1981) (emphasis in original)). The existence of an alternative possibility precludes a finding of inherency. *See HTC Corp.*, 877 F.3d at 1369 (“HTC has only shown that it is possible for the start of a frame preceding an ACK/NACK signal to correspond to the start of a message transmission. This possibility, however, is not enough to find that Baker necessarily discloses [the limitation].”).

B. Obviousness

Section 103 of the Patent Act provides that “[a] patent may not be obtained . . . if the differences between the subject matter sought to be patented 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 person having ordinary skill in the art to which said subject matter pertains.” 35 U.S.C. § 103(a). The obviousness analysis requires several threshold inquiries: the level of ordinary skill in the art must be established; the scope and content of the prior art must be determined; and any differences between the prior art and the claims at issue must be ascertained. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

1. Claims cannot be found obvious if an element is absent

If a single element of the claim is absent from the prior art, the claim cannot be considered obvious. *See CFMT, Inc. v. YieldUp Int’l Corp.*, 349 F.3d 1333, 1342 (Fed. Cir. 2003) (“Obviousness requires a suggestion of all limitations in a claim.”)

(citing *In re Royka*, 490 F.2d 981, 985 (C.C.P.A. 1974)); *In re Rijckaert*, 9 F.3d 1531, 1534 (Fed. Cir. 1993) (reversing obviousness rejection where prior art did not teach or suggest all claim limitations); *Garmin Int’l, Inc. v. Patent of Cuozzo Speed Techs. LLC*, IPR2012-00001, Paper 15 at 15 (PTAB Jan. 9, 2013) (refusing to institute an *inter partes* review under 35 U.S.C. § 103 where prior art did not disclose all claim limitations).

Additionally, it is improper to use the challenged claim as a roadmap to piece together disparate disclosure using hindsight bias. See *InTouch Techs., Inc. v. VGo Comm’ns., Inc.*, 751 F.3d 1327, 1351 (Fed. Cir. 2014) (reversing obviousness where “[i]t appears that [the expert] relied on the [] patent itself as her roadmap for putting what she referred to as pieces of a ‘jigsaw puzzle’ together.”); *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007) (“A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon ex post reasoning.”).

2. A petition must address the Graham factors

Obviousness is resolved on a number of factual determinations “including (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, and (3) the level of ordinary skill in the art.” See *Graham*, 383 U.S. at 17-18. Petitions for *inter partes* reviews “must address the Graham factors.” *Eizo Corp. v. Barco N.V.*, IPR2014-00358, Paper 11 at 29-30 (PTAB July 23, 2014).

3. A petition must provide articulated reasoning with rational underpinning to combine and/or modify references

The conclusion of obviousness based on a combination of references must also be supported with explicit analysis of a reason to combine those references. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). The Federal Circuit has stated that such reasons must be more than “mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006); *accord Innogenetics, N.V. v. Abbott Labs.*, 512 F.3d 1363, 1374 (Fed. Cir. 2008) (agreeing with the district court’s reasoning that “some kind of motivation must be shown from some source, so that the jury can understand why a person of ordinary skill would have thought of either combining two or more references or modifying one to achieve the patented method”); *see also LG Elecs., Inc. v. Cellular Commc’ns Equip. LLC*, IPR2016-00197, Paper 7 at 7-11 (PTAB April 29, 2016) (faulting a petition’s obviousness analysis for lack of sufficient articulated reasons with rational underpinnings for modifying references to achieve particular elements required in the claims).

Furthermore, “[d]emonstrating that a reference is analogous art or relevant to the field of endeavor of the challenged patent is not sufficient to establish that one of ordinary skill would have had reason to combine its teachings with other prior art in the manner set forth in the claim.” *Johns Manville Corp. v. Knauf Insulation, Inc.*, IPR2018-00827, Paper 9 at 10 (PTAB Oct. 16, 2018) (citing *See Securus Techs., Inc. v. Global Tel*Link Corp.*, 701 F. App’x 971, 977 (Fed. Cir. 2017) (“a broad

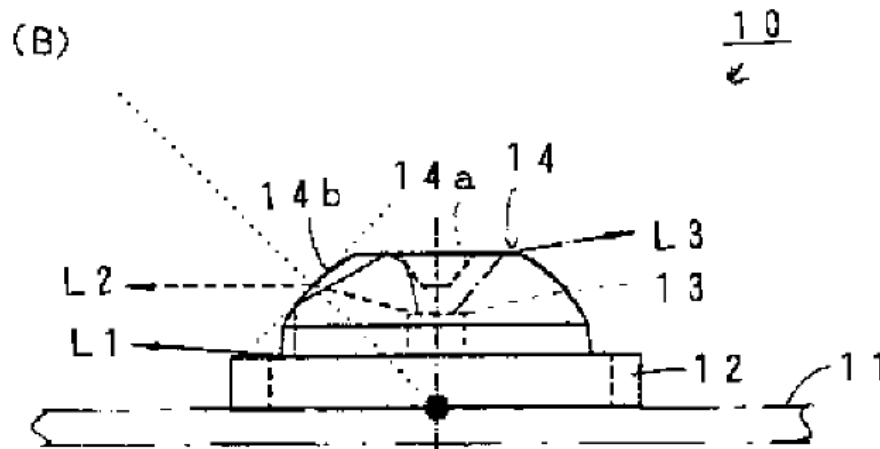
characterization of [prior art references] as both falling within the same alleged field . . . without more, is not enough for [Petitioner] to meet its burden of presenting a sufficient rationale to support an obviousness conclusion”). “Mere compatibility of the references is likewise not sufficient.” *Id.* (citing *Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 993 (Fed. Cir. 2017) (it is not enough to show that “a skilled artisan, once presented with the two references, would have understood that they could be combined”).

VI. SUMMARY OF THE PRIOR ART REFERENCES

Petitioners rely on the Odawara (Ex. 1004), Sommers (Ex. 1006), West (Ex. 1005), and Elpedes (Ex. 1007) references in the proposed grounds. A brief summary of Odawara, Sommers, West, and Elpedes follows.

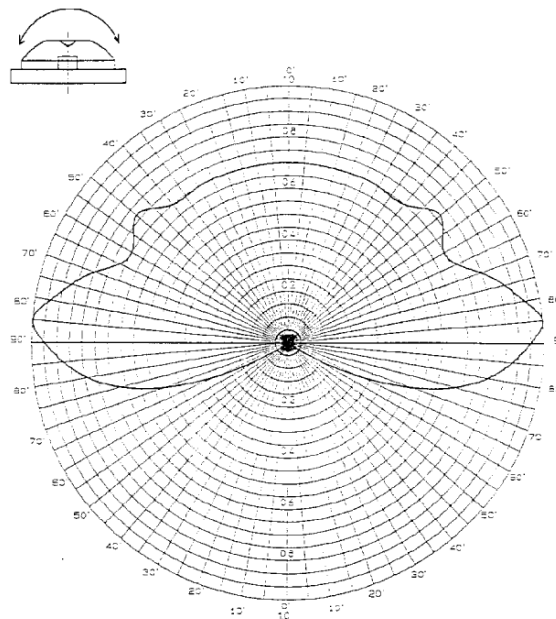
A. Overview of Odawara

Odawara is directed to an “LED having wide directivity with a simple configuration.” Odawara, Ex. 1004 at Abstract. To achieve wide directivity, Odawara discloses a lens having a recessed part 14a having a “truncated cone shape” and a “peripheral side surface” 14b:



Id. at FIG. 1(B), [0009]-[0013], [0018], [0033]. “[T]he light L1, L2 is guided laterally by the recessed part 14a and the side surface 14b, such that, as depicted in the light distribution characteristic of FIG. 3, the light has wide directivity of approximately 180 degrees....” *Id.* at [0032]. The desired wide-angle light distribution, approaching 180 degrees around a lateral axis, of the LED of FIG. 1 is depicted in FIG. 3:

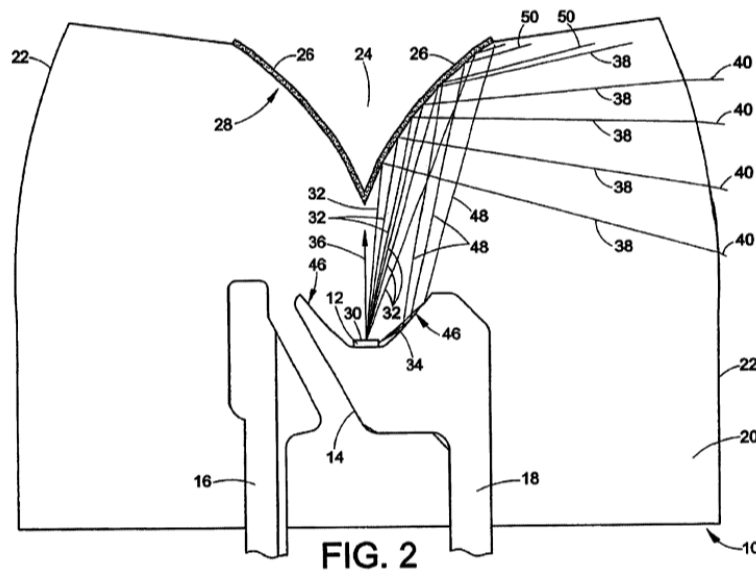
[FIG. 3]



Id. at FIG. 3 (demonstrating that the LED of FIG. 1 provides uniform light distribution across a 180-degree range, with enhanced intensity in the lateral directions); *see also id.* at Brief Description of Drawings.

B. Overview of Sommers

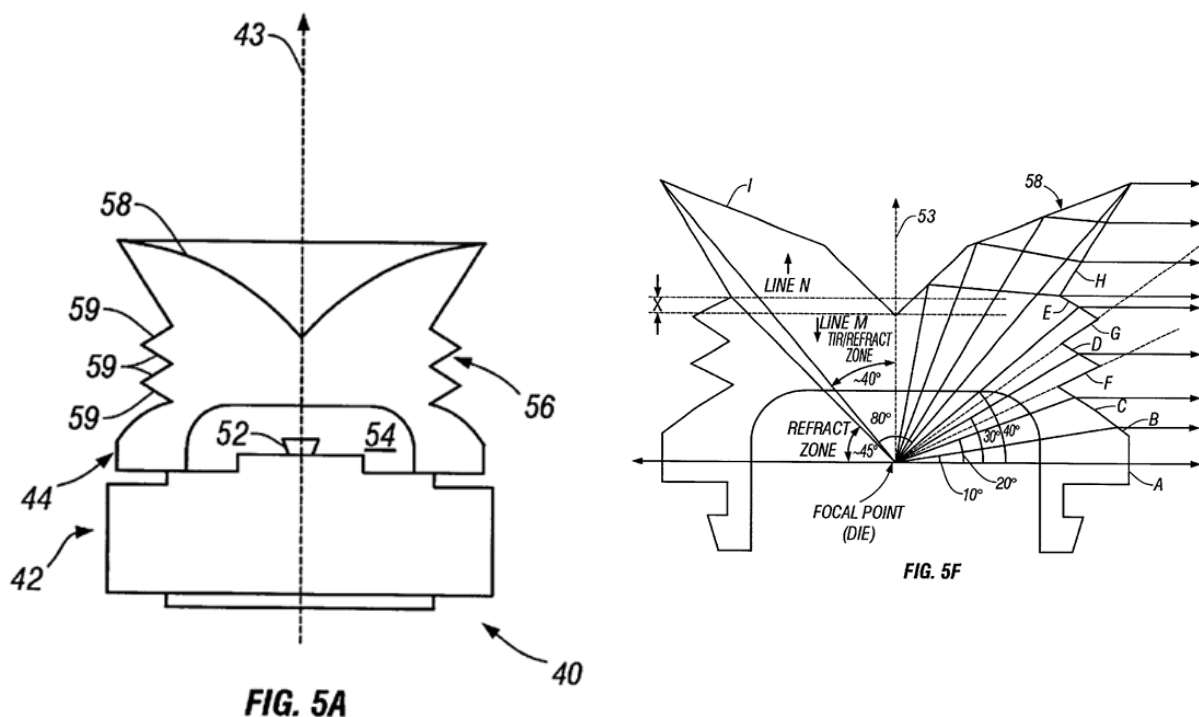
Sommers aims to improve an LED, which is a highly directional light source, to resemble the external emission intensity distribution of an incandescent light bulb. *See Sommers*, Ex. 1006 at 1:8-14, 1:45-2:2. To achieve “essentially similar intensity at most viewing angles,” Sommers discloses an LED package/capsule that has an encapsulant with a reflective coating 26 and side 22:



Id. at FIG. 2; *see also id.* at Abstract, 1:45-2:2. Light from the LED reflects off of the reflective coating 26, such as a metal coating much like a mirror, to be guided to and exit from the encapsulate side 22. *See id.* at FIG. 2, 3:60-62, 6:6-10.

C. Overview of West

West, which is discussed in the Background Art of the '873 Patent, discloses a “[l]ens 44 include[ing] a sawtooth, refractive portion 56 and a total internal reflection (TIR) funnel portion 58. The sawtooth portion 56 is designed to refract and bend light so that the light exits from lens 44 as close to 90 degrees to the longitudinal package axis 43 as possible.” West, Ex. 1005 at 4:1-5.



Id. at FIG. 5A (on left), FIG. 5F (on right). “Funnel portion 58 is designed as a TIR surface. The TIR surface reflects light such that light exits from lens 44 as close to 90 degrees to a longitudinal package axis 43 of LED package 40 as possible” *Id.* at 4:12-15.

D. Overview of Elpedes

Elpedes aims to improve alignment accuracy and thermal performance in LED assemblies by replacing traditional epoxy bonding with self-aligning solder-based connections. *See* Elpedes, Ex. 1007 at [0002]-[0003]. Elpedes discloses an LED assembly 100 including a body 112, leads 116, heat sink 102 (also called a “slug”), and lens 118. *See id.* at [0008]-[0010], [0013].

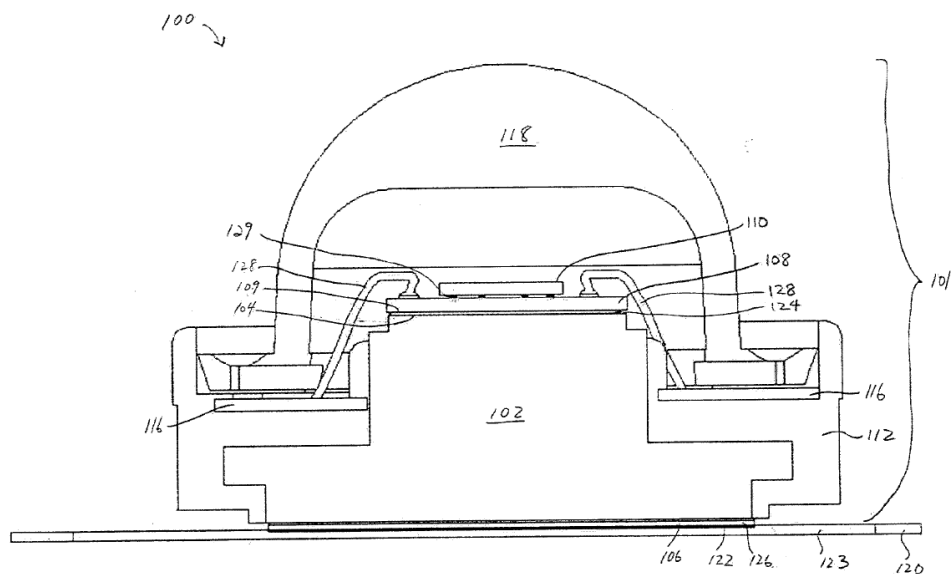


Fig. 2

Id. at Fig. 2. While Elpedes focuses on the accurate mounting of the structural components of an LED assembly, Elpedes does not discuss or provide any details of lens 118. *Id.* at [0001], [0013] (“Body 112 further includes a lens 118 fitted on body 112. An encapsulant may fill lens 118 to protect LED die 110.”).

VII. THE PETITION DOES NOT ESTABLISH A REASONABLE LIKELIHOOD OF SUCCESS

To justify the institution of an *inter partes* review, a petitioner must establish 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). Petitioners have not met their burden of establishing a reasonable likelihood of success at least because the Petition fails to show that a single reference discloses each and every limitation of a challenged claim and that one of ordinary skill would have chosen to combine the cited elements to achieve the claimed inventions of the ’873 Patent. Consequently, the Board should deny the Petition and decline to institute the *inter partes* review.

Petitioners have failed to demonstrate that any of independent claims 1, 8, or 12 is anticipated or rendered obvious over the cited references in Grounds I-X. Because the remaining challenged claims all depend from these independent claims, should the Board agree that trial should not be instituted on these independent claims, it necessarily follows that trial should not be instituted on the dependent claims. Accordingly, Patent Owner focuses on addressing the independent claims.

A. Grounds I and II: Odawara Fails to Anticipate or Render Obvious Independent Claim 1

Grounds I and II, which challenge independent claim 1 and claims depending therefrom, rely on Odawara (Ex. 1004) as disclosing the portion of claim 1 that recites “a total reflection surface with a total reflection slope with respect to a central axis of the body.” *See* Petition at 24-27. Petitioners cannot show that Odawara

discloses “a total reflection surface with a total reflection slope with respect to a central axis of the body” as required by independent claim 1.

As an initial matter, Grounds I and II suffer from erroneous claim construction as Petitioners improperly construe “total reflection surface” as a “surface that totally reflects light.” Petition at 24. Indeed, the Petition itself calls into question this construction. *See id.* at 26 (acknowledging that “total reflection” may refer to total *internal* reflection); *see also id.* at 24 (discussing support for total *internal* reflection). As discussed in Section IV.A above, the intrinsic record compels a “total *internal* reflection surface” construction.

The Petition also misrepresents the disclosure of Odawara. In particular, Petitioners completely misrepresent Figure 3. Figure 3 does not illustrate a different embodiment. Figure 3 “is a graph depicting the light distribution characteristics of the surface mounted LED of FIG. 1.” Odawara, Ex. 1004, Brief Description of Drawings (emphasis added). As explained by the patent, the distorted LED profile in Figure 3 is intended to represent the LED of Figure 1. *See id.*; *see also id.* at [0032]. Notably, Odawara does not provide any disclosure related to the lens profile shown in Figure 3. Nonetheless, Petitioners and their expert take the rough representation of Figure 1 included with Figure 3, add misleading annotations to the representative lens profile and make misleading, self-serving descriptions of the annotated profile, including suggesting it is a separate embodiment, in a misguided attempt to improperly supplement what Odawara actually discloses. Petition at 25-

26. Petitioners' characterization and discussion of Figure 3 should be disregarded in its entirety.

Regardless, Odawara's disclosure is completely lacking in relevant detail. Petitioners have not identified any disclosure from Odawara that discloses or describes the concept of total internal reflection, as is disclosed by the '873 Patent and required by the challenged claims. Although Odawara discloses "light emitted from the LED upward in the optical axis direction is totally reflected by the inner surface of the recessed part," Odawara does not disclose that the reflected light is the result of total internal reflection. *See* Odawara, Ex. 1004 at [0034]; *see also id.* at [0016], [0017], [0029]. It could be that the reflection is provided, for example, through a coating or some other property of the material used to construct the lens. Indeed, the Petition acknowledges that the "recessed part" of the Odawara lens could be "provided with a metallization to cause the light to be 'totally reflected.'" *See* Petition at 27. Consequently, Petitioners have not shown that Odawara expressly or inherently discloses the portion of claim 1 that requires "a total reflection surface with a total reflection slope with respect to a central axis of the body." In other words, Petitioner has not shown that there is a reasonable likelihood that the challenged claims are anticipated by Odawara.

Acknowledging that Odawara does not disclose "a total reflection surface with a total reflection slope with respect to a central axis of the body," as properly construed to require total internal reflection, the Petition improperly asks the Board to substitute expert testimony for actual disclosure in Odawara itself. *See* Petition at

26-27 (pointing to expert testimony that a POSITA would have understood that light being “totally reflected” by recessed part 14a is a result of total internal reflection). But “expert testimony cannot take the place of disclosure from patents or printed publications. In other words, expert testimony may explain ‘patents and printed publications,’ but it is not a substitute for disclosure in a prior art reference itself.” Patent Trial and Appeal Board Consolidate Trial Practice Guide (November 2019) at 36.¹ Petitioners’ reliance on expert testimony to backfill missing disclosure from Odawara cannot support a finding of anticipation or obviousness.

What is more, Petitioners’ argument that Odawara would have suggested total internal reflection, which conflates purported properties of Odawara’s refractive surface (14b) and reflective surface (14a), should be rejected because the properties of Odawara’s refractive surface and reflection surface are distinguishably different, and the disclosures of each surface cannot be shared or interchanged at Petitioners’ convenience. Odawara’s disclosures purportedly suggesting a TIR refractive surface, i.e., the “side surface,” does not remedy Odawara’s failure to disclose TIR for the alleged total reflection surface, i.e., the “recessed part.” Notably, Petitioners argue that “Odawara does not explicitly mention that recessed part is provided with a [non-TIR] metallization;” likewise, Odawara does not explicitly mention recessed part is a TIR surface either. Petition at 27. Petitioners cannot meet their burden of showing that Odawara describes “a total reflection surface with a total reflection slope with respect to a central axis of the body.”

¹ Available at <https://www.uspto.gov/sites/default/files/documents/tpgnov.pdf>.

Odawara merely discloses a lens that includes a recessed part 14a, which the Odawara application describes as a truncated cone, and that light incident on the recessed part of the lens is “totally reflected.” *See* Odawara, Ex. 1004 at [0029], [0033], [0034]; *see also id.* at [0013], [0018]. But Odawara does not describe the features or configuration of this “truncated cone.” It is silent as to how the recessed portion is configured, much less its optical properties, and it does not describe the mechanism by which light is “totally reflected” by the recessed part. As a result, Odawara fails to disclose the portion of claim 1 that recites “a total reflection surface with a total reflection slope with respect to a central axis of the body,” as properly construed to include a total internal reflection surface.

For at least the reasons discussed above, Petitioners have not satisfied their burden of showing a reasonable likelihood that any challenged claims are anticipated by or obvious in view of Odawara. Consequently, the Board should deny institution based on Grounds I and II.

B. Ground III: Odawara and West Fail to Render Obvious Independent Claim 1

Ground III relies on the combination of Odawara (Ex. 1004) and West (Ex. 1005). Ground III implicitly acknowledges that Odawara does not disclose “a total reflection surface with a total reflection slope with respect to a central axis of the body” and relies on West (rather than Odawara) as allegedly satisfying the portion of claim 1 (and claims depending therefrom) that recites “a total reflection surface

with a total reflection slope with respect to a central axis of the body.” Petition at 37-38.

Notably, the USPTO considered West in view of these limitations during prosecution, and the claims were allowed in view of West. *See* ’873 Prosecution History, Ex. 1003 at 395, 421-422, 1438-1443. What is more, a POSITA would not have been motivated to combine West with Odawara as proposed by Petitioners.

The Petition glosses over technical incompatibilities and conflicting design objectives of these references to piece prior art together without a clear, articulated rationale explaining why a POSITA would have been motivated to combine them. In fact, a POSITA would not have been inclined to combine Odawara and West given the distinct objectives, technical differences, and lack of motivation in the prior art. Such a hindsight-driven combination would undermine the specific objectives and technical advantages of the light emitting devices of Odawara and West.

For example, Odawara and West have competing objectives and solutions. The “object of [Odawara] is to provide a surface mounted LED having wide directivity using a simple configuration” such that “the light has wide directivity of approximately 180 degrees” whereas West’s objective is to provide a “side emitting light emitting diodes” so that “the light exits from the lens 44 as close to 90 degrees to the longitudinal package axis 43 as possible.” Odawara, Ex. 1004 at [0008], [0032], Fig. 3 (emphasis added); West, Ex. 1005 at 1:10-12, 4:2-5 (emphasis added).

A POSITA would not be motivated to combine the features of the *side* emitting device of West with the *wide directivity* emitting device of Odawara.

Further, West's sawtooth side surface design is incompatible with and does not align with Odawara's directive to use "a simple configuration." Odawara, Ex. 1004 at [0008] (emphasis added). As shown in the figure below, not only does West's "sawtooth" shaped surfaces (in green) fail to achieve Odawara's objective of wide directivity (narrow directivity shown in purple) but is also not a simple configuration:

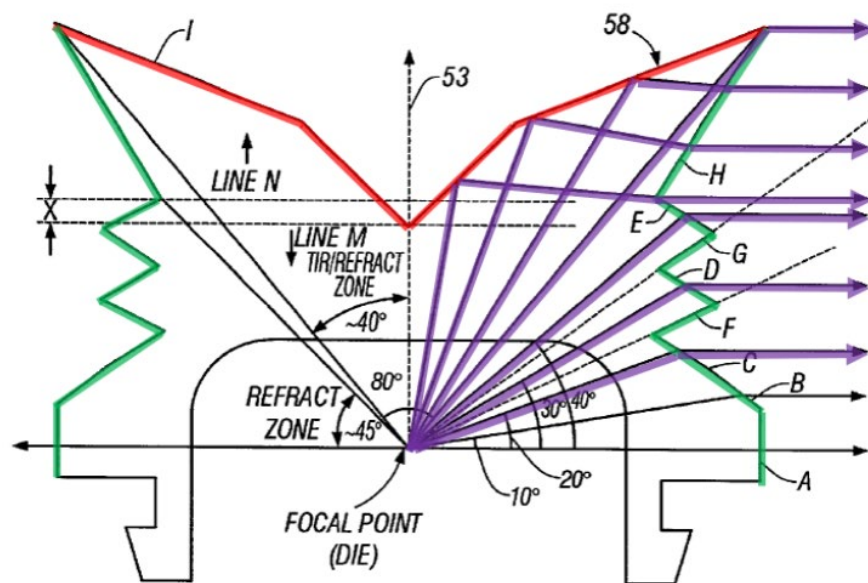


FIG. 5F

Petition at 16 (West, Ex. 1005, FIG. 5F annotated).

Odawara emphasizes manufacturing simplicity and uniform omnidirectional emission. Incorporating West's multi-surface, side-emitting lens system would add unnecessary complexity and shift the emission profile away from Odawara's intended broad directivity—including its upward component, which is expressly

relied upon for illumination in Odawara's embodiments. A POSITA seeking to improve the design of Odawara would not look to a system like West that sacrifices upward light emission, adds component complexity, and diverges from Odawara's design goals.

For the foregoing reasons, a person of ordinary skill in the art would not have been motivated to combine Odawara with West. The asserted combination represents a hindsight-driven modification that lacks any support in the references themselves, and would frustrate the design objectives of Odawara. Accordingly, Petitioners' challenge based on this combination should be rejected.

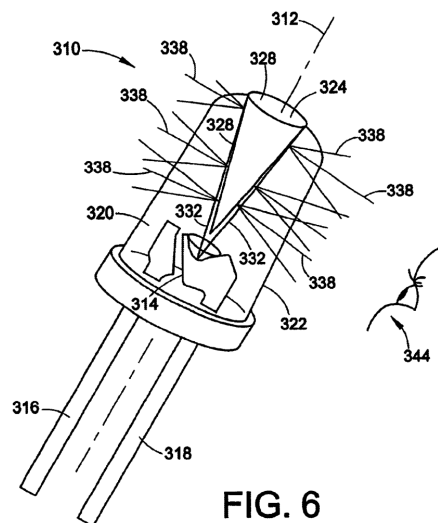
C. Grounds IV and V: Sommers Fails to Anticipate or Render Obvious Independent Claim 1

Grounds IV and V, which challenge independent claim 1 and claims depending therefrom, are based on Sommers (Ex. 1006). Grounds IV and V also suffer from faulty claim construction as Petitioners improperly construe "total reflection surface" as a "surface that totally reflects light." Petition at 24, 53. Indeed, the Petition itself calls into question this construction. *See id.* at 26 (acknowledging that "total reflection" may refer to total internal reflection); *see also id.* at 24 (discussing support for total *internal* reflection). As discussed in Section IV.A above, the intrinsic record compels a "total internal reflection surface" construction.

Sommers (Ex. 1006) fails to disclose a "total reflection surface." In fact, Sommers teaches away from "total reflection surface." *Cf.* Sommers, Ex. 1006 at 3:60-62, 6:6-10 ("the scattering strength may be increased either by coating the outer

surface 328 with a reflective coating [such as silver oxide], or by filling depression 324 with a metal or other reflective filling material”) with ’873 Patent at 5:18-20 (“With the use of the total internal reflection phenomenon of light, the light is not transmitted but reflected even on a transparent surface.”). Sommers suggests coating the total reflection surface with a metal, much like a mirror, thereby teaching away from the TIR surface claimed in the ’873 Patent.

Setting aside claim construction, Petitioners are unlikely to prevail for other reasons. Sommers does not disclose that the encapsulant also has “a total reflection surface with a total reflection slope with respect to a central axis of the body” as is required by claim 1. Petitioners argue that these limitations are satisfied by disclosure in Sommers that describes “filling depression 324 with a metal or other reflective filling material which is pressed against outer surface 328.” Petition at 53.



Sommers, Ex. 1006 at FIG. 6.

Petitioners' argument cannot be correct. Claim 1 requires "A lens, comprising ... a total reflection surface" A metal or other reflective material within depression 324 in the encapsulant is separate from the encapsulant itself, which Petitioners argue satisfies the claimed lens. In other words, the metal or other reflective material is not part of the alleged lens and, thus, cannot satisfy the portion of the claims that requires "[a] lens, comprising ... a total reflection surface."

For at least the reasons discussed above, Petitioners have not satisfied their burden of showing a reasonable likelihood that any challenged claims are anticipated by or obvious in view of Sommers. Consequently, the Board should deny institution based on Grounds IV and V.

D. Ground VI: Sommers and West Fail to Render Obvious Independent Claim 1

Petitioners are unlikely to prevail on ground VI. Ground VI relies on the combination of Sommers (Ex. 1006) and West (Ex. 1005). Petitioners rely on West as allegedly satisfying "a total reflection surface with a total reflection slope with respect to a central axis of the body." Notably, as discussed above, the USPTO considered West in view of these limitations during prosecution, and the claims were allowed in view of West. See '873 Prosecution History, Ex. 1003 at 395, 421-422, 1438-1443. What is more, a POSITA would not have been motivated to combine West with Sommers as proposed by Petitioners.

The Petition pieces the TIR funnel portion of West together with Sommers without a clear, articulated rationale explaining why a POSITA would have been

motivated to combine them. In fact, given the opposing design objectives and technical incompatibilities of these references, a POSITA would not have been inclined to combine Sommers with West.

Although both references are directed towards guiding emitted light to the sides, the purpose and objective are exactly the opposite: Sommers directionally *distributes* light and West directionally *concentrates* light. As shown (in purple) in the figures below, in West “the light exits from the lens 44 as close to 90 degrees to the longitudinal package axis 43 as possible” (West, Ex. 1005 at 1:10-12, 4:2-5) whereas Sommers “emits light in a non-directional manner within a certain viewing range” (Sommers, Ex. 1006 at 4:31-35).

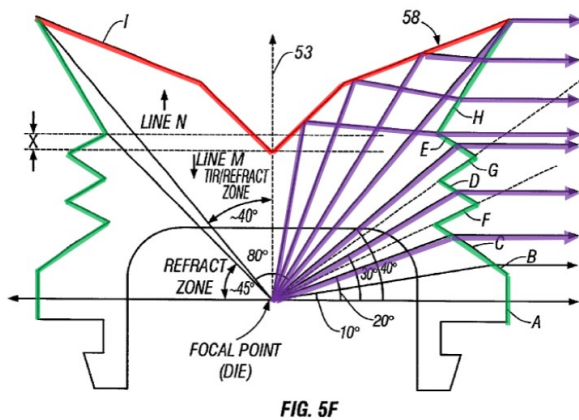


FIG. 5F

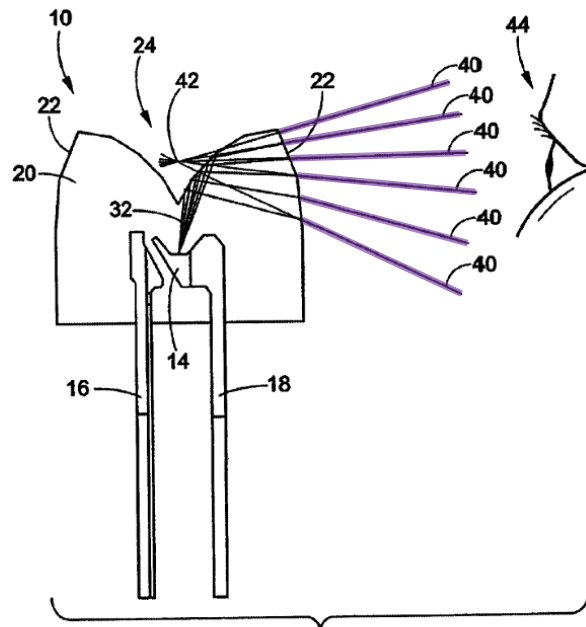


FIG. 3

Petition at 16 (West, Ex. 1005, FIG. 5F annotated) (on left); Sommers, Ex. 1006 at FIG. 3 (on right, annotations in purple added). In other words, Sommers’ aim, to

“produce[] an external emission intensity distribution that more closely approximates” “essentially similar intensity at most viewing angles,” is at odds with West’s primary directive of collimated light. Sommers, Ex. 1006 at 1:45-2:2; *see also id.* at 2:54-57 (“Another advantage of the present invention is that it provides an LED package which outputs an approximate point light source distribution” which is a distribution that emits light uniformly in all directions). As such, combining them would require extensive redesign and not yield predictable, functional results. A POSITA would recognize that these devices are not interchangeable and are purpose-built for very different lighting challenges. Combining them would dilute their performance without any notable design benefit.

Further, the design of Sommers is incompatible with the solution of West in that the LED package of Sommers will not satisfy a “need [] for an LED package to couple efficiently to shallow reflectors and thin light guides.” West, Ex. 1005 at 1:58-59. Sommers never suggests its LED package should be coupled with thin light guides and shallow reflectors, a point of emphasis in West.

Because Sommers is focused on producing wide lateral emission, while West is concerned with precision lateral emission, a POSITA would not view one as a natural enhancement or extension of the other. The proposed combination is an improper hindsight reconstruction, and cannot support a conclusion of obviousness under § 103.

E. Grounds VII-X: Elpedes and Odawara/Sommers [and West] Fail to Render Obvious Independent Claims 8 and 12

Petitioners are unlikely to prevail on grounds VII-X. These grounds rely on the combination of Elpedes (Ex. 1007) with the references and combinations of Grounds I-VI. Claim 8 (and claims depending therefrom) require “a lens including a total reflection surface encapsulating the package housing and having a total reflection slope with respect to a central axis of a body of the lens” and claim 12 (and claims depending therefrom) require “a lens including a total reflection surface encapsulating the package body and having a total reflection slope with respect to a central axis of a body of the lens.” Petitioners do not contend that Elpedes satisfies these limitations; instead, Petitioners rely on Odawara, the combination of Odawara and West, Sommers, and the combination of Sommers and West, as allegedly satisfying the limitations. Petition at 76, 92. Consequently, grounds VII-X suffer at least the same shortcomings as grounds I-VI.

Further, Petitioners’ attempt to combine Elpedes with any of Odawara, Sommers, or West is fundamentally flawed. There would have been no motivation for a POSITA to combine Elpedes with any of Odawara, Sommers, or West because: (1) the references address fundamentally different technical problems; (2) the prior art contains no teaching or suggestion to combine them; and (3) any such combination would require significant, unjustified reconstruction without offering technical improvement.

First, the core problems solved by Elpedes are unrelated to the optical and lens-related challenges addressed in Odawara, Sommers, and West. Elpedes is

focused on improving mechanical alignment accuracy and thermal performance in LED assemblies by replacing traditional epoxy attachment methods with solder-based self-alignment techniques. *See* Elpedes, Ex. 1007 at [0001]-[0003]. Elpedes addresses problems associated with die misalignment, thermal resistance, and manufacturing precision—not light emission profiles, packaging optics, or beam shaping addressed in Odawara, Sommers, and West. *See id.* at [0002]. A POSITA would not have looked to Odawara, Sommers, or West to modify or improve Elpedes.

Second, there is no teaching or suggestion in the prior art to combine Elpedes with any of the optical references. None of Odawara, Sommers, or West mention problems with mechanical alignment or incorporates solder reflow alignment techniques. Likewise, Elpedes does not discuss or suggest any application to side-emission geometries or TIR optical lens configurations. *See, e.g., id.* at [0013]. Without any express or implied teaching in either direction, a POSITA would not have combined Elpedes with these unrelated designs unless guided by hindsight of the claimed invention.

Third, the combination would require significant redesign and yield no predictable benefit. For example, integrating Elpedes' bonding and alignment techniques into any of the three optical references would require eliminating molded lenses or reworking package geometries to introduce planar solderable interfaces. A POSITA would not undertake such an extensive and unjustified redesign where the

original optical packages already meet their design goals using simpler, integrated solutions.

Accordingly, Petitioners' asserted combinations involving Elpedes must be rejected as based on improper hindsight and lack of any credible rationale under 35 U.S.C. § 103.

VIII. PATENT OWNER'S FINAL COMMENTS

Patent Owner does not concede the legitimacy of any arguments in the Petition that are not specifically addressed herein, and expressly reserves the right to rebut any such arguments in its Patent Owner Response if *inter partes* review is instituted. Similarly, Patent Owner also does not concede any underlying contentions in the Petition and reserves the right to rebut them later. Additionally, Patent Owner is not limited to the arguments presented here in this Preliminary Response, but expressly reserves the right to raise further arguments, including claim construction arguments, not presented in this Preliminary Response.

IX. CONCLUSION

For the foregoing reasons, Patent Owner respectfully requests that the Board decline to institute *inter partes* review of the '873 patent.

Dated: June 6, 2025

By: /s/ Brandon G. Moore
Brandon G. Moore
Registration No. 77,885
NELSON BUMGARDNER
CONROY P.C.
2727 North Harwood Street,

Ste. 250
Dallas, Texas 75201
Telephone: (214) 208-3684
Email: brandon@nelbum.com

David T. DeZern
Registration No. 60,117
NELSON BUMGARDNER
CONROY P.C.
2727 North Harwood Street,
Ste. 250
Dallas, Texas 75201
Telephone: (214) 446-4950
Email: david@nelbum.com

Attorneys for Patent Owner

CERTIFICATE OF COMPLIANCE WITH WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), I certify that this Preliminary Response complies with the type-volume limits of 37 C.F.R. § 42.24(b)(1) because it contains 7,696 words, excluding the parts of this Patent Owner's Preliminary Response that are exempted by 37 C.F.R. § 42.24(a), according to the word processing system used to prepare this Patent Owner's Preliminary Response.

Dated: June 6, 2025

By: /s/ Brandon G. Moore
Brandon G. Moore
Registration No. 77,885
NELSON BUMGARDNER
CONROY P.C.
2727 North Harwood Street,
Ste. 250
Dallas, Texas 75201
Telephone: (214) 208-3684
Email: brandon@nelbum.com

David T. DeZern
Registration No. 60,117
NELSON BUMGARDNER
CONROY P.C.
2727 North Harwood Street,
Ste. 250
Dallas, Texas 75201
Telephone: (214) 446-4950
Email: david@nelbum.com

Attorneys for Patent Owner

CERTIFICATE OF SERVICE

I hereby certify that on June 6, 2025, a copy of Patent Owner's Preliminary Response has been served in its entirety via email on the following:

Email: tcho@desmaraisllp.com

lavena@desmaraisllp.com

yha@desmaraisllp.com

Samsung-Sinotechnix-IPR@desmaraisllp.com

Dated: June 6, 2025

By: /s/ Brandon G. Moore
Brandon G. Moore
Registration No. 77,885
NELSON BUMGARDNER
CONROY P.C.
2727 North Harwood Street,
Ste. 250
Dallas, Texas 75201
Telephone: (214) 208-3684
Email: brandon@nelbum.com

David T. DeZern
Registration No. 60,117
NELSON BUMGARDNER
CONROY P.C.
2727 North Harwood Street,
Ste. 250
Dallas, Texas 75201
Telephone: (214) 446-4950
Email: david@nelbum.com

Attorneys for Patent Owner