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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

MASIMO CORPORATION,
Patent Owner.

Case IPR2024-00244
U.S. Patent 10,722,159

PATENT OWNER RESPONSE

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2002	Expert Declaration of Vijay K. Madiseti in Support of Patent Owner's Preliminary Response
2003	Commission Opinion (Public), <i>Certain Light-Based Physiological Measurement Devices and Components Thereof</i> , Inv. No. 337-TA-1276, EDIS No. 808521 (ITC Oct. 26, 2023)
2004	Decision Denying Institution of Inter Partes Review, <i>Apple Inc. v. Masimo Corp.</i> , IPR2022-01271, Paper 15 (PTAB Jan. 24, 2023)
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2021	Notice of Refund, <i>Apple Inc. v. Masimo Corp.</i> , IPR2022-1272, Paper 20 (PTAB June 20, 2023)
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2024	Notice of Refund, <i>Apple Inc. v. Masimo Corp.</i> , IPR2022-1275, Paper 19 (PTAB June 26, 2023)
2025	Notice of Refund, <i>Apple Inc. v. Masimo Corp.</i> , IPR2022-1276, Paper 20 (PTAB June 26, 2023)
2026	Notice of Refund, <i>Apple Inc. v. Masimo Corp.</i> , IPR2022-1292, Paper 17 (PTAB Mar. 7, 2023)
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2028	Correspondence from counsel for Apple to counsel for Masimo regarding Apple's prior art grounds in the Delaware Litigation, dated November 16, 2023
2029	June 6–10, 2022 Public Hearing Transcript, ITC Inv. No. 337-TA-1276
2030	Emails dated August–September 2022 between Apple's and Masimo's Counsel re IPR2022-01291 and -01465
2031	Email chain regarding false statements in IPR Petitions
2032	November 17, 2023 Letter from U.S. Food & Drug Administration to Masimo Corp. re Masimo W1 510(k) Clearance
2033	Petition for Inter Partes Review, <i>Apple Inc. v. Masimo Corp.</i> , IPR2022-01292
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2037	Redacted Excerpt of the December 15, 2023 Rebuttal Report of Dr. Majid Sarrafzadeh
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2077	CONFIDENTIAL – Transcript of Testimony of Dr. Paul Mannheimer from June 6-10, 2022 Hearing Transcript, Certain Light-Based Physiological Measurement Devices and Components Thereof, Inv. No. 337-TA-1276
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2081	CONFIDENTIAL – ITC Exhibit CX-0299C – Designated Portions of February 18, 2022 Deposition of Dr. Stephen Waydo
2082	CONFIDENTIAL – ITC Exhibit CX-0295C – Designated Portions of February 11, 2022 Deposition of Tao Shui
2083	CONFIDENTIAL – ITC Exhibit CX-0007C – Email from Brian Land to Paul Mannheimer et al.
2084	CONFIDENTIAL – ITC Exhibit CX-0175C – Apple Organization Chart
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2100	CONFIDENTIAL - Declaration of Vijay K. Madiseti, Ph.D. in Support of Patent Owner’s Response
2101	Document produced by Apple in related litigation bearing production numbers APL-MAS_00117783-877
2102	CONFIDENTIAL - Excerpt of document produced by Apple in related litigation bearing production numbers APL_DEL03985999-6078

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2103	Document produced by Apple in related litigation bearing production numbers APL_MAS_ITC_00311268-73
2104	CONFIDENTIAL - Document produced by Apple in related litigation bearing production numbers APL-MAS_01812072-78
2105	Petition, Apple Inc. v. Masimo Corp., IPR2020-01722
2106	“How to use the Blood Oxygen app on Apple Watch,” Apple Inc. (https://support.apple.com/en-us/120358)
2107	Transcript of October 28, 2024 Deposition of Brian Anthony, Ph.D. and Deposition Exhibit 1 Thereto
2108	Chris Stokel-Walker, “A Stand-Out Health Tracker: Masimo W1 Medical,” TIME, Oct. 30, 2024 (https://time.com/7094688/masimo-w1-medical)

I. INTRODUCTION

Apple's Petition arises from parallel litigation in Delaware district court ("Delaware Litigation"). Apple was not, historically, a company that had any involvement in physiological monitoring technologies. But, around 2013, Apple decided to enter the field and sought out Masimo for its technology. Despite claiming an interest in integrating Masimo's technology into Apple's products, Apple began poaching Masimo's employees, one after another. The poached employees included Chief Technical Officer Marcelo Lamago, an inventor of the three Masimo patents that the ITC recently found Apple infringed. Lamago took Masimo's sensor design knowledge with him to Apple. And in the Delaware Litigation, Masimo accused Apple's Watches of infringing Masimo's patented technology, including key features disclosed and claimed in the '159 Patent.

Apple filed its Petition on the one-year deadline. But the Petition lacks merit for numerous reasons. Apple's Sarantos-only grounds fail to show obviousness. The Board instituted this IPR based on Apple's argument that Sarantos alone discloses a material that changes the shape of light. But Apple correctly conceded during IPR2022-01465 that Sarantos does not disclose changing the shape of light. And Apple should be estopped from arguing that light passing through a transparent or translucent material would "necessarily" change shape when it previously

convinced the ITC that a translucent or transparent material in its own Apple Watch did not change the shape of light passing through it.

Apple's grounds based on Sarantos and Shie also fail. In IPR2022-01465, the Board correctly found that Apple failed to demonstrate a motivation to combine Sarantos and Shie. Apple never appealed the Board's decision and Apple is now collaterally estopped from relitigating the same issue. Further, Apple failed to show that a POSITA would have been motivated to combine Sarantos and Shie, or would have reasonably expected the proposed combination to succeed. Indeed, Apple's documents and the testimony of its own highly skilled engineers confirms a lack of reasonable expectation of success, and provides strong objective indicia of the nonobviousness of the challenged claims.

II. BACKGROUND

Masimo is the technology leader in the field of noninvasive physiological monitoring. In 1989, Masimo was a small startup operating in an inventor's condo. Today, Masimo is a publicly traded company employing 6,300 people worldwide with annual revenues exceeding \$1.1 billion. Masimo technology is used in clinical care to monitor over 200 million patients per year. This growth followed Masimo's development of a range of technologies that revolutionized the field of noninvasive physiological monitoring. Other Masimo patents have withstood extensive attacks,

including in litigation through trials, inter partes reexaminations, an ITC investigation, IPRs, and appeals.

A. The '159 Patent

Pulse oximetry is a method of noninvasively measuring the proportional amount of hemoglobin carrying oxygen in blood, called arterial oxygen saturation (abbreviated as SpO₂). EX1009, 16, 23; EX2100, ¶36. Pulse oximeters measure oxygen saturation by emitting light of at least two wavelengths, typically red and infrared, into a user's tissue and measuring the relative amounts of absorption of those wavelengths. EX1001, 1:65-2:3; EX1009, 40; EX2100, ¶37. Based on the relative amounts of detected light, a pulse oximeter can determine an oxygen saturation value. EX2100, ¶38.

The '159 Patent claims priority to a provisional application filed July 2, 2015.¹ The patent describes and claims improvements to pulse oximetry sensors that improve the accuracy of oxygen saturation measurements. EX1001, 1:22-26; EX2100, ¶39. Before the '159 Patent, conventional pulse oximetry used a “two-dimensional” approach. EX1001, 5:41-50. In a 2D model, the path of light as it penetrates tissue would be considered a two-dimensional vector. *Id.*, 5:62-

¹ Apple falsely alleged that Masimo withheld references from the Examiner during prosecution. Pet., 3-4, 83-84. Apple admitted those allegations were incorrect. *See* EX3001 (Apple requesting to strike such statements from its own petitions).

65. Conventional wisdom was that a focused point of light would reduce the variability in the light's pathlength through tissue and lead to more accurate measurements. *Id.*, 5:66-6:1.

The inventor, Al-Ali, recognized that light does not travel in straight paths through tissue due to “multiple scattering” events. *Id.*, 6:1-20. Al-Ali was able to obtain more accurate oxygen saturation measurements by applying a “three-dimensional” model to the tissue being measured. *Id.*, 6:55-7:3. Rather than irradiating tissue with a point source, Al-Ali added a material to change the shape of light emitted towards the user's tissue. *Id.*, 6:21-54. This change in shape irradiates a larger volume of tissue and provides a more accurate measurement. *Id.*, 6:55-7:3; EX2100, ¶40.

Al-Ali also recognized his new approach could detrimentally cause “light piping.” Light piping occurs when the emitted light reaches the detectors without first passing through tissue. EX1001, 7:25-29. The '159 Patent discloses sensor configurations to reduce light piping. *Id.*, 7:16-29, 8:54-9:10. One approach uses light blocks to inhibit LED light from reaching the detectors without first passing through tissue. *Id.*, 10:49-51, 11:10-20, Figs. 7A-7B. Another approach uses a dark-colored coating to limit reflections between the user's tissue and the sensor, leading to pathlength variations that affect measurement accuracy. *Id.*, 8:54-9:10; EX2100, ¶41. The claimed inventions provide novel combinations of these features that

improve measurements of oxygen saturation and other parameters from more difficult sites like the wrist. *Id.*, 1:22-26, 2:39-3:3, 10:40-51; EX2100, ¶42.

Based on Al-Ali's research and the resulting '159 Patent inventions, Masimo developed a medical-grade wrist-based pulse oximeter that is now sold as the Masimo W1, pictured below. EX2029, 248:24-250:14; EX2100, ¶43.



The Masimo W1 is the only product on the market that provides continuous oxygen saturation measurements at the wrist. On November 17, 2023, the Masimo W1™ received FDA 510(k) clearance for over-the-counter and prescription use for oxygen saturation monitoring. EX2032; EX2100, ¶44; EX2108. As of today, Masimo is the first and only company in the world to receive FDA clearance for a pulse oximeter that measures continuously at the wrist.

B. Related Proceedings (37 C.F.R. § 42.8(b)(2))

The parties previously litigated the validity of related claims in related U.S. Patent No. 10,687,745 at the ITC and before the Board. In ITC Investigation No. 337-TA-1276 (the “ITC Investigation”), the ITC upheld the validity of Claims 9, 18, and 27 of the ’745 Patent over the same Iwamiya and Sarantos references at issue here. *See* EX2093, 224-240. In IPR2022-01291 and IPR2022-01465, the Board upheld the validity of Claims 13 and 25 of the ’745 Patent but found the other challenged claims unpatentable. EX2035, EX2036. Masimo appealed to the Federal Circuit, and that appeal is pending. *Masimo Corp. v. Apple Inc.*, Appeal Nos. 2024-1635, -1636 (Fed. Cir.). Apple did not appeal the Board’s decision in IPR2022-01465 upholding the validity of Claims 13 and 25.

III. LEVEL OF ORDINARY SKILL IN THE ART

The Board adopted Petitioner’s definition of the level of ordinary skill in the art. Inst., 21-23; EX2100, ¶¶48-49. But Apple’s engineers, who vastly exceeded the level of ordinary skill in the art, expressed serious doubts that oxygen saturation could be measured from the wrist in July 2015 and failed to do so by that time. Thus, as explained below, Apple failed to show unpatentability under any proposed level of skill.

IV. CLAIM CONSTRUCTION***“change the first shape into a second shape”***

Claims 1 and 19 both recite a “material configured to change the first shape into a second shape by which the light emitted from one or more of the plurality of emitters is projected towards [a surface of] the tissue measurement site.”² The phrase does not require a specific first shape or second shape. However, as the parties agreed in the Delaware Litigation, the second shape must be a “shape different from the first shape (not just a change in size).” EX2038, 5; EX2100, ¶50. And the Board has likewise agreed that “this claim limitation in claims 1 and 19 refers to different shapes rather than merely different sizes of the same shape.” Inst., 24.

Notably, Apple never informed its expert, Anthony, that Apple agreed to this construction of “second shape” months before Anthony’s declaration. EX2107, 52:16-53:3, 60:9-62:1. Apple never explained why it withheld an agreed construction from its expert.

² Claim 19 omits “a surface of.”

V. GROUNDS 1A, 1C, 1D, AND 1G (SARANTOS ALONE)
FAIL TO DEMONSTRATE OBVIOUSNESS

A. Apple Failed to Demonstrate That Sarantos Discloses Changing a First Shape of Light into a Different Second Shape (Claims 1 and 19)

Independent Claims 1 and 19 both require a “material configured to change the first shape into a second shape.” The Board instituted Apple’s Petition based on Apple’s argument that Sarantos by itself discloses this limitation. Inst., 29 (citing Pet., 9-10, EX1003, ¶35 (“light shining through a translucent or transparent material as described in the specific arrangement of Sarantos would *necessarily* change in shape due to the refractive properties of translucent and transparent materials”).³

But Apple’s argument was based entirely on Anthony’s unsupported speculation. Pet., 9-10, 59; EX1003 ¶35. The Board should have rejected Apple’s argument at the institution stage because Anthony’s unsupported opinion was entitled to little or no weight. 37 C.F.R. § 42.65(a). Regardless, the Board should reject Apple’s argument because (1) Apple admitted that Sarantos alone does not disclose a change in the shape of light, (2) light transmitting through a flat transparent or translucent window like in Sarantos does not change shape, and (3) Apple should be estopped from arguing that a transparent or translucent material would “necessarily” change the shape of light based on its successful argument at

³ All emphases added unless noted otherwise.

the ITC that its own microlens array, which is a transparent or translucent material, did not change the shape of light. EX2100, ¶52.

1. **Apple Admitted That Sarantos Does Not Disclose a Change in the Shape of Light**

In IPR2022-01291 and IPR2022-01465 Apple raised Sarantos as prior art to the '745 Patent. Apple expressly admitted that Sarantos *does not* disclose a material configured to change the shape of light from a first shape to a different second shape. During oral argument in IPR2022-01291 and IPR2022-01465, Apple stated:

Sarantos doesn't describe the material as configured to change the first shape of light entering the material from the light source 2208 to a different second shape of light exiting the material towards the tissue. And so, turning to slide 51, we see that Shie describes such material.

EX2099, 18:14-21. Apple's admission was directed towards the "translucent or transparent material" in Sarantos's Figure 22, which Apple relied upon in the Petition. *Id.*; Pet., 9-10. Apple thus correctly admitted that Sarantos does not disclose a material configured to change the shape of light. EX2100, ¶53. Apple's prior admission should end the inquiry.

2. **Light Transmitting Through Sarantos's Window Would Not Change Shape**

The Board recognized that Apple's Sarantos-only argument was not a "traditional obviousness modification and rationale" because Apple did not argue that it "would have been obvious to modify Sarantos to include such a feature." Inst.,

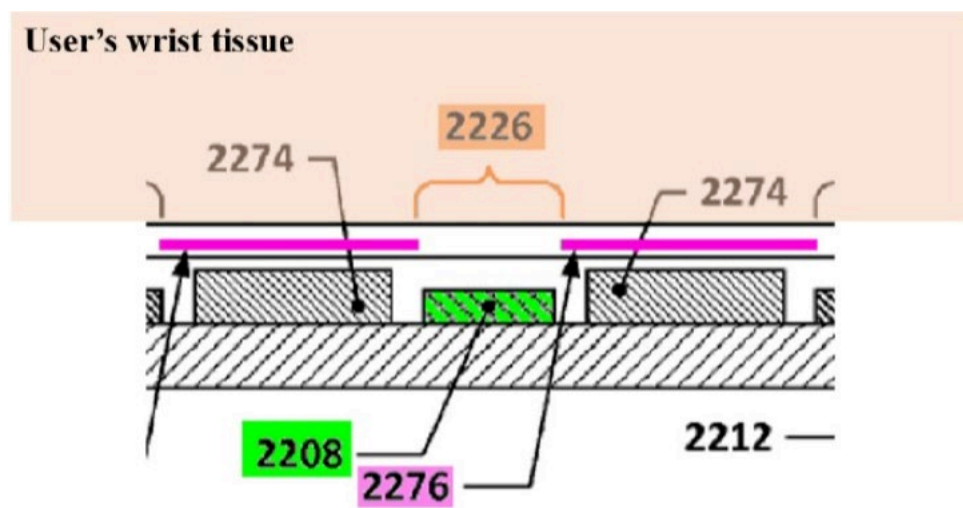
29. Instead, the Board understood Apple’s argument as “a POSITA, when interpreting Sarantos, would understand that its translucent or transparent window material would ***necessarily*** change the shape of the light.” Inst., 29; *see* Pet., 9-10 (“light shining through translucent or transparent material would change in shape due to the refractive properties of translucent and transparent materials”), EX1003 ¶35 (“light shining through a translucent or transparent material as described in the specific arrangement of Sarantos would necessarily change in shape due to the refractive properties of translucent and transparent materials”). Apple’s argument that light passing through Sarantos’s window would “necessarily” change the shape of light is an inherency argument. *See Akamai Techs., Inc. v. Cable & Wireless Internet Servs., Inc.*, 344 F.3d 1186, 1192 (Fed. Cir. 2003) (“A claim limitation is inherent in the prior art if it is necessarily present in the prior art, not merely probably or possibly present.”). But Apple’s argument is wrong and is contrary to its statements during oral argument in IPR2022-01291 and IPR2022-01465. EX2100, ¶54.

The prosecution history of parent application 16/532,065 confirms that there are refractive materials that do not change the shape of the light. EX2100, ¶55. Masimo interviewed the ’065 Application with the Examiner on February 13, 2020. EX2056 at 162. The interview summary stated: “Agreement was reached that Applicant’s proposed claim amendments, which reflect a change in shape of emitted

light beyond a change in size, defined over the Examiner’s citation of judicial notice of emitted light passing through a lens.” *Id.* A POSITA would have understood that a lens magnifies images through optical refraction. EX2100, ¶56. While a lens is an example of a translucent and transparent material, a lens that simply changes the size of the shape of light, without more does not change the shape of light. *Id.* Thus, Apple’s assertion that “light shining through translucent or transparent material would change in shape due to the refractive properties of translucent and transparent materials” (Pet., 9-10) is false because the prosecution history already identified such a material that does not change the shape of light. EX2100, ¶56.

Indeed, the parties agreed based on that prosecution history that the “second shape” must be a “shape different from the first shape (not just a change in size).” EX2038, 5. But Anthony did not even apply the agreed construction, let alone demonstrate the claimed change in shape. EX2107, 61:12-62:1; EX2100, ¶57. Nor could he when he did not perform any testing and testified that the shape of light emitted by Sarantos’s LED is “unknown.” EX2107, 41:11-42:9, 110:19-111:14. Notably, Anthony was questioned about what the shapes of light would be in Sarantos and in other examples and Apple’s counsel objected to such questioning as “call[ing] for speculation.” EX2107, 110:19-111:14; *see also id.* 94:2-10, 105:11-18. That is precisely Masimo’s point: Anthony’s opinions were nothing more than speculation.

Moreover, a POSITA would not expect that Sarantos's window would change the shape of light. EX2100, ¶58. The Petition pointed to window region 2226 in Sarantos's Figure 22 and asserted that "light shining through translucent or transparent material would change in shape due to the refractive properties of translucent and transparent materials." Pet., 9-10. Apple's annotations to Sarantos's Figure 22 are reproduced below:



Pet., 9. But a POSITA would not understand Sarantos's window 2226 to change the shape of light, particularly because a change in shape cannot be merely a change in size. EX2100, ¶59. As shown above, Sarantos's window is depicted as flat in Figure 22. And a POSITA would know that a flat window does not result in any change in the shape of light. *Id.* Flat windows are commonplace. For example, nearly all windows on buildings are flat translucent or transparent materials. Yet a

POSITA would have understood that the shape of light does not change when it passes through such a window. *Id.*

Apple's reliance on refraction is inapposite. Pet., 9-10. Refraction through a flat translucent or transparent material does not change the shape of light. EX2100, ¶60. The law of refraction, or Snell's law, describes how light bends at the interface between two media with different indices of refraction. *Id.*; EX2097, 60-63. That is how lenses work to magnify images. EX2100, ¶60. But, as the parties agreed based on the prosecution history, changing the size of a shape is not claimed. EX2038, 5. Moreover, when light transmits through a flat material, refraction would cause the light to emerge parallel to how it entered the material. EX2100, ¶60; EX2097, 62-63.

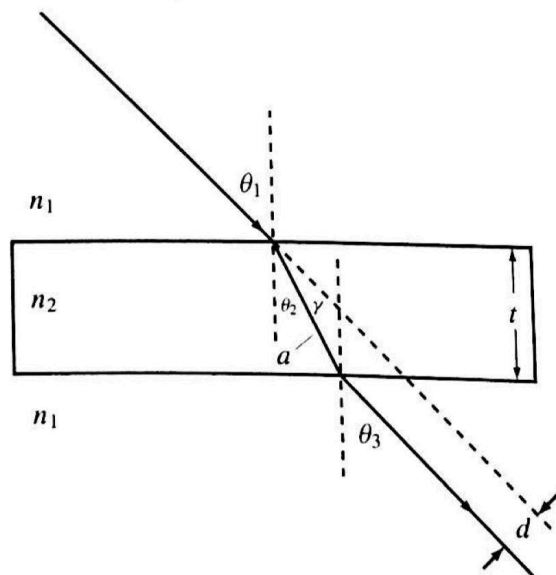


Figure 3.3. Light rays refracting through a slab of material with parallel sides.

Id. That would result, at most, in a shape of light with a slightly different size, but not a different shape. EX2100, ¶60.

Accordingly, Sarantos does not disclose a “material configured to change the first shape into a second shape.” *Id.*, ¶¶61-62.

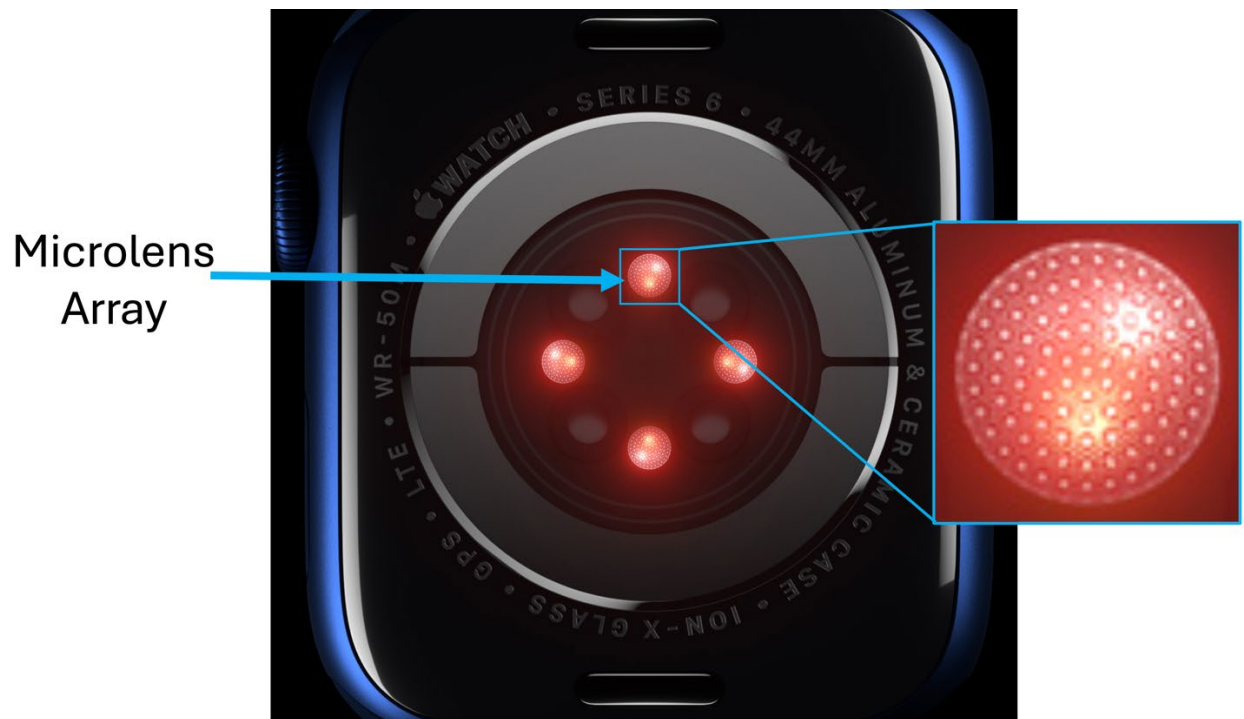
3. **Apple Should Be Estopped From Arguing Translucent or Transparent Materials Would Necessarily Change the Shape of Light**

Apple should also be estopped from arguing that light passing through a transparent or translucent material would necessarily change in shape based on its contrary and successful argument at the ITC. Specifically, Apple successfully convinced the ITC that a microlens array (MLA), which is a considerably more complex translucent or transparent material than the flat window in Sarantos’s Figure 22, did not change the shape of light. Having won that argument, Apple should now be estopped from arguing the inconsistent position that the shape of light would *necessarily* change shape when passing through a translucent or transparent material due to refraction.

Estoppel “protect[s] the integrity of the judicial process” by “prohibiting parties from deliberately changing positions according to the exigencies of the moment.” *New Hampshire v. Maine*, 532 U.S. 742, 749-750 (2001) (citations omitted). “[A] party should not be allowed to gain an advantage by litigation on one theory, and then seek an inconsistent advantage by pursuing an incompatible

theory.” *Id.* (quoting 18 C. Wright, A. Miller, & E. Cooper, Federal Practice and Procedure § 4477, p. 782 (1981)). Courts may estop an inconsistent argument when: (1) a party’s later position is “clearly inconsistent” with its earlier position, (2) the party “succeeded in persuading a court to accept that party’s earlier position, so that judicial acceptance of an inconsistent position in a later proceeding would create ‘the perception that either the first or the second court was misled,’” and (3) “the party seeking to assert an inconsistent position would derive an unfair advantage or impose an unfair detriment on the opposing party if not estopped.” *Id.*, 750-751.

During the ITC Investigation, the parties litigated whether the MLA in the accused Apple Watches changed the shape of light from a first shape to a second shape as required by Claims 9 and 27 of related U.S. Patent No. 10,687,745 (the “’745 Patent”). EX2093, 187-191. The MLA is a translucent or transparent material that is placed between the LEDs in the Apple Watch and the user’s wrist when the Apple Watch is in use, as shown below.



EX2107, Depo. Ex. 1 at 4 (annotated); *see also id*, 93:10-22 (Anthony agreeing the MLAs “have some translucent or transparent properties”). As shown above, the MLA is a much more complex translucent material due to its arrangement of numerous microlenses of different shapes and sizes than the simple flat window in Sarantos’s Figure 22.

Despite the complexity of the MLA, Apple successfully convinced the ITC that the MLA did not change the shape of light. According to Apple’s ITC expert, the shapes of light before and after the MLA were both “more or less circular” and “relatively the same.” EX2093, 189. The ITC accepted Apple’s position and thus Apple prevailed in arguing that the MLA, an example of a translucent or transparent material, did not change the shape of light passing through it. *Id.*, 190-191.

Here, however, Apple argued the opposite—that the shape of light would necessarily change when passing through a translucent or transparent material. Under Apple’s present position that light would necessarily change in shape when passing through a translucent or transparent material, the ITC would have found that the MLA satisfied the relevant claim limitation. Indeed, Apple’s IPR expert Anthony admitted that under his analysis, the MLA in the Apple Watch changed the shape of light. *See* EX2107, 90:21-95:5, 97:13-99:3 (“[Y]ou had asked me a question whether [the Apple Watch is] changing the light. And I said, yes.”).

Thus, allowing Apple to maintain its current inconsistent argument in this IPR would grant Apple an enormous unfair advantage and extraordinary prejudice to Masimo. In the ITC Investigation, Apple’s successful argument that the MLA did not change the shape of light was the *sole reason* the ITC did not find a violation of Section 337 based on the ’745 Patent. EX2093, 180-199. The ITC held that the asserted claims of the ’745 Patent were not invalid or unenforceable and that Masimo met the domestic industry requirements for the ’745 Patent. *Id.* at 336. But for Apple’s successful argument that the MLA did not change the shape of light, the ITC would have found a violation of Section 337 based on the ’745 Patent.

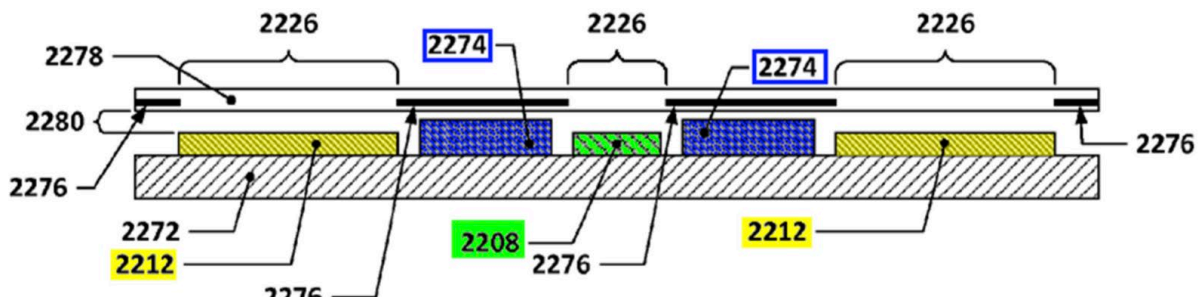
Accordingly, as an equitable matter, Apple should be estopped from arguing that the shape of light would necessarily change when passing through a translucent or transparent material. Apple therefore failed to demonstrate that Sarantos alone

discloses a “material configured to change the first shape into a second shape” as required by Claims 1 and 19. Accordingly, Apple’s Grounds 1A, 1C, 1D, and 1G fail to demonstrate obviousness for Claims 1, 19, and their challenged dependent claims.

B. Sarantos Does Not Disclose the Claimed Array of Detectors and Light Block (Claim 5)

Claim 5 requires a “plurality of detectors are arranged in an array having a spatial configuration corresponding to a shape of a portion of the tissue measurement site bounded by the light block.” However, Sarantos does not disclose this limitation. Instead, Apple’s Petition relied on hindsight to reconstruct the limitation based on three alternative arguments. EX2100, ¶63.

First, Apple relied on Sarantos’s Figure 22 and pointed to the walls 2274 as the “light block.” Pet., 18-19. Apple’s annotations to Figure 22 are reproduced below, with the walls 2274 highlighted in blue:



Pet., 19 (Apple’s annotations to EX1005, Fig. 22); EX2100, ¶64. But Figure 22 shows a cross-section of Sarantos’s sensor taken from the side, which does not show the shape of the walls 2274 when viewed from above. *Id.*, ¶65. A POSITA would

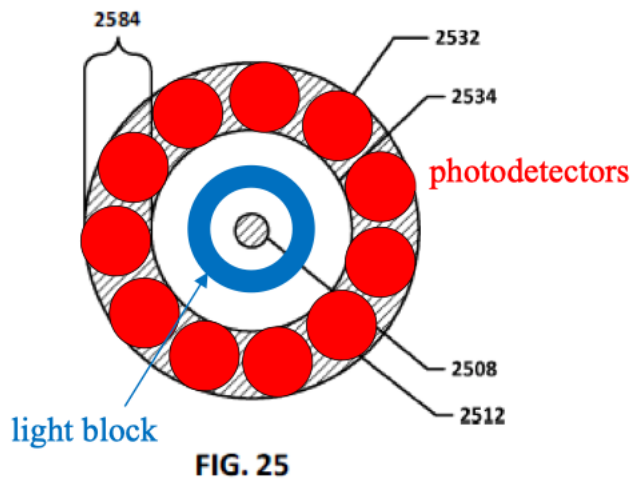
not be able to identify the “shape of a portion of the tissue measurement site bounded by the light block” from Sarantos’s Figure 22. *Id.* For example, the cross-section of the walls 2274 would be consistent with several possibilities, including two separate walls, a square wall, a rectangular wall, a circular wall, or a myriad of other shapes. *Id.* Thus, because the shape of the alleged light block is not disclosed, Sarantos’s Figure 22 does not disclose that its plurality of detectors are arranged in an array that corresponds to the shape of the tissue measurement site bounded by the alleged light block. *Id.*

Apple pointed to a different embodiment, Sarantos’s Figure 25, regarding the shape of the light block. Pet., 19. Apple argued that Figure 25 shows an annular photodetector and that therefore, it would have been obvious to use a circular light block. Pet., 19-21. But Figure 25 does not show any light block at all, let alone identify the shape of that light block. EX1005, Fig. 25. Figure 25 therefore does not inform a POSITA as to what shape the light block would be. EX2100, ¶66.

Apple also incorrectly argued that implementing the wall 2274 in Figure 25 would result in the light block being arranged in a circular configuration or that a circular light block would have been obvious. Pet., 20-21. But a POSITA would have understood that various shapes of light blocks would have worked with Figure 25’s annular detector, including a square light block. EX2100, ¶67. Indeed, Apple also argued about using a circular light block with a triangular array of

detectors. Pet., 22; EX2100, ¶67. Apple’s expert even admitted that “differently shaped light blocks (e.g., rectangular, triangular, etc.) could be used with the circular configuration of the photodetectors.” EX1003 ¶65. Thus, a POSITA would have understood that the shape of the light block is independent of the arrangement of the photodetectors. EX2100, ¶67.

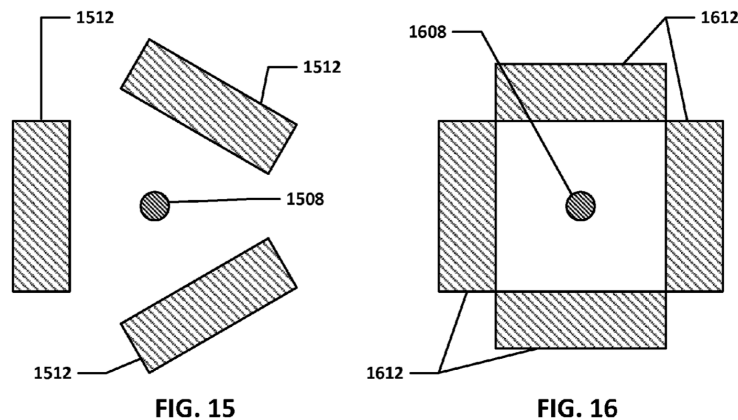
Moreover, Apple’s argument relied on multiple unfounded logical leaps that a POSITA would have had no reason to make. Apple began with Figure 22, which disclosed two detectors but did not disclose the shape of the tissue measurement site bounded by a supposed light block. To create a light block with a specific shape, Apple turned to a different embodiment in Figure 25 which does not disclose any light block at all. But because Figure 25’s single photodetector cannot satisfy the requirement for a “plurality” of detectors, Apple modified Figure 25 to break up the single annular detector into eleven smaller detectors, shown below.



Pet., 21 (Apple’s annotations to EX1005, Fig. 25).

Apple failed to articulate any reasonable explanation why a POSITA would have been motivated to perform this multi-step modification that flip flops between two, one, and eleven detectors and attempts to reconstruct a specific shape for the light block and detector arrangement. Only hindsight could have provided the motivation. EX2100, ¶¶68-69.

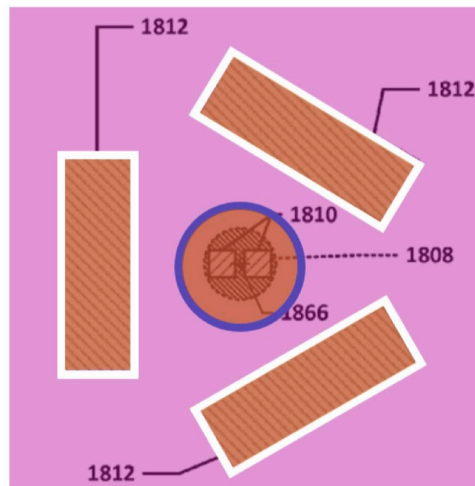
Second, Apple presented an alternative argument based on Sarantos’s Figures 15 and 16 instead of Figure 25. Pet., 21-23. Figures 15 and 16 are shown below, showing a triangular and square arrangement of photodetectors. EX1005, Figs. 15, 16; EX2100, ¶70.



Apple argued in a single sentence that “FIGs. 15-16 provide this claim, disclosing multiple photodetector elements (three and four respectively) arranged in an array corresponding to a circular shape about their respective light sources.” Pet., 21-22. But Apple’s conclusory statement failed to identify the shape of the light blocks in Figure 15-16. Those figures do not show any light block. EX2100, ¶71. Thus, it is impossible to determine whether the photodetectors in Figures 15 and 16 are in an

array that corresponds to the shape of the tissue measurement site bounded by a light block. *Id.*

Third, Apple argued that a POSITA would have implemented a circular light block with the three photodetectors in Sarantos's Figure 18, as shown below:



Pet., 22 (Apple's annotations to EX1005, Fig. 18). But this configuration does not meet the claim limitation. As Masimo explained during the prosecution of a related application, three photodetectors cannot correspond to a circular shape. EX2057, 322; EX2100, ¶72. The Board has repeatedly affirmed that Masimo's statements during prosecution exclude arrangements of two or three photodetectors when the light block has a circular shape. *See* EX2035, 109-112; *Apple Inc. v. Masimo Corp.*, IPR2024-00243, Paper 11 at 17-19 (PTAB July 9, 2024).

Accordingly, Apple fails to demonstrate that Claim 5 would have been obvious.

C. **Apple Represented That Sarantos Does Not Disclose a Diffuser (Claim 14)**

Claim 14 recites “a diffuser configured to be positioned between the plurality of optical sources and a tissue measurement site on the wrist of the user when physiological monitoring device is in use.” Apple refers to this as limitation 14.2. However, Apple did not argue that Sarantos discloses such a diffuser. Pet., 57-58. Instead, Apple argued, “Sarantos-Utter provides, or at least renders obvious, elements [14.0]-[14.6] for the reasons discussed in Ground 1B.” *Id.* But that argument fails for three reasons. EX2100, ¶73.

First, Ground 1B is directed to a combination of Sarantos with Shie, not Sarantos alone. And in Ground 1B, Apple relied on Shie, not Sarantos, as disclosing a “diffuser.” See Pet., 40-41 (arguing Limitation [14.2] is met by a diffuser from Shie combined with Sarantos); EX2100, ¶74. Anthony’s declaration similarly refers to his Ground 1B argument. See EX1003 ¶171 (referencing “element [14.2] in Ground 1B, above”).

Second, even if Apple and Anthony both meant to refer to Ground 1A, Ground 1A did not address Claim 14 and did not identify any diffuser in Sarantos. EX2100, ¶75. As the Board acknowledged in the Institution Decision, the “analysis addressing Ground 1A may not adequately address limitation 14.2.” Inst., 33.

Third, Apple expressly admitted that Sarantos **does not** disclose a diffuser. In IPR2020-01722, which challenged related U.S. Patent No. 10,470,695 based on

Sarantos, Apple conceded: “Neither Sarantos nor Mendelson-1991 disclose a diffuser.” EX2105, 63; *see also* EX1011, 17-18 (“[Apple] expresses that all features of claims 6, 14, and 21, with the exception of a diffuser, are found in Sarantos and Mendelson-1991.”); EX2100, ¶¶76-77.

Accordingly, Apple fails to demonstrate that Claims 14 and dependent Claims 16, 17, and 18 would have been obvious.

D. Sarantos Does Not Disclose a “Light Block Having a Circular Shape” (Claim 14)

Claim 14 requires “a light block having a circular shape” and a “plurality of detectors are arranged in an array having a spatial configuration corresponding to a circular shaped light block.” Apple’s arguments in Grounds 1G and 1H for these limitations refer to its Ground 1B argument, which in turn refers to its Claim 5 argument. Pet., 58, 68, 41. Apple’s arguments therefore failed for the same reasons as Claim 5. *Supra* §V.B; EX2100, ¶78.

E. Apple Failed to Address Claim 24

Apple argues in both Grounds 1G and 1H that Claim 24 would have been obvious based solely on a cross-reference to its Claim 12 argument. Pet., 68, 70. However, Claims 12 and 24 are different. Claim 12 concerns the “opening defined in the dark-colored coating” having a different width and length whereas Claim 24 concerns the “second shape” of light having a different width and length. Apple therefore fails to demonstrate Claim 24 would have been obvious. EX2100, ¶79.

VI. GROUNDS 1B, 1E, 1F, AND 1H (SARANTOS AND SHIE)
FAIL TO DEMONSTRATE OBVIOUSNESS

A. Apple Is Collaterally Estopped From Arguing a POSITA Would Have Been Motivated to Combine Sarantos and Shie (All Challenged Claims)

Apple’s Grounds 1B, 1E, 1F, and 1H are based on a combination of Sarantos with Shie. Apple presented the same arguments regarding Sarantos and Shie in IPR2022-01465. In that Final Written Decision, the Board held that Apple failed to demonstrate a motivation to combine Sarantos with Shie. *See* EX2036, 137-148. Apple did not appeal the Board’s decision in IPR2022-01465 and that part of the decision is now final. The Board’s Institution Decision invited Masimo to explain the impact of the IPR2022-01465 Final Written Decision on this proceeding. *Inst.*, 34-35. The impact is that Apple is collaterally estopped from rearguing that a POSITA would have been motivated to combine Sarantos and Shie.

“Collateral estoppel protects a party from having to litigate issues that have been fully and fairly tried in a previous action and adversely resolved against a party-opponent.” *Ohio Williwow Wood Co. v. Alps South, LLC*, 735 F.3d 1333, 1342 (Fed. Cir. 2013). Collateral estoppel applies to IPR proceedings and is met when “(1) the issue is identical to one decided in the first action; (2) the issue was actually litigated in the first action; (3) resolution of the issue was essential to a final judgment in the first action; and (4) [the party against whom collateral estoppel is being asserted] had a full and fair opportunity to litigate the issue in the first action.” *Google LLC*

v. Hammond Dev. Int’l, Inc., 54 F.4th 1377, 1381 (Fed. Cir. 2022) (citation omitted).

Moreover, collateral estoppel can also apply to claims of a related patent. *Id.* (citing *Ohio Willow Wood*, 735 F.3d at 1342; *see also SynQor, Inc v. Vicor Corp.*, 988 F.3d 1341, 1353-54 (Fed. Cir. 2021); *M2M Sols. LLC v. Amazon.com, Inc.*, No. 2022-1122, 2023 WL 2154964, at *2, *4 (Fed. Cir. Feb. 22, 2023) (applying collateral estoppel to similar claims of related patent based on prior IPR final written decision).

All the requirements for collateral estoppel are met here.

1. The Parties Litigated the Same Issue of Whether a POSITA Would Have Been Motivated to Combine Sarantos and Shie in IPR2022-01465

In IPR2022-01465, the parties litigated the same issue presented here: whether a POSITA would have been motivated to combine Sarantos with some optical material from Shie to change the shape of light. IPR2022-01465 involved limitations of the related ’745 Patent that Apple has characterized in the Delaware Litigation as “almost identical” to the limitations at issue in the ’159 Patent. EX2098, ¶144. The relevant limitations from the ’745 and ’159 Patents are shown below:

'745 Patent Limitation 1[B]	'159 Patent Limitations [1.2] & [19.3]
a material configured to be positioned between the plurality of light-emitting diodes and tissue on a wrist of a user when the physiological monitoring device is in use, the material configured to change the first shape into a second shape by which the light emitted from one or more of the plurality of light-emitting diodes is projected towards the tissue;"	a material positioned between the plurality of emitters and a tissue measurement site [on a wrist of a user] when the physiological monitoring device is in use, the material configured to change the first shape into a second shape by which the light emitted from one or more of the plurality of emitters is projected towards [a surface of] the tissue measurement site;" ⁴

Apple argued in this Petition that a POSITA would have been motivated to combine Sarantos and Shie based on the same reasoning it argued in IPR2022-01465. Indeed, Apple admitted that the present Petition “applies largely the same prior art to similarly address claims that closely resemble those of the ’745 patent” and more specifically, “the *same* Sarantos-Shie combination.” Pet., 71. In IPR2022-01465, the Board summarized Apple’s Sarantos-Shie arguments as follows:

Apple asserts it would have been obvious “to use the light shape changing material of Shie in the wristwatch sensor of Sarantos in between LEDs 2208 and the user’s wrist tissue,” in order to: (1) “precisely direct the light emitted toward the tissue so as to increase power efficiency by shining light closer to photodiodes [2212], as light not incident on the photodiodes represents wasted power”; (2) “increase accuracy of measurements by directing light towards a larger area to decrease irregular readings caused by moles or other aberrations on the skin”; and/or (3) “obscure the LED’s appearance from a user.”

⁴ Claim 19 omits the bracketed text.

EX2036, 139 (quoting Apple’s IPR2022-01465 Petition).

Apple presented those same arguments in its Petition here. *See* Pet., 31 (obvious to “use the light shape changing material of Shie in the wristwatch sensor of Sarantos to implement Sarantos’ region 2226, which is positioned by Sarantos between LEDs 2208 and the user’s wrist tissue”); *id.*, 32-33 (“precisely direct the light emitted toward the tissue so as to increase power efficiency by shining light closer to photodiodes, as light not incident on the photodiodes represents wasted power”); *id.*, 33-34 (“increased accuracy of measurements by directing light towards a larger area to decrease irregular readings caused by moles or other aberrations on the skin”; *id.*, 34-35 (“obscure appearance of the light source from a user”).

Moreover, in IPR2022-01465, the Board found that Apple failed to show a motivation to combine because Apple did not specify which of Shie’s numerous optical elements would provide the alleged benefits. EX2036, 143-144. As the Board noted, “it is impossible to evaluate the merits of these assertions without first identifying a particular lens structure for use in Sarantos’s Figure 22 sensor.” *Id.* The Board thus correctly concluded: “We reject the notion that *any* light shape changing material would have achieved these three benefits in Sarantos’s Figure 22 sensor.” *Id.*

Apple’s current Petition presents the same unspecific arguments that the Board previously rejected. Like in IPR2022-01465, the Petition did not identify a

specific optical element from the numerous optical elements disclosed in Shie that would provide all the alleged benefits from the combination. Instead, the Petition referred to various portions of Shie’s disclosures generally and stated that “Shei [sic] provides numerous examples of various lens shapes and structures that provide the disclosed light shaping functionality.” Pet., 32 (citing EX1007, Figs. 1a-8b). Apple’s citation to Figures 1a-8b of Shie encompasses *nine* different optical elements, including a Fresnel lens, two cylindrical lenses, a parabolic convex lens, a fiber optic cable, a prismatic optical element, a polarizer, a wave guide filter, and a parabolic concave lens. EX1007, 4:49-5:17.

Apple’s discussion of limitation [1.2] was similarly nonspecific. Pet., 36-38. There, Apple argued that “Shie gives numerous examples of how such a light shaping element can be beneficially implemented in the resulting combination,” and discussing multiple different optical elements including “‘micro-structures’ in a substrate,” “a parabolic convex lens,” “a lightpipe with micro-structures,” “a conventional cylindrical lens,” and “a Fresnel lens” without explaining how any one of those numerous elements would provide the alleged benefits. *Id.* Thus, the motivation to combine Sarantos and Shie issue presented in Apple’s current Petition is identical to the issue that was already finally adjudicated in IPR2022-01465.

Additionally, the Board’s Institution Decision requested the impact of any “differences in the record here compared to that in the -1465 IPR” on any decision

in this IPR. Inst., 34-35. As explained above, however, Apple’s arguments here are the same as the arguments it presented in IPR2022-01465. The Petition here does cite some additional references, such as Exhibit 1022, to support the same motivations to combine it presented in IPR2022-01465. But Apple’s reliance on new evidence does not change the result substantively, as discussed below in Section VI.B, and also because “[c]ollateral estoppel applies ‘even if new evidence exists.’” *SynQor*, 988 F.3d at 1355 (citation omitted). Apple’s current Petition “is precisely the type of rematch that collateral estoppel is intended to foreclose to serve the interests of repose and finality.” *Id.*

2. The Same Issue Was Actually Litigated in IPR2022-01465, Resolving It Was Essential to the Board’s Final Written Decision, and Apple Had a Full and Fair Opportunity to Litigate

The remaining three requirements for collateral estoppel are also met. The issue of whether a POSITA would have been motivated to combine Sarantos and Shie was actually litigated in IPR2022-01465. EX2036, 137-148. The Board’s resolution of that issue was essential to its final written decision that Claims 13 and 25 of the ’745 Patent were not unpatentable. *Id.* And Apple had a full and fair opportunity to litigate the issue in IPR2022-01465 (and did so) through briefing, expert declarations, and oral argument. Apple also had the opportunity to appeal the Board’s final written decision in IPR2022-01465 to the Federal Circuit but chose not

to. Thus, on April 12, 2024, the Board's decision regarding Sarantos and Shie became final and non-appealable.

Therefore, for Claims 1 and 19 of the '159 Patent, Apple is collaterally estopped in this proceeding from rearguing that a POSITA would have been motivated to combine Sarantos and Shie. Because Apple is estopped from presenting its Sarantos and Shie combination argument, the grounds relying on that argument (Grounds 1B, 1E, 1F, 1H) fail to show the unpatentability of independent Claims 1 and 19. Further, for the diffuser limitation ([14.2]) of independent Claim 14, Apple relies on the same Sarantos and Shie argument. Pet., 40-41. Because Apple is estopped from presenting that argument, the identified grounds also fail to show the unpatentability of Claim 14. Accordingly, collateral estoppel is dispositive of Grounds 1B, 1E, 1F, and 1H.

B. Apple's Motivations to Combine Sarantos and Shie Fail on the Merits for the Same Reasons Decided Previously

Even if the Board were to reevaluate the motivations to combine on the merits, Apple's arguments fail for the same reasons the Board already decided in IPR2022-01465. EX2100, ¶81.

Sarantos and Shie have nothing to do with each other. Sarantos does not discuss placing an optical material between the LED and the user's skin to change the shape of light. EX1005; EX2100, ¶82. And Shie has nothing to do with physiological sensors at all. EX1007; EX2100, ¶82. Instead, Shie discusses, *e.g.*,

“automotive applications” such as “trailer lights” and “vehicle taillamp construction.” *Id.*, 6:8-11; EX2100, ¶82. Shie does not disclose any material used in physiological sensors or oxygen monitoring. Shie is therefore not relevant to physiological monitoring or the ’159 Patent. EX2100, ¶82. There is no reason why a POSITA would have looked to Shie. *Id.*

Nevertheless, Apple argued that a POSITA would have been motivated to combine Sarantos with some unspecified optical element from Shie for three reasons: (1) “to more precisely direct the light emitted toward the tissue so as to increase power efficiency,” (2) to “direct[] light towards a larger area to decrease irregular readings caused by moles or other aberrations on the skin,” (3) “to obscure appearance of the light source from a user.” Pet., 32-35; EX1003, ¶99; EX2100, ¶83.

But just as in IPR2022-01465, the Petition failed to identify *which* optical element from Shie would provide those benefits and *how*. EX2100, ¶84. Instead, Apple asserted that “Shei [sic] provides *numerous examples* of various lens shapes and structures that provide the disclosed light shaping functionality,” and cited Shie’s Figures 1a-8b. Pet., 32. Those figures encompass at least a Fresnel lens, two different cylindrical lenses, a parabolic convex lens, a fiber optic cable, a prismatic element, a polarizer, a wave guide filter grating, and a parabolic concave lens. EX1007, 4:49-5:17; EX2100, ¶¶84, 89.

The Board previously held that establishing motivation to combine Sarantos and Shie and a reasonable expectation of success requires a “clear, evidence-supported account of the contemplated workings of the combination.” EX2036, 139-140 (citing *Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 994 (Fed. Cir. 2017)). The Petition’s vague and nonspecific arguments are insufficient. As the Board explained: “[I]t is impossible to evaluate the merits of these assertions without first identifying a particular lens structure for use in Sarantos’s Figure 22 sensor. We reject the notion that *any* light shape changing material would have achieved these three benefits in Sarantos’s Figure 22 sensor.” EX2036, 143-144. That conclusion is equally applicable to the same arguments presented here. EX2100, ¶84.

Apple’s Petition cited additional references to allegedly support the three motivations to combine Sarantos and Shie. *See, e.g.*, Pet., 33-35 (citing EX1008, EX1009, EX1016, EX1022-EX1025). But the new evidence did not address the fundamental problem that Apple did not identify any specific optical element from Shie that would be combined with Sarantos and explain how that optical element would provide the three alleged benefits. EX2036, 143-145. Thus, the new evidence does not change the result.

Moreover, Anthony’s declaration does not cure the deficiencies in the Petition. Like the Petition, Anthony did not identify any specific optical element in

Shie that could provide all three purported benefits. EX1003, ¶¶99-102; EX2100, ¶85. Moreover, it is unclear how any optical element can provide both purported benefits of “precisely direct[ing] the light ... closer to [the] photodiodes” and “directing light towards a larger area.” *Compare* Pet., 32–33 *with id.* at 33–34. Those two motivations describe opposite effects. EX2100, ¶86.

Accordingly, Apple failed to demonstrate a motivation to combine Sarantos and Shie for the same reasons already decided in IPR2022-01465. EX2100, ¶87.

C. Apple Failed to Demonstrate That the Combination of Sarantos and Shie Would Change the Shape of Light

Claims 1 and 19 require emitters to emit light in a “first shape” and a “material configured to change the first shape into a second shape.” For the substantially similar limitation in the related ’745 Patent, Apple represented that “the relevant comparison is between the shape of light when it reaches the [material] and the shape of light when it emerges from the [material].” EX2074, 65:20-23. But Apple did not perform that comparison here. EX2100, ¶88. Indeed, Apple and its expert could not make the appropriate comparison when its expert conducted no testing and testified that the shape of light, even from a square-shaped LED, is “unknown.” EX2107, 41:11-42:9, 110:19-111:14.

As discussed above, Apple did not identify what specific optical element from Shie would purportedly be combined with Sarantos and instead made various disjointed arguments. EX2100, ¶89. For example, Apple argued that a “diffuser

includes a ‘plurality of surface micro-structures’ that ‘are designed to homogenize light passing through’ the diffuser ‘to produce a predetermined pattern of smoothly varying, non-discontinuous light exiting the’ diffuser.” Pet., 30; *see also id.* at 36 (relying on “light diffusing and shaping advantages”). But that merely describes light diffusion. EX2100, ¶90. A diffuser does not necessarily change the shape of light. *Id.* The ’159 Patent specification explains that a diffuser must be “*further* configured to define a surface area shape.” EX1001, 3:7–10. This is also reflected by Claim 18, which recites that the “diffuser” of Claim 14 “comprises a material configured to change the first shape into a second shape.” EX2100, ¶90; *see Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 910 (Fed. Cir. 2004) (“[A] dependent claim that adds a particular limitation raises a presumption that the limitation in question is not found in the independent claim.”); *see also* EX2093, 190 n.71 (ITC identifying same passage in ’745 Patent as “indicat[ing] that light diffusion, in itself, does not necessarily provide changes in ‘shape.’”).

Apple also quoted various sections of Shie that vaguely refer to “shape the light” and “shaping.” *See* Pet., 36–37. But Shie’s vague references to “shape” and “shaping” do not demonstrate that Sarantos and Shie would change the shape of light (and not just change its size). EX2100, ¶91.

Apple also argued that a “parabolic convex lens,” a “lightpipe,” a “conventional cylindrical lens,” and a “Fresnel lens” would change the shape of

light. Pet., 36–38. But again, Apple relied on its expert’s speculation. Pet., 37-38; EX2107, 41:11-15. Such speculation does not demonstrate a change in shape. EX2100, ¶92. Apple also relied on descriptions in Shie of “shape the light into a narrow distribution” or “provide a broader light distribution pattern,” but those descriptions describe changing the size, not the shape, of light. Pet., 37 (citing EX1007, 7:8-27); EX2100, ¶93. Apple also did not explain how a lightpipe makes any sense in Sarantos’ physiological monitoring device. EX2100, ¶94. Apple also argued that in a cylindrical lens, “a beam of light entering the lens remains unaffected in its width and is spread by the cylindrical lens contour in a direction perpendicular to its width.” Pet., 37 (citing EX1007, 1:20-24). That describes how the light would be projected at a distance away from the lens, but not how the light would appear when it emerges from the lens, as required by the claims. EX2100, ¶¶95-96. Apple also argued that a Fresnel lens would change the shape of light. Pet., 37–38. But Anthony cited no such evidence in support. EX1003 ¶111; EX2100, ¶¶97-98. Instead, he relied on references discussing microlens diffusers, not Fresnel lenses. *See* EX1003 ¶111 (citing EX1053); EX2100, ¶98.

Apple’s unsupported arguments were also inconsistent with its expert’s testimony. For example, Apple relied on Anthony’s declaration that “a circle shaped Fresnel lens with diffusing microstructures would change Sarantos’s *square shaped light beam* ... entering the Fresnel lens into a circle shaped light beam exiting the

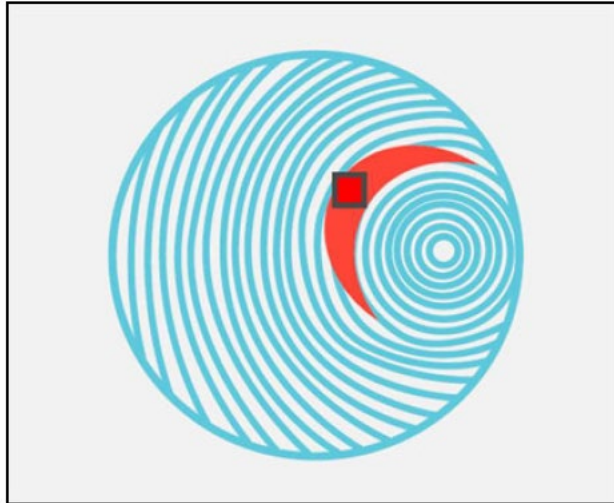
lens.” EX1003, ¶111; Pet., 38. Anthony opined that Sarantos has a “square shaped light beam” based on “square shaped light-emitting devices 1810” in Sarantos. EX1003, ¶111. But Anthony disavowed that conclusion during cross-examination, stating instead that the shape of light from a square-shaped LED would be “unknown.” EX2107, 110:19-111:14; EX2100, ¶99.

Apple also never explained why Anthony opined in this IPR that a square-shaped LED would emit a “square shaped light beam” (EX1003, ¶111) when its ITC expert testified otherwise. Specifically, Apple’s ITC and Delaware expert, Sarrafzadeh, opined that light from a square LED would “change[] from a square to a circular shape without passing through any material.” EX2050, 160, 166-168; EX2098, ¶47 (Sarrafzadeh opining “even an object with a square -surface—such as the LEDs in the Accused Products—will emit light in a cone-shaped pattern” and “[w]hen viewing this conical emission profile from the top-down, the emitted light will appear circular.”), ¶¶229-230.

Additionally, Apple’s argument about the Fresnel lens conflicts with the theory it presented in the ITC that a circular Fresnel lens would change the shape of light into a crescent, not into a circular shape.⁵ Specifically, Apple’s ITC expert

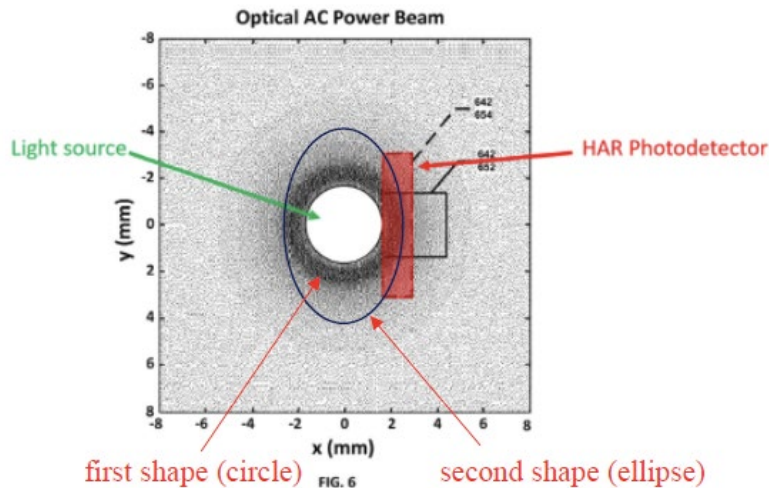
⁵ Apple’s crescent-shape theory in the ITC was also unsupported by evidence. EX2100, ¶100.

presented the following illustration of how he believed a Fresnel lens would change the shape of light into a crescent shape, shown in red below:

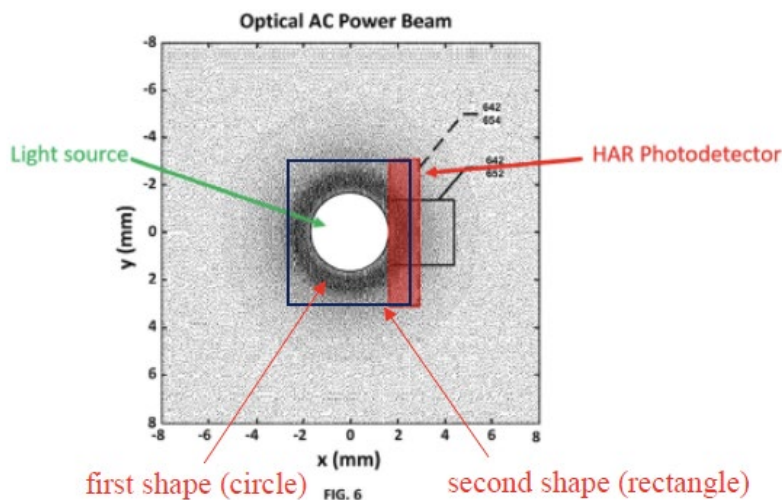


EX2042, 220 (reproducing demonstrative from Apple’s ITC expert’s testimony); EX2100, ¶100. Apple cannot meet its evidentiary threshold when its experts fundamentally disagree and do not know what the shapes of light would be.

Additionally, Apple’s expert declaration confirms that Apple and Anthony misapplied the “first shape” and “second shape” limitations to the prior art. Anthony’s declaration included the following two diagrams showing how he thinks an alleged “first shape” in Sarantos would change into two different “second shape[s].” EX1003, ¶102.



APPLE-1005, FIG. 6 (annotated)



APPLE-1005, FIG. 6 (annotated)

Id. (annotating EX1005, Fig. 6). In both annotated diagrams, Anthony identified a dark ring as the “first shape (circle).” Anthony also identified his own drawings of an ellipse and a rectangle as the alleged “second shape.” But none of those are the claimed “first shape” and “second shape” emitted by the LED and projected towards the tissue as recited in Claim 1 and 19. EX2100, ¶¶101-102.

The dark ring in Sarantos' Figure 6 is **not** the “first shape” of light emitted by Sarantos' light emitter. EX2100, ¶103. Rather, Sarantos explained the dark ring represents the intensity of light that is reflected **out** of the user's skin as a result of light shining into the skin at the center of the region. See EX1005, 6:5-8 (“FIG. 6 depicts a simulation of the AC intensity or power of light that is emanated within a 16 mm by 16 mm region of skin as a result of light that is shined into the skin at the center of the region...”), 10:51-11:3. It is therefore not the claimed “first shape.” EX2100, ¶103.

For the same reason, neither the ellipse nor rectangle that Anthony drew on the figure are the “second shape” of light recited in the claims. EX2100, ¶104. Apple therefore failed to demonstrate that the Sarantos-Shie combination discloses Claims 1 and 19 and their dependent claims. *Id.*, ¶105.

D. Apple Failed to Demonstrate That Determining Oxygen Saturation at the Wrist Would Have Been Obvious In July 2015 (Claims 8, 17)

Claims 8 and 17 depend from Claims 1 and 14, respectively, and further require “the physiological parameter comprises oxygen saturation.” Further, because Claims 1 and 14 specify the measurement takes place at the wrist (Limitations [1.2], [14.1], [14.2]), Claims 8 and 17 require the determination of oxygen saturation at the wrist. However, measuring oxygen saturation at the wrist, as opposed to measuring oxygen saturation from conventional locations like the finger or forehead, would not have been obvious in 2015. EX2100, ¶106.

1. **Sarantos Does Not Disclose Determining Oxygen Saturation at the Wrist**

Sarantos does not disclose determining oxygen saturation measurements at the wrist. EX2100, ¶107. Apple relies on Sarantos’ passing mention of “techniques” to measure “other physiological parameters” like oxygenation using “red *or* infrared” light. Pet., 43 (citing EX1005, 13:44-53). But Sarantos only refers to red “or” infrared LEDs disjunctively. EX1005, 13:47-49 (“It may ... be desirable to utilize an LED that predominantly emits light in the red *or* infrared spectrum”), 13:55-58 (FIG. 2 may have “a red- or infrared-wavelength LED”), 18:44-51 (mentioning “techniques” that may use light “in the red wavelengths, e.g., 660 nm, *or* in the infrared spectrum.”); EX2035, 64 n.13 (Board noting “Sarantos’s use of the disjunctive ‘or’”); EX2100, ¶107. But measuring oxygen saturation does not use either “red *or* infrared” light. Rather, the measurement uses red ***and*** infrared light. EX2100, ¶107; EX1009, 52 (“The two wavelengths chosen for pulse oximetry are 660 nm [red] and 940 nm [infrared].”), 94. Because Sarantos mentions using red *or* infrared light, a POSITA would have understood that Sarantos does not disclose measuring oxygen saturation. EX2100, ¶107; EX1004, 13:44-58, 18:44-51.

Sarantos also admits that it does not concern measuring oxygen saturation. EX1005, 18:42-51; EX2100, ¶108. Sarantos describes concepts of using “high-aspect-ratio” (HAR) photodetectors to provide “improved signal-strength-to-power-consumption performance” for pulse rate sensors. EX1005, Abstract, 10:16-26 (“the

examples discussed herein feature HAR photodetector elements”); Fig. 2. Those concepts are “discussed primarily with respect to light sources that emit green light, e.g., wavelengths in the range of 500 nm to 550 nm.” EX1005, 18:35-41. Sarantos also speculates that its concepts “may see similar performance with light sources that emit predominantly in the 500 nm to 600 nm range, which includes yellow light as well as some light orange light.” *Id.* But Sarantos then concedes it is “not tailored for use in other spectrums, such as the red or infrared spectra.” EX1005, 18:42-51. Because it is “not tailored for use” with red or infrared light, a POSITA would have understood that Sarantos does not disclose measuring oxygen saturation. EX1005, 18:42-51; EX2100, ¶108.⁶

Accordingly, Sarantos does not disclose measuring oxygen saturation at all, much less at the wrist. EX2100, ¶108. And for the many reasons discussed below, a POSITA would not have been motivated to modify Sarantos to measure oxygen saturation at the wrist with a reasonable expectation of success.

⁶ Apple also compared Sarantos to the ’159 Patent to argue Sarantos was enabled. Pet., 27. But Sarantos admitted it was “not tailored” to measure oxygen saturation. EX1005, 18:42-51. And unlike Sarantos, the ’159 Patent resulted in an FDA-cleared wrist pulse oximeter. EX2032.

2. **Apple’s Engineers’ Testimony and Documents Reveal That a POSITA Would Not Have Had a Reasonable Expectation of Success in Determining Oxygen Saturation at the Wrist in 2015**

Apple argued that modifying Sarantos to measure oxygen saturation at the wrist “would be obvious” to allow people exercising, flying planes, or climbing mountains to check their oxygen saturation. Pet., 25. But that argument says nothing more than adding oxygen saturation measurements would allow the measurement of oxygen saturation. EX2100, ¶109. Apple also argues that “such techniques were well-known in the art well before 2015.” Pet., 25. But Apple is wrong.

In 2015, a POSITA would not have reasonably expected measuring oxygen saturation at the wrist to succeed because it had never been done before in a commercial wrist-worn oximeter. EX2100, ¶109. Sarantos is a patent assigned to Fitbit. EX1005. Yet, Fitbit did not release a device that could measure oxygen saturation at the wrist until 2020, five years after the ’159 Patent. EX2100, ¶110; EX2091; EX2092. In a September 2020 Washington Post article, Fitbit’s director of research admitted that “[i]t’s a pretty hard technical problem to measure SpO₂ on the wrist.” EX2088, 4.

Far from being “well-known,” Apple also recognized at the time of the ’159 Patent that measuring oxygen saturation at the wrist was speculative. Lead Apple engineer Brian Land testified that when Apple began developing an oxygen saturation sensor for the wrist in late 2014, measuring oxygen saturation at the wrist

was “unprecedented” and “there were no commercially available products that did blood oxygen sensing at the wrist.” EX2076, 962:25-963:9, 964:2-6; EX2084. Thus, Apple cannot now credibly assert that measuring oxygen saturation at the wrist was somehow “well-known” in 2015. EX2100, ¶112.

Indeed, in 2014, Withings—another medical device company—released a wrist-worn device, but that device could not measure oxygen saturation from the wrist. EX2095. Instead, the device had a “seriously annoying” design where the user was required to remove the device from the wrist strap and place it on a finger to measure oxygen saturation. EX2095, 3-5; EX2100, ¶111.

Further, during the ITC Investigation, Apple elicited testimony from its key engineers who worked on developing a wrist-worn oxygen saturation sensor at the time of the ’159 Patent. Their testimony confirms that as of July 2015, a POSITA would not have had a reasonable expectation of success in modifying Sarantos to measure oxygen saturation at the wrist.

The testimony of Apple’s resident pulse oximetry expert, Dr. Paul Mannheimer, confirms as much. EX2100, ¶113. Apple hired Mannheimer at the end of 2014 [REDACTED]. EX2076, 962:15-963:15; EX2094, 17:1-14. Apple specifically sought out Mannheimer for his [REDACTED]. EX2076, 963:10-15; EX2077, 996:25-997:8. Mannheimer is highly skilled in the

relevant art, holding a Ph.D. in biomedical engineering and having spent over twenty years designing pulse oximeters at Nellcor (who was Masimo's largest competitor in the pulse oximetry space at that time). EX2077, 994:2-25, 1009:1-8, EX2080, 180:22-181:4. Mannheimer's first assignment at Apple was [REDACTED] [REDACTED] EX2080, 173:9-173:13; EX2077, 1012:12-25.

Despite his extensive education and decades of experience, Mannheimer admitted that his reaction to receiving that assignment was "internally to my head, *rolling my eyes*, thinking as I thought of in the past with other clients like *good luck with that*." EX2077, 1012:12-22; EX2080, 173:14-174:1. Mannheimer conceded that when he had previously tried to measure oxygen saturation using probes on the wrist, [REDACTED] EX2094, 19:10-20. Mannheimer even told his boss at Apple: "*I don't know if it can be done*." EX2080, 174:2-174:6; EX2077, 1012:23-25; EX2100, ¶113.

Mannheimer's testimony, which is from the perspective of one of extraordinary skill in the art, shows why a POSITA in 2015 would not have reasonably expected to succeed in measuring oxygen saturation at the wrist. EX2100, ¶114. For example, Mannheimer testified that "the wrist is just enormously different from a physiologic perspective than the fingertip or the forehead or the ear, the more conventional sites for pulse oximetry." EX2080, 174:7-18; EX2077,

1012:12-1013:6. He also explained that “the signal is just enormously weak” due to the physiology of the wrist. EX2080, 174:7-18; EX2077, 1012:12-1013:6. He further explained how the products he previously worked on “operated on a much more vascularized tissue bed, usually fingers or forehead,” but “the wrist is just an incredibly different beast.” EX2077 at 998:21-999:11.

Other Apple engineers expressed similar sentiments confirming that a POSITA in 2015 would not have reasonably expected measuring oxygen saturation at the wrist to succeed. EX2100, ¶115. For example, Dr. Stephen Waydo led the team of Apple engineers who developed the algorithm for Apple’s blood oxygen feature. EX2078, 919:1-8. Waydo testified that it was “extremely challenging” to develop the blood oxygen feature, so much so that the assignment [REDACTED] him. EX2078, 938:3-24. He also testified that “[t]he wrist is one of the most difficult places on the body to do almost every physiological measurement.” EX2081, 166:4-16. Specifically, he explained that [REDACTED]

[REDACTED]

[REDACTED] *Id.* He testified that [REDACTED]

[REDACTED]

[REDACTED] EX2078, 923:24-924:4.

Waydo’s colleague, Dr. Tao Shui, similarly testified that the [REDACTED]

of his work was that the “watch is worn on the wrist, and the wrist is well known for

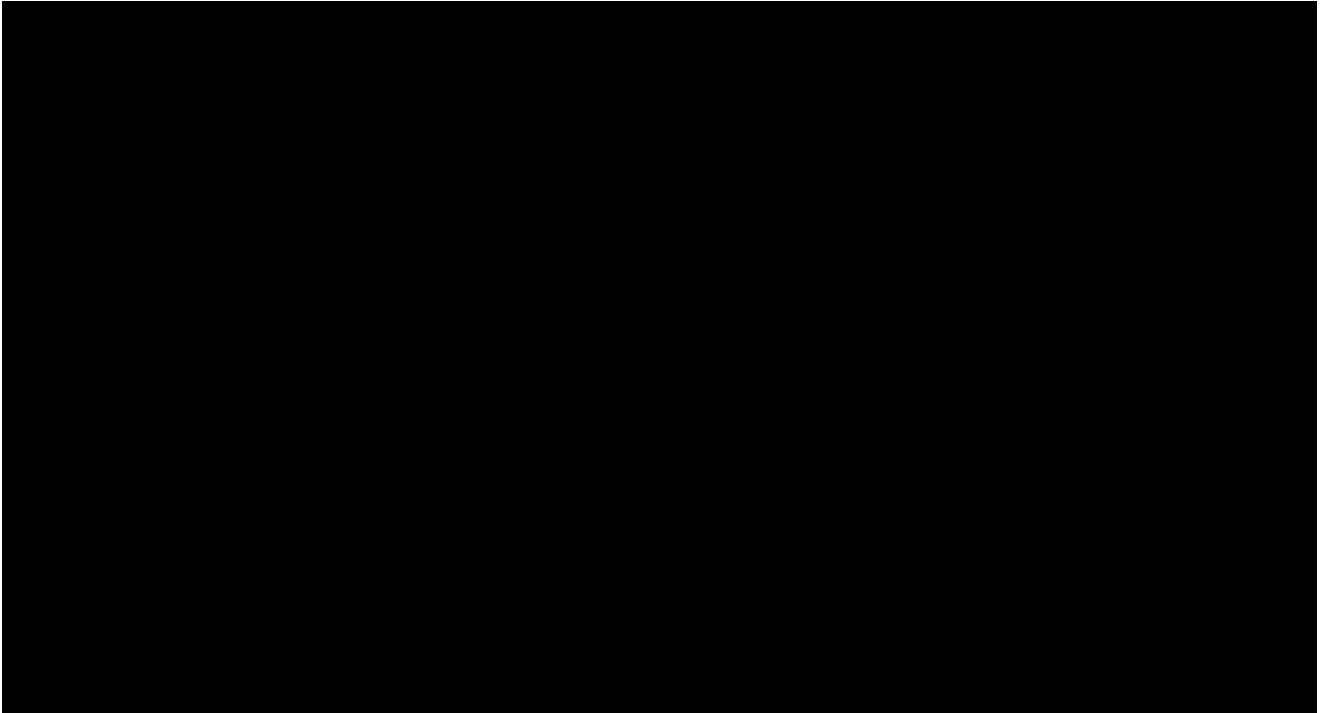
its lack of signal.” EX2082, 108:13-21; EX2100, ¶116. Waydo also explained that despite his team of highly skilled engineers being “just a small piece of the overall puzzle” for Apple Watch, they spent “something like 20 or 30,000 hours of engineering time just on that [oxygen saturation] algorithm architecture.” EX2078, 919:1-8, 925:23-926:6.

Apple’s R&D documents corroborate its engineers’ skepticism and their inability to measure oxygen saturation at the wrist by July 2015, showing a POSITA at the time would not have reasonably expected that measurement to succeed. EX2100, ¶117. On July 30, 2015—four weeks *after* the ’159 Patent—

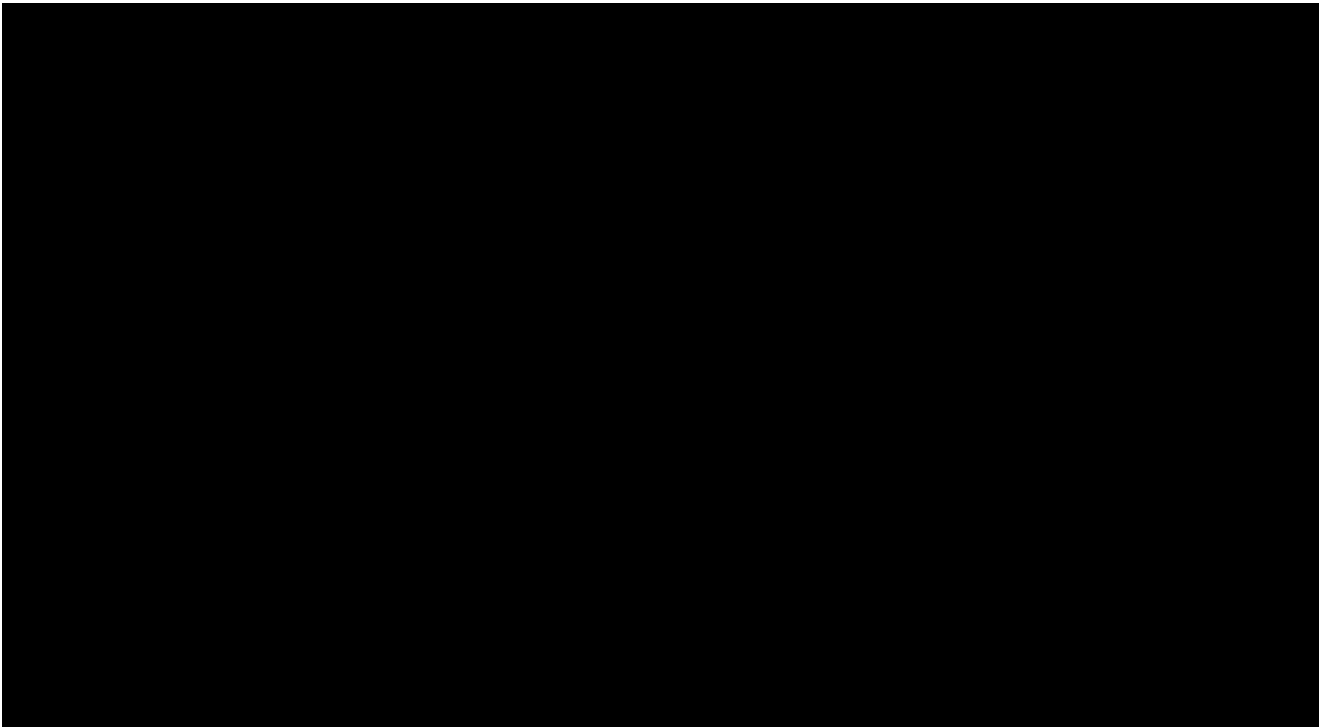
EX2085; EX2076, 981:19-983:1, 989:21-990:9. They investigated whether conventional methods of pulse oximetry could work at the wrist,

See EX2085 at 7. But they concluded that conventional methods would not work.

EX2100, ¶117; EX2085, 7-9.



Id. at 8.



Id. at 9.

The presentation went on to detail the engineers' conclusions from their investigation. They reported that "Conventional sensing methods *do not result* in waveforms that are consistent enough for SpO₂ measurements at the wrist." *Id.* at 13. Apple's engineers thus concluded, weeks after the '159 Patent, that "*Invention is required*" to measure oxygen saturation at the wrist. *Id.* Specifically, they explained that [REDACTED]

[REDACTED] at the wrist. *Id.* And [REDACTED] Apple's engineers could not even estimate [REDACTED]

[REDACTED] *Id.*; EX2094, 79:11-80:1. Indeed, [REDACTED] Apple's engineers were so far from expecting to succeed at measuring oxygen at the wrist that they questioned [REDACTED] EX2085, 13; EX2100, ¶118.

Moreover, Mannheimer revealed that in their 2015 research, Apple's engineers were not yet measuring oxygen saturation at all. He testified that [REDACTED] between red and infrared light. EX2094, 26:2-28:2. But even then, Apple's engineers were struggling to measure a reasonable modulation ratio. Mannheimer testified that they were measuring modulation ratios [REDACTED]

EX2094, 28:3-29:19. Those measurements were [REDACTED]

[REDACTED] *Id.*; EX2100, ¶119.

If measuring oxygen saturation at the wrist were “well-known” in 2015 as Apple alleged (Pet., 25-26), then Apple’s engineers who were “world experts” with “years of experience designing and shipping PPG sensors” (EX2089, 2) would have been able to implement that technique by that time. EX2100, ¶120. Yet, Apple’s engineers were not able to do so by 2015 and expressed serious doubt about the ability to measure oxygen saturation at the wrist, as explained above. Instead, Apple’s engineers ultimately were unsuccessful in developing such a feature until releasing Apple Watch Series 6 in September 2020. EX2080, 174:19-175:5, EX2088. Accordingly, despite their extraordinary skill in the art, Apple’s engineers did not expect to succeed in measuring oxygen saturation at the wrist by July 2015 and at that time were far from achieving a sensor that could do so. Therefore, as the ITC already found, the testimony of Apple’s engineers demonstrates that a POSITA would have lacked a lack of reasonable expectation of success in determining oxygen saturation at the wrist. EX2093, 231; EX2100, ¶120.

Despite the above evidence and the ITC’s conclusion that this evidence showed no reasonable expectation of success, the Board reached the opposite conclusion in IPR2022-01291. There, the Board speculated that Apple’s engineers

[REDACTED] and

“[t]hat fact alone belies Masimo’s position that Exhibit 2085 demonstrates a lack of reasonable expectation of success in July 2015.” EX2096, 99. The Board stated that Apple’s documentation only demonstrated “that there were challenges to be overcome in this regard, but those challenges were not so significant as to deter Apple from expecting to succeed in its product development efforts.” *Id.* However, the Board’s conclusion in IPR2022-01291 is wrong for numerous reasons.

First, Apple never raised such an [REDACTED] argument. And the Board was not “free to adopt arguments on behalf of petitioners that could have been, but were not, raised by the petitioner during an IPR.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1381 (Fed. Cir. 2016). Thus, it was error for the Board to raise and adopt that speculative argument on Apple’s behalf.

Second, even if Apple’s engineers received [REDACTED] to continue developing a wrist-worn pulse oximetry sensor, that is an irrelevant business decision. The [REDACTED] has no bearing on the relevant inquiry, which is whether a POSITA would have reasonably expected success in measuring oxygen saturation at the wrist in July 2015. The Board erred by elevating the assumed [REDACTED] over the testimony and evidence from those who were actually skilled in the art—Apple’s engineers. But in 2015, those engineers found that conventional methods of pulse oximetry would not work at the wrist, “invention is required,” and that they could not even estimate a development timeline due to

██ EX2085, 13; EX2100, ¶121. Apple’s engineers’ testimony and contemporaneous documents—not speculation ██████████
██████████—show the actual expectations of a POSITA at the relevant time. And their testimony and documents confirm a lack of reasonable expectation of success.
Id.

Third, the Board incorrectly discounted the testimony of Apple’s engineers as limited to challenges developing an oxygen saturation feature for Apple Watch rather than a reasonable expectation of success in determining oxygen saturation at the wrist “at all” or using Apple’s primary reference in that IPR. EX2096, 99-100. The Board cast aside the engineers’ testimony for allegedly not providing testimony from the perspective of a POSITA. But Apple’s engineers were skilled artisans who were working on the same problem addressed by the ’159 Patent at the time of that patent. Additionally, their testimony showed that a POSITA in 2015 would have lacked a reasonable expectation of success in measuring oxygen saturation at the wrist using any approach. For example, Mannheimer said, “*I don’t know if it can be done.*” EX2080, 174:2-174:6; EX2077, 1012:23-25. And the evidence showed that the lack of expectation of success was due to physiology of the wrist and the resulting lack of signal at that location, not extraneous issues with the Apple Watch. *See, e.g.*, EX2080, 174:7-18; EX2077, 998:21-999:11, 1012:12-1013:6; EX2078, 923:24-924:4, 938:3-24; EX2081, 166:4-16; EX2082, 108:13-21; EX2085, 7-9, 13.

Thus, the Board erred by not crediting this testimony, which reflects a POSITA's understanding at the relevant time.

Fourth, the Board elevated (a) the engineers' testimony about irrelevant development work that was conducted later over (b) their testimony about the difficulties and skepticism surrounding measuring at the wrist in 2015. EX2096, 100-101. For example, the Board minimized the significance of Apple's engineers' testimony based on the "small form factor" of the Apple Watch. *Id.* But at the relevant time in 2015, Apple's engineers were not struggling with the form factor of an Apple Watch or other constraints the Board cited. EX2100, ¶¶122-123. Rather, they were at square one, investigating whether oxygen saturation could be measured from the wrist at all, and they did so using prototype sensors that were not limited to the form factor of an Apple Watch. *Id.*; EX2085, 7-12; EX2080, 173:9-13 (Mannheimer broadly tasked with [REDACTED] [REDACTED]). Apple's documents confirm that their development was divided into various stages, and form factor would not be a constraint until at least three stages later. EX2085, 12; EX2100, ¶123.

Finally, the Board discounted the testimony of Apple's engineers because the challenges they faced "did not deter the engineers from continuing their product development efforts." EX2096, 102. But that finding contradicts the facts and is legally wrong. The Board cited no authority, and Masimo is aware of none, requiring

that engineers *completely give up* for their testimony to be relevant to assessing reasonable expectation of success. The relevant inquiry is simply whether Apple’s engineers reasonably expected in July 2015 to successfully measure oxygen saturation at wrist. And the evidence shows they did not. Instead, the engineers concluded that “conventional sensing methods” did not work to measure oxygen saturation at the wrist and “Invention is required” to do so. EX2085, 13. Their contemporaneous belief that “invention is required” is the antithesis of having a reasonable expectation of success at the relevant time. EX2100, ¶124. Indeed, “there can be little better evidence negating an expectation of success than actual reports of failure.” *Boehringer Ingelheim Vetmedica, Inc. v. Schering-Plough Corp.*, 320 F.3d 1339, 1354 (Fed. Cir. 2003). And the above-described Apple testimony and documents show such failure as of the time of the ’159 Patent.

In sum, for the reasons explained above, the testimony of Apple’s engineers and contemporaneous Apple documents confirm that a POSITA in 2015 would not have had a reasonable expectation of success in modifying Sarantos to measure oxygen saturation at the wrist.

3. Apple’s References Do Not Establish a Reasonable Expectation of Success

Apple argues that measuring oxygen saturation at the wrist was “well-known in the art well before 2015” based on six references. Pet., 25-26 (citing Sarantos,

EX1014-EX1016, EX1018, EX1021). But Apple’s references do not demonstrate that such measurements were “well-known” or somehow establish a reasonable expectation of success in achieving such measurements. EX2100, ¶125.

As the Board previously held, the requirement to “determine ... oxygen saturation” in the claims of the related ’745 Patent “requires actually calculating an oxygen saturation.” EX2096, 45-47. That construction should apply here to the same limitations of the ’159 Patent. EX2100, ¶126. At most, Apple’s references report detecting a PPG signal or modulation ratio. *Id.* But that is not determining oxygen saturation at the wrist and does not supply a reasonable expectation of success in the modification of Sarantos that Apple relies on. *Id.*

Sarantos (EX1005) does not disclose measuring oxygen saturation at the wrist at all, as explained above. *Supra* §VI.D.1; EX2100, ¶127.

Pang (EX1014) does not present any oxygen saturation determinations from the wrist. EX2100, ¶128. Instead, the only data presented are separate red and infrared waveforms. There is no indication that these waveforms are time-correlated, which is a very important factor. *Id.* Further, Pang relies on simulated data in Figure 13 rather than actual data, showing that its authors were not able to determine oxygen saturation using Pang’s design. *Id.*; EX1014, 1566 (noting use of simulator). Pang also does not demonstrate whether a POSITA would have had a reasonable expectation of success in modifying Sarantos to measure oxygen

saturation because unlike Sarantos, Pang used a “special design of its concave shape [to] help[] the sensor module to stay in the chosen location of the wrist.” EX1014, 1567; EX2100, ¶128. [REDACTED]

[REDACTED]. Thus, Pang does not show a reasonable expectation of success in the proposed modification. EX2100, ¶128.

Li (EX1015) is a paper coauthored by one of Apple’s experts in the ITC Investigation (Warren). EX2100, ¶129. But Li does not report any measurement of oxygen saturation from the wrist. Li expressly states, “At present, it is difficult to consistently obtain high quality PPG data from the wrist.” EX1015, 276; EX2100, ¶129. Li also presents three PPG signals apparently measured from the wrist, but from only a single unknown wavelength of light, not the two that would be needed to determine oxygen saturation. *Id.* And that is significant because measuring oxygen saturation requires two consistent and correlated PPG signals. EX2100, ¶129; EX2083, 9 [REDACTED]; EX2085, 8-9 [REDACTED]. And Li could only measure those signals if the locations of the user’s arteries were known. EX1015, 276; EX2100, ¶129. Li thus does not demonstrate that a POSITA would have had a reasonable expectation of success in modifying Sarantos to measure oxygen saturation. EX2100, ¶129.

Notably, Dr. Warren testified during the ITC Investigation about his pulse oximetry experiments, but the ITC found his testimony unpersuasive as to measuring oxygen saturation at the wrist. EX2093, 116-117. And Apple’s engineers were also aware of Li and Warren’s work. In a related litigation, Apple produced Kejia Li’s Master’s thesis that was apparently the basis for the Li (EX1015) article. EX2101. That Master’s thesis was [REDACTED]

[REDACTED]. *Id.* Li clearly does not disclose a sensor design that would measure oxygen saturation at the wrist, because Apple’s engineers knew of Li and yet still were unable to achieve measuring at the wrist at the relevant time. EX2100, ¶129.

Cai (EX1016) also does not support a reasonable expectation of success. Cai does not present any oxygen saturation measurements from the wrist. EX2100, ¶130; EX1016. Rather, Cai depicts a “Change map of the value of R after breath holding for 10s and 25s,” but R is not an oxygen saturation determination. EX1016, 1900; EX2100, ¶130. Moreover, Apple’s engineers were well aware of Cai even by 2013, yet Apple’s engineers still expressed that conventional sensing methods would not work to measure oxygen saturation at the wrist and that invention was still needed. [REDACTED]

[REDACTED] [REDACTED] [REDACTED]
[REDACTED]. *Id.*, 78. Despite being aware of Cai, the engineers still were unable to measure oxygen saturation at the wrist at the

relevant time. Thus, Cai also does not demonstrate a reasonable expectation of success. EX2100, ¶130.

Maattala (EX1018) similarly does not demonstrate a reasonable expectation of success. EX2100, ¶131. The authors expressly stated that they “concentrated on studying SNRs and signal amplitudes instead of finding out actual SpO2-readings.” EX1018, 1858. Thus, Maattala does not show any determinations of oxygen saturation. EX2100, ¶131. Indeed, the authors indicated “[m]any problems still have to be overcome.” EX1018, 1860; Abstract (“many problems, that should be overcome, were detected.”) Maattala identified a location on the wrist for follow-up research, but Maattala does not support a reasonable expectation of success in determining oxygen saturation at the wrist, much less Apple’s position that such measurements were so well-known they were routine. EX2100, ¶131. Moreover, Apple’s engineers were also aware of Maattala. Again, in a related litigation, Apple produced Maattala [REDACTED] [REDACTED]. EX2103. Despite being aware of Maattala, Apple engineers still were unable to measure oxygen saturation at the wrist at the relevant time. Thus, Maattala also does not demonstrate a reasonable expectation of success. EX2100, ¶131.

Apple’s last reference, Brady (EX1021), also does not support a reasonable expectation of success for determining oxygen saturation at the wrist. EX2100,

¶132. Brady is a patent application filed by Impact Sports Technologies. EX1021, Cover. Brady mentions oxygen saturation but much of its disclosure focuses on calculating burned calories. *Id.*; EX2100, ¶132. Moreover, Brady’s under-the-wrist sensor is applied to a completely different site than Sarantos, which is for the top of the wrist. *Compare* EX1021, Figs. 1-2, 5 *with* EX1005, FIGS. 1-2; EX2100, ¶132. And as a patent application, Brady does not evidence the existence of any device that determined oxygen saturation at the wrist before July 2015. [REDACTED]

[REDACTED]. EX2086, 3-4, 7-10. Despite being aware of Impact’s devices, Apple engineers still were unable to measure oxygen saturation at the wrist at the relevant time. Thus, Brady also does not demonstrate a reasonable expectation of success. EX2100, ¶132.

Additionally, if such techniques were “well-known” as Apple argues, someone would have made (or at least published about) a device that successfully determined oxygen saturation at the wrist. EX2100, ¶133. But none of the researchers involved with Apple’s cited references ever did so, which would have left a POSITA with the understanding that such measurements were not reasonably expected to succeed in July 2015. *Id.*

Moreover, even if Apple had found a prior art device that could actually measure oxygen saturation at the wrist, the mere existence of such references “does

not establish a reasonable expectation of success in [modifying] the particular prior art reference[] here.” *See, e.g., Juniper Networks, Inc. v. Correct Transmission, LLC*, No. 2023-1046, 2024 WL 3517862, at *6 (Fed. Cir. July 24, 2024). And indeed, none of Apple’s cited references demonstrate a reasonable expectation of success in modifying the *Sarantos* sensor to determine oxygen saturation at the wrist. EX2100, ¶134. Apple’s references neither relate to a sensor design that is remotely similar to *Sarantos*, nor do the references use a material that changes the shape of light as required by the claims. *Id.*

The Petition also improperly incorporated by reference 14 paragraphs from Anthony’s declaration that discuss references not mentioned in the Petition. Pet., 25-26 (citing EX1003, ¶¶71-84), 26-27 (same). The Board previously held in IPR2022-01291 that Apple improperly incorporated similar arguments about additional references through Anthony’s declaration and did not consider them. EX2035, 90-91. Here, the Board should likewise ignore any references not discussed in the Petition. 37 C.F.R. § 42.6(a)(3).

Accordingly, for the above reasons, a POSITA in July 2015 would not have reasonably expected to succeed in modifying *Sarantos*, with or without *Shie*, to determine oxygen saturation measurements at the wrist.

4. **Objective Evidence of Industry Skepticism, Failure of Others, and Long-Felt-But-Unmet Need Further Support Nonobviousness**

Objective indicia of nonobviousness “may often establish that an invention appearing to have been obvious in light of the prior art was not.” *Mintz v. Dietz & Watson, Inc.*, 679 F.3d 1372, 1378 (Fed. Cir. 2012) (citation omitted). “A retrospective view of the invention is best gleaned from *those who were there at the time*.” *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1143 (Fed. Cir. 1985).

Claims 8 and 17 require determining oxygen saturation at the wrist. EX2100, ¶135. Apple’s engineers were working on determining oxygen saturation at the wrist at the time of the ’159 Patent in 2015. Their testimony and documents show there was significant industry skepticism at that time about measuring oxygen saturation at the wrist. *Supra* §VI.D.2; EX2100, ¶136. For example, Dr. Mannheimer, is Apple’s resident pulse oximetry expert with over twenty years of experience developing pulse oximeters. EX2077, 993:17-994:25. Dr. Mannheimer testified that his initial reaction to being [REDACTED] [REDACTED] was, “*good luck with that*” and “*I don’t know if it can be done*.” EX2077, 1012:12-25; EX2080, 174:2-174:6. Despite his decades of experience, Mannheimer doubted whether oxygen saturation could be measured from the wrist at the time. EX2100, ¶136. And Apple’s other highly skilled engineers were equally skeptical, as explained above.

In IPR2022-01291, the Board erroneously disregarded the skepticism of Apple’s engineers, reasoning that the challenges they faced “were not so significant to deter Apple and its engineers from continuing their product development efforts.” EX2096, 105. But the Board’s decision cited no authority to minimize skepticism simply because product development continued. Indeed, the Federal Circuit has rejected such a narrow view of skepticism. *See, e.g., Neptune Generics, LLC v. Eli Lilly & Co.*, 921 F.3d 1372, 1377-78 (Fed. Cir. 2019) (rejecting argument that skepticism must be premised on whether it is “technically infeasible,” “unworkable,” or “impossible” that the claimed invention would work and affirming finding that FDA’s concerns demonstrated skepticism even though FDA allowed clinical trials to continue). Rather, a wide range of evidence can constitute skepticism. *See, e.g., Circuit Check Inc. v. QXQ Inc.*, 795 F.3d 1331, 1337 (Fed. Cir. 2015) (holding testimony from customers who were “worried” or “surprised” sufficient to establish skepticism). “[An infringer’s] skepticism is relevant and persuasive evidence of the nonobviousness of [the] invention.” *Gillette Co. v. S.C. Johnson & Son, Inc.*, 919 F.2d 720, 726 (Fed. Cir. 1990). Furthermore, “known disadvantages in old devices which would naturally discourage the search for new inventions may be taken into account in determining obviousness.” *United States v. Adams*, 383 U.S. 39, 52 (1966). Thus, the fact that Apple continued developing their oxygen saturation

feature beyond 2015 does not negate the real skepticism Apple’s engineers expressed at the relevant time in 2015.

Additionally, in IPR2022-01291, the Board erroneously limited the skepticism expressed by Apple’s engineers to “the specific context of developing a future iteration of the Apple Watch.” EX2096, 105. The Board thus incorrectly disregarded their testimony as unrelated to “whether they were skeptical of being able to measure oxygen saturation at the wrist *at all*.” *Id.* (original emphasis). But that was precisely what their testimony addressed: the feasibility in 2015 of measuring oxygen saturation at the wrist at all. EX2100, ¶137.

Mannheimer was not hired by Apple to simply add oxygen saturation measurements at the wrist to the Apple Watch as if that were a conventional feature. Instead, Apple hired Mannheimer [REDACTED] [REDACTED] EX2080, 173:9-13. Mannheimer’s skepticism arose from the physiological problems associated with the anatomy of the wrist. EX2080, 174:7-174:18 (“the wrist is just enormously different from a physiologic perspective than the fingertip or the forehead or the ear, the more conventional sites for pulse oximetry”). And his skepticism was not limited to the Apple Watch, but rather was consistent with how he “thought of it in the past with other clients.” *Id.* 173:14-174:1. Contrary to the Board’s finding, Mannheimer was specifically

skeptical of being able to measure oxygen saturation at the wrist at all. EX2100, ¶137.

Apple's other engineers similarly explained that their skepticism in measuring oxygen saturation at the wrist was due to the physiology of the wrist. EX2100, ¶138. Dr. Waydo explained that "[t]he wrist is one of the most difficult places on the body to do almost every physiological measurement." EX2081, 166:4-16. Dr. Shui likewise testified that the [REDACTED] of working on developing the oxygen saturation sensor was "related to the position of the Apple Watch blood oxygen sensor": "The watch is worn on the wrist, and the wrist is well known for its lack of signal." EX2082, 108:13-21. Apple's 2015 presentation also identified the [REDACTED] with measuring oxygen saturation at the wrist were due to the physiology of the wrist. EX2085, 6. And Apple's engineers were experimenting with [REDACTED]. *Id.*, 12. Thus, the skepticism squarely addressed whether Apple's engineers expressed doubt about whether measuring oxygen saturation at the wrist in 2015 was possible at all, with any device. EX2100, ¶138. Apple's engineers simply did not know at that time, even though Apple hired "world experts" who had "been there, done that" and understood which sensor "ideas are likely to work, and which ones have been tried and failed (and they know why they failed." EX2089, 2. Their testimony shows the

skepticism in the industry toward determining oxygen saturation at the wrist in 2015 in any way, and thus supports the nonobviousness of the claimed inventions.

Additionally, the evidence discussed above demonstrates the failure of others, including Apple, Fitbit, and Withings to achieve a device that determines oxygen saturation from the wrist and a long-felt-but-unmet need for such a device. *See supra* §§VI.D.2-3; EX2100, ¶139. As discussed, Apple’s own engineers tried and failed in 2015 to determine oxygen saturation at the wrist. *Id.*; EX2085, 7-13. As they explained, “Conventional sensing methods do not result in waveforms that are consistent enough for SpO₂ measurements at the wrist” and “Invention is required.” EX2085, 13. Mannheimer even revealed that the [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] EX2094, 28:3-29:19.

Likewise, Fitbit was unable to release a device that measured oxygen saturation from the wrist until 2020. EX2100, ¶140; EX2091; EX2092. And even then, Fitbit had to rely on “long-term averaging” during “overnight measurements.” EX2088, 4; EX2100, ¶140. Withings also released a device in 2014 that was mounted on a wrist strap, yet needed to be *removed and placed on the finger* in order to measure oxygen saturation. EX2095, 3-5; EX2100, ¶140.

Finally, the references Apple cited to support its reasonable expectation of success argument demonstrate that there was a long-felt-but-unmet need in the industry for a device that could determine oxygen saturation at the wrist. EX2100, ¶141. That multiple research groups over the years were investigating the same problem, and yet no such devices were available in 2015 confirms a long-felt-but-unmet need. *Id.* As Apple’s engineers expressed, there were still [REDACTED] [REDACTED] in 2015 impeding development of such a sensor. EX2085, 13.

Accordingly, the objective evidence of industry skepticism, failure of others, and long-felt-but-unmet need demonstrates that Claims 8 and 17 would not have been obvious to a POSITA in 2015. EX2100, ¶142. Instead, as Apple’s engineers expressed in 2015, measuring oxygen saturation at the wrist required “[i]nvention.” EX2085, 13.

VII. CONCLUSION

For the foregoing reasons, Masimo respectfully requests the Board uphold the validity of the challenged ’159 Patent claims.

IPR2024-00244

Apple Inc. v. Masimo Corp.

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: November 5, 2024

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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), Counsel for Patent Owner Masimo Corporation hereby certifies that this document complies with the type-volume limitation of 37 C.F.R. § 42.24(b). According to Microsoft Office Word 2010's word count, this document contains approximately 13,889 words, including any statement of material facts to be admitted or denied in support, and excluding the table of contents, table of authorities, mandatory notices under § 42.8, exhibit list, certificate of service or word count, or appendix of exhibits or claim listing.

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: November 5, 2024

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CERTIFICATE OF SERVICE

I hereby certify that, pursuant to 37 C.F.R. § 42.6(e) and with the agreement of counsel for Petitioner, a true and correct copy of **PATENT OWNER RESPONSE AND EXHIBITS 2069, 2076-2078, 2080-2086, 2088-2089, 2091-2108** are being served electronically on November 5, 2024 to the e-mail addresses shown below:

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