

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

**SAMSUNG ELECTRONICS CO., LTD.,
SAMSUNG ELECTRONICS AMERICA, INC.,
FOSSIL GROUP, INC.,
FOSSIL STORES I, INC.,
FOSSIL PARTNERS, L.P.,
OURA HEALTH OY, AND
ONEPLUS TECHNOLOGY (SHENZHEN) CO., LTD.**

Petitioners,

v.

OMNI MEDSCI, INC.,

Patent Owner.

Case IPR2025-01250
Patent No. 9,651,533

PETITIONERS' REPLY TO PATENT OWNER'S RESPONSE

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1005	<i>Apple Inc. v. Omni Medsci, Inc.</i> , No. IPR2019-00916, Paper 1 (PTAB Apr. 10, 2019) (“533-Pet.”)
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1031	U.S. Patent No. 8,050,730 ("Zhang")
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1035	U.S. Patent No. 5,822,473 ("Magel")
1036	US Patent 5,592,124 ("Mullins")
1037	E.F. Schubert, <i>Light-Emitting Diodes</i> (Cambridge Univ. Press, 2nd ed. reprinted 2014)
1038	"The Biomedical Engineering Handbook," by Joseph D. Bronzino (1995)
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1073	U.S. Patent Publication No. 2015/0057511 (“Basu”)
1074	U.S. Patent Publication No. 2013/0327966 (“Fidler”)
1075	U.S. Patent Publication No. 2011/0267688 (“Kleppe”)
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1100	U.S. Patent No. 10,874,304 (“304”)
1101	U.S. Patent No. 11,160,455 (“455”)
1102	U.S. Patent No. 12,193,790 (“790”)
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1138	Declaration of Brian Anthony in Support of Petitioners' Reply to Patent Owner Response ("Anthony-Reply") [REDACTED]
1139	Transcript of Igor Efimov, Ph.D. (July 16, 2026) ("Efimov-Tr.") [REDACTED]

TABLE OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
'533	U.S. Patent No. 9,651,533 (Ex. 1001)
Challenged Claims	Claims 6, 11-12, 14, and 18 of the '533
Cancelled Independent Claims	Claims 5 and 13 of the '533
IPR	<i>Inter Partes</i> Review
Petitioners	Petitioners Samsung Electronics Co. Ltd., Samsung Electronics America Inc., Fossil Group, Inc., Fossil Stores I, Inc., Fossil Partners, L.P., Oura Health Oy, and OnePlus Technology (Shenzhen) Co., Ltd.
PO	Patent Owner
POSITA	Person of Ordinary Skill in the Art
Board	Patent Trial and Appeal Board
Pet.	<i>Samsung Electronics Co., Ltd. et al. v. Omni MedSci, Inc.</i> , No. IPR2025-01250, Pap. 1 (PTAB Aug. 5, 2025)
POR	<i>Samsung Electronics Co., Ltd. et al. v. Omni MedSci, Inc.</i> , No. IPR2025-01250, Pap. 29 (PTAB May 7, 2026)
POPR	Patent Owner Preliminary Response
FWD	Final Written Decision
Texas Case	<i>Omni MedSci, Inc. v. Samsung Electronics Co., Ltd. et al.</i> , No. 2:24-cv-01070-JRG-RSP (E.D. Tex.)

ABBREVIATION	DESCRIPTION
'484	U.S. Patent No. 10,517,484
'533-FWD	<i>Apple Inc. v. Omni Medsci, Inc.</i> , No. IPR2019-00916, Paper 39 (PTAB Oct. 14, 2020) (Ex. 1008)
'484-FWD	<i>Apple Inc. v. Omni Medsci, Inc.</i> , No. IPR2021-00453, Paper 22 (PTAB Aug. 3, 2022) (Ex. 1015)
'484-RFWD	<i>Apple Inc. v. Omni Medsci, Inc.</i> , No. IPR2021-00453, Paper 26 (PTAB Feb. 14, 2025) (Ex. 1016)
Prior FWDs	'533-FWD, '484-FWD, and '484-RFWD (Exs., 1008, 1015-1016)
Lisogurski	U.S. Patent No. 9,241,676 (Ex. 1025)
Carlson	U.S. Patent Pub. No. 2005/0049468 (Ex. 1028)
Tam	U.S. Patent No. 7,029,628 (Ex. 1030)
Tarsa	U.S. Patent No 7,005,679 (Ex. 1071)
Fidler	U.S. Patent Publication No. 2013/0327966 (Ex. 1074)
SEC	Samsung Electronics Co., Ltd.
SEA	Samsung Electronics America, Inc.
SDS	Samsung SDS Co., Ltd.
SSI	Samsung Semiconductor, Inc.

I. INTRODUCTION

The Board previously found claims 5 and 13 (“Cancelled Independent Claims”) of U.S. Patent No. 9,651,533 (“’533”) unpatentable. Patent Owner Omni MedSci, Inc. (“PO”) is collaterally estopped from challenging this decision and does not argue otherwise. The Petition extends the same Grounds to show that the additional limitations in the previously-unchallenged claims 6, 11-12, 14, 18 (“Challenged Claims”) are unpatentable.

The PO Response (“POR”) challenges only a limited number of issues:

(1) whether Lisogurski discloses or renders obvious “wherein at least one of the light emitting diodes emits light with a bandwidth between [approximately] 20 nanometers to [approximately] 40 nanometers” (claims [6], [14]) (Grounds 1-2);

(2) whether Lisogurski (either alone or in view of Carlson) in view of Tam renders obvious “wherein at least one of the light emitting diodes emits light with a bandwidth between [approximately] 20 nanometers to [approximately] 40 nanometers” (claims [6], [14]) (Grounds 3-4);

(3) whether Lisogurski discloses or renders obvious “wherein the output optical beam comprises a plurality of optical wavelengths, and the output signal is generated in part by comparing signals at different optical wavelengths” (claim [12]) (Grounds 1-2); and

(4) whether Lisogurski in view of Carlson renders obvious “wherein the receiver further comprises one or more filters in front of one of more detectors to select a fraction of the one or more optical wavelengths” (claims [11], [18]) (Ground 2).

PO’s arguments, however, rely on mischaracterizations of the Petition, prior art, law, and Challenged Claims. For the reasons set forth in the Petition, the Challenged Claims are rendered obvious by the asserted Grounds. PO’s reliance on alleged secondary considerations does not change the outcome.

II. CLAIM CONSTRUCTION

As PO notes, in the parallel Texas Case, the parties agreed upon the constructions for the “beam” and “personal device” terms (Ex. 2047, 3-5; Pet., 17), and the court also construed the “one or more filters” term (Ex. 1119, 9, 18). POR, 9. However, no construction, including the Board’s prior construction of the “personal device” or “a light source configured to increase signal-to-noise ratio by...increasing a pulse rate...” is necessary here, as the prior art discloses the Challenged Claims’ indisputable scope. Pet., 16-17. Indeed, PO does not disagree, and its limited challenges do not concern any of those terms. *See* POR, 8-10. Anthony-Reply, ¶8.

III. LISOGURSKI DISCLOSES AND RENDERS OBVIOUS “A BANDWIDTH BETWEEN 20 NANOMETERS TO 40 NANOMETERS” (GROUNDS 1-2, CLAIMS 6, 14)

Lisogurski discloses using “Red and IR light emitting diodes (LEDs).” Lisogurski, 10:48-56. Because RED and IR LEDs were well known to have typical bandwidths of 20 to 40 nanometers, a POSITA would have understood Lisogurski’s LEDs to fall within that range.¹ Pet., 41-42,; Anthony, ¶¶142-143; *see also* Pet., 45 (explaining claim 14 is met for the same reasons). Dr. Anthony’s deposition testimony further confirms, contrary to PO’s position (POR, 12), that a POSITA would have understood Lisogurski to involve LEDs with typical bandwidths “of 20 to 40 nanometers.” Ex. 2046, 342:20-343:18. Anthony-Reply, ¶¶9-23.

PO’s assertion that a POSITA would have understood Lisogurski to disclose red and IR LEDs with bandwidths of 100 and 200 nm, respectively, rests on a mischaracterization of Lisogurski. POR, 13. PO incorrectly derives this position from Lisogurski’s statement that “[i]n one embodiment, the Red wavelength may be between about 600 nm and about 700 nm and the IR wavelength may be between

¹ Contrary to PO’s assertion based on a single word in Dr. Anthony’s declaration (POR, 13-15), Petitioners do not rely on inherency. In fact, the word “inherently” in Dr. Anthony’s declaration was to discuss standard commercial LEDs, not Lisogurski’s disclosure. Anthony Decl., ¶143; Antony-Reply, ¶18.

about 800 nm and about 1000 nm.” Lisogurski, 10:52-58. PO thus argues “the red LED has a bandwidth of about 100 nm (i.e., the difference between 600 nm and 700 nm) and the IR LED has a bandwidth of about 200 nm (i.e., the difference between 800 nm and 1000 nm).” POR, 13. As Dr. Anthony explained, however, these ranges merely describe a range for “nominal central wavelength” (i.e. “peak wavelength”) of the *emitted light*, or the range of wavelengths that would result in different colors—this is different from bandwidths *of LEDs*, which indicate the LEDs’ spectral spread around the peak wavelengths. Ex. 2046, 343:19-344:20; Anthony-Reply, ¶¶11-13.

Further, even under PO’s interpretation, Lisogurski explains that the wavelengths “may” be between these numbers—thus disclosing a range overlapping with the claimed 20-40 nm range. *See also* Ex. 2043, ¶94 (PO’s expert testifying that “[a] POSITA would understand that Lisogurski is merely referring to the wavelengths of light that the LEDs may emit”).² Because “difference[s] between

² Dr. Efimov does not opine that a POSITA would have understood Lisogurski to disclose only bandwidths of 100 nm or 200 nm. Instead, he offers only a hypothetical example (e.g., a 600–700 nm emission corresponding to a 100 nm bandwidth) and general observations about LED spectra. Ex. 2043, ¶¶93-94. Anthony-Reply, ¶12.

the claimed invention and the prior art is some range or other variable within the claims,” PO must, but has failed to, “show that the particular range is **critical**, generally by showing that the claimed range achieves unexpected results relative to the prior art range.” *In re Woodruff*, 919 F.2d 1575, 1578 (Fed. Cir. 1990); *see also Spectrum Sols. LLC v. Longhorn Vaccines & Diagnostics, LLC*, IPR2021-00847, Paper 114 at 57-58 (PTAB May 3, 2023) (“The case for obviousness based on encompassing or overlapping ranges shifts the burden of production to the patentee to rebut the case, and this is applicable in the context of an [IPR].”). Anthony-Reply, ¶14.

The prosecution history reinforces the point that the range is not critical: the Examiner found—and Applicant did not contest—that Fidler (Ex. 1074) “teaches that conventional LEDs have a bandwidth of approximately 30nm, falling between 20nm to 40nm.” ’533FH, 723; Petition, 64. Anthony, ¶197. The ’533 itself likewise states that “LED’s are solid state components that emit a wavelength band that is of moderate width, **typically** between about 20 nm to 40 nm.”³ ’533, 20:1-11. For the

³ Petitioners do not use the AAPA in the ’533 to “supply a missing claim limitation” (POR, 16), but rather “to demonstrate the knowledge of a person having ordinary skill in the art,” which is explicitly permitted (Memo: Enforcement and Non-Waiver of 37 C.F.R. § 42.104(B)(4) and Permissible Uses of General Knowledge in *Inter*

same reason, and contrary to PO's suggestion (POR, 15), a POSITA would not have understood Lisogurski's LEDs to be super-luminescent LEDs that "may even emit over a much wider wavelength range" than the typical 20–40 nm bandwidth range. '533, 20:2-9. Anthony-Reply, ¶¶15-16.

As the Petition explains, a POSITA would have at least found obvious that Lisogurski's LEDs are conventional LEDs with bandwidths typically between 20 nm to 40 nm. Pet., 41-42; Anthony, ¶¶142-143. This follows from well-known industry characteristics, confirmed by contemporaneous literature describing LEDs as having bandwidths in this range. Anthony, ¶ 142. For example, Tam (Ex. 1030) explains that "[a] 40 nm bandwidth is representative of current LED sources in the red to near infrared range, and about 20 nm bandwidth is representative for the lower visible wavelengths." Tam, 9:57-60. Similarly, Tarsa (Ex. 1071) notes that "[i]n the case of the red+green+blue LED lamps, the spectral emission lines of the component LEDs are typically narrow (e.g. 10–30 nm full width at half maximum (FWHM))." Tarsa, 2:22-24. Anthony-Reply, ¶17.

As Dr. Anthony further explains, and given well-known industry characteristics, a POSITA would have at least found it obvious that Lisogurski's

Partes Reviews (Jul. 31, 2025)); *Apple Inc. v. Theta IP, LLC*, IPR2024-00816, Paper 32 at 32 (PTAB Nov. 24, 2025).

LEDs would have standard, off-the-shelf LEDs with 20 nm to 40 nm bandwidth to simplify design and integration, and to reduce overall system complexity and cost.⁴

Anthony, ¶¶142-143. Use of these widely available components would also have reduced development risk, simplified procurement, lowered cost, and improved reliability due to their well-established specifications and performance characteristics. Anthony, ¶143. Anthony-Reply, ¶¶19-22.

PO's arguments to the contrary rest on the incorrect premise that Lisogurski teaches LEDs with bandwidths larger than 20–40 nm that would need to be replaced or modified. *See, e.g.*, POR, 16-18. Rather, Lisogurski teaches a range of possible bandwidths that includes 20-40 nm as discussed above. Accordingly, and contrary to PO's assertions, Lisogurski requires no modification to use LEDs with bandwidths of 20–40 nm. Anthony-Reply, ¶¶11-14, 22.

PO argues that a POSITA would not have selected a 20–40 nm range because The Biomedical Engineering Handbook (EX1038) and Tam disclose broader ranges (POR, 17), but again PO fails to show criticality of the claimed range. Nor does Tam

⁴ The Petition provides why a POSITA would have been motivated to use the 20 nm to 40 nm bandwidth as supported by Dr. Anthony's declaration as well as Tam and Tarsa. Pet., 41-42 (citing Anthony, ¶¶142-143); *contra* POR 17. Anthony-Reply, ¶¶17, 19-22.

support PO's position. The 7–100 nm range PO cites is not presented as “typical,” but appears only in a different context addressing operation without additional optical components. Tam, 13:45–52. To the contrary, Tam confirms that “a 40 nm bandwidth is representative of current LED sources in the red to near infrared range, and about 20 nm ... for the lower visible wavelengths.” *Id.*, 9:57–60. PO's attempt to characterize 20–40 nm bandwidth LEDs as more expensive (POR, 18) also fails, as PO again rests on a misreading of Lisogurski that it teaches LEDs with bandwidths of 100–200 nm, and that 20–40 nm is therefore “narrower” and more expensive—as discussed above, Lisogurski does not teach so, and a POSITA would have understood Lisogurski to teach 20-40nm bandwidth. POR, 16–18. And, regardless, such economic considerations are not “telling on the issue of nonobviousness.” *See Orthopedic Equip. Co. v. United States*, 702 F.2d 1005, 1013 (Fed. Cir. 1983). Anthony-Reply, ¶¶20-22.

IV. LISOGURSKI IN VIEW OF TAM RENDERS OBVIOUS “A BANDWIDTH BETWEEN 20 NANOMETERS TO 40 NANOMETERS” (GROUNDS 3-4, CLAIMS 6, 14)

Even if additional disclosure of the 20–40 nm bandwidth were required (it is not), Lisogurski in view of Tam renders this limitation obvious. As the Petition explains, a POSITA would have been motivated to apply Tam's teaching of LEDs with typical bandwidths of 20–40 nm to Lisogurski's system (alone or in view of Carlson) to reduce manufacturing cost while maintaining measurement accuracy.

Pet., 62–64; Anthony, ¶¶192-199; *see also* Pet., 65 (explaining claim 14 is met for the same reasons). Tam teaches that “a 40 nm bandwidth is representative of current LED sources in the red to near infrared range, and about 20 nm bandwidth is representative for the lower visible wavelengths,” and further explains that narrower bandwidth LEDs are available “at a premium price.” Tam, 9:57–62. A POSITA would therefore have been motivated to use such LEDs with well-known, standard characteristics for ease of implementation and to avoid the unnecessary premium cost associated with narrower-band LEDs, thereby reducing overall manufacturing cost. Tam, 9:61–62; Anthony, ¶¶196-197. Anthony-Reply, ¶¶24-29.

In response, PO again relies on its incorrect premise that a POSITA would have understood Lisogurski’s LEDs to have bandwidths of 100–200 nm. POR, 39. Based on that flawed assumption, PO argues again that applying Tam’s 20–40 nm LEDs would increase costs. *Id.* As explained above, Lisogurski does not teach such bandwidths, and PO’s argument therefore collapses, and such arguments do not evidence non-obviousness. *See* §III. Regardless, the Petition in Grounds 3-4 explains that a POSITA would have recognized the cost benefits of using Tam’s standard 20–40 nm bandwidth LEDs instead of narrower, premium-cost alternatives. Pet., 63-64. Anthony-Reply, ¶25.

PO’s attempt to discount the Examiner’s finding that Fidler (Ex. 1074) “teaches that conventional LEDs have a bandwidth of approximately 30 nm, falling

between 20nm to 40nm” is likewise unavailing. POR, 39-40; Ex.1002, 723. That finding reinforces the POSITA’s understanding that 20–40nm bandwidths are typical, supporting Petitioners’ rationale of using common, off-the-shelf components. Pet., 63-64. PO’s reliance on Applicant’s generic traversal (POR, 39-40) does not undermine the Examiner’s finding, particularly where Applicant did not specifically contest it. MPEP §2141(IV) (“If an applicant disagrees with any factual findings by the Office, an effective traverse of a rejection based wholly or partially on such findings must include a reasoned statement explaining why the applicant believes the Office has erred substantively as to the factual findings.”). Indeed, the ’533 specification suggests that Applicant agrees with the Examiner’s finding. ’533, 20:1-11 (“LED[s] are solid state components that emit a wavelength band that is of moderate width, typically between about 20 nm to 40 nm.”). Anthony-Reply, ¶27.

Finally, PO argues that Tam teaches LEDs with bandwidths of 7–100 nm as inadequate and that this disclosure undermines any motivation to use LEDs within the claimed 20–40 nm range. POR, 40–41. PO again mischaracterizes both Tam and Petitioners’ position by taking the cited disclosure out of context. While Tam notes that LEDs with bandwidths “from about 7 to 100 nm” alone may be insufficient for accurate measurements, it explains that accuracy is improved by narrowing the effective bandwidth—e.g., using a “40 nm bandpass ‘filter.’” Tam,

13:45–14:10. Read in context, Tam does not suggest that the entire 7–100 nm range is uniformly inadequate; rather, it identifies broader bandwidths (e.g., toward the upper end of that range) as problematic and narrower bandwidths (e.g., around 40 nm) as suitable for accurate measurement. Ex. 2046, 346:23-347:25. Indeed, PO’s interpretation would render Tam’s discussion of a 40 nm filter nonsensical, as applying such a filter would not meaningfully alter LEDs already operating at substantially narrower bandwidths. *Id.* Anthony-Reply, ¶26.

Nor is Tam’s disclosure limited to separate filter components in the manner PO suggests. Tam’s key teaching upon which Petitioners rely is that bandwidths within the range of 20–40 nm are “representative” and “typical.” Tam, 9:57-60; Pet., 62-63. Tam’s subsequent discussion at 13:45–14:10 reinforces this point by explaining that performance improves when broader bandwidth light is narrowed (e.g., to around 40 nm), providing further motivation to employ such conventional bandwidths. Pet., 63-64; Anthony, ¶196. Anthony-Reply, ¶27.

V. LISOGURSKI DISCLOSES AND RENDERS OBVIOUS “THE OUTPUT SIGNAL[] GENERATED IN PART BY COMPARING SIGNALS AT DIFFERENT WAVELENGTHS” (GROUNDS 1-2, CLAIM 12)

As the Petition details, and as the Board previously agreed, a POSITA would have been motivated to modify Lisogurski such that the front-end processing circuitry, among other components, would be implemented in Lisogurski’s sensor.

Pet., 28-30 (citing '533-FWD, 22-25, 37-39; Anthony, ¶¶92-109). PO does not dispute this. The Board recognized that this is consistent with the industry trend to “improv[e] capabilities of wearable sensors for use in sports and personal fitness applications and wireless connecting wearable sensors to networks to remotely monitor patient health.” Pet., 29 (citing '533-FWD, 23, 38; Anthony, ¶94). Further consistent with the Board’s prior finding, the Petition details that the claimed “output signal” is met by Lisogurski’s “processed signals,” which are generated by “front end processing circuitry 150.” Pet., 42-43; '533-FWD, 37-39. PO does not dispute this either. Anthony-Reply, ¶¶30-37.

Lisogurski confirms that its physiological monitoring “system may process data to determine physiological parameters using techniques well known in the art.” Lisogurski, 4:52-53. “For example, the system may determine blood oxygen saturation” by “comparing the intensities of two wavelengths” (e.g., “Red and infrared (IR) wavelengths”). Lisogurski, 4:42–56; Pet., 43–44; Anthony, ¶¶150–151. Lisogurski further teaches that signals “may be preprocessed by sensor 102 before being transmitted” and that calculations for physiological parameters may be performed at the sensor and transmitted to the monitor. Pet., 43; Lisogurski, 11:20–27; 17:62–18:3. In view of these teachings and the Board-approved modification relocating front-end processing circuitry to the sensor, a POSITA would have understood, and least found it obvious, that signal comparison is performed at the

sensor via front-end processing circuitry, and that the resulting “processed signals” are generated in part by comparing signals at different optical wavelengths (e.g., Red and IR). Pet., 28, 42-44; Anthony, ¶¶152-53. Anthony-Reply, ¶¶32-33.

PO disputes only whether signal comparison for different wavelengths occurs in the front-end processing circuitry, asserting instead that it takes place in the back-end circuitry. POR, 20–24. In support, PO relies on a single statement in Lisogurski that “[p]rocessor 172 *may* receive and process physiological signals received from front end processing circuitry,” along with Dr. Efimov’s conclusory opinion based on that statement.⁵ POR, 22-23. But this statement does not identify where particular processing steps, such as wavelength comparison, must occur; nor does it exclude front-end processing. To the contrary, Lisogurski expressly discloses “front end processing circuitry” “provid[ing]” “processed signals to back end processing circuitry” and that calculation of physiological parameters “may be performed on the sensor units.” Lisogurski, 11:20–27, 17:62–18:3; *see also* Pet., 43. Consistently, the Board found that Lisogurski “expressly suggests ... ‘the functionality of some of

⁵ Dr. Efimov’s opinion does not add anything else to PO’s arguments. At best, Dr. Efimov opines that the back end processing *may* perform the comparison of wavelengths, but not that the front end processing circuitry cannot or does not. Efimov ¶¶108-109. Anthony-Reply, ¶XX.

the components may be combined in a single component’ and embodiments in which ‘the functionality of some of the components of monitor 104 ... may be divided over multiple components.’” ’533-FWD, 23 (quoting Lisogurski, 16:2-4, 16:7-9); Lisogurski, 15:66-16:9; Anthony, ¶¶92-94. Recognizing such teachings in Lisogurski, the Board further found that a POSITA would have been motivated to relocate Lisogurski’s front-end processing functionality to its sensor, consistent with the industry trends improving sensor capabilities. ’533-FWD, 23, 38; Pet., 28-30; Anthony, ¶94. PO’s contention that Petitioners provided no support for locating the wavelength comparison in the front-end processing circuitry (POR, 21) thus ignores the record and relies on a selective reading of Lisogurski. Anthony-Reply, ¶¶32-34.

Finally, PO mischaracterizes Dr. Anthony’s testimony, asserting that Dr. Anthony failed to identify a specific component in Lisogurski that performs the comparison between different intensities. POR, 22-23. To the contrary, when asked “[w]hich component in Lisogurski would a [POSITA] understand performs the...comparison of intensities of two different wavelengths,” Dr. Anthony testified that “the front-end processing as I opined in the ... motivation to modify would ... detect the signals and calculate the comparisons.” Ex. 2046, 362:21-363:3. While acknowledging that back-end circuitry *may* or *could* perform certain processes in some of Lisogurski’s embodiments (*Id.*, 366:7-20), Dr. Anthony confirmed that, under the Board’s modification, wavelength comparison would be performed by the

front-end processing circuitry at the sensor. *Id.*, 361:20-25, 362:21-363:3. As Dr. Anthony explains, relocating the front-end processing circuitry to Lisogurski's sensor allows it to "process the detected signal before wirelessly transmitting it to the monitor," including performing various functions such as comparison of the intensities of two wavelengths, "enhances signal integrity, reduces noise and signal degradation, improves data reliability and accuracy, simplifies sensor-to-monitor communication, and ensures system responsiveness." Anthony, ¶101. Anthony-Reply, ¶35.

VI. LISOGURSKI IN VIEW OF CARLSON RENDERS OBVIOUS THE "FILTER" LIMITATION (GROUND 2, CLAIMS 11, 18)

As the Petition details, Lisogurski discloses a "receiver" comprising "one or more detector[s]" for detecting "an output optical beam with one or more optical wavelengths," "that is reflected by or has traveled through the subject's tissue." Pet., 57-58 (addressing claims 11 and 18); Lisogurski, 10:48-52, 10:52-63, 17:39-45. Carlson similarly discloses a "photo detecting element" that receives transmitted light (e.g., through an earlobe), along with optical filters (e.g., wavelength or double-pass filters) that block stray light and ensure only desired wavelengths (e.g., ~660 nm and ~890 nm) reach the detector. Pet., 58–61; Carlson, [0015], [0026], [0056]–[0062]; Anthony, ¶¶185–187. PO does not dispute these disclosures. Anthony-Reply, ¶¶38-44.

The Petition further shows that a POSITA would have been motivated to apply Carlson’s filter teachings to Lisogurski’s receiver to advantageously filter out background noise and ambient light before detection. Pet., 52-53. Both references recognize the desirability of removing background noise to improve the quality of physiological measurements, and Carlson expressly teaches using “optical wavelength filters to suppress ... environmental radiation.” Carlson, [0026]; Pet., 52 (citing Lisogurski, 6:7-31, 14:46-55, 12:42-49, 11:9-27; Carlson, [0059], [0062]-[0063]). Indeed, the Board also confirmed that both Carlson and Lisogurski recognize the problem of ambient light noise “and the need to offset its negative impact on the signal-to-noise ratio.” ’533-FWD, 31-34; Pet., 49 (also citing Lisogurski, 1:67-2:3, 9:46-60; 37:6-18; Carlson, [0064], [0067]-[0069]; Anthony, ¶165). A POSITA would therefore have applied Carlson’s filters to improve Lisogurski’s measurement quality. Pet., 49; Anthony, ¶¶164, 170. Anthony-Reply, ¶¶39-40.

PO challenges only the motivation to combine—wrongly arguing that (1) Petitioners’ rationale is conclusory, (2) Carlson addresses a different problem, and (3) Lisogurski already provides solutions. POR, 26–38. First, PO’s assertion that Petitioners’ motivation is “conclusory” improperly focuses on whether Lisogurski alone discloses filters. POR, 26–27. Ground 2 relies on Lisogurski in view of Carlson, not Lisogurski alone. As discussed above, the Petition provides a detailed

rationale supported by both references and expert testimony. Pet., 52–53; Anthony, ¶¶164, 170. Anthony-Reply, ¶¶40–41.

Second, PO’s attempt to distinguish the references fails. Both Lisogurski and Carlson address reducing unwanted optical contributions, whether described as “background noise,” “ambient light,” or “stray light,” to improve measurement quality. Lisogurski, 1:67–2:3, 6:7–31, 9:46–60, 11:9–27, 12:42–49, 14:46–55, 37:6–18; Carlson, [0059], [0062]–[0064], [0067]–[0069]; Pet., 49, 52. As PO recognizes, Carlson’s “filter” teaching achieves this by filtering background noise “outside of a particular range of wavelengths,” while Lisogurski discloses other techniques to reduce the background noise (e.g., by excluding background noise “across a range of wavelengths”). POR, 29. These approaches are complementary, not inconsistent. Indeed, Carlson’s filter teachings would directly benefit Lisogurski, particularly because Lisogurski already focuses on specific wavelengths (red and IR), making Carlson’s wavelength selection at the detector advantageous. Anthony, ¶170 (“A [POSITA] would have understood ... implementing such filters significantly reduce interference from ambient and stray light, which ensures that detectors measure primarily relevant and accurately conditioned light that was generated/transmitted by the device (e.g., source LEDs) instead of originating from the environment.”). Anthony-Reply, ¶42.

Third, PO’s argument that Carlson is unnecessary because Lisogurski already

reduces noise is unavailing. The Federal Circuit rejected this precise reasoning in *Intel Corp. v. PACT XPP Schweiz AG*, where the Board had reasoned that if a reference “already addresses [the] problem ... through the use of a known technique,” there would be no reason to apply another known solution. 61 F.4th 1373, 1380–81 (Fed. Cir. 2023). The court held that this reasoning was wrong: “[t]hat [both references] address the same problem and that [the secondary reference’s technique] was a known way to address that problem is precisely the reason that there’s a motivation to combine under *KSR*.” *Id.* This principle directly applies here and is consistent with *KSR*’s holding that there is motivation to combine “if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007). Anthony-Reply, ¶43.

Contrary to PO’s suggestion, Carlson’s filters are not redundant but provide an additional, compatible way to reduce unwanted optical contributions by selecting desired wavelength ranges. Indeed, none of Lisogurski’s noise-reduction techniques that PO discusses (POR, 35-37) employs a physical optical filter that Carlson teaches (Carlson, [0014], [0069]). A POSITA would have recognized the benefits to suppress a specific range of wavelength via physical optical filters. Pet., 52-53; Anthony, ¶170. Carlson is therefore not redundant; it is complementary. *See Maxell, Ltd. v. Amperex Tech. Ltd.*, No. 2023-2256, 2025 WL 271614, at *4 (Fed.

Cir. Jan. 23, 2025) (“the fact that the references teach discrete means to achieve the same goal ... is entirely consistent with a motivation to combine because each of the cathode material of Choi and electrolyte of Kim or Noh, independently, would have been expected to increase thermal stability”). Anthony-Reply, ¶43.

**VII. PO’S ALLEGED SECONDARY CONSIDERATIONS DO NOT
NEGATE THE CLAIMS’ OBVIOUSNESS**

A. No Evidence of Copying or a Nexus to the Claims

PO wrongly accuses Samsung of copying [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] [REDACTED]

[REDACTED]

[REDACTED]

^{7,8} POR, 42-43.

⁶ “SNR” refers to “signal-to-noise ratio.”

⁷ Claims do not require [REDACTED] PO, in fact, only identifies [REDACTED]

[REDACTED]

[REDACTED] claimed in the ’533. POR, 43.

⁸ PO’s [REDACTED]

[REDACTED]

[REDACTED]

Mere alleged knowledge of related patents and generic concepts cannot show nexus or copying. *Enova Tech. Corp. v. Seagate Tech. (US) Holdings Inc.*, 706 F. App’x 987, 995 (Fed. Cir. 2017) (knowledge of the patent and products embodying patent are relevant, but not “sufficient to establish copying”). Anthony-Reply, ¶¶45-61.

The Board already found each such “SNR-improvement technique” known in the art. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]. Anthony-Reply, ¶¶46-48.

[REDACTED] are separate, independent third parties not involved in this IPR or the co-pending Texas Case. POR, 69-70; Ex. 2116, 1 (asserting infringement by Petitioners, but not SDS or SSI); Ex. 1134-1136.

Anthony-Reply, ¶53.

No evidence shows Samsung copying “SNR-improvement techniques” —PO’s reliance (POR, 43) on the infringement contentions cannot establish copying. *Fleming v. Cirrus Design Corp.*, 28 F.4th 1214, 1224 (Fed. Cir. 2022) (“Not every ... product that arguably falls within the scope of a patent is evidence of copying. Otherwise[,] every infringement suit would automatically confirm the nonobviousness of [a] patent.”); *Iron Grip Barbell Co. v. USA Sports, Inc.*, 392 F.3d 1317, 1325 (Fed. Cir. 2004) (“[C]opying requires the replication of a specific product,” which can be shown through “internal documents,” “direct evidence such as disassembling a patented prototype, photographing its features, and using the photograph as a blueprint to build a virtually identical replica,” or “access to, and substantial similarity to, the patented product (as opposed to the patent).”). Anthony-Reply, ¶¶52-54.

PO’s only remaining support for Samsung’s alleged copying is Dr. Efimov’s declaration—it likewise fails. POR, 43 (citing Ex. 2043, ¶¶158, 161, 166). **First**,

Dr. Efimov’s opinion is based on his misunderstanding that Dr. Islam’s “SNR-improving techniques” are proprietary solely for being “essentially covered by patents”—Dr. Islam’s “proprietary techniques” were public knowledge, as the Board confirmed. Ex. 1127, 57:21-58:10. Anthony-Reply, ¶¶48-49.

Second, Dr. Efimov concludes copying based solely on PO’s infringement contentions (“PIC”) in the Texas Case. Ex. 2043, ¶¶157-159, 161 (citing Exs. 2106, 2116). The PIC fails to show Samsung’s copying, let alone infringement. *E.g.*, Ex. 2116, 19-33, 61-96. For example, for [REDACTED] [REDACTED] the PIC relies on documentation concerning multiple third-party processing circuitries and their available features (including programmable LED current), which do not show that the limitation is met—nor does the PIC show whether or how such processors are implemented a Samsung product. Ex. 2116, 19-33. Dr. Efimov likewise admitted not having examined the Samsung Accused Products—or Samsung’s internal documents—while acknowledging the need to assess the products or their technical descriptions to confirm their features. Ex. 1127, 71:11-98:7; Ex. 1128, 34:6-50:19, 74:17-76:12, 78:9-79:12, 82:12-83:3, 88:2-89:3, 118:12-119:18 (acknowledging the same). PO’s remaining, purported support likewise provides insufficient technical detail. Ex. 2116, 61-96; Ex. 1127, 169:4-15 (confirming no Samsung document with technical details cited in PIC). This is in stark contrast with Lisogurski—which the Board previously found meets

this limitation twice. Lisogurski, 6:3-6; '484-FWD, 27; '533-FWD, 26. Anthony-Reply, ¶¶49-51.

Third, Dr. Islam fails to identify what techniques, other than generic, well-known information that the Board already found to be met by the prior art, was shared with Samsung—likewise, Dr. Efimov admitted no knowledge regarding the entities or individuals [REDACTED], Samsung's corporate structure, or how any such entities or individuals relate to Samsung's wearable-device development—he could not have opined on what information Samsung Electronics Co., Ltd. or Samsung Electronics America, Inc. received or how the information was used, if at all, in the accused products. Ex. 1127, 107:7-111:4, 126:2-139:7; Ex. 2100, ¶¶7-21. Indeed, the materials cited by Dr. Efimov and Dr. Islam generally [REDACTED]

[REDACTED]

[REDACTED].

Ex. 2100, ¶8; Ex. 2105 at OMS_SAM0031867. And, whether Dr. Islam allegedly offered to help Samsung is irrelevant to whether the alleged techniques were actually incorporated, let alone reflected, in Samsung's devices, or whether Samsung had already developed any such techniques prior to the alleged meeting. Ex.2043, ¶383. There is no evidence tying the development or operation of Samsung's products to

Dr. Islam's alleged disclosure of the '533 patent or known SNR improvement techniques. Anthony-Reply, ¶¶52-54.

B. No Evidence of Long Felt Need or a Nexus to the Claims

Each of the '533 limitations that PO identifies as resolving alleged long-felt needs *was already known in the art*, as the Board agreed in the prior FWDs (§VII.A). POR, 44-46 (“...increase the signal-to-noise ratio by increasing light intensity...,” “...increase signal-to-noise ratio ... by increasing a pulse rate of at least one of the plurality of semiconductor sources,” “receiver is configured to be synchronized to the light source”); *see also* Ex. 1128, 30:1-15, 48:8-49:3, 74:1-14, 132:10-133:16, 139:8-15 (named inventor admitting these concepts were known in the field and admitting he did not know whether they were used in wearable devices before his patents). Anthony-Reply, ¶¶48, 55-56.

Further, PO fails to establish that the '533 indeed resolved the alleged needs to avoid “the patient [to] remain still” or “controlled clinical environments,” let alone that the '533 provided improvements over the prior art. POR, 44-45. Dr. Islam alleges that although “premium wearable devices” used his “techniques” by 2017 (Ex.2103 at OMS_SAM0031785), the “SNR ... problem” was not “solved” in those devices (Ex.2100, ¶33). Thus, his “techniques” did not resolve any alleged long-felt need. No nexus exists between PO's hand-picked—already known—limitations (individually or collectively) and the alleged issues being resolved. POR, 43-46; *In*

re Huai-Hung Kao, 639 F.3d 1057, 1068 (Fed. Cir. 2011) (requiring nexus); *In re Karpf*, 758 F. App'x 960, 965 (Fed. Cir. 2019) (finding no “evidence, other than attorney argument, that the claimed invention meets that [unresolved] need”). Anthony-Reply, ¶¶57-61.

VIII. CONCLUSION

PO’s arguments do not distinguish any Challenged Claim from the prior art. The Challenged Claims should be found unpatentable.

Respectfully submitted,

Dated: July 30, 2026

By: /James L. Davis, Jr./
Name: James L. Davis, Jr.
Registration No. 57,325
*Counsel for Petitioners Samsung
Electronics Co. Ltd. and Samsung
Electronics America Inc.*

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. §42.24(c) and (d), the undersigned hereby certifies that this Petitioners' Reply to Patent Owner's Response complies with the type-volume limitation of 37 CFR §42.24(c) because, exclusive of the exempted portions, it contains 5270 words as counted by the word processing program used to prepare the paper.

Dated: July 30, 2026

By: /James L. Davis, Jr./
Name: James L. Davis, Jr.
Registration No. 57,325
*Counsel for Petitioners Samsung
Electronics Co. Ltd. and Samsung
Electronics America Inc.*

CERTIFICATE OF SERVICE

The undersigned certifies that the foregoing PETITIONERS' REPLY TO PATENT OWNER'S RESPONSE was served by filing this document through the Patent Trial and Appeal Case Tracking System (P-TACTS) as well as providing a courtesy copy via electronic mail to the following attorneys of record for each party as listed below:

OMNI MEDSCI, INC.	
Lead Counsel	Back-Up Counsel
Jennifer Hayes Registration No. 50,845 Nixon Peabody LLP 300 South Grand Avenue, Suite 4100 Los Angeles, CA 90071-3151 Phone: 213-629-6179 Facsimile: 213-629-6001 jenhayes@nixonpeabody.com	Daniel Stringfield Registration No. 68,677 Phone: 312-977-4130 Facsimile: 833-923-0056 dstringfield@nixonpeabody.com Timothy Maloney Registration No. 38,233 Phone: 312-977-4451 Facsimile: 833-818-8070 tmaloney@nixonpeabody.com Angelo J. Christopher Registration No. 81,594 Phone: 312-977-4391 Facsimile: 312-977-4405 achristopher@nixonpeabody.com Benjamin R. Holt Registration No. 78,605 Phone: 202-585-8048 Facsimile: 833-824-1380 bholt@nixonpeabody.com Daniel Georgiev Registration No. 80,647

	Phone: 312-977-4412 Facsimile: 833-824-7710 dgeorgiev@nixonpeabody.com Corey Leggett Registration No. 70,017 (415) 984-8340 Facsimile: 415-984-8300 cleggett@nixonpeabody.com
FOSSIL GROUP, INC., FOSSIL STORES I, INC., AND FOSSIL PARTNERS, L.P.	
	Back-Up Counsel
	Jared A. Smith Reg. No. 73,749 FISH & RICHARDSON P.C. 12860 El Camino Real, Suite 400 San Diego, CA 92130 Phone: +1 858-678-4702 Fax: +1 858-678-5099 jasmith@fr.com Ricardo J. Bonilla Reg. No. 65,190 FISH & RICHARDSON P.C. 1717 Main Street, Suite 5000 Dallas, TX 75201 Phone: +1 214-760-6150 Fax: +1 214-747-2091 rbonilla@fr.com
OURA HEALTH OY	
	Back-Up Counsel
	Jasjit S. Vidwan Reg. No. 72,080 MAYER BROWN LLP 1999 K Street, NW Washington, DC 20006-1101

	Tel.: 202.263.3065 JVidwan@mayerbrown.com Robert G. Pluta Reg. No. 50,970 MAYER BROWN LLP 71 S. Wacker Drive Chicago, IL 60606 Tel.: 312.701.8641 RPluta@mayerbrown.com
ONEPLUS TECHNOLOGY (SHENZHEN) CO., LTD.	
	Back-Up Counsel Jack Shaw Reg. No. 72,262 CHERRY JOHNSON SIEGMUND JAMES PC 8140 Walnut Hill Lane, Suite 105 Dallas, Texas 75231 Tel: 254-732-2242 Fax: 866-627-3509 jshaw@cjsjlaw.com

Dated: July 30, 2026

By: /James L. Davis, Jr./
Name: James L. Davis, Jr.
Registration No. 57,325
*Counsel for Petitioners Samsung
Electronics Co. Ltd. and Samsung
Electronics America Inc.*