

Case IPR2024-01312
U.S. Patent No. 11,697,028

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BIOFRONTERA INC., BIOFRONTERA BIOSCIENCE GMBH,
BIOFRONTERA PHARMA GMBH, and BIOFRONTERA AG
Petitioner

v.

SUN PHARMACEUTICAL INDUSTRIES, INC.
Patent Owner

Case IPR2024-01312

U.S. Patent No. 11,697,028

PATENT OWNER'S RESPONSE

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37 C.F.R. §42.104(b)	72

All emphases are added unless otherwise noted.

PATENT OWNER’S EXHIBIT LIST

EX #	DESCRIPTION
2001	Declaration of Dr. Jose Sasian
2002	<i>Curriculum Vitae</i> of Dr. Jose Sasian
2003	Complainant’s Initial Statement Regarding The Public Interest filed in ITC Investigation No. 337-TA-1411, dated June 25, 2024
2004	Australian Patent Application Publication No. AU 200143869 published September 6, 2001 to Eric Larsen entitled <i>Device and methods for the stimulation of body cells through electromagnetic radiation</i> (“Larsen Publication”)
2005	United States Trademark Serial No. 78214595 Statement of Use and correspondence for BEAUTYLIGHT (“BEAUTYLIGHT”)
2006	United States Patent No. 4,832,294 issued May 23, 1989 to John C. Eldem entitled <i>Portable I.V. Stand</i> (“the ’294 patent”)
2007	Inventor Tom Boyajian LinkedIn profile at https://www.linkedin.com/in/tom-boyajian-404286307/
2008	Inventor Mark Carota LinkedIn profile at https://www.linkedin.com/in/mark-c-366911a/
2009	Inventor Brian Mazejka LinkedIn profile at https://www.linkedin.com/in/brianmazejka/
2010	Lighting-Gallery.net – My lights/completely clear/uncoated Sylvania 28W T5 HE demonstration tube at https://www.lighting-gallery.net/gallery/displayimage.php?album=1601&pos=188&pid=211863
2011	Bourget, C. Michael, <i>An Introduction to Light-emitting Diodes</i> , HortScience, Vol. 43(7), pp. 1944-1946 (December 2008)
2012	United States Patent No. 6,979,101, issued December 27, 2005 to Christian Sauska et al., entitled <i>Fluorescent Lamp Providing Uniform Backlight Illumination for Displays</i> (“the ’101 patent”)
2013	Ndjongue, Alain R. et al., <i>Visible Light Communications (VLC) Technology</i> , pp. 1-23 (June 2015)
2014	Technical Domestic Industry Claim Chart for U.S. Patent No. 11,697,028 (Ex. 10C Public Version) filed in ITC Investigation No. 337-TA-1411, dated July 9, 2024
2015	Declaration of Heather J Roberts, MD, FAAD
2016	<i>Curriculum Vitae</i> of Heather J Roberts, MD, FAAD
2017	https://www.levulanhcp.com/

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2018	https://www.levulanhcp.com/how-to-use
2019	https://www.levulanhcp.com/how-it-works
2020	https://www.levulanhcp.com/treatment-landscape
2021	https://www.levulanhcp.com/efficacy
2022	https://www.levulanhcp.com/assets/pdf/levulan-patient-brochure.pdf
2023	https://drheatherroberts.com/procedures-and-treatments/photodynamic-therapy-pdt-for-skin-cancer/
2024	https://www.mydrugrep.com/mobile-campaigns/Levulan V13a 01a/space requirements.html
2025	https://somalaser.com/dr-michael-ehrenreich-md-millburn-dermatologist/
2026	https://somalaser.com/blu-for-acne/
2027	https://somalaser.com/photodynamic-therapy/
2028	https://somalaser.com/photodynamic-therapy-for-actinic-keratoses-and-skin-cancer/
2029	https://somalaser.com/photodynamic-therapy-for-skin-conditions/
2030	https://somalaser.com/skin-conditions/actinic-keratosis/
2031	[RESERVED]
2032	[RESERVED]
2033	<i>In Re Certain Photodynamic Therapy Systems, Components Thereof, And Pharmaceutical Products Used In Combination With The Same</i> Investigation No. 337-TA-1411 (Order No. 18 – Construing Certain Claim Terms, dated March 4, 2025 (Public Version))
2034	<i>In Re Certain Photodynamic Therapy Systems, Components Thereof, And Pharmaceutical Products Used In Combination With The Same</i> Investigation No. 337-TA-1411 (Redacted Expert Report of Dr. Robert E. Grove, Ph.D. on behalf of Respondents, dated January 22, 2025)
2035	United States Patent No. 8,216,289 issued July 10, 2012 to Scott Lundahl, et al., entitled <i>Illuminator for Photodynamic Therapy</i> (“the ’289 patent”)
2036	<i>In Re Certain Photodynamic Therapy Systems, Components Thereof, And Pharmaceutical Products Used In Combination With The Same</i> Investigation No. 337-TA-1411 (Redacted Deposition Transcript of Dr. Robert E. Grove, taken February 26, 2025)
2037	BLU-U® Optical Specification
2038	<i>In Re Certain Photodynamic Therapy Systems, Components Thereof, And Pharmaceutical Products Used In Combination With The Same</i>

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2039	Redacted Deposition Transcript of Mark Baldyga in ITC Inv. No. 337-TA-1411, taken December 19, 2024
2040	Ex. 6 to Baldyga Deposition Transcript in ITC Inv. No. 337-TA-1411 (Marketing Presentation Slides)
2041	Ex. 5 to Baldyga Deposition Transcript in ITC Inv. No. 337-TA-1411 (Ameluz Marketing Materials)
2042	Ex. 4 to Baldyga Deposition Transcript in ITC Inv. No. 337-TA-1411 (RhodoLED® XL Trifold)
2043	RhodoLED® XL User Manual, Version 1.7SW_G2
2044	" <i>Biofrontera AG receives FDA-approval of the BF-RhodoLED® XL lamp,</i> " GlobalNewswire, https://www.globenewswire.com/news-release/2021/10/22/2319235/0/en/Biofrontera-AG-receives-FDA-approval-of-the-BF-RhodoLED-XL-lamp.html , dated October 22, 2021
2045	" <i>Biofrontera Announces the Launch of a New, FDA-Approved Red Light Source, the RhodoLED® XL Lamp,</i> " BioSpace, https://www.biospace.com/biofrontera-announces-the-launch-of-a-new-fda-approved-red-light-source-the-rhodoled-xl-lamp , dated June 24, 2024
2046	" <i>Biofrontera Inc. Announces 100 RhodoLED®XL Machines Now Placed in US Market,</i> " GlobalNewswire, https://www.globenewswire.com/news-release/2024/12/23/3001296/0/en/Biofrontera-Inc-Announces-100-RhodoLED-XL-Machines-Now-Placed-in-US-Market.html , dated December 23, 2024
2047	" <i>Biofrontera Inc. Reports Record Fiscal Year 2024 Financial Results and Provides a Business Update,</i> " Biofrontera, Inc., dated March 21, 2025
2048	Declaration of Thomas Vander Veen
2049	Supplemental Declaration of Heather J Roberts, MD, FAAD
2050	Declaration of Dr. Nan Jokerst
2051	<i>Curriculum Vitae</i> of Dr. Nan Jokerst
2052	Excerpted Deposition Transcript of Mark Carota in ITC Inv. No. 337-TA-1411, taken December 5, 2024
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2054	<i>“FDA Approves RhodoLED XL Lamp Red Light Source for Use in Actinic Keratosis Treatment,”</i> Dermatology Times, dated July 2, 2024 https://www.dermatologytimes.com/view/icymi-fda-approves-rhodoled-xl-lamp-red-light-source-for-use-in-actinic-keratosis-treatment
2055	Biofrontera Form 10-K, dated March 20, 2025
2056	BF-RhodoLED®, https://us.ameluz.com/hcp/activate-with-rhodoled-lamp/
2057	Biofrontera Q4 2024 Earnings Call Transcript
2058	<i>“Biofrontera Inc. Announces FDA Orange Book Listing of U.S. Patent for BF-RhodoLED® XL, Extends Protection of Ameuluz® PDT Through October 2040,”</i> BioSpace, dated March 14, 2022
2059	U.S. Pat. No.11,235,169 issued February 1, 2022 to Markus Osterloh, et al., entitled <i>Illumination Device for Photodynamic Therapy, Method for Treating a Skin Disease and Method for Operating an Illumination Device</i> (“the ’169 patent”)
2060	AMELUZ Prescribing Information, December 2021
2061	File History of U.S. Patent No. 11,446,512
2062	<i>“Actinic Keratosis,”</i> Cleveland Clinic, https://my.clevelandclinic.org/health/diseases/14148-actinickeratosis
2063	<i>“Actinic Keratosis: Diagnosis and Treatment”</i> American Academy of Dermatology Association, https://www.aad.org/public/diseases/skin-cancer/actinic-keratosistreatment
2064	<i>“Biofrontera Announces U.S. FDA Approval of Ameluz® and Activating BF-RhodoLED® Device for Treatment of Actinic Keratosis”</i> Biofrontera News Release, https://www.biofrontera.com/fileadmin/files/PDFs/Corporate_news/2016/EN/20160511 , May 11, 2016
2065	<i>“Biofrontera Bioscience GmbH,”</i> www.medicines.ie
2066	<i>“Biofrontera Inc. (BFRI) Q2 2024 Earnings Call Transcript”</i> https://seekingalpha.com/article/4714932-biofrontera-inc-bfri-q2-2024-earnings-call-transcript , August 15, 2024
2067	<i>“Biofrontera Inc. (BFRI) Q4 2023 Earnings Call Transcript”</i> https://finance.yahoo.com/news/biofrontera-inc-nasdaq-bfri-q4-132209594.html , March 18, 2024
2068	<i>“Biofrontera Inc. Reports First Quarter 2024 Financial Results and Provides a Business Update”</i> https://www.biospace.com/biofrontera-inc-

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2069	“Biofrontera Inc. Reports Third Quarter and Nine-Month 2024 Financial results and Provides Business Update” https://www.biospace.com/press-releases/biofrontera-inc-reports-third-quarter-and-nine-month-2024-financial-results-and-provides-business-update , November 14, 2024
2070	Biofrontera Inc., Annual Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934 for the Fiscal Year Ended December 31, 2023 (Form 10-K)
2071	“Biofrontera Pharma GmbH,” https://www.medicines.org.uk/emc/product/3158/smpc
2072	“Photodynamic Therapy Market Size, Share, and Trends 2025 to 2034” Precedence Research, https://www.precedenceresearch.com/photodynamic-therapy-market
2073	“Photodynamic Therapy Market to Grow by USD 2.35 Billion (2024-2028), Driven by Rising Cancer Prevalence, AI-Powered Report Highlights Market Trends – Technavio” PR Newswire, https://www.prnewswire.com/news-releases/photodynamic-therapy-market-to-grow-by-usd-2-35-billion-2024-2028-driven-by-rising-cancer-prevalence-ai-powered-report-highlights-market-trends---technavio-302305410.html , November 14, 2024
2074	“Photodynamic Therapy” Mayo Clinic https://www.mayoclinic.org/tests-procedures/photodynamic-therapy/about/pac-20385027
2075	“U.S. Actinic Keratosis Treatment Market Size Industry Analysis 2033” BioSpace, https://www.biospace.com/u-s-actinic-keratosis-treatment-market-size-industry-analysis-2033 , April 25, 2024
2076	“Why Levulan® Kerastick® + BLU-U®,” https://www.levulan.com/why-levulan-kerastick
2077	Tim Smith, “FDA-Approved Red-Light LED Lamp Released for Patients With Actinic Keratosis,” AJMC, https://www.ajmc.com/view/fda-approved-red-light-led-lamp-released-for-patients-with-actinic-keratosis , June 28, 2024
2078	ROTH MKM, Biofrontera, Inc, “BFRI 3Q24: Hurricane Milton Impacted 3Q Revs, But 4Q Is Already Compensating,” Jonathan Aschoff, Ph.D., November 14, 2024
2079	FDA letter regarding BLU-U Model 4170E, dated May 1, 2025

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2080	“ <i>Gas Discharge Tubes – Introduction</i> ”, G3YNH.info, https://www.g3ynh.info/disch_tube/intro.html
2081	[RESERVED]
2082	IPR2024-00874 EX1003 Declaration Eric Bretschneider, Ph.D.
2083	[RESERVED]
2084	Deposition Transcript of Robert E. Grove, Ph.D., taken May 13, 2025
2085	Dermatology Times, “ <i>FDA Approves Sun Pharma’s New LED BLU-U Device for AK</i> ”, May 16, 2025 https://www.dermatologytimes.com/view/fda-approves-sun-pharma-s-new-led-blu-u-device-for-ak

I. Introduction

U.S. Patent No. 11,697,028 (the “’028 Patent”) covers significant advances in the field of photodynamic therapy (PDT). Prior to the ’028 Patent, conventional PDT devices left “optical dead space[s]” near the edges of the device panels, which “reduce[d] the uniformity of the light along the treatment area, thereby reducing the effectiveness of PDT.” EX1001, 2:41-44, 2:52-56. Sun Pharma developed a five-panel PDT device that provides uniform illumination during PDT treatment without optical dead spaces. *Id.*; EX1001, 2:52-3:21. In particular, the PDT device of the ’028 Patent uses hinges on “the inner side surfaces of adjacent panels,” which “reduc[e] the area in which no light source is present on the illuminator.” EX1001, 3:11-21, 4:65-5:1, FIG. 3A. The light sources are arranged on the panels such that those close to the shorter edges of the panels emit a higher intensity of light than those close to the longer edges of the panels. EX1001, 6:18-40, FIG. 5. Sun Pharma’s novel configuration produces “light output uniformity” that is “greatly enhanced across the patient’s face and exhibits little to no deviation from the light output measured in the center of the patient’s face to the light output measured at the edges of the patient’s face.” EX1001, 8:44-64, FIG. 8. Sun Pharma’s BLU-U® and Levulan® are the “#1-prescribed photodynamic therapy.” EX2017-EX2022. The BLU-U® 4170E, which embodies the ’028 Patent, has been hailed by the industry as “a step forward in photodynamic therapy.” EX2085, 3.

Petitioner cannot prevail on any of its grounds. For Ground 1 that relies on Lundahl in view of Larsen, Petitioner (1) fails to show the combination renders obvious the “uniformly illuminates a treatment surface” limitations under the parties’ agreed-to claim construction of “irradiating light over the active emitting area such that the measured irradiance at a treatment surface of the patient is at least within 60% of the measured maximum,” and fails to show a POSITA would have had a reasonable expectation of success in combining the references to meet those limitations; (2) fails to show the combination renders obvious “each” of the five panels have “a higher intensity of light [] emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges”; (3) fails to show Larsen discloses or renders obvious the “hinges” limitation; (4) fails to show Larsen teaches or suggests the “individually configurable” limitation; and (5) fails to show Larsen teaches or suggests the “continuous illumination” limitation.

For Ground 2 that relies on Lundahl, Larsen, and Bansal, Petitioner cannot prevail for all the same reasons set forth for Ground 1. Additionally, Petitioner has not shown Lundahl in view of Larsen and further in view of Bansal renders obvious the “uniformly illuminates” and “higher intensity” limitations. In particular, the Board has already determined “Petitioner has not sufficiently shown for institution that Bansal teaches or suggests arranging light sources ‘such that a higher intensity of light is emitted proximate the second edges compared to the intensity of light

emitted not proximate the second edges.” IPR2024-00874, Paper 9, 12-13, 17-18; Institution Decision, 22 (citing decision denying institution in IPR2024-00874). Here, Petitioner makes the same arguments regarding Bansal, and the Board should find Ground 2 deficient for the same reasons: the claims distinguish between first edges and second edges of the panels. But, as Petitioner and its experts have admitted, “Bansal’s solution provides higher intensity (or density) of lights around all edges of the panel.” Bansal does not disclose this limitation because it requires a higher intensity of light emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges, which includes at least the first edges. Petitioner’s failure to meet its burden with respect to this limitation, which is present in all the independent claims, is alone sufficient for the Board to find Petitioner has not met its burden with respect to Ground 2.

Additionally, secondary considerations strongly support non-obviousness for both Grounds: the commercial success of Petitioner’s RhodoLED® XL device is a result of the combined features of the patented inventions and the benefits enabled by those features, which have received industry praise. Petitioner’s subsequent recognition and adoption of Sun Pharma’s inventions must be considered as a check against the hindsight-driven reasoning Petitioner applies in its flawed obviousness analyses.

Accordingly, Petitioner cannot prevail on Ground 1 or 2, and claims 1, 2, 4-6, 16, 17, and 19-21 (“Challenged Claims”) are patentable.

II. Background

A. Overview Of The '028 Patent

The '028 Patent relates to an “adjustable illuminator that provides a uniform distribution of visible light” and “is suitable for use in photodynamic therapy [PDT] and diagnosis.” EX1001, 1:19-22.

The '028 Patent addressed the problem of “optical dead space that can occur at or near the hinges of conventional adjustable illuminators,” which “reduces the uniformity of the light along the treatment area, thereby reducing the effectiveness of PDT.” EX1001, 2:41-44. The illuminator panels of an embodiment of the present invention are “coupled together using nested hinges, thereby reducing the area in which no light source is present on the illuminator” and “the light sources on each of the panels are individually configurable to provide specific power output to certain areas of the light sources on the panels to compensate for decreased uniformity.” EX1001, 3:11-21.

As shown below in FIG. 2B, the illuminator “preferably has five individual panels 10a-10e, each of which are connected in a rotatable manner via nested hinges 50.” EX1001, 3:52-56. Each of the five panels contains an array of light emitting

diodes (LED) 60, which preferably “extend[] as far to the edges as possible.”

EX1001, 3:56-64.

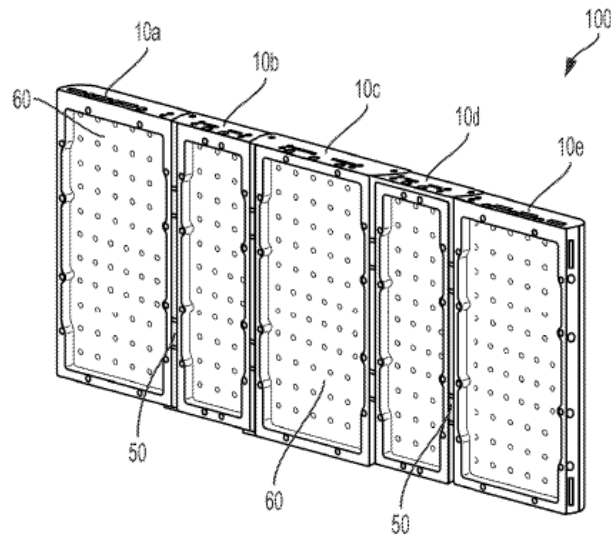


FIG. 2B

EX1001, Fig. 2B. The “nested hinges 50” (shown in blue) are “mounted to the inner side surfaces of adjacent panels (e.g., 10a, 10b),” as shown in FIG. 3A below.

EX1001, 4:65-5:1.

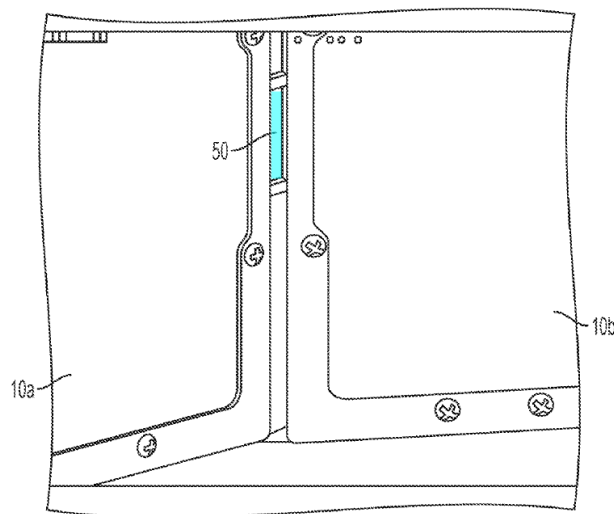


FIG. 3A

EX1001, Fig. 3A.

As shown in FIG. 5, the LED arrays “are divided into three general areas.”
EX1001, 6:24-31. A higher current is supplied to areas 1 and 2 (shown in red) than
areas 3 and 4 (shown in yellow) “such that areas 1 and 2 emit a higher intensity of
light than areas 3 and 4.” EX1001, 6:32-40.

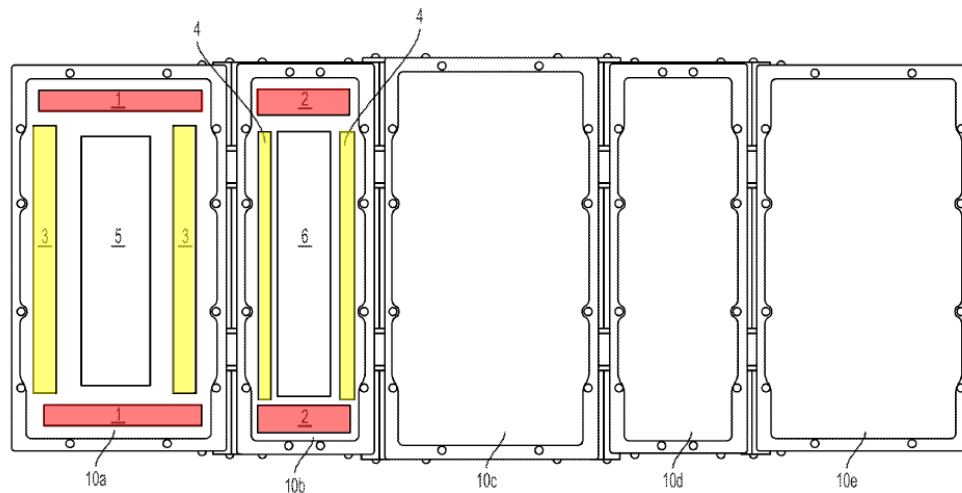


FIG. 5

EX1001, FIG. 5.

As shown in FIG. 4, the illuminator’s main body 100 with the five LED panels
is “mounted to a movable stand 80,” which includes a base 81 and vertical pillar 82.
EX1001, 5:15-21. Each of the five LED panels “may have a dedicated control unit
to regulate power to the individual LED array on a given panel.” EX1001, 5:57-62.

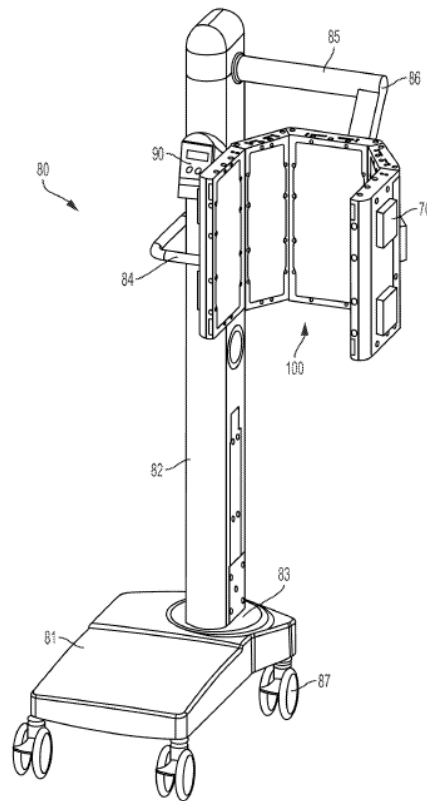


FIG. 4

EX1001, FIG. 4. The '028 Patent discloses that the “light output uniformity” produced by an embodiment of the illuminator of the present invention is “greatly enhanced across the patient’s face and exhibits little to no deviation from the light output measured in the center of the patient’s face to the light output measured at the edges of the patient’s face” over an operating “distance of two and four inches.” EX1001, 8:43-67 (comparing light uniformity produced by a conventional illuminator in FIG. 7 to the light uniformity produced by an embodiment of the present invention in FIG. 8), FIG. 8. EX2050, ¶¶49-71.

B. Overview Of The '028 File History

The application that issued as the '028 Patent was filed on September 12, 2022 and claimed priority to a provisional application filed on October 15, 2015. EX1001, 1:8-15.

In an Office Action dated November 18, 2022, the Examiner rejected pending claims 18 and 20-22 as unpatentable over the Larsen '381 patent (EX1008) in view of Fan (U.S. 2006/0253175). EX1002, 328-330. The Examiner stated claims 3, 6, 9, and 19 would be allowable if rewritten in independent form. EX1002, 333.

In response, on February 16, 2023, Applicant amended pending claim 18 to recite the subject matter of claim 19: “each of the five panels having two first edges and two second edges shorter than the two first edges, the light sources arranged such that a higher intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges.” EX1002, 203-204, 207.

Following the amendment, the Examiner issued a Notice of Allowance on March 1, 2023. EX1002, 114. The Examiner stated in the reasons for allowance that “the art of record neither anticipates nor renders obvious ‘wherein each of the five panels has two first edges and two second edges shorter than the two first edges, and the light sources are arranged such that a higher intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate

the second edges’ in combination with the rest of the claimed limitations set forth in the independent claim.” EX1002, 120. EX2050, ¶¶72-79.

III. Overview Of The References

A. Lundahl (EX1014)

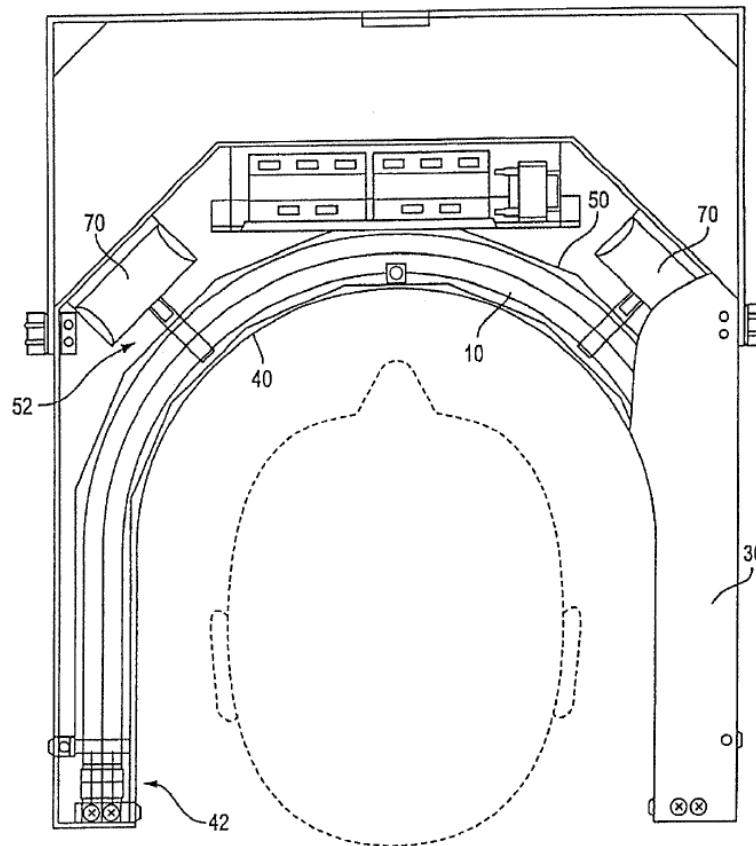
Lundahl discloses “an improved illuminator for PDT and/or PD.” EX1014, 2:33-38. Lundahl teaches its “invention differs from conventional light sources because of the biological requirements imposed on a PDT light source” and “[a] much higher degree of precision and *integration is required for the components of the present invention.*” EX1014, 4:12-16. Lundahl stresses uniformity “must be controlled to assure that the properties of the device are suitable to deliver light to the target lesions and drive the photodynamic reaction.” EX1014, 4:16-19. To achieve this uniformity, Lundahl teaches “each functional block within the present invention comprises carefully selected and engineered components.” EX1014, 4:19-21. These include:

- **U-shaped tubes**: to “ameliorate” the problem of “flat emitting surface[s that] would not deliver a uniform light dose” the “invention uses a U-shaped emitting surface,” which “*provides the desired...uniformity*” and “ensures that the proper visible light dosage is applied to all target areas during PDT.” EX1014, 4:27-38, 6:31-42, Abstract, 2:62-67, 3:62-67, claim 1, FIG. 1, FIG. 4A.

- **reflector**: “to *increase the uniformity* of the output distribution” the invention uses “reflector 50...which is bent to approximately conform to the configuration of the tubes.” EX1014, 8:62-67, 5:30-32, Abstract, FIG. 5B.
- **electrical system**: “[T]he U-shaped tubes” “are driven by electronic ballasts” and “[a]djustment of the ballast voltage controls the output power of the tubes.” EX1014, Abstract, claim 26, 7:10-35, 8:10-59, FIGS. 3, 7, 8, 9A. The ballasts “correct[] output of said light from said plurality of light sources so as to *maintain said substantially uniform intensity*.” *Id.*
- **cooling system**: “modulation of the temperature distribution may be used to *control irradiance uniformity*.” EX1014, 4:39-44, Abstract, 2:46-48, 3:22-28, 9:13-53, claim 34, FIGS. 1, 3.

FIG. 1 shows “a partial cross-section, front elevation view of an illuminator according to the present invention.” EX1014, 4:60-61.

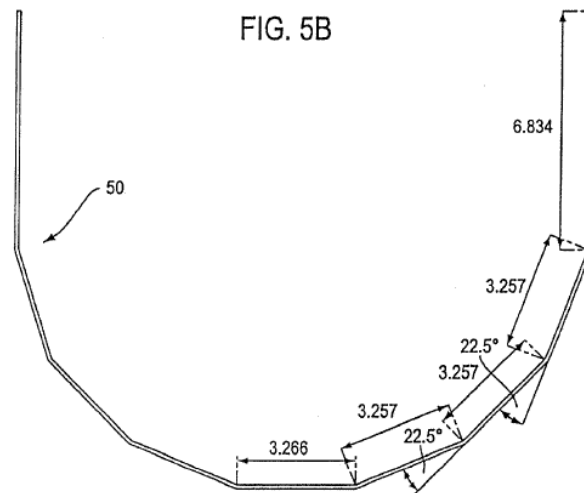
FIG. 1



EX1014, FIG. 1. Lundahl discloses an illuminator with a “*U-shape*” that “*provides the desired irradiance and irradiance uniformity* for scalp and facial irradiation, and thus ensures that the proper visible light dosage is applied to all target areas during PDT.” EX1014, 6:31-42, 4:33-38. Lundahl also discloses the invention is “directed to...other areas of the patient (e.g., arms, legs, etc.).” EX1014, 1:14-17; *see also* EX2015.

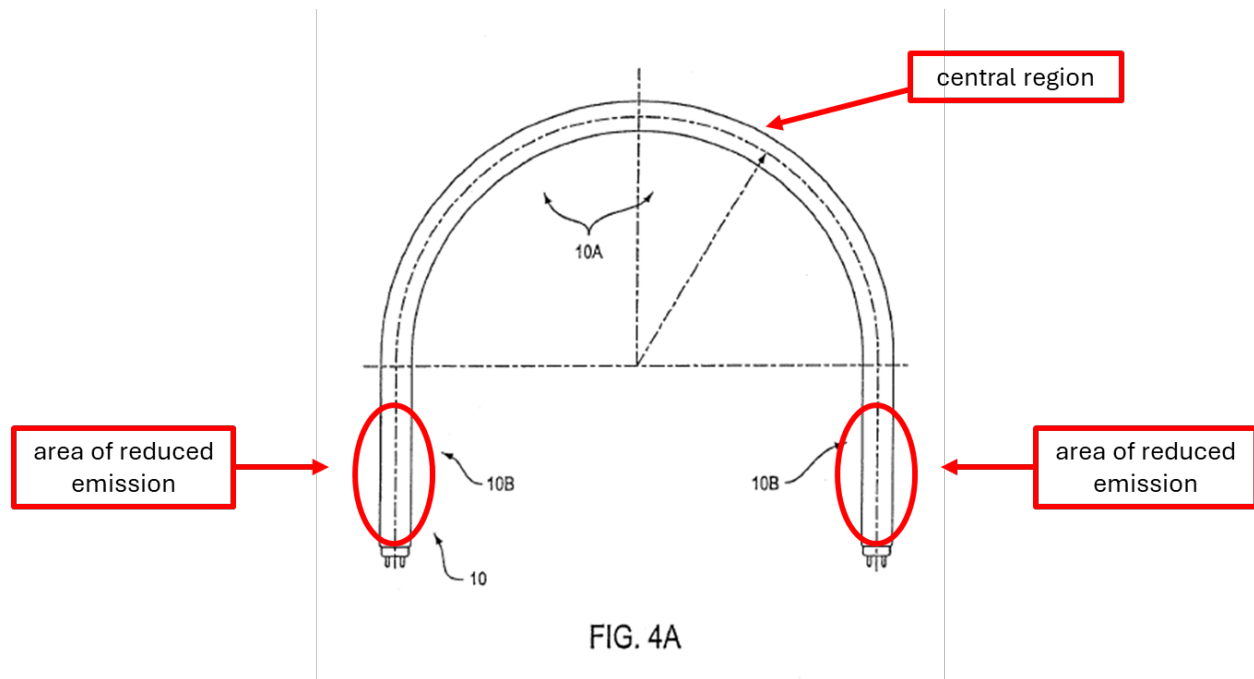
As shown in Fig. 5B, *reflector 50* located behind the fluorescent tubes is “bent to approximately conform to the configuration of the tubes” and “*increases both the*

output irradiance and the uniformity of the output distribution.” EX1014, 5:30-32, 8:65-67.



EX1014, FIG. 5B.

As shown in FIG. 4A, the fluorescent tubes “have a generally arcuate *central region* 10A and arms 10B extending from respective ends of the central region,” which “*produces higher output irradiances than the rest of the tube.*” EX1014, 5:43-46, 9:43-54. Lundahl discloses the tubes have “*area[s] of reduced emission*” and “[t]he output measured in the immediate vicinity of the cathode is typically much lower than the output over the rest of the tube.” EX1014, 6:10-16.



EX1014, FIG. 4A.

Lundahl also discloses “[t]o avoid uniformity problems, one embodiment of the present invention utilizes a plurality of U-shaped tubes 10(1)-10(7). This arrangement allows the cathodes and their *low output area to be located outside the active emitting area (effectively behind the patient’s ears). Only the more uniform center portion of the tube output is used for patient treatment.*” EX1014, 6:16-22.

Lundahl further discloses “[c]ontrol of the voltage and/or tube current characteristics, as well as heating of the cathodes is accomplished with external electronic circuitry which is usually engineered and packaged into a single device commonly referred to as a ‘ballast’.” EX1014, 7:28-32, 8:46–54, 11:6–18, FIGS. 7, 8, and 9A. Lundahl’s *electronic circuitry “correct[s] output of said light from said*

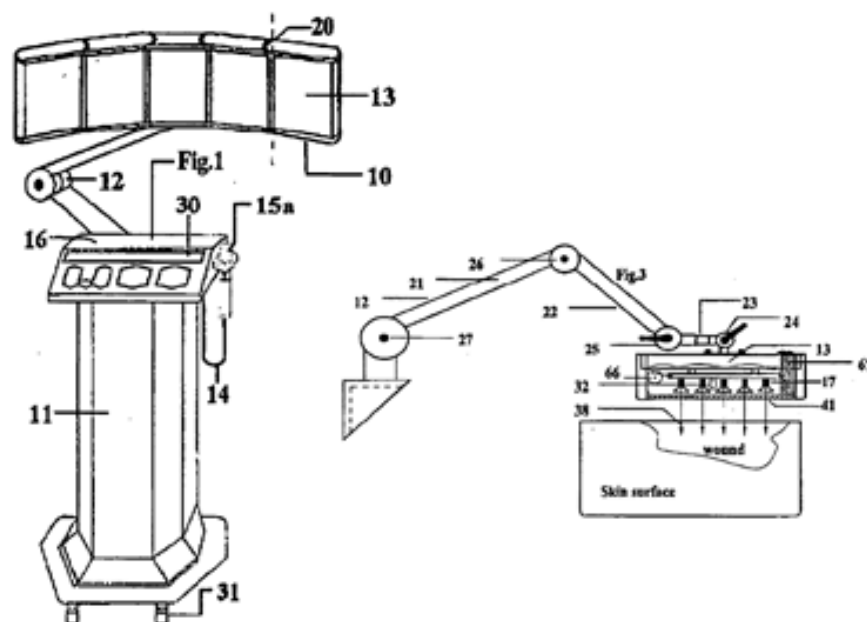
plurality of light sources so as to maintain said substantially uniform intensity.”

EX1014, claim 26. EX2050, ¶¶83-98.

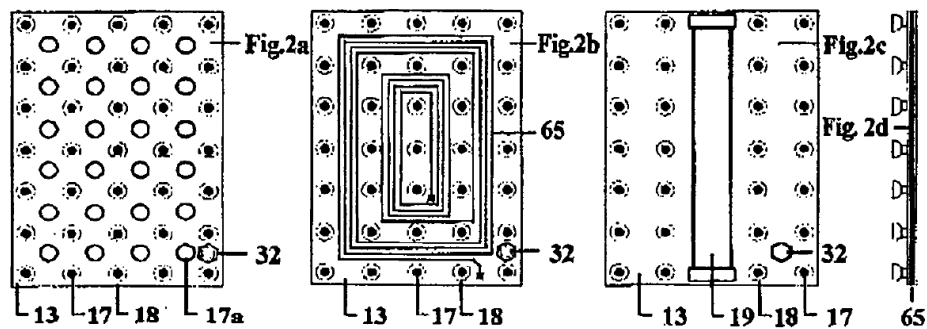
B. Larsen (EX1004)

Larsen discloses a device for photodynamic therapy (PDT) with “changeable applicators using a light and/or laser radiation of several wavelength ranges suited for the photodynamic stimulation of the cell energy in living cells.” EX1004, Abstract, [0026].

Figure 1 illustrates the device, “consist[ing] of a stand 11, with which machine applicators 13...are connected through a jointed arm 12.” EX1004, [0069], [0040]. The “*applicators 13 are flexibly connected to each other through hinges 10*, respectively connecting one edge with the other.” EX1004, [0072], [0027].



EX1004, FIGS. 1, 3. “In each applicator the printed circuit board carrying the light sources is connected to a small electrical *scan engine 66, which can move the light sources with linear movements.*” EX1004, [0072], FIG. 3. The applicators 13 have printed circuit boards with *light sources 17 “placed in regular row arrangements, i.e., 20* equidistant from each other, whereby, according to FIG. 2c, one applicator 13, in addition to the diodes 17, has a light source 19.” EX1004, [0071].



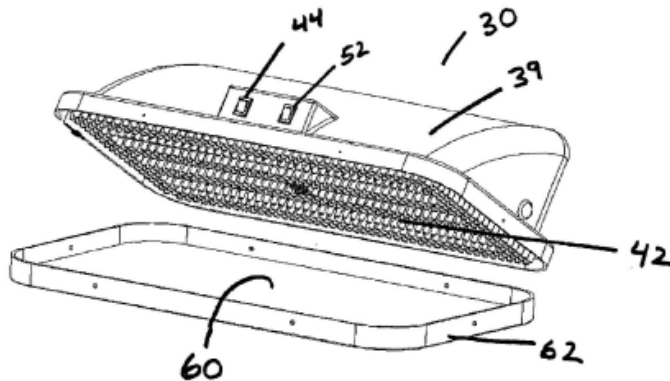
EX1004, FIGS. 2a, 2b, 2c, and 2d.

As shown in FIGS. 2a, 2b, and 2c, the applicators 13 “are equipped with sensors 32 arranged between the semiconductor and/or laser diodes 17.” EX1004, [0079]. Larsen discloses “[w]ith the help of the control mechanism 16, *the invented device is adjustable* within a relatively large range with reference to duration, amplitude and frequency of surge of current, so that the semiconductor diodes 17, 17a and 18, as well as laser 17 diodes with the same realisation as semiconductor diode 17, can be used as light sources.” EX1004, [0074]. EX2050, ¶¶99-108.

C. Bansal (EX1005)

Bansal discloses a “phototherapy system including a non-uniform array of light sources.” EX1005, [0010]. Shown below in Figure 2, Bansal’s device has an enclosure 30 that supports the LED board 42. EX1005, [0023], [0012].

Fig. 2

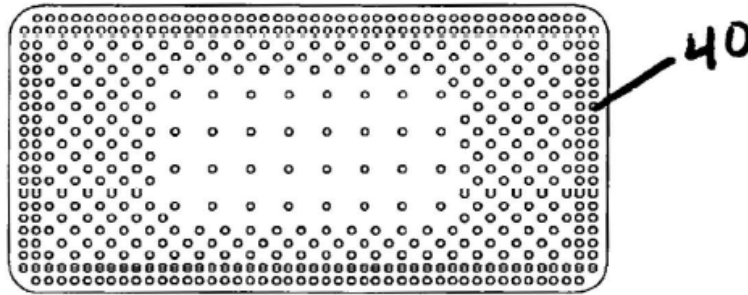


EX1005, FIG. 2. Bansal also has “a light diffusing panel 60 placed between the array 40 and a subject.” EX1005, [0021].

Bansal discloses the array of light sources “can take a number of different non-uniform forms to achieve the goal of even exposure on the subject’s skin.” EX1005, [0025]. In one embodiment, “the density of light source distribution would vary throughout the array, such as with higher density in the periphery and a lower density in the center. In yet another version of the invention, low intensity light sources could be used in one portion of the array, and higher intensity light sources could be used in another section. This can be achieved by either using different intensity light sources or driving the light sources with a lower power in the center

and a higher power on the outer edges....Some exemplary light source configurations are provided in FIGS. 9a-9d.” *Id.* Fig. 9b of Bansal is shown below.

Fig. 9b



EX1005, FIG. 9b.

Bansal further discloses PDT devices with light sources arranged in “uniform arrays” that are “suspended 12 inches above a subject” can “produce sufficient intensity...to be a clinically useful phototherapy device.” EX1005, [0007]. EX2050, ¶¶109-113.

IV. The Level Of Ordinary Skill In The Art

The Board should apply the same definition of a POSITA adopted in the Institution Decision, 8-10. Regardless, the Petition is deficient under either party’s definition. EX2050, ¶¶30-36.

V. Claim Construction

Claim terms in IPRs are construed according to their “ordinary and customary meaning” to those of skill in the art. 37 C.F.R. § 42.100(b); *see also Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-1313 (Fed. Cir. 2005) (*en banc*). In the parallel ITC

investigation, the ALJ issued a claim construction order adopting the parties' agreed-to construction of the "uniformly illuminate" limitations:

CLAIM TERM	RELEVANT CLAIMS	PARTIES' AGREED CONSTRUCTION
"uniformly illuminate a treatment surface"	'028 patent: claims 1, 16, 20, 21 '512 patent: claims 1, 2, 20	"irradiating light over the active emitting area such that the measured irradiance at a treatment surface of the patient is at least within 60% of the measured maximum"
"uniformly illuminating a treatment surface"	'028 patent: claim 5 '512 patent: claim 8	"irradiating light over the active emitting area such that the measured irradiance at a treatment surface of the patent is at least within 60% of the measured maximum"

EX2033, 13. In addition, the ALJ construed the following claim terms, which were based on Patent Owner's constructions:

Claim Term	Construction
"a higher intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges"	"a higher intensity of light is emitted close to the second shorter edges compared to the intensity of light emitted not close to the second shorter edges"
"the five panels are individually configurable to control illumination from each of the five panels"	"the power output and/or light intensity of each panel can be individually controlled"

EX2033, 14-23, 35-40. Because these constructions are supported by the claims and specification, and because *Petitioner "[f]or purposes of this IPR" took a "view of the scope of the claims consistent with Patent Owner's infringement allegations,"*

the Board should apply these same constructions. EX2033, 13-23, 35-40; Petition, 12; EX2050, ¶¶80-82.

VI. Ground 1: The Challenged Claims Are Patentable Over Lundahl And Larsen

A. Lundahl In View Of Larsen Does Not Render Obvious The “Uniformly Illuminate” Limitations (All Claims)

Petitioner argues “Lundahl and Larsen teaches” “uniformly illuminate a treatment surface” and “uniformly illuminating a treatment surface.” Petition, 39-42, 55, 65, 70, 72; EX1015, ¶¶160-165, 200, 234, 250. However, Petitioner fails to meet its burden of showing obviousness because the Petition only addresses the teachings of the references separately. Petitioner does not show that Lundahl and Larsen, as *combined together*, render obvious “uniformly illuminate a treatment surface” and “uniformly illuminating a treatment surface.” *See Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011) (“Obviousness requires more than a mere showing that the prior art includes separate references covering each separate limitation in a claim....”). EX2050, ¶¶116-117.

As explained (Section V), the ALJ in the related ITC proceeding adopted the parties’ agreed-to construction of “uniformly illuminate a treatment surface” and “uniformly illuminating a treatment surface,” construing these limitations as “irradiating light over the active emitting area such that the measured irradiance at a treatment surface of the patient is at least within 60% of the measured maximum.”

EX2033, 13. Petitioner’s expert agreed this is the construction he is applying in this proceeding. EX2084, 80:20-81:3. Petitioner fails to show the **combination** of Lundahl in view Larsen renders obvious the “uniformly illuminate” limitations for each of the reasons set forth below. EX2050, ¶118.

1. Petitioner’s reliance on Lundahl’s disclosure does not show the combination is obvious

Petitioner argues Lundahl discloses the “uniformly illuminate” limitations because Lundahl’s “invention is directed to photodynamic therapy using an illuminator that provides a uniform distribution of visible light” and “highly uniform output irradiance.” Petition, 39-41 (citing EX1014, 1:9-11, 6:16-57; EX1015, ¶¶160-162). However, Petitioner’s reliance on Lundahl’s **separate** references to “highly uniform output irradiance” does not inform the POSITA what the **measured output** would be for the **combination** of Lundahl and Larsen. *Unigene*, 655 F.3d at 1360; EX2050, ¶119.

Petitioner presents no supporting evidence or analysis to show that the alleged **combination** of Lundahl and Larsen would “irradiat[e] light over the active emitting area such that the measured irradiance at a treatment surface of the patient is at least within 60% of the measured maximum.” Petitioner’s assertion that Lundahl and Larsen teach the limitations is based on Dr. Grove’s declaration (EX1015, ¶¶160-165), *which contains neither supporting evidence nor analysis by comparison to a*

maximum “over the active emitting area” for the proposed combination. Petition, 39-42. Dr. Grove addresses only the *individual* teachings of Lundahl (EX1015, ¶¶160-162) and Larsen (EX1015, ¶¶163-164). For the proposed *combination*, Dr. Grove provides no comparison of outputs to the maximum output at the alleged operation distances of “2-4” of the entire treatment surface.” EX1015, ¶125 (“ensure the light panels could be maintained at a distance of 2-4” of the entire treatment surface”), ¶126 (“POSITA would have been motivated to change the design of the system of Lundahl to...ensure a 2-4” distance”). EX2050, ¶120. Dr. Grove does not identify what the measured maximum is for the *combination* of Lundahl and Larsen, nor does he explain how a POSITA would have achieved the same measured results as Lundahl after combining Lundahl with Larsen. *Id.* Petitioner fails to meet its burden of showing obviousness because Petitioner does not explain how the *combination* of prior art references is mapped to the claim limitations under the agreed-to construction or articulate its reasoning for why the subject matter of the claim would have been obvious. *Id.*; *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (“Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, *there must be some articulated reasoning with some rational underpinning* to support the legal conclusion of obviousness.”).

Additionally, Petitioner ignores Lundahl’s teachings that multiple “*carefully selected and engineered components*” *together affect irradiance uniformity*,

including (1) the U-shaped tubes, (2) the reflector, (3) the electrical control system, and (4) the cooling system. EX1014, 4:12-22, 4:39-44, Abstract, 2:46-48, 3:22-28, 7:10-8:59, 9:13-53, claims 26, 34, FIGS. 1-11; EX2050, ¶¶121-123. For example, Lundahl teaches (1) “the ‘U’ shape *provides the desired irradiance and irradiance uniformity*” (EX1014, 6:39-42); (2) the reflector “*increases* both the output irradiance and the *uniformity of the output distribution*” (EX1014, Abstract); (3) the electrical system corrects the output of light from the light sources “so as to *maintain said substantially uniform intensity*” (EX1014, claim 26); and (4) the cooling system “modulat[es]” “temperature distribution...to *control irradiance uniformity*” (EX1014, 4:39-44). Lundahl teaches a “*much higher degree of precision and integration*” is required for these components to *achieve “irradiance uniformity*” and “to assure that the properties of the device are suitable to deliver light to the target lesions and drive the photodynamic reaction.” EX1014, 4:12-22; *see also* EX1015, ¶47 (Dr. Grove acknowledging “[t]he design of the light source plays an important role in achieving an irradiance that is as uniform as possible”). EX2050, ¶¶121-124.

In an attempt to reconstruct the claimed invention using hindsight, Petitioner proposes numerous *modifications* to the design of Lundahl’s system. Petition, 30 (“...POSITA would have been motivated to change the design of the system of Lundahl...”) (“...the easiest way to modify the fixed, curved U-shape of Lundahl

would be to incorporate hinged panels...”), 31 (“POSITA was also motivated to modify Lundahl to incorporate LEDs...”); EX1015, ¶¶178, 126, 129 (“a motivation existed to combine the teachings of Lundahl and Larsen to: (1) incorporate the hinged panels of Larsen *into the PDT device* of Lundahl to increase the adaptability of the device; and (2) replace the *fluorescent bulbs* of Lundahl *with LEDs*”); EX2034, ¶268 (“...*the electrical needs and design of Lundahl’s system* for operating fluorescent tubes would need to be changed to accommodate the electrical needs and design of Larsen’s LED panels...”). EX2050, ¶125. However, Petitioner does not present any supporting evidence or analysis to show that the device resulting from the combined teaching and numerous modifications would “irradiat[e] light over the active emitting area such that the measured irradiance at a treatment surface of the patient is at least within 60% of the measured maximum.” Petitioner does not identify what the measured maximum is for the alleged combination, nor does Petitioner explain how a POSITA would have achieved the same measured results as Lundahl after changing the U-shaped fluorescent tubes, changing the reflector, changing the electrical system, and changing the cooling system. *Id.* The extent of the modifications proposed by Petitioner and whether there would be a reasonable expectation of success that the combination would “irradiat[e] light over the active emitting area such that the measured irradiance at a treatment surface of the patient is at least within 60% of the measured maximum”

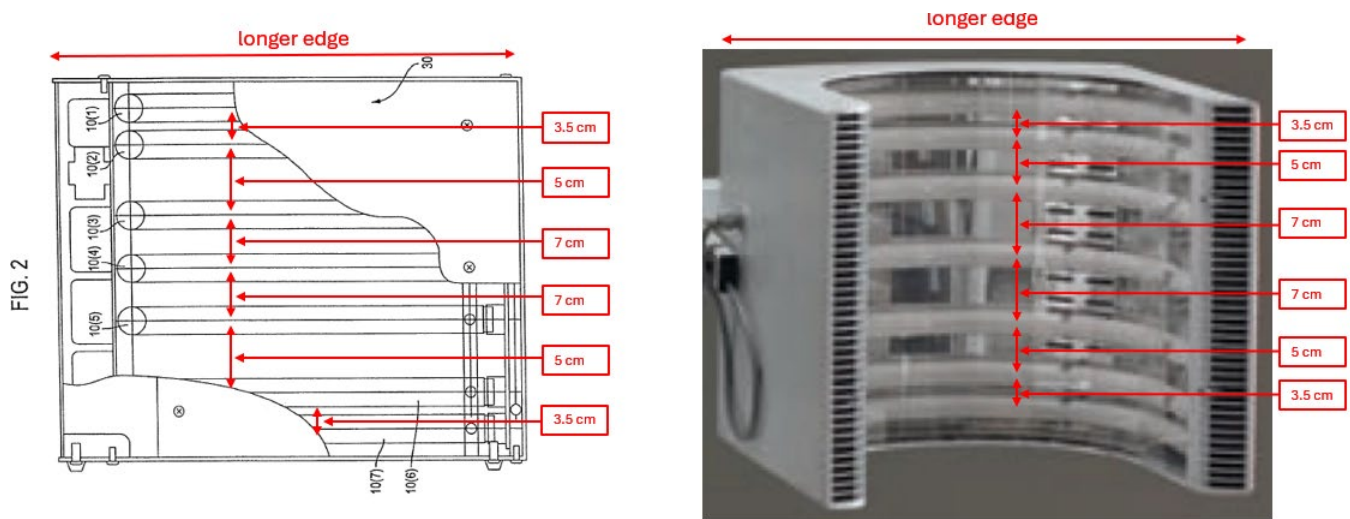
are not adequately supported. By failing to address numerous modifications that impact uniformity and failing to show a reasonable expectation of success, Petitioner has not shown the **combination** of Lundahl in view Larsen renders obvious the “uniformly illuminate” limitations. EX2050, ¶¶124-125.

First, Petitioner argues a “POSITA would have been motivated to **change the design of the system of Lundahl**” and “the easiest way to **modify the fixed, curved U-shape of Lundahl** would be to incorporate hinged panels.” Petition, 30; EX1015, ¶126. However, modifying Lundahl’s U-shaped tubes to incorporate panels would create gaps between the panels, affecting uniformity. EX2050, ¶¶126-128; EX2082, ¶151 (Petitioner’s expert, Dr. Bretschneider, acknowledging “lower irradiance regions at the junction of two of Larsen’s panels”); EX2052, 88:8-89:1 (Mr. Carota explaining the “difficulty” the inventors had “because of the gap between the lights at the place where there was a hinge”).

Dr. Grove also argues a POSITA would “**replace the fluorescent bulbs of Lundahl with LEDs**.” EX1015, ¶¶178, 129. But, replacing Lundahl’s diffuse fluorescent tube illuminators with discrete, point-source LEDs would also create gaps between the LEDs, impacting the uniformity. EX2050, ¶¶127, 38-48; EX2053, 100:22-101:15 (Mr. Boyajian explaining the difference between fluorescent tubes with “no gaps” and LEDs with “points of light” that “give an area that you can’t have light”). Dr. Grove states he “**incorporate[s] the uneven spacing of light**

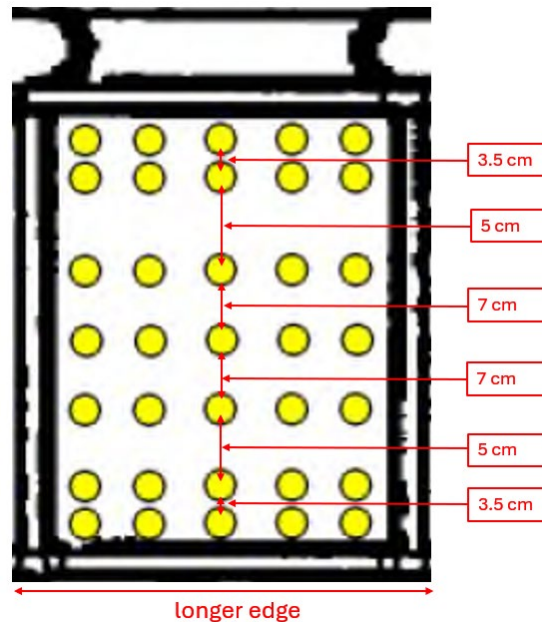
sources of Lundahl” in his alleged combination (EX1015, ¶¶178-179), but applying Lundahl’s teaching of spacing of the light sources to LEDs would not result in the claimed uniform illumination. EX2050, ¶127; Petition 47-48; EX1015, ¶¶176-177 (Dr. Grove relying on express teaching of Lundahl’s spacing); EX2036, 149:24-150:4 (Dr. Grove testifying he is relying on Lundahl’s spacing, not Larsen’s spacing).

Lundahl teaches the “lateral spacing” is “3.5 cm between tubes 10(2),10(1) and 10(6),10 (7)”; “5 cm between the tubes 10(3),10(2) and 10(5),10 (6)”; and “7 cm between the center tube 10(4) and each of the two tubes 10(3),10(5) adjacent to the center tube,” as shown below (EX1014, 6:48-57):



Left: EX1014 (Lundahl Fig. 2 rotated counterclockwise 90° and annotated to show the distances between light sources); Right: EX1023, 29 (Lundahl Blu-U® annotated to show distances between light sources). EX2050, ¶127.

Spacing LEDs as taught by Lundahl would create gaps (“optical dead spaces”) in areas of the target treatment area that would impact the uniform illumination, because LEDs and fluorescent tubes have different light output characteristics. EX2050, ¶¶127-128, 38-48.



EX1015, ¶¶178-179 (Dr. Grove’s alleged panel, annotated to show the distance between light sources). By changing Lundahl’s continuous diffuse fluorescent tubes to discrete, point-source LEDs, and failing to address the impact this change has on the uniformity, Petitioner and Dr. Grove have not shown that the *combination* of Lundahl and Larsen “uniformly illuminates a treatment surface” under the parties’ agreed-to construction. EX2050, ¶128.

Second, Dr. Grove argues a POSA “*would not seek to replicate the design ... of Lundahl with nine sections,*” but would instead include “*five reflectors,* matching

the number of panels disclosed by Larsen.” EX2034, ¶265. However, Dr. Grove’s modification ignores Lundahl’s teaching that the nine-section reflector “*increase[s] the uniformity* of the output distribution” by “conform[ing] to the configuration of the tubes” and contains vents “so that cooling air flows primarily over the straight section and the end portions of the curved section.” EX1014, 8:62-67, 9:43-46, FIG. 5B. Dr. Grove also does not explain why a POSITA would have incorporated Larsen’s LEDs, but not Larsen’s reflectors. *See* EX1004 (Larsen), [0070]. Whether Dr. Grove’s combination uses five reflectors or none at all, changing Lundahl’s reflector would impact the combination’s uniformity. EX2050, ¶129. Because Petitioner fails to address the impact that would have on uniformity, Petitioner has not shown the *combination* of Lundahl and Larsen “uniformly illuminate[s] a treatment surface” under the parties’ agreed-to construction. *Id.*

Third, Petitioner changes Lundahl’s electrical system that “correct[s] output of said light from said plurality of light sources so as to *maintain said substantially uniform intensity.*” EX1014, Abstract, claim 26. Dr. Grove argued “*the electrical needs and design of Lundahl’s system for operating fluorescent tubes would need to be changed* to accommodate the electrical needs and design of Larsen’s LED panels.” EX2034, ¶268. However, changing Lundahl’s electrical control system to drive LEDs at lower voltage would necessarily affect uniformity. EX2050, ¶130; EX1014, 5:58-61, 8:46-54; EX2011, 1944. Because Petitioner fails to address the

impact a change to the electrical control system would have on uniformity, Petitioner has not shown the **combination** of Lundahl and Larsen “uniformly illuminate[s] a treatment surface” under the parties’ agreed-to construction. EX2050, ¶130.

Fourth, Petitioner does not address Lundahl’s cooling system that “control[s] irradiance uniformity,” despite acknowledging that Lundahl’s uniformity is “affected by heat and the ability to cool the Lundahl device.” EX1014, 4:39-44; Petition, 26; EX1015, ¶121; EX1016, ¶¶68-69. Lundahl discloses a complex cooling system that includes zones, intake vents, fans, reflector vents, and exhaust vents at specific locations. EX1014, 9:13-54. Changing Lundahl’s cooling system to simply incorporate one or more fans as Dr. Grove proposes (EX1015, ¶240), without Lundahl’s zones, vents, shield, and reflector, would also necessarily affect uniformity. EX2050, ¶¶131, 46-47; EX2011, 1944, 1945. Because Petitioner fails to address the impact the change to the cooling system would have on uniformity, Petitioner has not shown the **combination** of Lundahl and Larsen “uniformly illuminate[s] a treatment surface” under the parties’ agreed-to construction. *Id.*

Because Petitioner modifies and/or replaces multiple carefully selected and engineered components that Lundahl teaches must work together to achieve uniformity (EX1014, 4:14-22), and does not address the affects those changes have on uniform illumination, Petitioner has not shown the **combination** of Lundahl and

Larsen renders obvious the “uniformly illuminate” limitations under the parties’ agreed-to construction. EX2050, ¶¶119-132.

2. Petitioner’s reliance on Larsen’s disclosure does not show the combination is obvious

Petitioner argues Larsen’s use of a scan engine teaches “uniformly illuminate a treatment surface.” Petition, 41-42, 66; EX1015, ¶¶163, 235 (citing EX1004, [0072]). However, again Petitioner relies on Larsen’s disclosure *separately* and does not show that the *combination* of Lundahl and Larsen renders obvious the “uniformly illuminate” limitations. *Unigene*, 655 F.3d at 1360; EX2050, ¶133.

Larsen does not disclose “irradiating light over the active emitting area such that the measured irradiance at a treatment surface of the patient is at least within 60% of the measured maximum.” EX2050, ¶134. Indeed, Dr. Grove admitted “*Larsen doesn’t disclose how to achieve uniformity meeting the requirements of 60 percent of the measured maximum at all points.*” EX2036, 139:9-14. Moreover, Petitioner’s expert, Dr. Bretschneider, opined there are “lower irradiance regions at the junction of two of Larsen’s panels.” EX2082, ¶151. He acknowledged “the scan engine would have been a less effective way to achieve more uniform illumination” because “the scan engine can only move lights linearly in one direction at a time, which *would only decrease unradiated gaps on the portion of the*

treatment surface towards which the light sources are being moved.” EX2082, ¶154; *see also* EX2052, 118:10-119:17.¹

Petitioner’s argument that “Larsen also describes measurements taken by sensors 32” also fails. Petition, 42; EX1015, ¶164. Larsen’s sensors 32 “measure the amount of energy radiated away from the skin surface, which is indicative of the *total energy* penetrating into the tissue” (EX1004, [0079]). A POSITA would have understood that *indicative of the total energy* (measured in Joules) measured by Larsen’s sensors is *not* equivalent to the *measured irradiance* (measured in W/cm²). EX2050, ¶135. Larsen *does not* teach or suggest “irradiating light over the active emitting area such that the *measured irradiance* at a treatment surface of the patient is at least within *60% of the measured maximum.*” *Id.*

Therefore, Petitioner has not shown Larsen discloses the “uniformly illuminate” limitations. Nor has Petitioner shown the combination of Lundahl and Larsen renders obvious these limitations. EX2050, ¶¶133-136.

¹ Petitioner argues that during prosecution of the ’512 Patent, the Examiner stated Larsen discloses “the illuminator being configured to uniformly illuminate a treatment surface of the patient via the light sources (see EX1004 [0072]).” Petition, 41. However, the Examiner’s statement is conclusory, incorrect, and addresses Larsen’s disclosure *separately, not* the alleged combination of Lundahl and Larsen.

3. The evidence demonstrates no reasonable expectation of success

Petitioner fails to show a POSITA would have had a reasonable expectation of success that the combination of Lundahl and Larsen would “irradiat[e] light over the active emitting area such that the measured irradiance at a treatment surface of the patient is at least within 60% of the measured maximum.” Petitioner argues a “POSITA would have had a reasonable expectation of success in combining Lundahl with Larsen, because both references describe similar illuminators for using light to treat conditions on a patient’s skin” and “the conversion from fluorescent tubes to LEDs was a routine practice.” Petition, 31-32; (citing EX1015, ¶¶128, 131). However, “[t]he reasonable expectation of success requirement refers to the likelihood of success in combining references to *meet the limitations of the claimed invention*.” *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir. 2016). Petitioner provides no basis to support that a POSITA combining Lundahl in view of Larsen would have had a reasonable expectation of success in achieving “irradiating light over the active emitting area such that the measured irradiance at a treatment surface of the patient is at least within 60% of the measured maximum.” EX2050, ¶¶137, 121-132. On this basis alone, Petitioner cannot meet its burden.

Significantly, Petitioner’s own expert argued that achieving uniform illumination was *not routine* at the time of the invention. Dr. Grove argued a “*POSA would be required to perform undue experimentation to make and use an illuminator that provides ‘uniform illumination.’*” EX2034, ¶186. Dr. Grove explained “[i]t is well-known that the field of optics and illumination is complex, and in some cases requires extensive measurement and experimentation. *A POSA will expect that the amount of experimentation and testing necessary to achieve a specific design goal increases where the treatment surface is not flat, a challenge further compounded by the fact that the shape of the illuminator does not follow the contours of a face or other treatment area. Moreover, there is a range of distances between the illuminator and the treatment surface, and this variance can dramatically affect irradiance of the skin. And, finally, much of the targeted skin area is not in the same plane as the emitting source; the irradiance falls off rapidly if the treatment surface is not orthogonal to the light emitted from the illuminator.*” EX2034, ¶191; EX2084, 66:1-67:14.

Dr. Grove’s assertions in IPR2025-00287 also support no reasonable expectation of success; he argued “based on the teachings of Lundahl and Larsen, uniformity of illumination is *still a key design motivation*, as a POSITA would want to minimize *gaps between the adjacent panels (appreciable gaps between panels might impact the ability to produce uniform illumination).*” IPR2025-00287,

EX1015, ¶139. Furthermore, the inventors of the '028 Patent testified that achieving uniform illumination was “one of the *more difficult challenges* that [they] had,” and they conducted numerous tests because “LEDs don’t act like fluorescents.” EX2052, 73:20-74:14; EX2053, 87:3-89:12, 100:7-12, 100:22-101:15. A POSITA would have understood that replacing fluorescent tubes with LEDs creates problems unique to LEDs, due at least in part to the different optical and electrical characteristics of LEDs and fluorescent tubes. EX2050, ¶¶138-139, 38-48. Therefore, the evidence demonstrates that a POSITA would have had no reasonable expectation of success that the combination of Lundahl in view of Larsen would “irradiat[e] light over the active emitting area such that the measured irradiance at a treatment surface of the patient is at least within 60% of the measured maximum.” EX2050, ¶¶137-140.

Accordingly, for each of the above reasons, Lundahl in view of Larsen does not render obvious the “uniformly illuminate” limitations. Petitioner has not met its burden for all Challenged Claims.

B. Lundahl In View Of Larsen Does Not Render Obvious The “Higher Intensity” Limitation (All Claims)

Petitioner argues Lundahl in view of Larsen renders obvious “the light sources are arranged such that a higher intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges.”

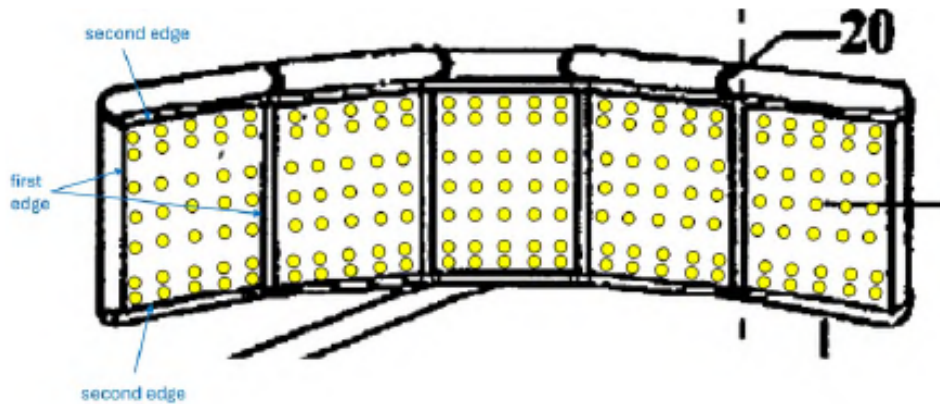
Petition, 46-49, 56, 67, 71, 73; EX1015, ¶¶175-181, 204-205, 238, 254-255, 264-265. However, Lundahl in view of Larsen does not render obvious this limitation for each of the reasons set forth below. EX2050, ¶¶141-142.

First, Petitioner argues “the PDT device and light distribution of Lundahl” combined with “the “hinged panels and LED lights” of Larsen renders obvious this limitation. Petition, 49; EX1015, ¶¶178-180. However, Petitioner fails to read the claim language as a whole, which requires that “each of the five panels” has “a higher intensity of light [] emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges.” See, e.g., EX1001, 10:39-44 (“wherein each of the five panels has two first edges and two second edges shorter than the first two edges, and the light sources are arranged such that a higher intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges”). EX2050, ¶¶144-145.

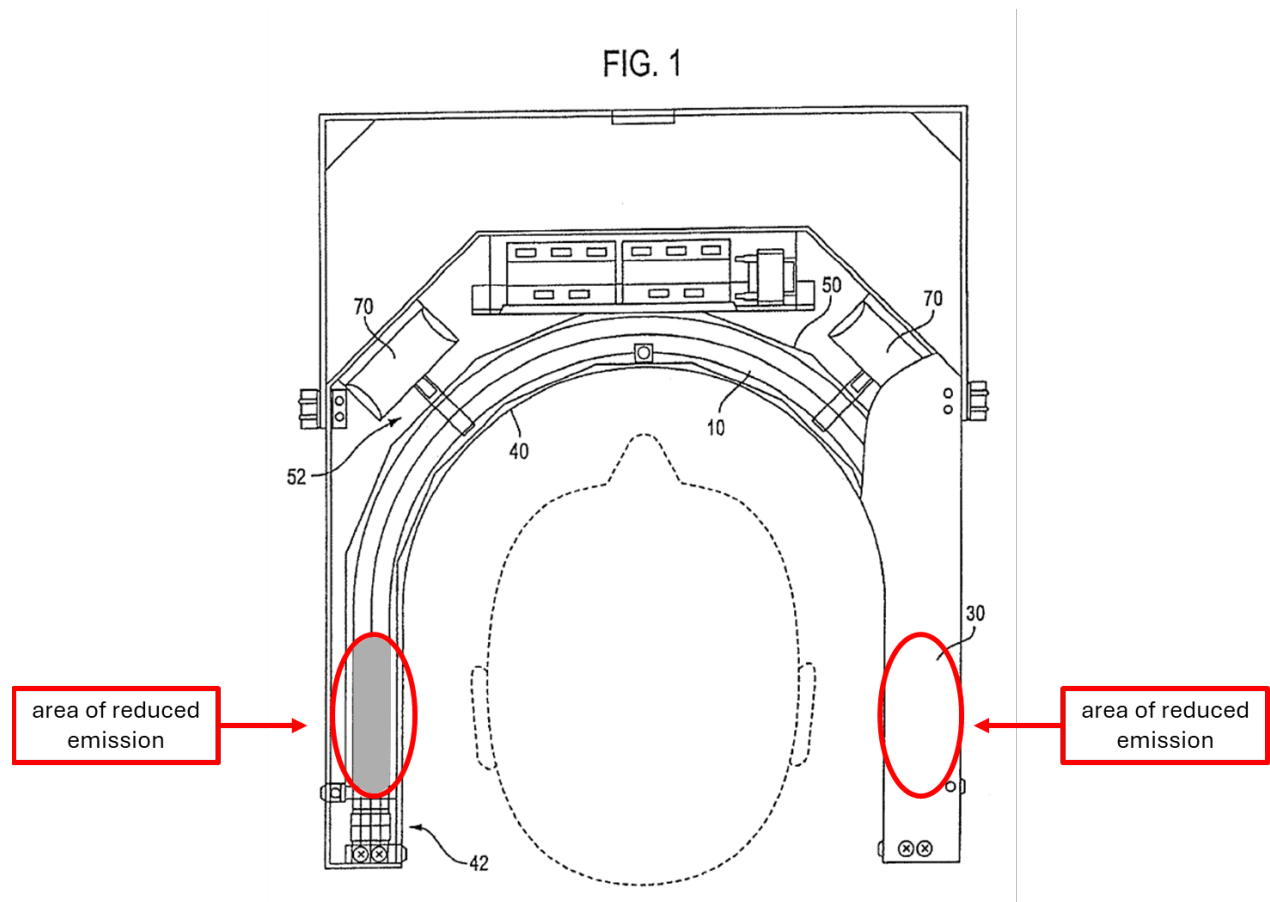
Petitioner argues the combination of Lundahl and Larsen “maintain[s] the same light distribution pattern Lundahl utilized for the fluorescent bulbs” (EX1015, ¶179; Petition, 49), but *ignores Lundahl’s teachings* of “*area[s] of reduced emission*” and “*[o]nly the more uniform center portion of the tube output is used for patient treatment.*” (EX1014, 6:10-22). When the claim language and Lundahl are properly read as a whole, a POSITA would understand in applying Lundahl’s

teachings that “***each*** of the five panels” would ***not*** have “a higher intensity of light [] emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges.” EX2050, ¶¶145-149.

Dr. Grove alleges “a POSITA would expect the resulting device to have a design similar to the below (yellow circles representing LEDs).” EX1015, ¶¶178-179; Petition, 48-49.

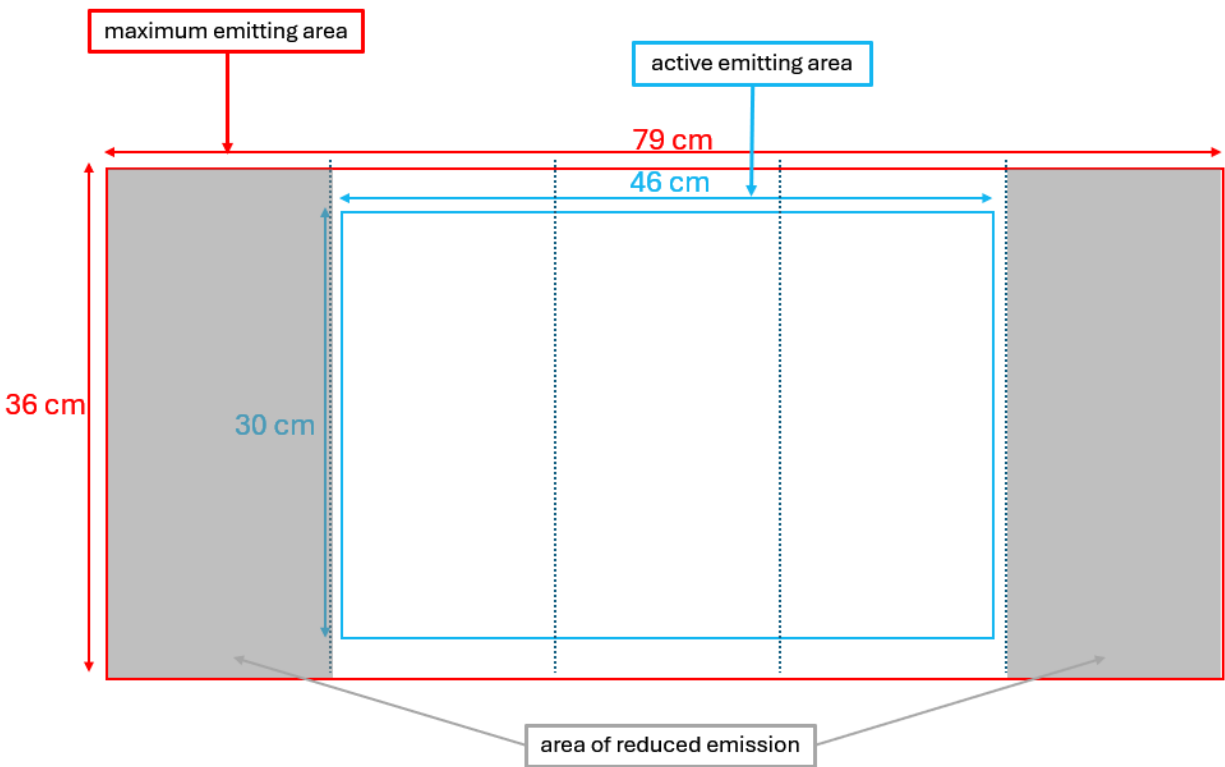


However, Dr. Grove’s alleged “resulting device” contradicts Lundahl’s teachings. Lundahl teaches “***[t]he output from a fluorescent tube is not inherently uniform.***” EX1014, 6:10-11. The light sources have “***low output area[s]***” (i.e., “***area[s] of reduced emission***”), which are “***located outside the active emitting area (effectively behind the patient’s ears),***” and therefore ***[o]nly the more uniform center portion of the tube output is used for patient treatment.***” EX1014, 6:10-22. Dr. Grove ignores Lundahl’s express teachings of “area[s] of reduced emission,” as illustrated below in red:



EX1014, FIG. 1. A POSITA purporting to apply Lundahl’s express teachings of “light distribution” would have understood the alleged “resulting device” would have had “*area[s] of reduced emission*” as shown in FIG. 1 above. EX2050, ¶145.

In fact, a POSITA would have understood that if Larsen’s five panels were incorporated into the PDT device of Lundahl (as Dr. Grove proposes, EX1015, ¶178), the *combination would not result* in Dr. Grove’s alleged design. Instead, the “resulting device” would have “*area[s] of reduced emission*” “*located outside the active emitting area,*” as illustrated below:



EX2050, ¶146; EX1014, 6:10-22; EX2036, 151:17-152:6 (Dr. Grove agreed he is taking “the single long U-shaped panel of Lundahl and dividing it into five sections”). Lundahl teaches the “therapeutically active area” (shown in blue) is “30 cm high by 46 cm wide,” and the “maximum visible light-emitting area” (shown in red) is “36 cm high by [79] cm wide.” EX1014, 5:38-43; EX2037 (“Total Emitting Area” is “36 cm H X 79 cm W”). Based on Lundahl’s teachings, the light emitted proximate the second edges of *each of the five panels* would not be a higher intensity than the light emitted not proximate the second edges, at least because there would be “*area[s] of reduced emission*” “located *outside the active emitting area*” on at least the outer panels (shown in gray). EX2050, ¶¶146-147; EX1014, 6:10-22,

FIGS. 1, 4A, 5:43-46 (discussing and showing an “active emitting” “central region” and “low output” “arms”).

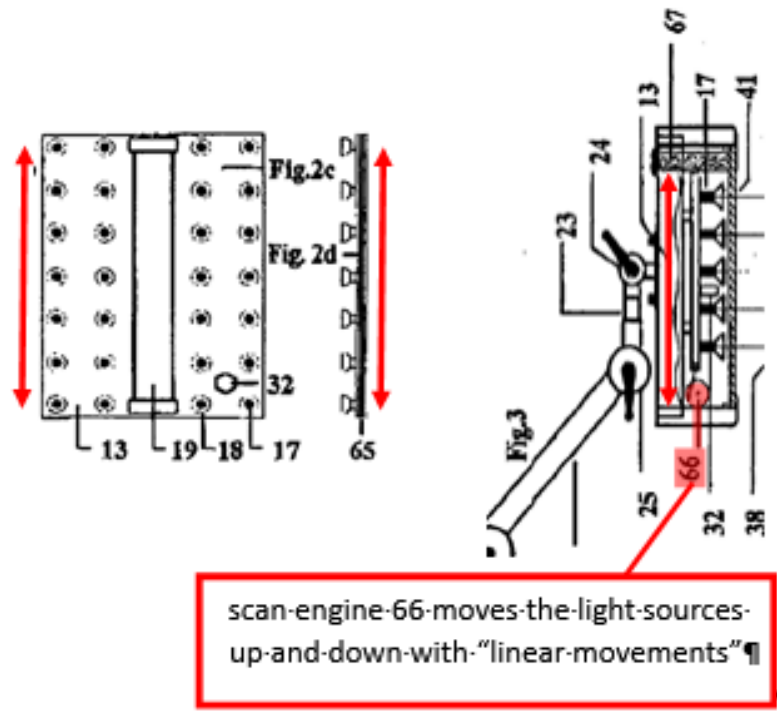
Further, Dr. Grove’s proposal to apply “Larsen’s solution” regarding LEDs (EX1015, ¶130) would not meet the “higher intensity” limitation, because Larsen’s “regular row arrangements” of LEDs do **not** have higher intensity proximate the shorter edges. EX1004, [0071], FIGS. 2a-2d; EX2050, ¶148. In fact, Petitioner admitted “Larsen does not expressly teach that the light sources on its applicators are arranged such that a higher intensity of light is emitted proximate the second edges.” IPR2024-00874, Paper 1, 36. And, as discussed below, neither Lundahl nor Larsen teaches or suggests higher intensity proximate the shorter edges.

Accordingly, when the claim language and references are properly read as a whole, the combination of Lundahl in view of Larsen does not render obvious “wherein **each** of the five panels has two first edges and two second edges shorter than the first two edges, and the light sources are arranged such that a higher intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges.” EX2050, ¶¶141-149.

Second, Petitioner relies on Larsen’s disclosure of a scan engine that “move[s] the light sources with linear movements” in its alleged combination. Petition, 41-42, 66 (citing EX1004, [0072]); EX1015, ¶¶163-164, 235. However, a POSITA would have understood the combination applying Larsen’s teaching of “***electrical***

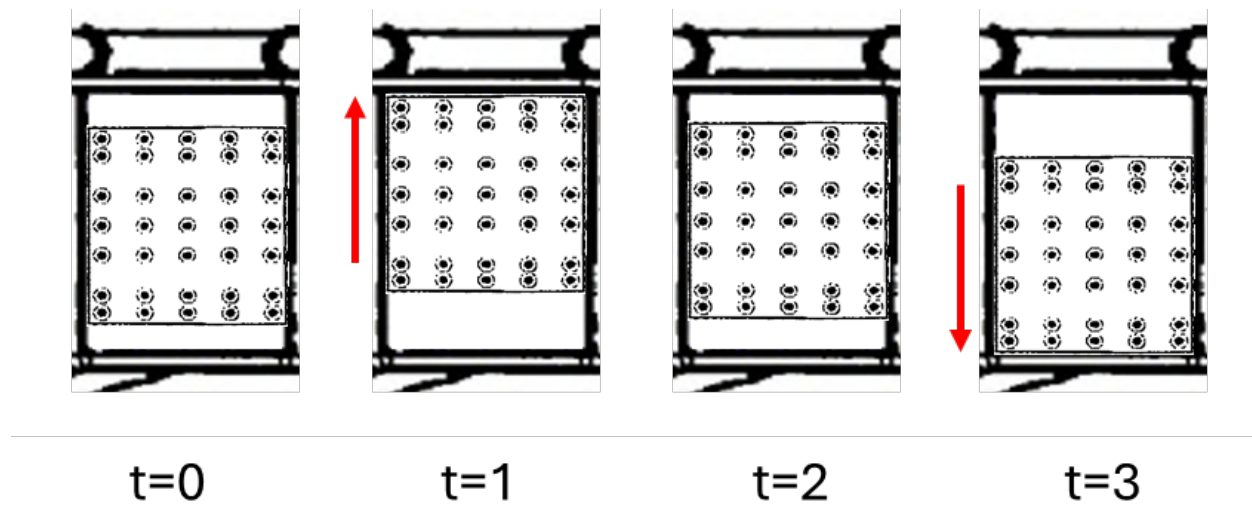
scan engine 66” that “*move[s] the light sources with linear movements*” would not result in a device that renders obvious “the light sources are arranged such that a higher intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges.” EX2050, ¶150.

Larsen teaches “[i]n each applicator, the printed circuit board carrying the light sources is connected to a small electrical scan engine 66, which can move the light sources with linear movements.” EX1004, [0072]; EX2082, ¶154 (Petitioner’s expert acknowledging Larsen’s scan engine is “configured to only move the lights linearly in a single direction.”); IPR2024-00874, Paper 1, 18 (“scan engine is configured to only move the lights along a single axis”). Based on Larsen’s teaching, and as shown in Larsen’s figures, a POSITA would have understood the scan engine “move[s] the light sources with linear movements” up and down along the longer axis of each of the applicators:



EX1004, Figs. 2c-d, Fig. 3 (rotated 90° to be same orientation as Figs. 2a-d), [0072];
EX2050, ¶151.

A POSITA reading Larsen would have understood that in Petitioner’s alleged “resulting device” (EX1015, ¶¶178-179), the scan engine 66 would move the light sources linearly up and down, as shown below:



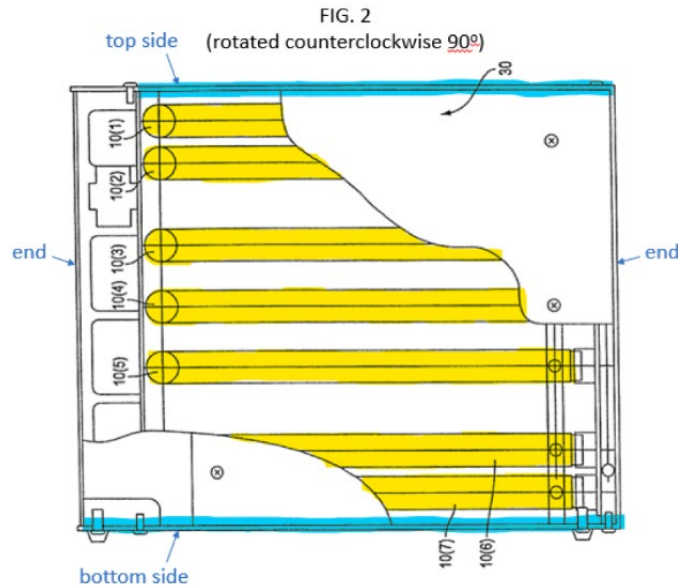
EX1015, ¶¶178-179; EX1004, [0072]; EX2050, ¶152. (illustrating light sources moving up and down over time, *e.g.*, from $t=0$ to $t=3$). As Petitioner’s expert explained, this linear movement “*would only decrease unradiated gaps on the portion of the treatment surface towards which the light sources are being moved.*” EX2082, ¶154, IPR2024-00874, Paper 1, 18. When taken as a time lapse, *e.g.*, from $t=0$ to $t=3$, *there would be more light sources in the center portion of each panel than near the shorter edges of each panel.* EX2050, ¶152. Therefore, a POSITA would have understood the light sources in the alleged “resulting device” applying Larsen’s teaching would not meet the higher intensity limitation because a *lower* intensity of light is emitted proximate the second edges compared to the intensity of light not proximate the second edges (*e.g.*, the center), when the teachings of Lundahl and Larsen are considered as a whole. EX2050, ¶¶150-152.

Third, the Board preliminarily found “Petitioner’s proposed modification *applies Lundahl’s disclosure* of providing greater light intensity at the top and bottom sides *to the top and bottom sides of Larsen*, which are the shorter edges in Larsen.” Institution Decision, 19. However, the Board applied the combination backwards—Petitioner did not argue to apply Lundahl’s disclosure to Larsen’s device. Rather, Petitioner argued a POSITA would have been motivated “to *incorporate Larsen’s solution* of disposing light sources, specifically LEDs, on the surface of the light applicators *to Lundahl’s device*.” Petition, 32 (citing EX1015, ¶130); IPR2025-00287, Petition, 31 (citing EX1015, ¶¶119 (“*incorporate* the hinged panel LED displays of *Larsen into the PDT device of Lundahl*”), 192 (“hinged panels and LEDs taught by *Larsen* are *incorporated into the device of Lundahl*”)).

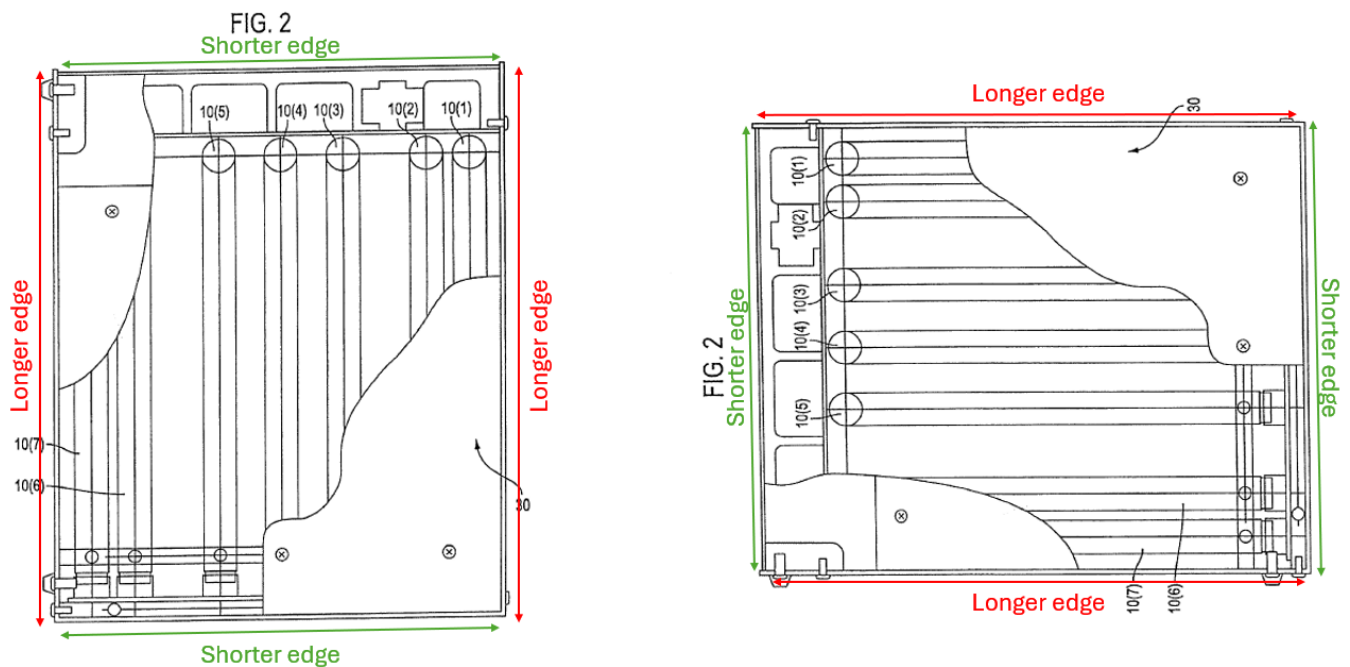
In any event, the combination of Lundahl and Larsen does not render obvious the higher intensity limitation because *neither of the references teaches or suggests that the light sources emit a higher intensity close to the shorter edges*. Lundahl’s more closely spaced fluorescent tubes are at the *longer edges* of Lundahl’s panel, not the *shorter edges*. As discussed below, a POSITA reading Lundahl’s and Larsen’s disclosures would have understood that *both Lundahl and Larsen* teach to have *lower* intensity near the shorter edges. EX2050, ¶¶153-154. Petitioner’s piecemeal reconstruction of the prior art in an attempt to manufacture the claimed invention should be rejected because *neither of the references teaches or suggests*

that the light sources emit a higher intensity close to the shorter edges. Application of *Wesslau*, 353 F.2d 238, 241 (CCPA 1965) (reversing the Board’s decision affirming the rejection of the claims because “*no one of the references suggests* such a substitution” and “[s]uch piecemeal reconstruction of the prior art patents ... is contrary to the requirements of 35 U.S.C. §103”); *Purdue Pharma L.P. v. Depomed, Inc.*, 643 F. App’x 960, 966 (Fed. Cir. 2016) (finding improper to use “hindsight in formulating the problem to be solved”); *In re Kotzab*, 217 F.3d 1365, 1371-1372 (Fed. Cir. 2000) (reversing and finding “the Board fell into the hindsight trap” where there “was no finding as to the specific understanding...that would have motivated one with no knowledge of Kotzab’s invention to make the combination in the manner claimed”).

Dr. Grove argues a “POSITA would have understood that the tubes of Lundahl are spaced to emit a higher intensity of light proximate the *top and bottom sides* compared to the intensity of light emitted not proximate the *top and bottom sides*.” EX1015, ¶176; Petition, 47-48. Dr. Grove rotates Fig. 2 and labels in blue a “top side” and “bottom side”:



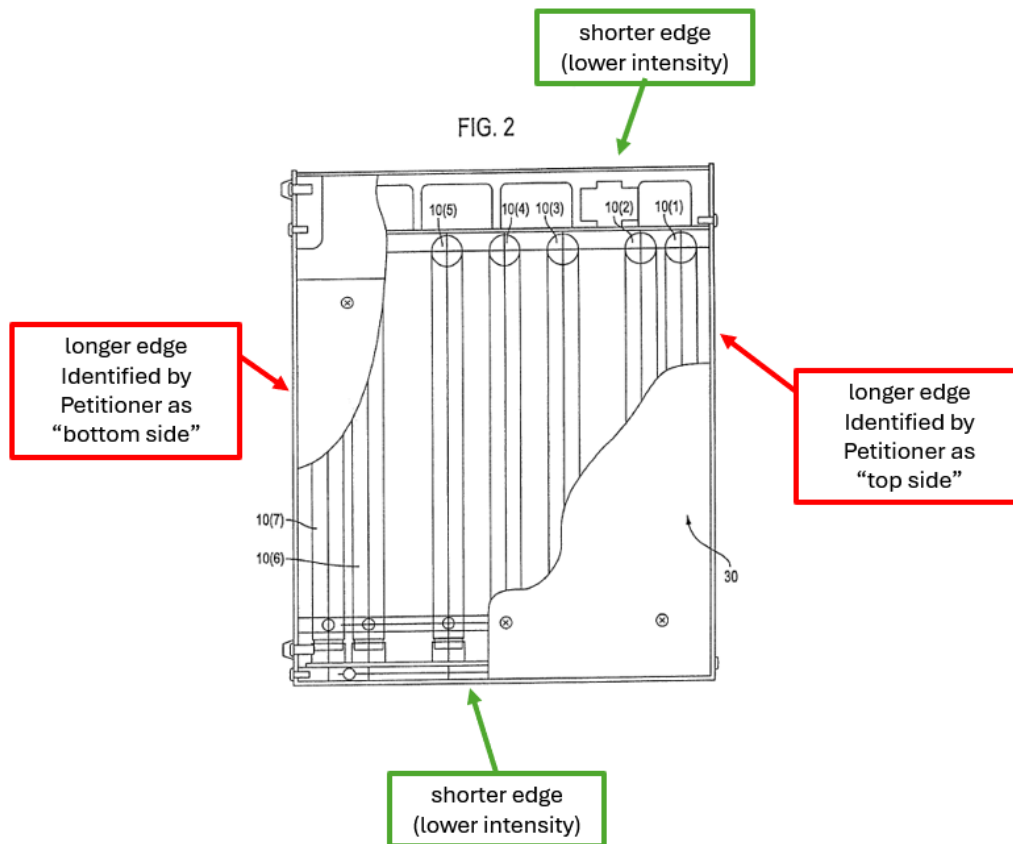
EX1015, ¶175; Petition, 47. However, Dr. Grove’s labels are misleading—a POSITA reading Lundahl would have understood that rotating and labeling Fig. 2 does not change that the “top side” and “bottom side” are the *still* the *longer* edge:



EX1014, FIG. 2; *see also* FIG. 1. EX2050, ¶¶155-156. Based on Lundahl’s express disclosure, the “seven 36” U-shaped F34T8 Ultra Blue fluorescent tubes 10(1)-10(7) provide a *maximum visible light-emitting area 36 cm high by [79] cm wide (approximately 2850 cm²)*, with a *minimum therapeutically active area 30 cm high by 46 cm wide (approximately 1350 cm²)*.” EX1014, 5:38-43; EX2037. Therefore, there can be no dispute the “*top side*” and “*bottom side*” identified by Dr. Grove are the *longer edges*, regardless of how he orients the figures. EX2050, ¶¶155-157.

Petitioner fails to consider the requirements of the “higher intensity” limitation as a whole and instead breaks the limitation into disjointed pieces. Petition, 45-49; EX1015, ¶¶173-181. When the entire claim limitation is read (“wherein each of the five panels has *two first edges and two second edges shorter than the two first edges*, and the light sources are arranged such that a higher intensity of light is emitted *proximate the second edges* compared to the intensity of light emitted *not proximate the second edges*”), it is clear the claims distinguish between the *shorter second edges* and the longer first edges of the panels. In context, the plain language of the claims requires that the intensity of light emitted *proximate the shorter second edges* is higher than the intensity of light emitted *not proximate the shorter second edges*. EX2050, ¶158. Therefore, Dr. Grove’s “top side” and “bottom side” are the *longer edges*—not the *shorter second edges* required by the claims. *Id.*

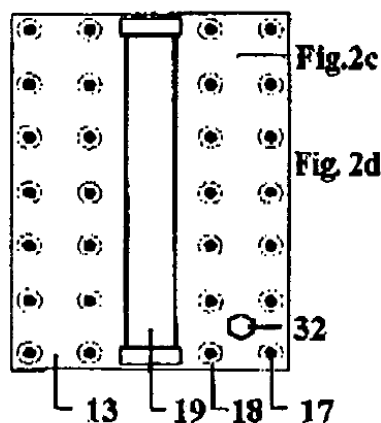
Additionally, as discussed above, Lundahl discloses its *shorter edges* are in “*area[s] of reduced emission*,” not areas of higher intensity, as illustrated below:



EX1014, Fig. 2; EX2050, ¶159. As Lundahl explains, “[t]he output measured in the immediate vicinity of the cathode is typically much lower than the output over the rest of the tube. ... This *area of reduced emission* is known as the Faraday dark space”; the “*low output area*” is “located outside the active emitting area (effectively behind the patient's ears)”. EX1014, 6:10-22. Based on Lundahl’s disclosure, a POSITA would have understood that maintaining Lundahl’s “light distribution” would place the “*area[s] of reduced emission*” on the panels proximate the *shorter*

edges such that the light emitted proximate the shorter edges would be of *lower intensity*, not “higher intensity” as required by the claims. EX2050, ¶159.

Further, Larsen’s disclosure would have discouraged a POSITA from having a higher intensity near the shorter edges. EX2050, ¶160. As shown in Fig. 2c, at least one of Larsen’s applicators contains a “light source 19 formed as a tube” that can emit “fluorescent light.” EX1004, [0071].



EX1004, Fig. 2c. The cathodes of the light source 19 are at the *shorter edges* of the applicator. Because fluorescent tubes have “area[s] of reduced emission” near the cathodes, a POSITA would have understood the intensity of light is *lower* proximate the *shorter edges* than not proximate the shorter edges of the applicator. EX2050, ¶¶160-161; EX1014, 6:10-16; EX2012, 1:31-45, 4:9-25; EX2080. Thus, a POSITA would have been discouraged from pursuing a higher intensity near the shorter edges. *Id.*; *Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1363 (Fed. Cir. 2017) (one must consider evidence that “suggests reasons that a

skilled artisan would be discouraged from pursuing such a combination,” even when not rising to the level of teaching away).

Accordingly, for each of the reasons set forth above, Lundahl in view of Larsen does not render obvious the “higher intensity” limitation. Petitioner has not met its burden for all Challenged Claims. EX2050, ¶¶141-162.²

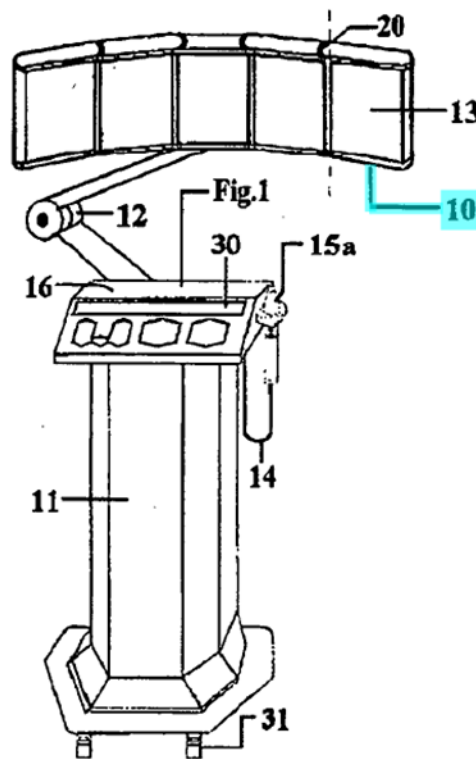
C. Larsen Does Not Disclose Or Render Obvious “Hinged Structures On Inner Side Surfaces Of Adjacent Panels” (Claims 1, 5, 20, 21)

Petitioner argues Larsen discloses or renders obvious an “illuminator comprising five panels connected by hinged structures on inner side surfaces of adjacent panels.” Petition, 35-38, 55, 69-71, 73, 77; EX1015, ¶¶152-156, 198-199, 246-248, 257, 266, 277. However, Larsen does not disclose or render obvious this limitation. EX2050, ¶¶163-164.

First, Larsen does not disclose “hinged structures on inner side surfaces of adjacent panels.” EX2050, ¶165. Larsen states “several applicators 13 are flexibly connected to each other through *hinges 10*.” EX1004, [0072]. As shown in Fig. 1

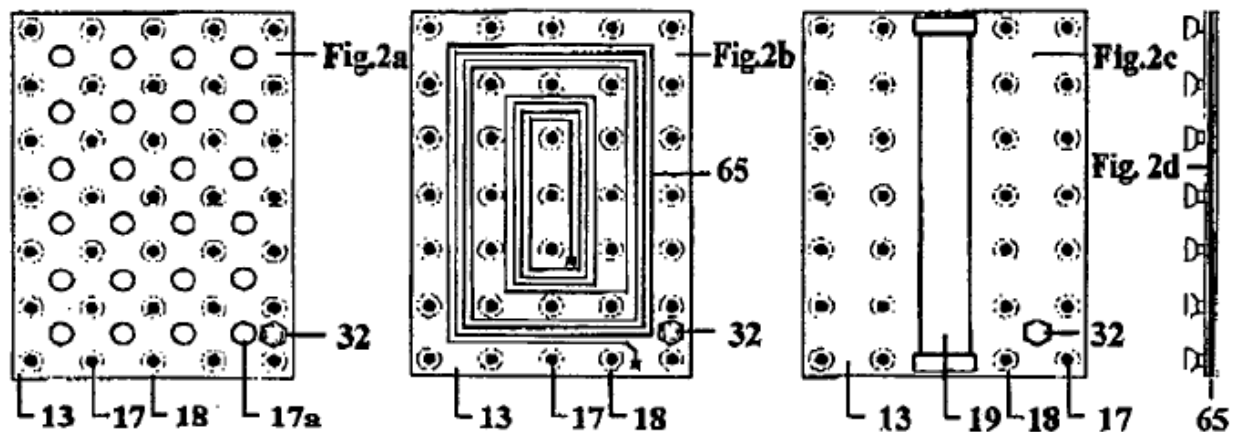
² The Board should reject any argument by Petitioner that the alleged combination of Lundahl and Larsen is “similar” to the RhodoLED XL; this is irrelevant and Petitioner has failed to disclose the details of such device.

below, element “10” points to the *bottom* of the applicator 13, not to the inner side surface of the adjacent panels.



EX1004, FIG. 1; EX2050, ¶165.

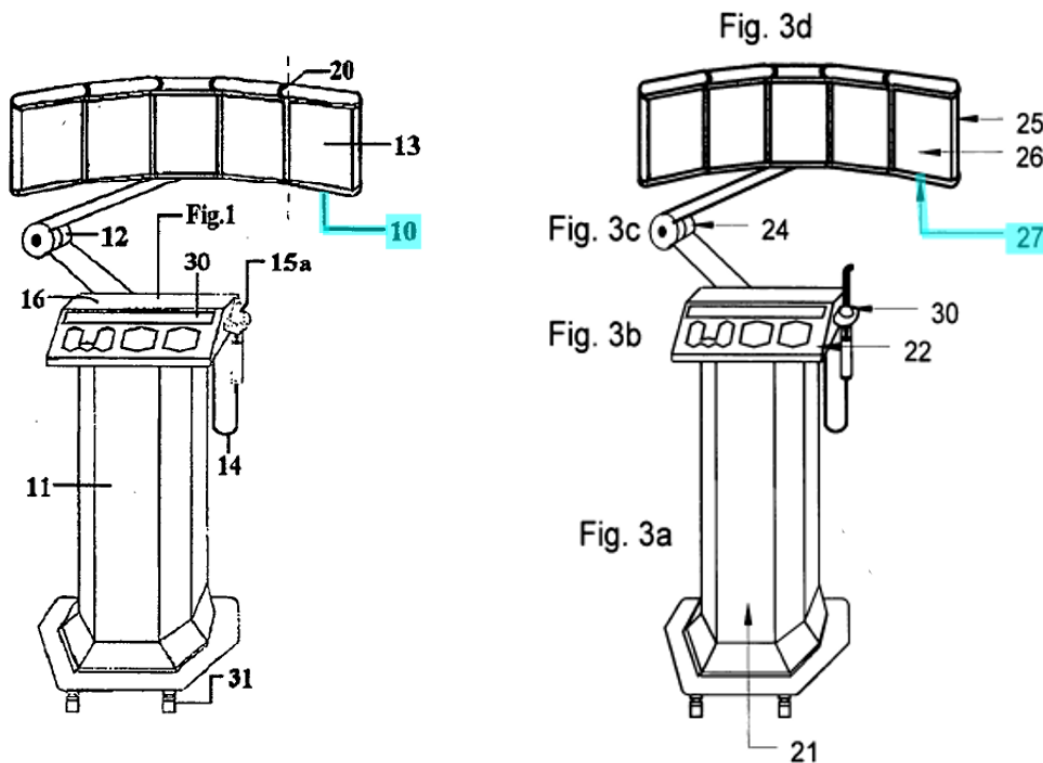
Petitioner argues that, despite Larsen’s clear labeling of “hinges” as “10,” the hinges are “shown as element 20 in Figure 1.” Petition, 36-37; EX1015, ¶153-154. However, Larsen identifies “20” as the regular row arrangements of light sources in the applicator 13, which are shown below, for example, in Figs. 2b and 2c: “According to FIGS. 2b and 2c *the light sources 17 are placed in regular row arrangements, i.e., 20* equidistant from each other.” EX1004, [0071].



EX1004, Figs. 2a-2d. Dr. Grove’s deposition testimony contradicts Petitioner’s argument that the hinges are shown as element 20 in Figure 1—when Dr. Grove was shown the disclosure in Larsen that “the light sources 17 are placed in *regular row arrangements, i.e., 20*” (EX1004, [0071]), he stated “it’s not clear to me what 20 is referring to, unless it’s simply referring to rows of light sources. In which case *if it’s referring to rows of light sources as is shown in, for example, Figure 2a, then I understand what 20 means.*” EX2084, 143:18-145:18. A POSITA reading Larsen’s disclosure would have understood that “hinges 10” refers to element 10 at the bottom of the applicator and not to element 20 in Fig. 1. EX2050, ¶166; EX0014, [0071]-[0072]). A POSITA would have further understood that element 20 refers to the light sources in regular row arrangements. *Id.*

That Larsen’s hinges 10 are on the bottom of the applicator (not the inner side surfaces) is confirmed by Fig. 3 of another Larsen publication (AU 2001/43869),

which like Fig. 1 of Larsen, points to hinges (27) on the *bottom* of the applicator (shown highlighted in blue below):



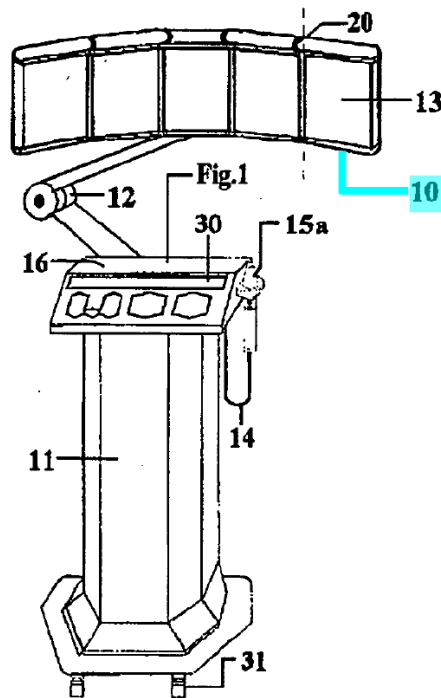
EX1004, Fig. 1; EX2004, Fig. 3; EX2050, ¶167. As shown, the claims of the Larsen publication recite “a flat applicator (25) consisting of a number of individual *hinged (27)* flat elements.” EX2004, claim 19. Like Larsen, the Larsen publication has no disclosure of “hinged structures on inner side surfaces of adjacent panels.” EX2050, ¶167.

Petitioner points to an Examiner statement during prosecution of the '871 patent application that Larsen taught “five panels connected by a plurality of hinges 20 ... on inner side surfaces of adjacent panels that connect panels together.”

Petition 37 (citing EX1009, ¶4 (citing EX1004, Figs. 1-3, [0069], [0072], lines 1-4); EX1015, ¶154). However, Petitioner fails to address the *later contradictory* statements by the *same Examiner*. For example, *after* the '871 Office Action, the *same Examiner* allowed the claims of the '512 Patent, stating “*the art of record* [including Larsen] *neither anticipates nor renders obvious ‘nested hinges on inner side surfaces of adjacent panels.’*” EX2061, 494, 559. And, during the *later prosecution* of the '028 Patent, the *same Examiner* identified the hinges as element 10 in reference to Figure 1: “*Larsen discloses ... the illuminator comprising: at least five panels 13 connected by hinged structures 10 (see Figure 1....*” EX1002, 328. In fact, Dr. Grove acknowledged the Examiner’s statement points to *Larsen’s Figure 1* when referencing Larsen’s “*hinged structures 10.*” EX2084, 190:12-22. EX2050, ¶¶168-170.

Moreover, there is no inherent disclosure in Larsen of “hinged structures on inner side surfaces of adjacent panels.” EX2050, ¶171. Petitioner asserts that because “the panels (13) are nearly flush with each other,” Larsen’s hinges are on inner side surfaces of adjacent panels. Petition, 36-37; EX1015, ¶154. However, a POSITA would have understood that Larsen’s hinges are *not necessarily* on inner side surfaces of adjacent panels. EX2050, ¶171 (citing EX1004, [0071], [0072], Fig. 1). As explained above, Larsen discloses its applicators **13** are connected to each

other by “hinges **10**.” EX1004, [0072]. Element **10** in Fig. 1 of Larsen (shown in blue) points to the *bottom* of the applicator **13**, not any inner side surfaces.



EX1004, Fig. 1. Larsen refers to element **20** as “light sources” “placed in regular row arrangements, i.e., **20**” and never references element **20** as hinges. EX1004, [0071]; EX2050, ¶171; *see also* EX2005, 2, 5, 10 (“BEAUTYLIGHT” illuminator showing hinges on the bottom and listing Mr. Eric Larsen as addressee).

Second, Larsen does not render obvious “hinged structures on inner side surfaces of adjacent panels.” EX2050, ¶172. Petitioner provides only unsupported, conclusory argument that a POSITA “would have found it obvious to try placing the hinges on the inner side surfaces of the panels.” Petition, 37-38; EX1015, ¶155. Petitioner *does not identify a single prior art reference* that discloses a “hinged

structure on inner side surfaces of adjacent panels.” Nor does Petitioner provide any evidence that the claimed hinge was known at the time of the invention or that it would work for its intended purpose in an illuminator to output uniform light for PDT. Indeed, Petitioner cites only a single paragraph of Dr. Grove’s declaration that merely regurgitates verbatim its unsupported assertions. Petition, 37-38 (citing EX1015, ¶155). EX2050, ¶172. Such conclusory opinion, unsupported by actual underlying evidence, is insufficient to support alleged obviousness. *See Xerox Corp. et. al. v. Bytemark, Inc*, IPR2022-00624, Paper 9, 16-18 (Aug. 24, 2022) (finding Petitioner did not show the claims would have been obvious where the expert did not cite to any additional supporting evidence or provide and technical reasoning to support his statement); *Johns Manville Corp. v. Knauf Insulation, Inc.*, IPR2018-00827, Paper 9, 12-13, 19-20 (Oct. 16, 2018) (informative) (denying Petition and giving little weight to expert testimony unsupported by evidence); 37 C.F.R. §42.65(a) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight”).

Petitioner has not met its burden of showing obviousness because Larsen *already* had hinges 10 on the *bottom* of the applicators 13 that were “flexibly connected to each other.” *See* EX1004, [0072], Fig. 1; EX2004, Fig. 3; EX2050, ¶173. In addition, Dr. Grove alleges the panels of Figure 1 were *already* “nearly flush with each other” (EX1015, ¶154), so there would have been no motivation for

a POSITA to change Larsen’s hinges from the bottom of the applicators to another undisclosed hinge type and orientation to allegedly achieve flush panels. EX2050, ¶173.

Dr. Grove argues “there were finite number of known, predictable solutions for Larsen’s panels to be ‘flexibly connected to each other through hinges.’” Petition, 38; EX1015, ¶155. But, contrary to Dr. Grove’s unsupported argument, a POSITA would have attached hinges on the *bottom* of the panels, as disclosed in Larsen, and would have understood there were *numerous* other designs that could have attached the hinges, for example, on the bottom, top, or back of the panels. EX2050, ¶174. For example, there are butt hinges that sit on top of the surfaces you are connecting; overlay hinges that are used on cabinet doors to help them sit flush; strap hinges that include a leaf and a strap; offset hinges that attach at an angle to increase the clearance; and knife hinges, also called pivot hinges, where the hinge rotates around a center point. *Id.* A POSITA would have understood that these hinges could be placed in numerous locations in various orientations. *Id.* Contrary to Dr. Grove’s unsupported argument, a POSITA designing an illuminator to output uniform light for PDT would have been discouraged from placing the hinges on the front of the panels, which would have blocked light from reaching the patient, or between the panels, which can create gaps between the panels, interfere with the panels’ wiring, and create issues with the use and alignment of the PDT panels—all

of those issues would frustrate the goal of providing uniform illumination. EX2050, ¶175. Additionally, for all these reasons, Petitioner does not show a POSITA would have had a reasonable expectation of success in combining the references to meet the claimed invention, as there were numerous design options for placing hinges on Larsen’s panels that would not reasonably lead to panels with Dr. Grove’s “nearly flush arrangement.” *Id.*; *Intelligent Bio-Sys.*, 821 F.3d at 1367.

Accordingly, Larsen does not disclose or render obvious an “illuminator comprising five panels connected by hinged structures on inner side surfaces of adjacent panels.” Petitioner has not met its burden for claims 1, 5, 20 and 21 (and their dependent claims). EX2050, ¶¶163-176.

D. Larsen Does Not Disclose “The Five Panels Are Individually Configurable To Control Illumination From Each Of The Five Panels” (Claims 16, 21)

Petitioner argues Larsen discloses “the five panels are individually configurable to control illumination from each of the five panels.” ’028 Patent Petition, 63-65, 71-72, 77; EX1015, ¶¶228-231, 262, 266, 277. However, Larsen does not teach or suggest this limitation. EX2050, ¶¶177-178.

As explained (Section V), the ALJ in the related ITC proceeding construed “the five panels are individually configurable to control illumination from each of the five panels” to mean “the power output and/or light intensity of each panel can be individually controlled.” EX2033, 35-40 (adopting Patent Owner’s

construction). The Board should apply this same construction because Petitioner “[f]or purposes of this IPR” took a “view of the scope of the claims consistent with Patent Owner’s infringement allegations.” Petition, 12, 63-65. Larsen does not teach or suggest this limitation for each of the reasons set forth below. EX2050, ¶179.

None of Larsen’s disclosures relied on by Petitioner teaches or suggests that Larsen’s “five panels are individually configurable to control illumination from each of the five panels.” *First*, Petitioner asserts Larsen discloses this limitation because Larsen teaches “each of the applicators (13) ‘can be used in the working model according to Fig. 2a to 2c *individually*, side by side (in large numbers) or in combination with an applicator.’” Petition, 64 (citing EX1004, [0070]) (emphasis by Petitioner); EX1015, ¶229. However, Petitioner misreads Larsen’s disclosure. When properly read in context, Petitioner’s alleged support identifies the *printed circuit boards* as the subject, *not* “each of the applicators (13).” EX1004, [0070] (“The FIGS. 2a, 2b and 2c show plain surfaced *printed circuit boards* with light sources mounted in the applicators 13. *These* can be used in the working model according to FIG. 2a to 2c individually, side by side (in large numbers) or in combination with an applicator. *Furthermore the printed circuit boards....*”). EX2050, ¶180. When properly read in context, Larsen discloses only that the printed circuit boards can be used in the working model individually, side by side or in

combination with an applicator, **not** that “five panels are individually configurable to control illumination from each of the five panels.” *Id.*; *Phillips*, 415 F.3d at 1314 (“the context of the surrounding words of the claim also must be considered in determining the ordinary and customary meaning of those terms”).³ In fact, Petitioner acknowledged that [0070] of Larsen teaches “[t]hese circuit boards can be used ‘individually, side by side (in large numbers) or in combination with an applicator.’” IPR2024-00874, Paper 1, 20 (citing EX1004, [0070]). Under any of these three options—printed circuit boards used (i) individually, (ii) side by side, or (iii) in combination with an applicator—Larsen does not teach five panels individually configurable to control illumination from each of the panels, as claimed. That is, these 3 different use cases for the printed circuit boards do not teach each of Larsen’s applicators being individually configurable to control illumination from each applicator of a five-applicator device (*i.e.*, “the power output and/or light intensity of each panel can be individually controlled”). EX2050, ¶¶180-181.

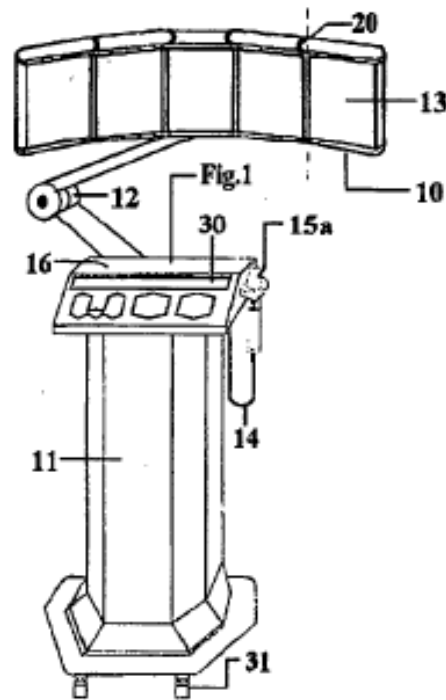
³ Petitioner’s reliance on an Examiner’s statement again fails. Petition, 64 (citing EX1002, ¶328. That the printed circuit boards “can be used in the working model according to FIG. 2a to 2c **individually**” provides no disclosure that “five panels are individually configurable to control illumination from each of the five panels.” EX2050, ¶182.

Second, Petitioner relies on Larsen’s disclosure that “[u]sing the control mechanism, *‘the invented device* is adjustable within a relatively large range with reference to duration, amplitude and frequency of surge of current, so that the semiconductor diodes 17, 17a and 18, as well as laser 17 diodes with the same realisation as semiconductor diode 17, can be used as light sources.’” Petition, 64 (citing EX1004, [0074]); EX1015, ¶229. However, this passage discloses only that “*the invented device* is adjustable,” **not** that each of the five applicators is individually configurable to control illumination from each of the five panels. EX2050, ¶183 (citing EX1004, [0074]); see also Petition, 69 (quoting adjustments to “the invented device”).

Third, Petitioner relies on Larsen’s disclosure that “[t]he control mechanism includes ‘a switch select system for operating different types of semiconductor diodes 17 and/or with laser diodes. Both semiconductor diodes and/or laser diodes with tuneable wavelengths can be operated, which is a great advantage, and therefore the printed circuit boards can be equipped with a more intensive radiation effect.’” Petition, 64 (citing EX1004, [0074]); EX1015, ¶229. However, once again Larsen discloses that the control mechanism 16 is controlling the wavelengths of *the invented device*, **not** that the panels are individually configurable to control illumination from each of the five panels. EX2050, ¶184; EX1004, [0074] (“With the help of the control mechanism 16, *the invented device is* adjustable...**For that**

purpose the control mechanism is equipped with a switch select system for operating different types of semiconductor diodes 17 and/or with laser diodes.”). A POSITA would have understood that Larsen discloses that *the device* switches between the LEDs and/or laser diodes, *not* that “the five panels are individually configurable to control illumination from each of the five panels” (*i.e.*, “the power output and/or light intensity of each panel can be individually controlled”). EX2050, ¶184.

Fourth, Petitioner argues “[e]ach of the applicators is connected to a control mechanism 16.” Petition, 64 (citing EX1004, [0074], FIG. 1); EX1015, ¶229 (citing FIGS. 1 and 4). However, Larsen shows only *one* control mechanism 16 for the *entire device*, not one control mechanism 16 connected to each of the applicators 13. EX2050, ¶185.



EX1004, FIG. 1. In fact, Larsen consistently depicts and refers to only “*the* control mechanism 16” and not to multiple control mechanisms. *See* EX1004, FIG. 4, Abstract (“The stand is freely moveable on wheels and includes *a control mechanism...*”), [0027] (“The stand, freely moveable on wheels, consists of *a control mechanism...*”), [0030] (“At least one of the applicator elements is equipped with feedback sensors for controlling the patient's response to the therapy, and via an automatic regulation system in *the control mechanism* it is possible to optimise the therapy results.... *The control mechanism* is also connected with a hand applicator...”), *see also* [0043], [0069], [0073], [0074], [0079], FIG. 4. EX2050, ¶¶185-186. This is in contrast to the '028 Patent, which discloses that “each panel may have a dedicated control unit to regulate power to the individual LED array on

a given panel,” and claimed “the five panels are individually configurable to control illumination from each of the five panels.” EX1001, 5:57-62, 11:57-58; EX2050, ¶186.

Fifth, Petitioner argues “each applicator is individually configurable, since each one can be adjusted by the controller based on feedback from its own sensors.” Petition, 65; EX1015, ¶230. To allegedly support its argument, Petitioner relies on Larsen’s disclosure that “each applicator includes sensors that ‘measure the amount of energy radiated away from the skin surface, which is indicative of the total energy penetrating into the tissue.’... A ‘sensor 32a is also contained in at least one of the machine applicators, measuring the temperature change of the radiated tissue, whereby the control unit can react with a feedback regulation of the radiation parameters depending on the therapy indication, location and (PDT) light sensitive substance used.’” Petition, 65 (citing EX1004, [0079]-[0080], Figs. 2a-2c); EX1015, ¶230. However, Larsen does not teach or suggest that each applicator 13 is adjusted individually based on the feedback received at the sensors 32. Rather, Larsen discloses that “[a]n increase of the registered amount of energy *can be achieved by the invented device* by increasing the operating potential (and thereby the pulse amplitude) or the pulse frequency and/or prolonging the duration of the treatment time *through an adjustment of the control mechanism 16*.” EX1004,

[0079]. Larsen discloses changing the amount of energy emitted *by the device, not* by each applicator 13. EX2050, ¶187.

Sixth, Dr. Grove alleges Fig. 17b has light sources that are “individually controllable” (EX1015, ¶158, fn 5), but Larsen provides no basis to support this conclusory allegation and the Fig. 17b embodiment has only two panels. EX2050, ¶188.

Accordingly, Larsen does not teach or suggest that “the five panels are individually configurable to control illumination from each of the five panels.” Petitioner has not met its burden for claims 16 and 21 (and their dependent claims). EX2050, ¶¶177-189.

E. Larsen Does Not Disclose “Five Panels Connected By Hinged Structures To Allow Continuous Illumination Across The Five Panels” (Claim 16)

Petitioner argues “Larsen discloses five panels connected by hinged structures to allow continuous illumination across the five panels.” Petition, 63-65; EX1015, ¶¶228-231. However, Larsen does not disclose this limitation. EX2050, ¶¶190-191.

First, Petitioner references back to claim 1(a). But, Larsen does not disclose “hinged structures on inner side surfaces of adjacent panels” *See* Section VI.C, *supra*. Because Larsen lacks any such disclosure, Petitioner cannot show Larsen’s

“hinged structures...allow continuous illumination across the five panels.”
EX2050, ¶192.

Second, Petitioner cites Larsen [0027] and [0072] (Petition 64), but these paragraphs contain no teaching or suggestion that Larsen’s “hinged structures...allow continuous illumination across the five panels.” EX2050, ¶193. Indeed, Petitioner’s own expert, Dr. Bretschneider, admitted in the first IPR that Larsen does not provide continuous illumination across the five panels—he stated there are “lower irradiance regions at the junction of two of Larsen’s panels.” EX2082, ¶151. A POSITA would understand that with “lower irradiance regions at the junction” of Larsen’s panels, Larsen does not provide continuous illumination across its five panels. EX2050, ¶193.

Third, Petitioner cannot rely on Larsen’s scan engine for this limitation, because claim 16 requires “***hinged structures*** [to] allow continuous illumination,” not a scan engine. Larsen does not connect hinges 10 to scan engine 66. EX2050, ¶194. Regardless, Larsen’s scan engine does not allow for continuous illumination. See EX1004, [0072], Fig. 3; EX2050, ¶¶194-195. As Petitioner’s expert confirmed, Larsen’s “scan engine can only move lights linearly in one direction at a time, which ***would only decrease unradiated gaps on the portion of the treatment surface towards which the light sources are being moved.***” EX2082, ¶154, IPR2024-00874, Paper 1, 18. Larsen’s scan engine “move[s] the

light sources with linear movements” up and down along the longer axis of each of the applicators—the up and down movement on the panels does not affect the gap *between* the panels. EX1004, [0072], Fig. 3; EX2050, ¶¶194-195; *see* Section VI.B, *supra*.

Accordingly, Larsen does not teach or suggest “five panels connected by hinged structures to allow continuous illumination across the five panels.” Petitioner has not met its burden for claims 16 and 21 (and their dependent claims). EX2050, ¶¶190-196.

VII. Ground 2: The Challenged Claims Are Patentable Over Lundahl, Larsen And Bansal

A. Lundahl In View Of Larsen And Bansal Does Not Render Obvious The “Uniformly Illuminate” Limitations (All Claims)

Petitioner argues “Bansal’s teachings are in addition to what Lundahl and Larsen teach, as discussed in Ground 1.” Petition, 73-75; EX1015, ¶¶266-270. Patent Owner incorporates herein the entirety of its response regarding Lundahl and Larsen from Ground 1. *See* Section VI.A.1-3, *supra*. Additionally, for all the same reasons as in Ground 1, Petitioner’s reliance on Bansal’s *separate* reference to the output of light from *Bansal’s phototherapy system* does not inform the POSITA what the output would be for the *combination* of Lundahl, Larsen, and Bansal. *Unigene*, 655 F.3d at 1360; EX2050, ¶¶199-201.

Petitioner presents no supporting evidence or analysis to show the proposed **combination** of Lundahl, Larsen, and Bansal would “irradiat[e] light over the active emitting area such that the measured irradiance at a treatment surface of the patient is at least within 60% of the measured maximum.” Petitioner’s assertion that Bansal teaches the limitations is based on Dr. Grove’s declaration (EX1015, ¶¶266-270), *which contains neither supporting evidence nor analysis by comparison to a maximum “over the active emitting area”* for the proposed combination. Petition, 74-75. Dr. Grove addresses only the *individual* teachings of the references. For the proposed **combination**, Dr. Grove provides no comparison of outputs to the maximum output at the alleged operation distances of “2-4” of the entire treatment surface of the patient.” EX1015, ¶¶125-126. Dr. Grove does not identify what the measured maximum is for the **combination**, nor does he explain how a POSITA would have achieved the same results as Bansal after combining Bansal with Lundahl and Larsen. Petitioner fails to meet its burden of showing obviousness because Petitioner does not explain how the **combination** of prior art references is mapped to the claim limitations under the agreed-to construction or articulate its reasoning for why the subject matter of the claim would have been obvious. EX2050, ¶¶202-203, 119-136; *KSR*, 550 U.S. at 418.

Additionally, for the same reasons set forth above, Petitioner fails to show a POSITA would have had a reasonable expectation of success that the combination

of Lundahl, Larsen and Bansal would “irradiat[e] light over the active emitting area such that the measured irradiance at a treatment surface of the patient is at least within 60% of the measured maximum.” Petitioner has not met its burden for all Challenged Claims. *See* Section VI.A.3, *supra*; EX2050, ¶¶204-205, 137-140.

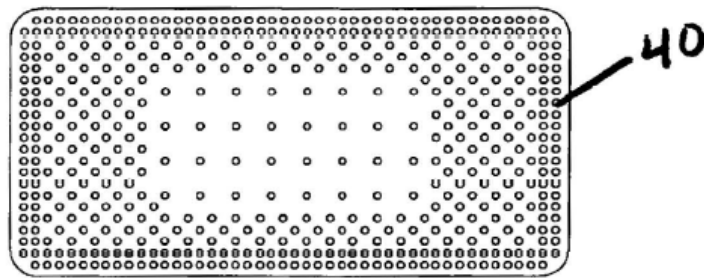
B. Lundahl In View Of Larsen And Bansal Does Not Render Obvious The “Higher Intensity” Limitation (All Claims)

Petitioner argues “Bansal’s teachings are in addition to what Lundahl and Larsen teach, as discussed in Ground 1.” Petition, 73-77; EX1015, ¶¶266, 271-275. Patent Owner incorporates herein the entirety of its response regarding Lundahl and Larsen from Ground 1. *See* Section VI.B, *supra*. Additionally, Petitioner has not shown that Bansal discloses or renders obvious this limitation in combination with Lundahl and Larsen. EX2050, ¶¶206-207. *The Board should find Ground 2 deficient for the same reasons it already determined Petitioner cannot prevail, namely “Petitioner has not sufficiently shown for institution that Bansal teaches or suggests arranging light sources ‘such that a higher intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges.’”* IPR2024-00874, Paper 9, 12-13, 17-18; *see also* Institution Decision, 22.

Petitioner argues Bansal discloses varying “the density of light source distribution ... throughout the array, such as with *higher density in the periphery*

and a lower density in the center” and that “Figure 9b of Bansal shows one embodiment where more light sources are placed near the edges of the panel compared to the light sources in the center.”

Fig. 9b



Petition, 75-76 (citing EX1005 [0025], claim 10, Figs. 9a-9d); EX1015, ¶272. In addition, Petitioner argues Bansal discloses “*driving the light sources with a lower power in the center and a higher power on the outer edges.*” Petition, 77 (citing EX1005, [0025]-[0026]); EX1015, ¶273. However, none of Bansal’s disclosures teaches the “higher intensity” limitation. EX2050, ¶¶208-210.

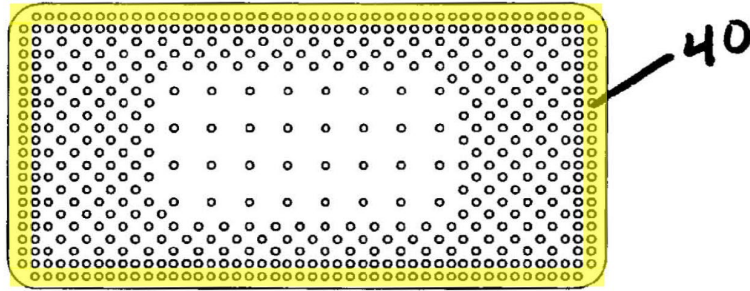
Petitioner fails to consider the requirements of the higher intensity limitation as a whole and instead breaks the limitation into disjointed pieces. Petition, 45-56, 75-77. When the entire claim limitation is read (“wherein each of the five panels has *two first edges and two second edges shorter than the two first edges*, and the light sources are arranged such that a higher intensity of light is emitted *proximate the second edges* compared to the intensity of light emitted *not proximate the second edges*”), it is clear the claims distinguish between the shorter second edges and the longer first edges of the panels. In context, the plain language of the claims

requires that the intensity of light emitted *proximate the second edges* be higher than the intensity of light emitted *not proximate the second edges, which includes at least light proximate the first edges*. EX2050, ¶¶210-214; *Phillips*, 415 F.3d at 1314 (“the context of the surrounding words of the claim also must be considered in determining the ordinary and customary meaning of those terms”).

Contrary to the claim requirements, Petitioner admitted “Bansal’s solution provides higher intensity (or density) of lights *around all edges of the panel*.” IPR2024-00874, Paper 1, 18 (citing EX2082, ¶154).⁴ Bansal discloses “*higher density in the periphery* and a lower density in the center” and “lower power in the center and a *higher power on the outer edges*.” Petition, 75-77; EX1015, ¶¶272-273 (citing EX1005, [0025]); EX2050, ¶¶211-212. As shown in Fig. 9b relied on by Petitioner, the intensity of light emitted proximate *both* the second edges *and* the first edges (e.g., shown in yellow below) is higher than the intensity of light emitted in the center of the array. See Petition, 76-77; EX1015, ¶272 (citing EX1005, Fig. 9b).

⁴ Further, Dr. Grove admitted “if a POSA designed a rectangular lamp to be bright *near four edges*, such that the light had equal intensity around the four edges, *it would not meet the [higher intensity] claim limitation*.” EX2036, 123:21-124:13; see also EX2084, 63:17-65:2.

Fig. 9b



EX1005, Fig. 9b. Bansal distinguishes between higher intensity (or density) of lights “*around all edges of the panel*” and the center of the panel instead of between the intensity of light emitted proximate the second edges and *not proximate the second edges*, which includes at least light proximate the first edges. Bansal thus fails to disclose “a higher intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges,” as required by the claims. EX2050, ¶¶211-212.

This distinction between the first and second edges is supported by the specification of the '028 Patent. For example, as shown in Fig. 5 below, the '028 Patent distinguishes between areas 1 and 2 (shown in red) proximate the shorter second edges and areas 3 and 4 (shown in yellow) proximate the longer first edges. “[A]reas 1 and 2 emit a higher intensity of light than areas 3 and 4.” EX1001, 6:33-38; EX2050, ¶213.

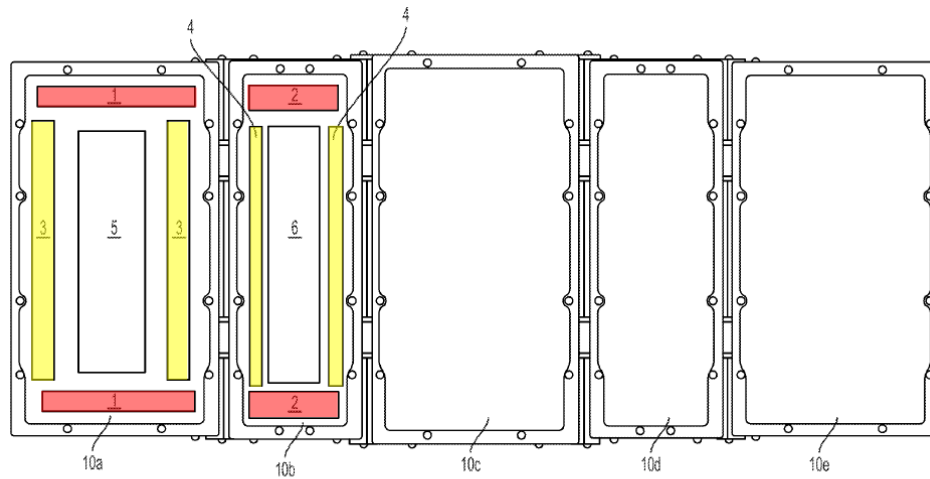


FIG. 5

EX1001, Fig. 5. This is in direct contrast to Bansal’s solution that discloses a higher intensity (or density) of lights “*around all edges of the panel.*” IPR2024-00874, Paper 1, 18; EX2082, ¶154. Petitioner’s reliance on Bansal’s disclosure of higher intensity *around all edges of the panel* is misplaced because both the specification and the claims consistently distinguish between areas proximate the shorter second edges that emit a higher intensity of light than areas proximate the longer first edges. EX2050, ¶¶213-214.

Accordingly, Lundahl in view of Larsen and further in view of Bansal does *not* render obvious the “higher intensity” limitation of the ’028 Patent. Petitioner has not met its burden for all Challenged Claims. EX2050, ¶¶206-215.

C. Lundahl In View Of Larsen And Bansal Does Not Disclose Or Render Obvious The Remaining Limitations

For the remaining limitations, Petitioner merely argues they “are taught for the same reasons provided in Ground 1.” Petition, 73, 77. However, the combination of Lundahl, Larsen, and Bansal does not disclose or render obvious the “hinges,” “individually configurable,” and “continuous illumination” limitations. Petitioner cannot prevail for the same reasons provided for Ground 1. *See* Section VI.C-E, *supra*; EX2050, ¶¶216-224, 163-196.

VIII. All Grounds: Secondary Considerations Support Non-Obviousness

Objective indicia of nonobviousness guard against hindsight reasoning in an obviousness analysis and are often “the most probative and cogent evidence in the record.” *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1328 (Fed. Cir. 2016). Here, the patentability of the Challenged Claims is supported by strong secondary considerations of non-obviousness. The Petition is deficient for that reason alone. *WBIP*, 829 F.3d at 1328; 37 C.F.R. §42.104(b).

A. The '028 Patented Invention Has Achieved Commercial Success

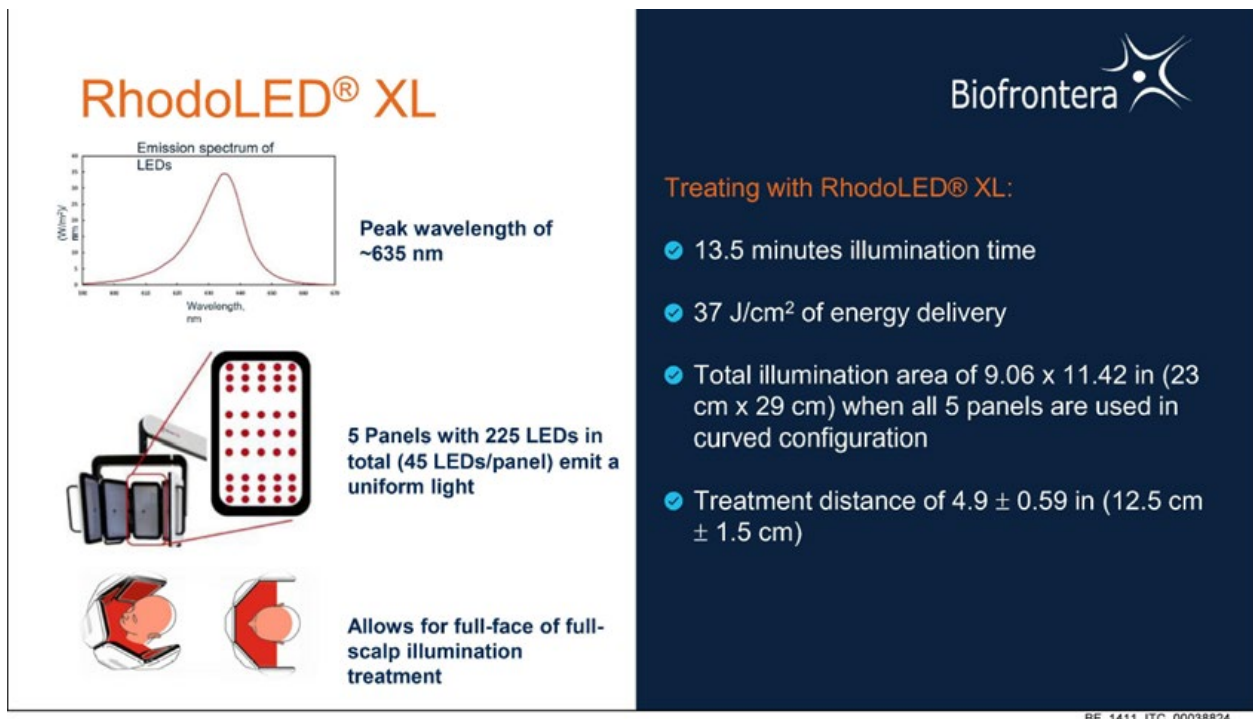
The increased sales of Biofrontera’s RhodoLED® XL and its rapid uptake in the US market compared to its predecessor, the RhodoLED®, demonstrate the commercial success of the claimed invention. EX2048 ¶¶19-33, 43. While the original RhodoLED® does not embody the claimed features of the '028 Patent, the

RhodoLED® XL embodies the claimed features and is coextensive with them. EX2050, ¶¶226-232, Appendix B; EX2038, 127-132; EX2043; EX2056, 2; EX2058, 1; EX2059; EX2060, 1; EX1019. Tellingly, in 2024, Biofrontera sold more RhodoLED® XL devices (marketed with the claimed features) than RhodoLED® devices in just half the time on the market. EX2048, ¶¶27-33; EX2045, 1; EX2046, 1; EX2047, 1; EX2057, 3; EX2064, 1; EX2066, 3, 8; EX2067, 3; EX2068, 2; EX2069, 1-2; EX2078, 1. This commercial success is a result of the combined features of the claimed invention and the benefits enabled by those features. EX2048, ¶¶27-36; EX2050, ¶¶225-226, 230-231, 233-246.

The RhodoLED® XL practices at least exemplary claim 1 of the '028 Patent. EX2050, ¶¶226-229, Appendix B; EX2043; EX2056, 2; EX2058, 1; EX2059; EX2060, 1. In its marketing materials, Biofrontera touts the claimed features of the '028 Patent, including (1) an adjustable five-panel design, (2) uniform illumination of the treatment surface of a patient, and (3) an LED arrangement, which provides for a higher intensity of light emitted proximate the shorter edges of the panels. EX2050, ¶¶228-245. For example, in marketing materials to customers, Biofrontera highlighted how the RhodoLED® XL outputs uniform light to photodynamically treat patients using ALA together with a five-panel illuminator in a curved configuration, where LEDs are arranged on each panel such that there is a higher intensity of light emitted proximate the shorter edges. EX2039, 33:2-16, 36:13-37:9,

37:13-46:21, 48:3-21; EX2040, 1, 5-7; EX2041, 5; EX2043, 7; EX2050, ¶¶233-238.

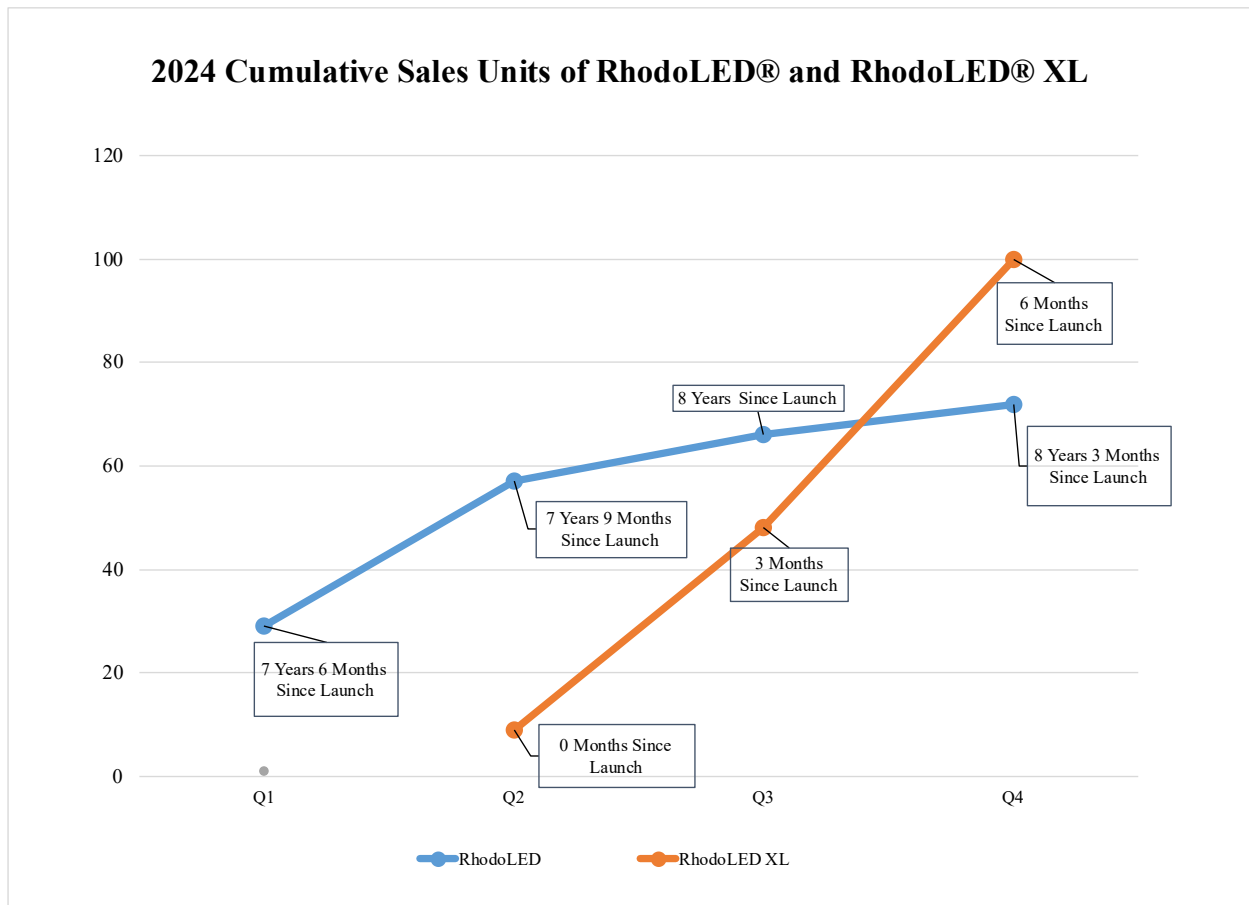
In the marketing presentation below, Biofrontera showcased that the RhodoLED® XL includes “**5 Panels** with 225 LEDs in total” which emits “**a uniform light**,” and includes a graphic that has **all five panels illuminated**, next to the text “[a]llows for full-face o[r] full-scalp illumination treatment.” EX2040, 7; EX2039, 44:18-46:21.



Mark Baldyga, Biofrontera Inc.’s Vice President of Sales and Marketing, confirmed that, in reference to the above presentation, “another one of the features that was advertised with the customer was that the **RhodoLED XL includes five panels with this particular LED arrangement** that we see here.” EX2039, 44:9-45:11. Mr. Baldyga testified that the **purpose of the presentation was to encourage customers to purchase the RhodoLED® XL**. *Id.*, 40:6-11.

Biofrontera also promotes the benefits enabled by the claimed features. According to Mr. Baldyga, the five panels of the RhodoLED® XL are different from the original RhodoLED device and allow for a larger illumination area and healthcare providers appreciate that benefit. EX2039, 46:2-5, 58:15-59:6. In press releases, in marketing materials, and on earnings calls, Biofrontera has touted the enabled benefit of illumination over a larger treatment area. EX2039, 37:13-45:15; EX2040, 7; EX2043, 7, 17; EX2044, 1 (“The new PDT lamp *enables the illumination of larger areas.*”); EX2045, 1 (“[T]he RhodoLED XL offers a *larger illumination area with five panels compared to one*”); EX2046, 1 (“The main difference between the company’s existing BF-RhodoLED lamp and the new RhodoLED XL is the *number of LED panels which allows a larger surface area to be illuminated,*” and touting that customers were impressed by “the *lamp’s robust yet elegant design,*” “*adjustability,*” and a “*larger illumination area*”); EX2057, 3; (“[the RhodoLED XL] provides clinicians with the *ability to illuminate a larger treatment area*”); EX2050, ¶¶233-238, 240-245; EX2048, ¶¶37-45.

Since its launch in June 2024, Biofrontera “has seen rapid uptake in the US market” for the RhodoLED® XL. EX2046, 1; EX2045, 1. Biofrontera sold far more RhodoLED® XL devices (embodying the patented invention) in six months than the original RhodoLED® sold (not embodying the patented invention) in all of 2024.



EX2048, ¶¶27-33; EX2045, 1; EX2046, 1; EX2047, 1; EX2057, 3; EX2064, 1; EX2066, 3, 8; EX2067, 3; EX2068, 2; EX2069, 1-2; EX2070-EX2077. Biofrontera also saw nearly 10% revenue increase in 2024, which Biofrontera stated “was *primarily driven by...the successful launch of our RhodoLED® XL.*” EX2047, 1; EX2055, 6, 51; EX2078, 1; EX2048, ¶30; EX2050, ¶245. Additionally, the 2.5X price premium of the RhodoLED® XL over the RhodoLED® further underscores the commercial success of the RhodoLED® XL as a result of the patented invention. EX2048, ¶¶34-36; EX2050, ¶239; EX2015, ¶¶40-42; EX2049, 10-12; EX2039, 56:19-57:4, 91:2-10, 114:20-22; EX2047, 1; EX2055, 6, 51; EX2078, 1.

Accordingly, the evidence demonstrates commercial success of the claimed invention. EX2048, ¶¶27-46; EX2050, ¶¶226-246.

B. The '028 Patented Invention Has Received Industry Praise

Petitioner's RhodoLED XL has received industry praise as a result of the combined patented features of the claimed invention and the benefits enabled by those features. EX2050, ¶¶247-252. The RhodoLED® XL has been called an “innovative device,” “state-of-the-art,” and a “considerable upgrade” with “advanced features.” EX2045, 1; EX2054, 1; EX2050, ¶¶248-251. In addition to the above, customers have proclaimed, “[w]e were thoroughly impressed by the *lamp's robust yet elegant design*, as well as its exceptional maneuverability and *adjustability*, which made it ideal for Photodynamic Therapy (PDT) treatments in our offices. . . The *larger illumination area* has significantly increased our patient throughput while also enhancing the overall quality of care and patient experience” (EX2046, 1; EX2039, 44:9–45:11, 58:15–59:6), and that “[t]he RhodoLED® XL should be the lamp of choice for PDT” (EX2042, 4).

Additionally, Patent Owner's BLU-U® 4170E, which embodies the '028 Patent, has been praised by the dermatology industry as “a step forward in photodynamic therapy.” EX2014; EX2085, 3; EX2079; EX2050, ¶252.

C. Nexus Between The '028 Patent Claimed Invention And The Objective Evidence Of Non-Obviousness

Finally, there is a nexus between the '028 Patent claimed invention and the objective evidence of non-obviousness. EX2050, ¶253; EX2048, ¶¶27-46. The evidence discussed above is the direct result of the combination of features claimed in the claims of the '028 Patent. Biofrontera prominently showcased and received praise for the RhodoLED® XL, which it touted “offers a larger illumination area with five panels compared to one,” “a uniform light,” and “five panels with [the] particular LED arrangement.” It is the claimed combination of features and the benefits enabled by those features that have driven commercial success and garnered praise in the industry. EX2050, ¶¶225-254; EX2048, ¶¶26-46.

IX. Conclusion

For the foregoing reasons, the Challenged Claims are patentable.

Dated: May 21, 2025

Respectfully submitted,

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CERTIFICATION UNDER 37 C.F.R. § 42.24(d)

I hereby certify that this paper, excluding the portions exempted under 37 C.F.R. § 42.24(a), has 13,957 words as counted by Microsoft Word 365, the word-processing system used to prepare this paper.

Dated: May 21, 2025

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), the undersigned certifies that on May 21, 2025, a complete copy of the foregoing was served on counsel of record for Petitioner by filing this document through P-TACTS and by sending this document via electronic mail to the following addresses:

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