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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 IPR2024-00243
U.S. Patent 10,722,159

PATENT OWNER RESPONSE

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2029	June 6–10, 2022 Public Hearing Transcript, ITC Inv. No. 337-TA-1276
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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
2103	Document produced by Apple in related litigation bearing production numbers APL_MAS_ITC_00311268-73

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2105	Petition, <i>Apple Inc. v. Masimo Corp.</i> , 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. Apple presented no claim constructions in its Petition, leaving all terms to their plain meaning. But Apple argued in the Delaware Litigation that the plain meaning of "opening" requires an absence of material. Under Apple's interpretation of the term's plain meaning, the Petition's prior art does not disclose an "opening" because it is filled with a solid material. Apple thus violated Rules 42.104(b)(3)-(4) because its Petition fails to construe the claims and explain how the construed claims are unpatentable. And the Board cannot adopt an argument on behalf of Apple that the

plain meaning of “opening” encompasses the prior art when Apple did not make that argument.

Other claim elements are also not disclosed and a POSITA would not have been motivated to combine the references with a reasonable expectation of success. Apple argued, for example, that it would have been obvious to modify the prior art to determine oxygen saturation at the wrist. But Apple’s own engineers were skeptical that could be done and failed to achieve it by the July 2015 date of the ’159 Patent. Indeed, at that time, Apple’s engineers did not know if measuring oxygen saturation at the wrist was possible and believed “invention” would be “required” to achieve it.

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. EX2100, ¶39; EX1001, 1:21-25. Before the '159 Patent, conventional pulse oximetry used a “two-dimensional” approach. *Id.*, 5:41-50. In a 2D model, the path of light as it penetrates tissue would be considered a two-dimensional vector. *Id.*, 5:62-65. Conventional wisdom was that a focused point of light would reduce the variability in the light's

¹ Apple falsely alleged that Masimo withheld references from the Examiner during prosecution. Pet., 3-4, 87-88. Apple admitted those allegations were incorrect. *See* EX3001 (Apple requesting to strike such statements from its own petitions).

pathlength through tissue and lead to more accurate measurements. *Id.*, 5:66-6:1; EX2100, ¶39.

The inventor, Al-Ali, recognized that light does not travel in straight paths through tissue due to “multiple scattering” events. EX1001, 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 of the '159 Patent provide novel combinations of these features that improve measurements of oxygen saturation and other parameters from more difficult sites like the wrist. *Id.*, 1:21-25, 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 have received 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 in this proceeding. *See* EX2043, 224-240.

However, in IPR2022-01291 and IPR2022-01465, the Board held the claims other than Claims 13 and 25 of the ’745 Patent unpatentable. EX2035, EX2036. Masimo has appealed the Board’s decisions of unpatentability and that appeal is pending before the Federal Circuit. *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., 13-14; 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

Apple was required to set forth in its Petition “[h]ow the challenged claim is to be construed.” 37 C.F.R. § 42.104(b)(3). Masimo addresses Apple’s failure to construe “opening” in Section V.A. below.

Masimo also construes “through the surface” in the limitation “wherein an opening defined in the dark-colored coating is configured to allow at least a portion of light reflected from the tissue to pass *through the surface*” in Section V.C, below.²

Additionally, the Board’s Institution Decision agreed with Masimo that the Claim 14 limitation “a plurality of detectors ... arranged in an array having a spatial configuration corresponding to a shape of the portion of the tissue measurement site bounded by the circular shaped light block” excludes arrangements of two or three detectors based on statements made during prosecution of a parent application. Inst., 17-19; EX2057, 322; EX2100, ¶¶50-51. The Board should continue to apply that construction in this proceeding.

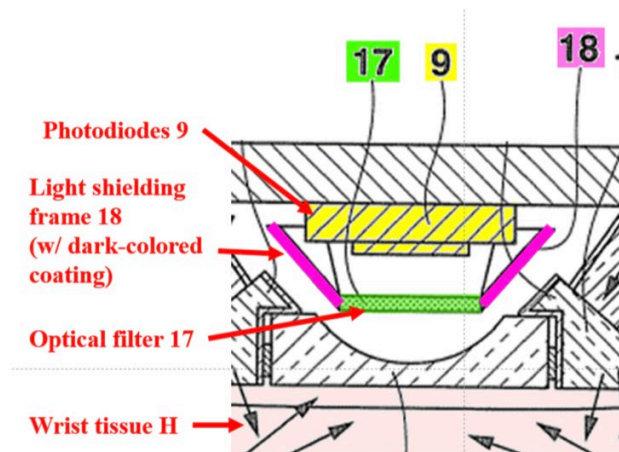
² All emphases added unless noted otherwise.

Finally, in IPR2022-01291, the Board previously held that “determine ... oxygen saturation” in the claims of related ’745 Patent “requires actually calculating an oxygen saturation.” EX2035, 45-47. That construction should apply here to the same limitations of the ’159 Patent. EX2100, ¶110.

V. ARGUMENT

A. Apple Failed to Satisfy 37 C.F.R. § 42.104(b)(3) by Not Construing “Opening” (Claims 1, 19)

The Board’s rules require petitions to explain “[h]ow the challenged claim is to be construed” and “[h]ow the construed claim is unpatentable.” 37 C.F.R. §§ 42.104(b)(3)-(4). But Apple’s Petition fails to satisfy these requirements. In the Petition, Apple asserted that “no claim terms need to be construed,” thus leaving all claim terms to their plain and ordinary meaning. Pet., 5. Apple also argued that “opening” in Claims 1 and 19 encompasses an opening filled with a solid material. See Pet., 23-24, 65. Specifically, Apple argued that Iwamiya’s optical filter 17 (green, below) is the recited “opening.”



Pet., 24 (Apple’s annotations to Iwamiya Fig. 4).

However, Apple argued that the Petition’s interpretation of “opening” is *not* the plain and ordinary meaning of this term. Just three days after filing the Petition, Apple’s expert in the Delaware Litigation (Sarrafzadeh) opined that the plain meaning of “opening” is “empty space,” and that “[a] POSITA would not regard solid material as an ‘opening.’” EX2098, ¶¶465; *id.* at ¶518 (applying “opening” claim construction to ’159 Patent); EX2100, ¶¶53-54. And Apple’s Delaware interpretation of the plain meaning of “opening” was based on the intrinsic evidence. EX2098, ¶¶478-482. Under that interpretation, Apple argued the accused Apple Watches do not infringe because their alleged openings are “filled with solid material, not empty space.” *Id.* Likewise, under that construction, the prior art does not disclose an “opening.” EX2100, ¶¶55-56; EX2107, 65:1-22, 73:11-19 (Anthony agreeing the optical filter is a “material” and “not a vacuum”).

Accordingly, Apple simultaneously argues materially inconsistent plain meanings for the same term: (1) an “opening” cannot be filled with solid material and requires “empty space”; and (2) an “opening” can be filled with solid material. Those constructions conflict with one another and cannot coexist. In its Institution Decision, the Board acknowledged Apple’s inconsistent positions on the plain meaning of “opening” but instituted trial because it was “persuaded that the plain

and ordinary meaning of ‘opening’ encompasses Iwamiya’s optical filter.” Inst., 16. That decision was wrong for several reasons.

First, because Apple interpreted the plain meaning of “opening” in two different ways, Apple “needed to identify in its Petition *what interpretation* of [the term] should be used.” *Unified Patents, LLC v. Cedar Lane Techs. Inc.*, IPR2020-00006, Paper 24 at 9 (Dec. 8, 2021) (“*Cedar Lane*”). The Petition then also needed to show “[h]ow the **construed** claim is unpatentable.” 37 C.F.R. § 42.104(b)(3)-(4). Because Apple’s Petition did neither, Apple violated 37 C.F.R. § 42.104(b)(3)-(4) and thus failed to show obviousness for claims reciting an “opening.” *See, e.g., Cedar Lane*, at 7-10 (finding failure to show obviousness where petition violated 37 C.F.R. § 42.104(b)(3) by not identifying a construction when there were multiple plausible interpretations of the term’s plain meaning).

Second, the Board was “persuaded that the plain and ordinary meaning of ‘opening’ encompasses Iwamiya’s optical filter 17 as mounted within light shielding frame 18.” Inst., 16. But Apple **never** raised that argument. Apple’s only argument about the plain meaning of “opening” comes from the Delaware Litigation, where Apple argued the plain meaning of “opening” is “empty space.” EX2098, ¶465. Because Apple never argued the plain meaning of “opening” encompasses solid material like Iwamiya’s optical filter, the Board was not free to adopt it. *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1381 (Fed. Cir. 2016).

Third, the Board’s preliminary construction of “opening” is not supported by the record here. The Board found that construing “opening” to encompass Iwamiya’s optical filter was “consistent” with its decision in IPR2022-01291 and Masimo’s position in the Delaware Litigation. Inst., 16. But IPR2022-01291 is inapposite because the construction of “opening” was not at issue there. EX2035. The parties’ dispute about the claimed “opening” did not arise until a few days after this Petition was filed, when Apple revealed its Delaware argument that the plain meaning of “opening” in the ’159 Patent is “empty space.” EX2098, ¶465. Further, the Board never explained how it was appropriate to rely on Masimo’s position in Delaware when Apple bears the burden on this issue and has argued that solid material, like Iwamiya’s optical filter, is not a correct interpretation of “opening.” *See, e.g., Ebates Performance Mktg., Inc. v. Int’l Bus. Machs. Corp.*, IPR2022-00439, Paper 11 at 12 (Oct. 3, 2022) (“Having proposed constructions it alleges are incorrect, Petitioner is unlikely to prove in a trial that those constructions are correct.”). Thus, Apple’s Petition failed to comply with Rule 42.104(b)(3) and cannot demonstrate “[h]ow the construed claim[s] [are] unpatentable.” 37 C.F.R. § 42.104(b)(4).

B. A POSITA Would Not Have Been Motivated to Add a Dark-Colored Coating to Iwamiya’s Light Shielding Frame (Claims 1, 19)

Claims 1 and 19 both require “a surface comprising a dark-colored coating ... positioned between the plurality of detectors and the tissue.” Limitations [1.4],

[19.5]. As the Board noted, Apple makes the same arguments that it presented in IPR2022-01291. Inst., 26. Specifically, Apple argues that a POSITA would have combined Iwamiya’s light shielding frame with an in-mold label or silk-screened mask.³ Pet., 21-23, 65. The Board preliminarily adopted that argument “for the same reasons as the Board in IPR2022-01291.” Inst., 26-28. But Apple’s argument, and the Board’s Institution Decision, are incorrect. A POSITA would not have been motivated to apply a dark-colored coating to Iwamiya’s light shielding frame. EX2100, ¶57.

1. A POSITA Would Not Have Looked Beyond Iwamiya for a Light Shielding Material for the Frame, Much Less a Dark-Colored Coating

A POSITA would not have looked to “Sarantos’s in-mold label or other masking techniques as a way to implement opacity in Iwamiya’s light shielding frame.” Inst., 29-30. As explained below, a POSITA would have looked to Iwamiya itself to “implement opacity in Iwamiya’s light shielding frame.” Neither Apple nor the Institution Decision proffered any reason why a POSITA would have ignored the teachings of Iwamiya to instead look to another reference. There is nothing in Iwamiya that teaches away from using the disclosed reflective material for the light

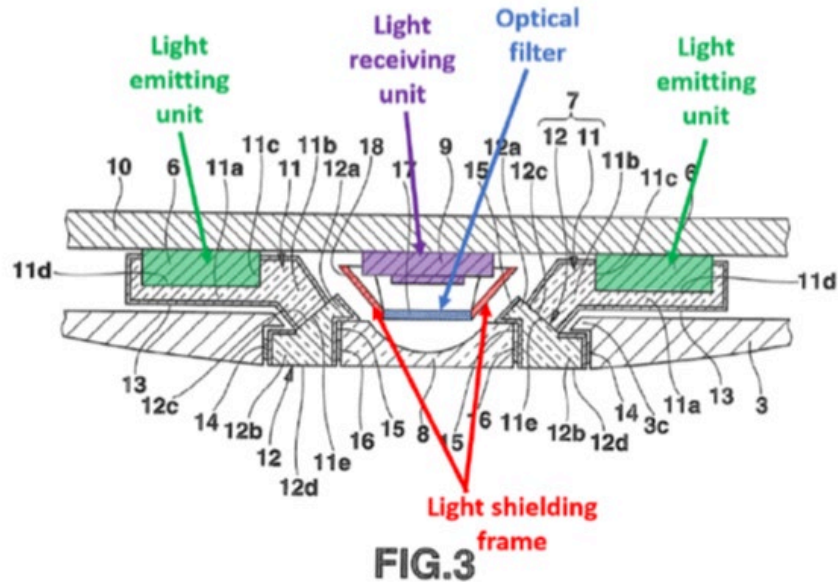
³ Sarantos’s in-mold label is not a coating—it is a label within Sarantos’s window.

EX1005, Fig. 22; EX2100, ¶57 n.4.

shielding frame. Nor would a POSITA read Iwamiya as stating that information from one embodiment cannot be used with another embodiment. Indeed, Apple recognized as much when it conflated Iwamiya's disclosures regarding the light shielding frame with the holder portion in other embodiments.

In IPR2022-01291, the Board premised its decision on its finding that “Iwamiya provides no detail concerning the *structural* configuration of frame 18” and that there was no “disclosure in Iwamiya concerning a specific material or structure of frame 18 that achieves the light shielding function.” *See* Inst., 26 (quoting EX2035, 38-39). The Institution Decision adopted this reasoning, stating that “although Iwamiya describes its light shielding frame as opaque, it does not speak to how its opacity is achieved, i.e., as to what materials and/or coatings are employed in order to render its frame as opaque.” Inst., 28. Thus, the Board viewed the “use [of] Sarantos's specific materials ... as implementing the opacity of Iwamiya's light shielding frame rather than adding to it.” *Id.*

But that reasoning ignores Iwamiya's extensive disclosures concerning the light shielding frame 18's structural configuration and how to perform the function of light shielding. For example, Iwamiya's figures show the structure of the light shielding frame 18 (red):



EX1004, Fig. 3 (annotated); EX2100, ¶¶58-59. Iwamiya also describes the structure of light shielding frame 18 by explaining that it is “light shielding,” “surround[s] the light receiving unit 9,” and holds the optical filter 17. EX1004, 8:38-42, Figs. 1-4. Thus, a POSITA would have understood the structure of frame 18 and its “light shielding” function. *Id.*; EX2100, ¶59. Accordingly, a POSITA would have understood that Iwamiya’s light shielding frame 18 was already made of light shielding material. *Id.*

Iwamiya’s disclosure did not “invite” a POSITA to look to another reference to disclose a “suitable light-shielding material” because Iwamiya already identifies a material that provides a “light shielding” function. Inst., 27 (quoting EX2035, 38-39); EX2100, ¶60. In IPR2022-01291, the Board recognized “Iwamiya’s description of holder portion 43 establishes that a reflective material is one example of a structure that may be used in frame 18 to perform its light shielding function.”

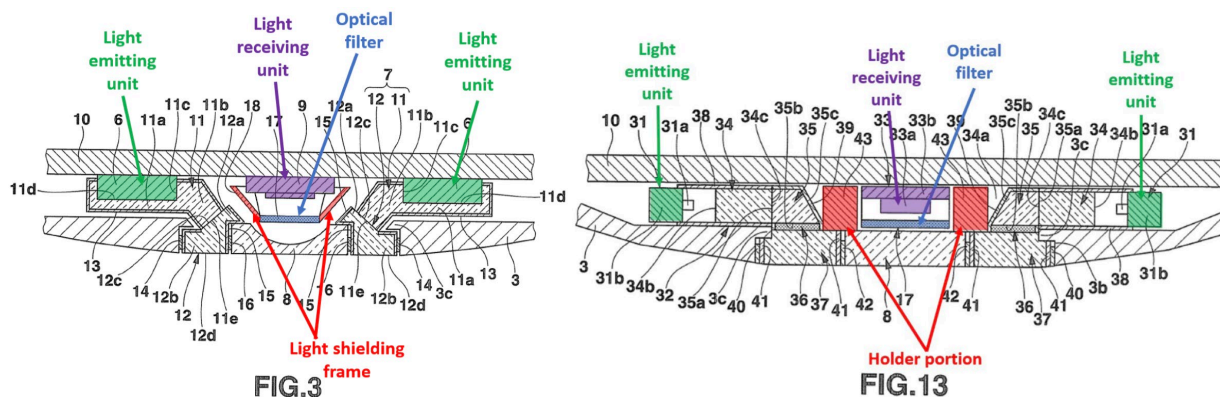
EX2035, 40-41; EX1004, 18:61-65 (“holder portion 43 of the light receiving unit 33 is formed of a metal with a light shielding property, such as aluminum, and its surface is subject to alumite treatment to have a reflection function.”); *see also id.* at 28:64-29:5, 39:20-24. Indeed, Iwamiya used the same “light shielding” terminology for both the frame and the material. EX2100, ¶60. Thus, a POSITA would have understood that Iwamiya already disclosed that metal, such as aluminum, accomplishes the light shielding function. *Id.*

In IPR2022-01291, the Board dismissed Iwamiya’s disclosure of metal as pertaining to a holder portion 43 from another embodiment with “a different structure than light shielding frame 18.” EX2035, 40. But that reasoning makes little sense—if a POSITA would not have viewed Iwamiya’s own disclosure as relevant, a POSITA certainly would not have turned to a completely different structure from a different patent (Sarantos). EX2100, ¶61.

The Board dismissed Iwamiya’s description of holder portion 43 because Iwamiya used a different reference numeral “43” instead of “18.” EX2035, 40. But the use of a different reference numeral is not dispositive. Indeed, Iwamiya used different reference numerals for the same or analogous structures between its various embodiments such as “light emitting units 6” and “light emitting units 31,” “light guide unit 7” and “light guide unit 32,” and “light receiving unit 9” and “light receiving unit 33.” EX2100, ¶61. Instead of focusing on the reference numerals, a

POSITA would have recognized from Iwamiya's figures and descriptions that the light shielding frame 18 in the first embodiment and the holder portion 43 in other embodiments are analogous structures that are located in the same location and serve the same purpose of holding the optical filter within their respective sensor designs.

EX2100, ¶62; EX1004, Figs. 13, 16, 19, 18:51-60, 28:52-63, 39:9-19.



EX1004, Figs. 3, 13 (annotated); EX2100, ¶62. Indeed, Apple conflates the light shielding frame 18 and holder portion 43, further confirming that a POSITA would have viewed them as analogous structures. Pet., 10; EX1003, ¶50; EX2100, ¶62. Thus, a POSITA would have had no reason to look beyond the four corners of Iwamiya to a completely different reference for a material to implement Iwamiya's light shielding function. EX2100, ¶62.

Additionally, the Institution Decision stated that Iwamiya “does not speak to how its opacity is achieved, i.e., as to what materials *and/or coatings* are employed in order to render its frame as opaque.” Inst., 28. But Iwamiya does not disclose the use of a coating on the light shielding frame at all. EX2100, ¶63. Rather, Apple's

argument rests on *adding* a coating that was not previously disclosed. EX1004, 8:38-42; Pet., 12. If Iwamiya were actually silent about the material of the frame (it is not), a POSITA would have looked for a material that could provide the structure of the frame 18—not a coating. EX2100, ¶63. The Board’s reasoning that a POSITA would have selected a coating because Iwamiya left the material or structure of the frame up to the designer is akin to a contractor selecting paint because a house blueprint did not specify what a wall is made of. EX2100, ¶64.

Notably, the Board even acknowledged in IPR2022-01291 that Iwamiya disclosed that “reflective material is one example of a structure that may be used in frame 18 to perform its light shielding function,” but skipped over that disclosure and went to a dark-colored coating from Sarantos because Iwamiya did not teach away from a dark-colored material or identify a benefit from using a reflective material. EX2035, 40-41. But that reasoning relied on improper hindsight to ignore Iwamiya’s disclosure and turn to a different reference. Under an analysis not based in hindsight, a POSITA would have chosen metal, as disclosed by Iwamiya, for the light shielding frame 18 precisely because the frame itself is “light shielding” and Iwamiya described metal as providing a “light shielding property.” EX1004, 18:61-64; EX2100, ¶64. There would have been no need for a POSITA to look beyond Iwamiya’s four corners. *Id.*

In IPR2022-01291, the Board also incorrectly suggested that Iwamiya's light shielding frame 18 might be translucent or transparent like Sarantos's window "because Iwamiya does not limit the material or structure to be used in light shielding frame 18." EX2035, 40. But the description "light shielding" describes opaque frame materials rather than something translucent or transparent. EX2100, ¶65. A POSITA would have understood that a frame made of a translucent or transparent material would be inconsistent with the description that the frame itself is a "light shielding frame." *Id.*

Thus, a POSITA would have understood that the light shielding frame 18 is already opaque without the need to add a separate coating to accomplish that function. EX2100, ¶66. And given that the frame 18 itself is light shielding, a POSITA would have had no reason to add a separate dark-colored coating to the frame. *Id.*; *Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1369 (Fed. Cir. 2012) (holding no reason other than hindsight to combine references that accomplish redundant functions).

2. Apple's Alleged Benefits of Using a Dark-Colored Coating Are Based on the Teachings of the '159 Patent

Apple additionally argued that a dark-colored coating would have provided certain benefits, but Apple's arguments were unsupported, based on hindsight in view of the '159 Patent's teachings, and inconsistent with Iwamiya's disclosures.

For example, Apple argued that a “coated light shielding frame has improved characteristics for shielding the photodiodes from stray light, thereby minimizing the amount of light that reaches the photodiodes 9 from LEDs 6 without first being reflected off the user’s skin.” Pet., 9. But Iwamiya’s light shielding frame does not prevent light emitted from the LEDs from reaching the photodetector without first passing through the user’s tissue. EX2100, ¶¶67-68. Indeed, Apple argued that a different structure serves that purpose: the “reflection layers 13 and 15 act as light blocks that prevent light emitted from light emitting unit 6 from reaching the photodiodes/light receiving units 9 without first reaching the tissue of the user’s wrist.” Pet., 25. And Apple argued in a related IPR that this function of preventing light from reaching the photodetector without first reaching the tissue *cannot* inform a POSITA’s understanding of the light shielding frame because it is an entirely different function. In Apple’s own words:

[T]he function of reflection layers is generally different from light shielding frame 18, which is specifically design to shield light from reaching the photodiodes 9. APPLE-1004, 8:38-42. Iwamiya even refers to frame 18 and reflecting layers, e.g., reflection layers 13 and 15, by different terminology, thereby underscoring differences in their respective functions.

IPR2024-00241, Pet., 17. Thus, based on Apple’s representations, a POSITA would not have been motivated to add a dark-colored coating for the purpose of minimizing

the amount of light that reaches the photodetector from the LEDs “without first being reflected off the user’s skin” (Pet., 9) because that is not the function of the light shielding frame. EX2100, ¶69.

Apple also argued that a dark-colored coating would beneficially absorb light rather than reflecting it. Pet., 12. Specifically, Apple argued that a dark-colored coating “would have reduced the amount of arrant [sic] light that could reflect back from the empty space and the optical filer [sic] 17 to the photodiodes” and that a “POSITA would have sought to reduce these effects since any light that reflected back from the space surrounding frame 18 and through the optical filter 17 to the photodiodes would have different path lengths that could increase optical interference and reduce measurement accuracy.” Pet., 12. Apple’s argument is incorrect for several reasons.

First, Apple did not cite competent evidence that a POSITA would have known that pathlength variations caused by reflections within a sensor housing contributes to noise or would reduce measurement accuracy. EX2100, ¶¶70-71; Pet., 12; EX1003, ¶42. Apple relied on Webster (EX1009), 69, 96-97), but Webster does not discuss reflections within a sensor housing causing pathlength variations as a potential source of error. Pet., 12; EX2100, ¶71. Rather, the cited passages discuss light scattering *in tissue* and errors caused by ambient light and emitted light that bypasses the tissue. EX1009, 69, 96-97; EX2100, ¶71. Even Apple acknowledged

that is a different problem the light shielding frame is not designed to address. IPR2024-00241, Pet., 17 (explaining the function of reflection layers 13 and 15 is different from the light shielding frame 18); EX2100, ¶69. Apple’s expert’s testimony is also entitled to little to no weight. Anthony’s declaration did nothing more than repeat the Petition’s argument verbatim. EX1003, ¶42; *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 at 15 (PTAB Aug. 24, 2022) (precedential) (expert testimony that “repeats, *verbatim*, the conclusory assertion for which it is offered to support” is “entitled to little weight”). No prior art of record describes using a dark-colored coating to reduce pathlength variations caused by light reflecting inside a sensor. EX2100, ¶71.

Second, Apple apparently relied on the ’159 Patent’s own teachings to provide the motivation. EX2100, ¶72. The ’159 Patent taught the use of a dark-colored coating to prevent pathlength variations that might occur when light reflects back and forth between the user’s tissue and the sensor—because it is the pathlength of light as it scatters through the user’s tissue that results in more light absorption. EX1001, 8:54-9:7; EX2100, ¶72. Reliance on pathlength variation disclosure from the ’159 Patent is improper hindsight. *W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553 (Fed. Cir. 1983) (“To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a

hindsight syndrome wherein that which only the inventor taught is used against its teacher.”). But Apple misapplied the ’159 Patent’s teachings to light reflecting in the empty space inside a sensor housing. EX2100, ¶72.

Third, if pathlength variations from reflections inside of a sensor (not within the user’s tissue) were the motivation, a POSITA would have disregarded Iwamiya entirely because Iwamiya’s sensor design causes untold amounts of reflections within the light guide, as illustrated below. EX2100, ¶73.

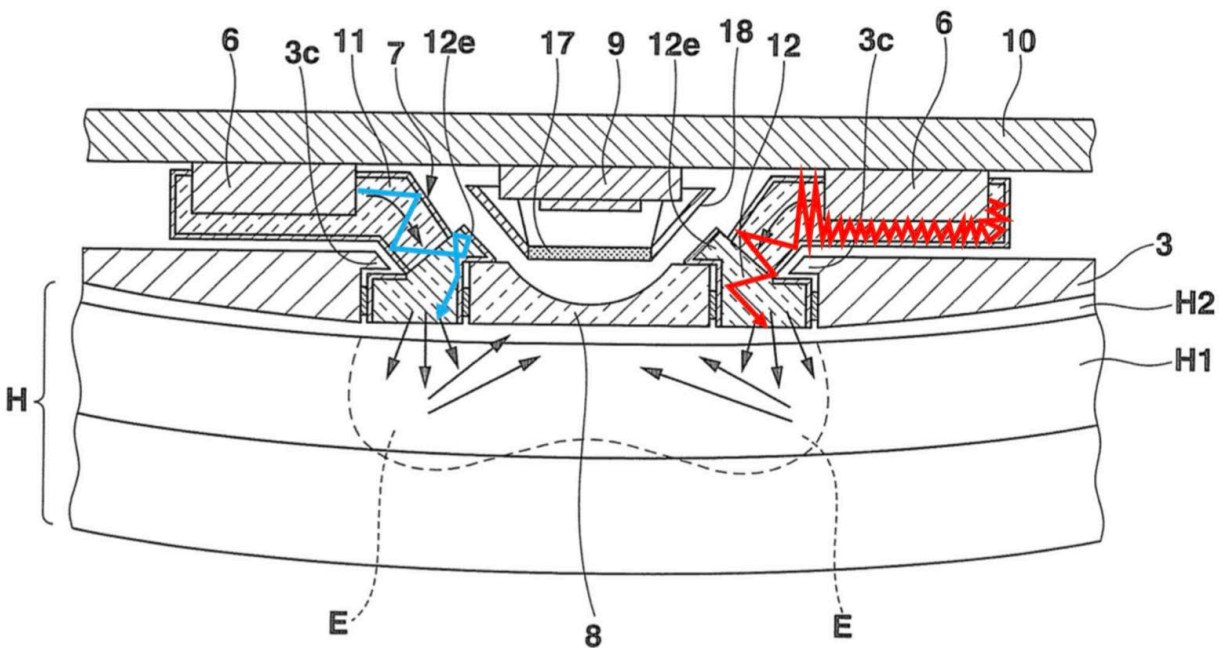


FIG.4

EX1004, Fig. 4 (red and blue annotations show two potential light paths within Iwamiya’s light guide as a 2D feature—actual light paths would be more complex due to the 3D shape of the light guide and scattering); EX2100, ¶73. Thus, a

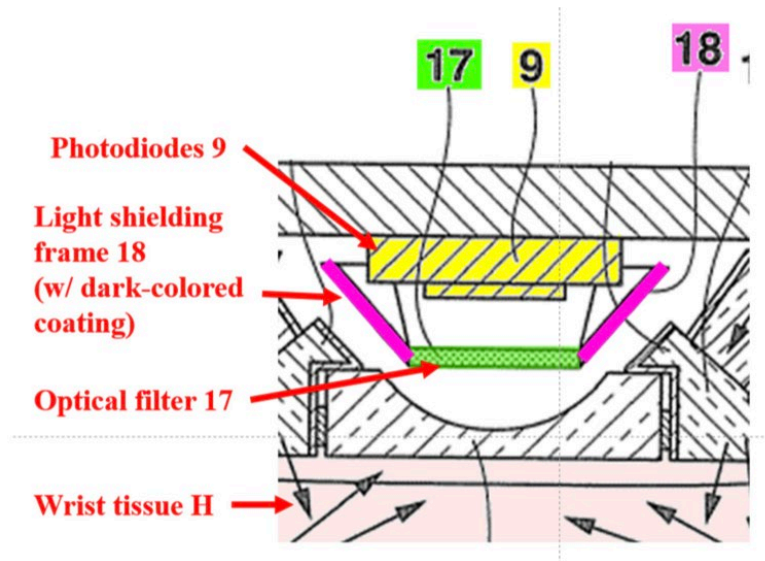
POSITA would not have been motivated to add a dark-colored coating to the existing light shielding frame to address reflections internal to the device. *Id.*

That leaves “design choice” as Apple’s remaining motivation. Pet., 10. But Iwamiya does not leave the choice of a coating to the POSITA. EX2100, ¶74. Iwamiya does not disclose a coating on the light shielding frame 18 at all. *Id.*; EX1004, 8:38-47. As explained above, Apple’s argument *adds* a coating to Iwamiya. Pet., 10. Thus, a POSITA would not have been faced with a “design choice” between what type of coating to use. EX2100, ¶74.

Accordingly, Apple failed to demonstrate that a POSITA would have been motivated to combine Iwamiya with a dark-colored coating from Sarantos as recited in Claims 1 and 14. EX2100, ¶75.

C. The Iwamiya-Sarantos Combination Does Not Have an “Opening Defined in the Dark-Colored Coating” That Allows Light to “Pass Through the Surface” (Claims 1, 19)

Even if a POSITA would have been motivated to apply a dark-colored coating to Iwamiya’s light shielding frame, the Iwamiya-Sarantos combination does not disclose an “opening defined in the dark-colored coating [that] is configured to allow at least a portion of light reflected from the tissue to pass *through the surface*.” Limitation [1.5], [19.5]. Apple relied on Iwamiya’s light shielding frame 18 as the “surface” and a separate structure, Iwamiya’s optical filter 17, as the “opening.” See Pet., 23-24. Apple’s annotations to Iwamiya are shown below.

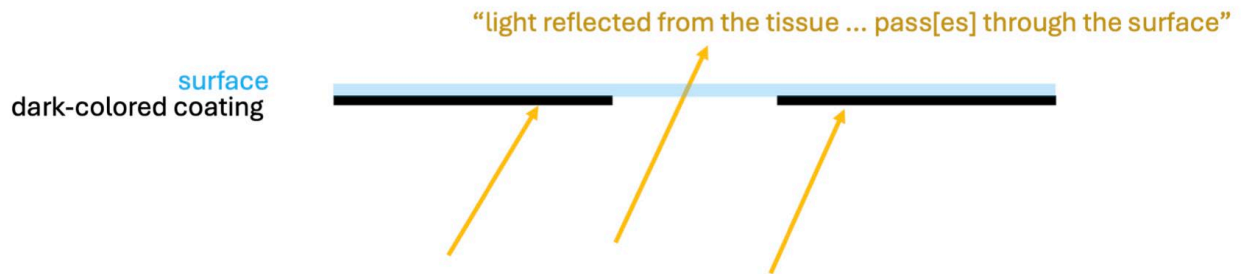


Pet., 24 (Apple’s annotations to Iwamiya Fig. 4). But the “optical filter 17” is not an “opening defined in the dark-colored coating” and light does not “pass through the surface” (*i.e.*, the light shielding frame). EX2100, ¶76.

Apple agreed that the claims require that the dark-colored coating be on the “surface.” See Pet., 9 (“[A] POSITA would have been motivated to implement Iwamiya’s light shielding frame 18 to include a black or opaque dark-colored coating ... such that the resulting *coated* light shielding frame has improved characteristics...”); *id.* at 12. But Apple failed to identify any “opening defined in the dark-colored coating” on the surface it identified (the light shielding frame 18). Instead, Apple relied on the optical filter as the “opening.” Pet., 21-23. The optical filter is not an “opening *defined in the dark-colored coating*.” EX2100, ¶77. Rather, it is a separate structure that is mounted to the light shielding frame. EX2100, ¶77, EX1004, 8:38-42 (“[A]n optical filter 17 is disposed in a state where

the optical filter is mounted on the lower side of a light shielding frame 18 to surround the light receiving unit 9.”).

Further, the optical filter does not permit light to “pass through the surface” (*i.e.*, the light shielding frame) as required by the claim. The Institution Decision invited Masimo to construe this phrase. Inst., 33. The plain language of the claims requires that light “pass ***through the surface***.” In other words, light must transmit through the surface, as illustrated below. EX2100, ¶78.



Id.

The surrounding claim language confirms this construction is correct. The claims require a “surface comprising a dark-colored coating.” The “surface” and the “coating” are distinct claim elements. The surface comprises a coating, but they are not one and the same because a coating, like paint, cannot exist on its own without some structure. EX2100, ¶79. Instead, a coating is *applied to* a surface. *Id.* Moreover, the limitation requires an “opening defined in the *dark-colored coating*,” rather than an opening defined in the *surface*. *Id.* And that opening must be

configured to allow light to “pass through *the surface*.” *Id.* Accordingly, the plain language of the claims require that light transmit through the surface. *Id.*

The Institution Decision questioned whether “it is instead sufficient that light is allowed to pass through an opening in the surface (as Petitioner implicitly contends).” Inst., 33. That would be incorrect because the opening is “defined in the dark-colored coating,” not in the “surface,” and the opening must allow light to “pass through *the surface*.” EX2100, ¶80.

Apple’s Iwamiya-Sarantos combination fails to disclose this limitation as properly construed. Light does not transmit through the light shielding frame 18, which Apple identified as the “surface,” and the optical filter is also not an “opening defined in the dark-colored coating.” *Id.* Accordingly, Apple failed to demonstrate obviousness for Claims 1 and 14.

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

Claims 8 and 17 depend from Claims 1 and 14, respectively, and add the limitation, “wherein the physiological parameter comprises oxygen saturation.” Both claims also specify that oxygen saturation be determined from the wrist because limitations [1.2] and [14.2] specify a “tissue measurement site on [a/the] wrist of the user.” However, measuring oxygen saturation at the wrist would not have been obvious in 2015. EX2100, ¶81.

1. Iwamiya and Sarantos Do Not Determine Oxygen Saturation at the Wrist and Their Combination Would Not Do So

Neither Iwamiya nor Sarantos discloses the determination of oxygen saturation at a user's wrist. Iwamiya does not disclose measuring oxygen saturation at all because it discloses the use of only a single wavelength of light, which is insufficient to measure oxygen saturation. EX2100, ¶82; EX1004, 10:34-38, 11:19-23. Indeed, during oral arguments in IPR2022-01291 and IPR2022-01465, Apple represented that Iwamiya does not disclose oxygen saturation and disavowed any such argument. EX2099, 50:2-51:18.

Sarantos also does not disclose measuring oxygen saturation. EX2100, ¶83. 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). Indeed, 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'"). But oxygen saturation is not measured using either "red or infrared" light. Rather, the measurement uses red ***and*** infrared light. EX1009, 52 ("The two wavelengths chosen for pulse oximetry are 660 nm [red] and 940 nm [infrared]."); EX2100, ¶84.

Because Sarantos mentions using red *or* infrared light, a POSITA would have understood that Sarantos does not disclose measuring oxygen saturation. EX2100, ¶83; EX1004, 13:44-58, 18:44-51.

Sarantos also admits that it does not concern measuring oxygen saturation. EX1005, 18:42-51; EX2100, ¶84. 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, Fig. 2; EX2100, ¶84. 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, ¶84.⁴

⁴ Apple also compared Sarantos to the ’159 Patent to argue Sarantos was enabled. Pet., 43-44. 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.

Accordingly, Iwamiya and Sarantos do not disclose measuring oxygen saturation at the wrist. EX2100, ¶¶82-84. And for the many reasons discussed below, a POSITA would not have been motivated to modify Iwamiya to measure oxygen saturation at the wrist with a reasonable expectation of success.

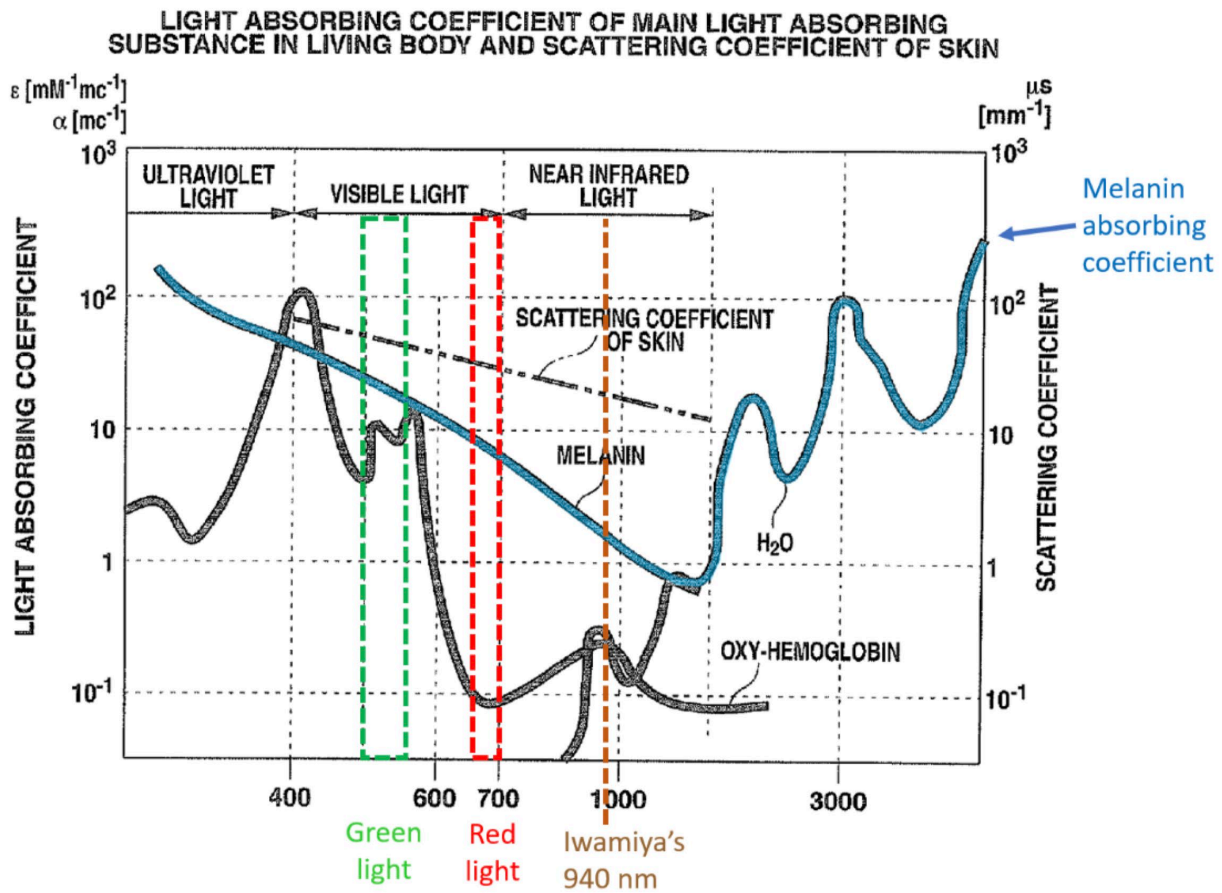
2. Iwamiya Teaches Away from Using Red Light Used for Measuring Oxygen Saturation

Apple argued a POSITA would have adapted Iwamiya's sensor to measure oxygen saturation by "adding one or more red LEDs." Pet., 42. But Iwamiya teaches away from using visible light, including red light, in its sensor design and included multiple design aspects specifically designed to avoid visible light. EX2100, ¶87.

Iwamiya's sensor uses a single wavelength of infrared light at 940 nm to measure pulse waves. EX1004, 10:34-38, 11:19-23; EX2100, ¶87. Iwamiya specifies that 940 nm wavelength to solve a specific problem: melanin in the skin "has extraordinarily high absorbance in a wavelength band from ultraviolet light to visible light," resulting in a weak signal and the inability to accurately measure pulse waves. EX1004, 1:62-2:6, 21:38-22:12, Fig. 6; EX2100, ¶87. Iwamiya repeatedly taught that infrared light at 940 nm avoids the problems associated with melanin in the skin with respect to measuring pulse wave. EX1004, 10:34-38 ("[E]ven though the epidermis H2 contains the large amount of melanine [sic] pigment, the observation light is light of an infrared band of $\lambda_p=940$ nm. For this reason, the amount of light absorbed by the melanine [sic] pigment is small and the light is

securely incident in the dermis H1.”); *see also id.* at 6:31-34, 11:43-49, 15:26-29, 20:51-55, 21:62-67, 22:24-31, 32:57-60, 42:44-48; EX2100, ¶87.

Iwamiya’s Figure 6 (annotated below) illustrates the “extraordinarily high absorbance” of melanin in the visible spectrum.



EX1004, Fig. 6 (annotated); EX2100, ¶88.

The melanin absorption is highlighted in blue. The visible light spectrum is labeled at the top of Figure 6, with annotations showing the red spectrum (red dashed box) and green spectrum (green dashed box). The light absorbing coefficient is on a logarithmic scale. Thus, the melanin absorption coefficient is approximately eight

times higher in the red spectrum than at Iwamiya's 940 nm (brown dashed line), and approximately 20 times higher in the green spectrum. EX2100, ¶88.

Iwamiya tailors multiple aspects of its sensor design to measurement of 940 nm infrared light. *Id.*, ¶89. Iwamiya teaches using a detector with a peak sensitivity at 940 nm and less sensitivity in the UV and visible wavelengths and above 940 nm. Figure 9 illustrates the spectral sensitivity of Iwamiya's detector.

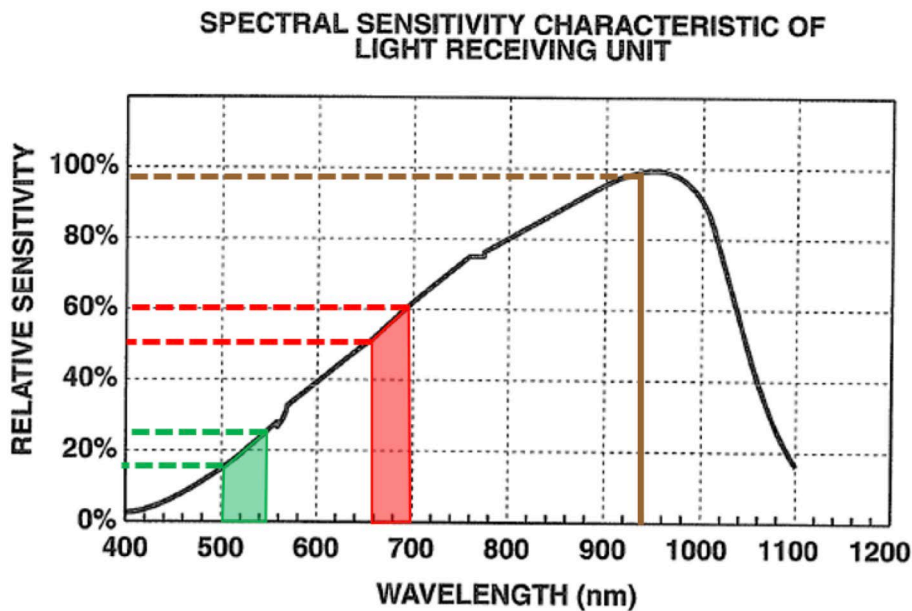
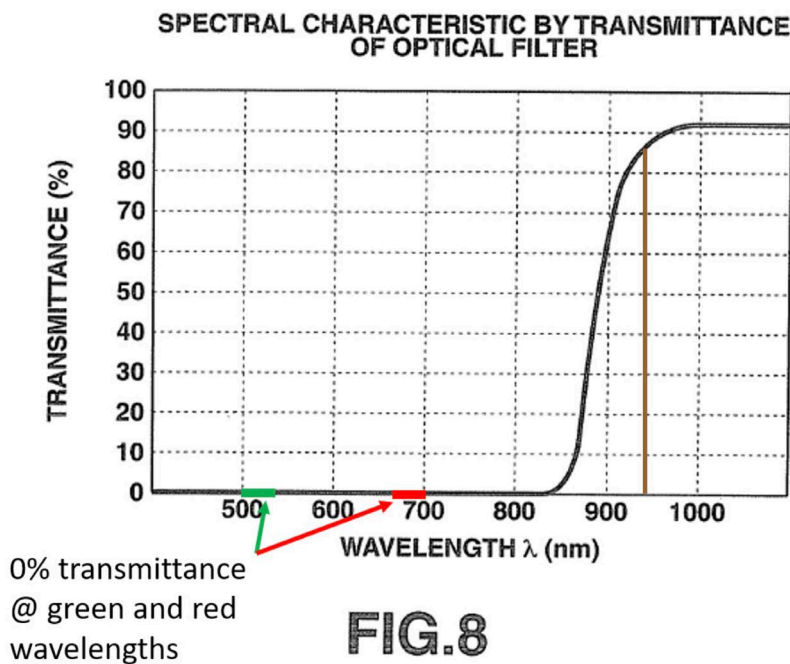


FIG.9

EX1004, Fig. 9 (annotated), 8:29-37; EX2100, ¶89. As shown in Figure 9 above, the relative sensitivity of the detector to green light (500-550 nm) is only 15-25% of that at 940 nm, and its relative sensitivity to red light (660 nm) is only about 50-60% of that at 940 nm. *Id.* Thus, Iwamiya's light receiving unit would have very little

sensitivity to measurements using visible light. *Id.* The device is not designed for making such measurements.

Iwamiya also includes an optical filter 17 that transmits light above 900 nm but blocks light below 900 nm from being detected by the detector. EX1004, 8:38-47; EX2100, ¶90. Iwamiya describes that this is done in part to avoid measurement changes due to external light. EX1004, 4:26-27, 8:38-47, Figs. 3-4, Fig. 8; EX2100, ¶90. Iwamiya's Figure 8 (reproduced below) shows that the optical filter has 0% transmittance for all visible light, including green and red light. EX2100, ¶90.



EX1004, Fig. 8 (annotated); EX2100, ¶90.

“A reference teaches away when it suggests that the line of development flowing from the reference’s disclosure is unlikely to be productive of the result sought by the applicant.” *Santarus, Inc. v. Par Pharm., Inc.*, 694 F.3d 1344, 1354

(Fed. Cir. 2012) (cleaned up). Iwamiya expressly teaches away from the use of visible light, including red light, in its sensor due to weak signal problems. EX2100, ¶91. A POSITA therefore would not have been motivated to modify Iwamiya to use red light as Apple argued. *Id.*

In IPR2022-01291, the Board incorrectly found that to the extent Iwamiya teaches away from using visible light in its device, that teaching away applied “only to users having ‘a large amount of melanin[] pigment’ in their skin, ‘for example, in the case of a person of dark skin color.’” EX2035, 65. The Board concluded that using visible light in Iwamiya’s device would be a “*suitable* option” because it might work for “users having less than a ‘large amount’ of melanin in their skin.” *Id.* (quoting *PAR Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1197-98 (Fed. Cir. 2014)). But Iwamiya does not support the Board’s speculation in IPR2022-01291 about how Iwamiya might work when changing its device to use red light. EX2100, ¶92. Moreover, no evidence supports the idea that a POSITA would have found it “suitable” to proceed against Iwamiya’s express criticisms and develop a device that might only work on persons with light skin color but stop working at some unknown skin tone. *Id.* Instead, a POSITA would have understood that Iwamiya criticized and taught away from the use of visible light in its device because melanin in the skin would create signal issues for many users. *Id.*

The Board also incorrectly dismissed Iwamiya's teaching away from using visible light as being only within the context of determining heart rate, not oxygen saturation. EX2035, 68. Determining oxygen saturation involves analyzing two simultaneous PPG signals generated from red and infrared light. EX2100, ¶93. And determining oxygen saturation is significantly more difficult than determining pulse rate due to the need for high quality signals. *Id.* Iwamiya's teaching away from using visible light due to signal issues applies with even greater force in the context of determining oxygen saturation. *Id.*

Accordingly, a POSITA would not have been motivated to modify Iwamiya's device with red light to measure oxygen saturation because Iwamiya expressly taught away from that modification. *Id.*

3. Apple's Generic Motivation to Combine Iwamiya and Sarantos to "Improve" Iwamiya's Device Is Legally Insufficient

Apple argued a POSITA would have modified Iwamiya to measure oxygen saturation "to expand the range of physiological parameters measured by Iwamiya's sensor, thereby improving the functionality and utility of the sensor." Pet., 39. But that motivation is generic and says nothing more than the combination would have added oxygen saturation as a feature. EX2100, ¶85. Such a generic motivation would apply to any device in any field. The Federal Circuit has held such a generic motivation "to build something better" is insufficient because it "bears no relation to any specific combination of prior art elements." *ActiveVideo Networks, Inc. v.*

Verizon Commc'ns, Inc., 694 F.3d 1312, 1328 (Fed. Cir. 2012). Indeed, Apple raised the same generic motivation to modify Iwamiya based on Sarantos during the ITC Investigation and the ITC rejected it as too generic. EX2093, 230.

Apple also argued that adding oxygen saturation measurements to Iwamiya would eliminate the need for a separate device to measure oxygen saturation and would allow people to check their oxygen saturation. Pet., 39-40. But that argument adds nothing and ignores that Iwamiya teaches away from adding measurement of red light necessary for oxygen saturation measurement. EX2100, ¶86. Moreover, Apple's unsupported argument that such a modification would provide "a safe, reliable, real time and continuous measurement" of oxygen saturation and that oxygen saturation could be measured "while jogging or exercising" is contrary to the evidence. Pet., 40. There were no devices in 2015 that measured oxygen saturation at the wrist, much less measured it continuously through motion. EX2100, ¶86; EX2076, 962:25-963:9, 964:2-6. Even today, the Apple Watch cannot measure oxygen saturation through any motion whatsoever. EX2106, 2 ("Stay still, and make sure your wrist is flat with the Apple Watch facing up."); *see also* EX2078, 927:19-928:8. Only Masimo has received FDA clearance for a pulse oximeter that measures continuously at the wrist. EX2032.

Apple’s generic motivation fails to account for the teachings of Iwamiya, which a POSITA would have understood as teaching away from using the red light used for measuring oxygen saturation.

4. **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 argues that modifying Iwamiya to measure oxygen saturation “would have been routine and have a reasonable expectation of success at least because wrist-worn pulse oximetry sensors, such as that described in Sarantos, were well-known in the art.” Pet., 41. But Apple is wrong.

By the relevant time 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, ¶94. 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, ¶95; EX2091; EX2092. Indeed, 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.

Similarly, 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, ¶96.

Far from being “well-known,” Apple also recognized at the time of the ’159 Patent that measuring oxygen saturation at the wrist was speculative. For example, 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, ¶97.

Further, during the ITC Investigation, Apple elicited testimony from several of the 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 Iwamiya to measure oxygen saturation at the wrist.

For instance, the testimony of Apple’s resident pulse oximetry expert, Dr. Paul Mannheimer, confirms as much. EX2100, ¶98. 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. Indeed, 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] 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 unequivocally told his boss at Apple that measuring oxygen saturation at the wrist may be technologically impossible, stating: "*I don't know if it can be done.*" EX2080, 174:2-174:6; EX2077, 1012:23-25. EX2100, ¶98.

Mannheimer's testimony, which is from the perspective of one of extraordinary skill in the art, also shows why a POSITA in 2015 would not have reasonably expected to succeed in measuring oxygen saturation at the wrist. EX2100, ¶99. 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, ¶100. 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.

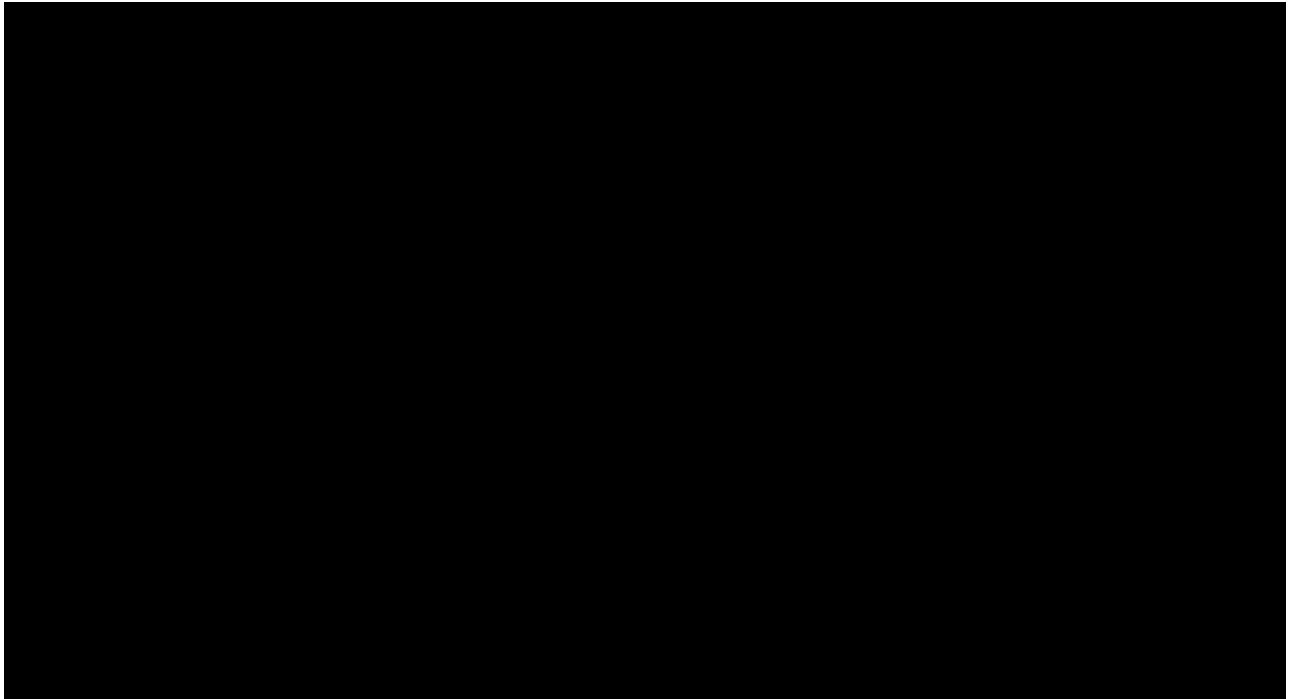
Waydo's colleague, Dr. Tao Shui, similarly testified that the [REDACTED] of his work was that the "watch is worn on the wrist, and the wrist is well known for its lack of signal." EX2082, 108:13-21; EX2100, ¶101. Waydo also explained that despite his team of highly skilled engineers being "just a small 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, ¶102. On July 30, 2015—four weeks *after* the '159 Patent—[REDACTED]

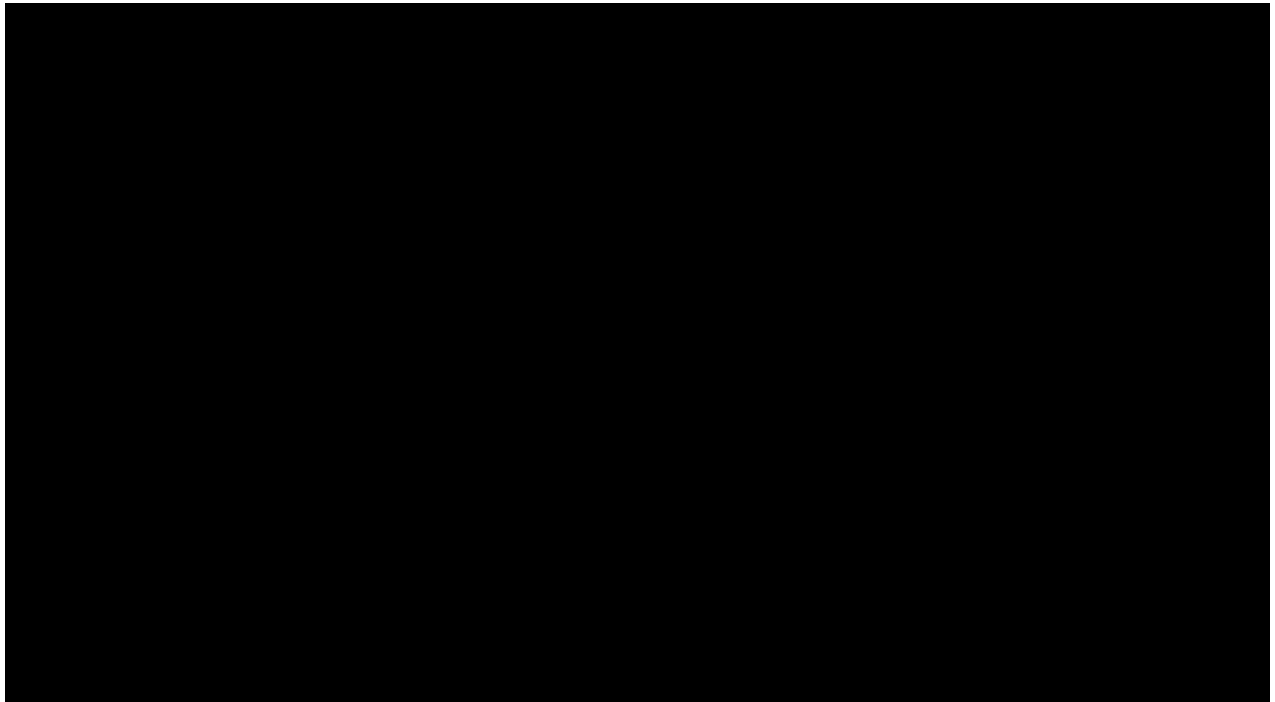
[REDACTED] EX2085; EX2076, 981:19-983:1, 989:21-990:9. They investigated whether conventional methods of pulse oximetry could work at the wrist, [REDACTED]

[REDACTED] *See* EX2085 at 7. But they concluded that conventional methods would not work. [REDACTED]

[REDACTED] EX2100, ¶102; EX2085 at 7-9.



Id. at 8.



Id. at 9.

The presentation went on to detail the engineers' conclusions from their investigation. Consistent with the above-included slides, 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]

[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]

[REDACTED] EX2085, 13; EX2100, ¶103.

Moreover, Mannheimer revealed that in their 2015 research, Apple's engineers were not yet measuring oxygen saturation at all. He testified that [REDACTED]

[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. And as Mannheimer explained, their measurements were [REDACTED]

[REDACTED] *Id.*; EX2100, ¶104.

If measuring oxygen saturation at the wrist actually had been “well-known” in 2015 as Apple alleges (Pet., 25-26), then Apple’s engineers (“world experts who have years of experience designing and shipping PPG sensors”, EX2089, 2) would have been able to implement that technique by that time. EX2100, ¶105. Yet, Apple was not able to do so by 2015, 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, ¶105.

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 is 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*, 829 F.3d at 1381. 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, ¶106. 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 thought that “*I don’t know if it can be done*” at all. 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

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, ¶¶106-107. 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, ¶107.

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 (emphasis in original). 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, ¶108. 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 Iwamiya to measure oxygen saturation at the wrist.

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

Apple argued that “wrist-worn pulse oximetry sensors, such as that described in Sarantos, were well-known in the art” based on six exhibits. Pet., 41 (citing Sarantos, EX1014-EX1016, EX1018, and EX1028). 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, ¶109.

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, ¶110. 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 Iwamiya that Apple relies on.

Sarantos does not disclose measuring oxygen saturation at the wrist as explained above. *Supra* § V.D.1; EX2100, ¶111.

Pang (EX1014) does not present any oxygen saturation determinations from the wrist. EX2100, ¶112. Instead, the only data presented are separate red and IR waveforms. EX1014, 1566; EX2100, ¶112. There is no indication that these waveforms are time correlated, which is a very important factor. EX2100, ¶112. 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. EX1014, 1566 (noting use of simulator); EX2100, ¶112. Pang also does not demonstrate whether a POSITA would have had a reasonable expectation of success in modifying Iwamiya to measure oxygen saturation because 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, ¶112. Notably, Apple's engineers were aware of Pang. *See* EX2104 [REDACTED]. But despite their awareness of Pang, Apple's engineers still were unable to achieve measuring oxygen saturation at the wrist at the relevant time. Thus, Pang does not show a reasonable expectation of success in the proposed combination. EX2100, ¶112.

Li (EX1015) is a paper coauthored by Dr. Steve Warren, who was one of Apple's expert witnesses in the ITC Investigation. EX2100, ¶113. 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, ¶113. 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. EX2100, ¶113. And that is significant because measuring oxygen saturation requires two consistent and correlated PPG signals. *Id.*; EX2083, 9 [REDACTED]

[REDACTED]; EX2085, 8-9 [REDACTED]

[REDACTED]. And Li could only measure those signals if the locations of the user's arteries were known. EX1015, 276; EX2100, ¶113. Li thus does not demonstrate that a POSITA would have had a reasonable expectation of success in modifying Iwamiya to measure oxygen saturation. EX2100, ¶113.

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, ¶113.

Cai (EX1016) also does not support a reasonable expectation of success. Cai does not present any oxygen saturation measurements from the wrist. EX2100, ¶114; 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, ¶114. Moreover, Apple's engineers were well aware of Cai 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] *Id.*, 78. Thus, Cai does not demonstrate a reasonable expectation of success. EX2100, ¶114.

Maattala (EX1018) similarly does not demonstrate a reasonable expectation of success. EX2100, ¶115. 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, ¶115. 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, let alone support Apple’s position that such measurements were so well known as to be routine. EX2100, ¶115. 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, ¶115.

Apple’s last reference, Brady (EX1028), also does not support a reasonable expectation of success for determining oxygen saturation at the wrist. Brady is a patent application filed by Impact Sports Technologies. EX1028, Cover. Brady mentions oxygen saturation but much of its disclosure is actually focused on calculating burned calories. EX2100, ¶116; EX1028. 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, ¶116. 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. [REDACTED] Apple engineers still were unable to measure oxygen saturation at the relevant time. Thus, Brady also does not demonstrate a reasonable expectation of success. EX2100, ¶116.

Additionally, if such techniques were “well-known,” as Apple argued, someone would have made (or at least published about) a device that successfully determined oxygen saturation at the wrist. EX2100, ¶117. 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 *Iwamiya*’s sensor to determine oxygen saturation at the wrist. EX2100, ¶118. Apple’s references neither relate to a sensor design that is remotely similar to *Iwamiya*, 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 19 paragraphs from Anthony’s declaration that discuss references not mentioned in the Petition. Pet., 41 (citing EX1003, ¶¶94-113), 42 (citing EX1003, ¶¶100-109). The Board previously held in IPR2022-01291 that Apple improperly incorporated similar arguments about additional references not discussed in its Petition through Anthony’s declaration and thus, did not consider those references. 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 all the reasons above, a POSITA would not have had a reasonable expectation of success as of July 2015 in modifying Iwamiya and Sarantos to determine oxygen saturation from the wrist.

6. Objective Evidence of Industry Skepticism, Failure of Others, and Long-Felt-but-Unmet Need Further Support Nonobviousness of Claims 8 and 17

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 as discussed above, require the determination of oxygen saturation at the user’s wrist. EX2100, ¶119. 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* §V.D.4; EX2100, ¶120. 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. Mannheimer testified that his initial reaction to being [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. 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, ¶121.

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, ¶121.

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, ¶122. 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 “major challenges” with measuring oxygen saturation at the wrist were due to the physiology of the wrist. EX2100, ¶122; EX2085, 6. And Apple’s engineers were experimenting with [REDACTED] EX2100, ¶122; EX2085, 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, ¶122. 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 further 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* §§ V.D.4-5; EX2100, ¶123. As discussed, Apple’s own engineers tried and failed in 2015 to determine oxygen saturation at the wrist. EX2100, ¶123; 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]

EX2094, 28:3-29:19.

Likewise, Fitbit was unable to release a device that measured oxygen saturation from the wrist until 2020. EX2100, ¶124; EX2091; EX2092. And even then, Fitbit had to rely on “long-term averaging” during “overnight measurements.” EX2088, 4; EX2100, ¶124. 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, ¶124.

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, ¶125. 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 as of 2015. EX2100, ¶126. Instead, as Apple’s engineers expressed, this required “[i]nvention.” EX2085, 13.

E. Apple’s Combination Does Not Disclose an Opening With a Different Width and Length (Claim 12)

Claim 12 depends from Claim 1 and adds “wherein the opening defined in the dark-colored coating comprises a width and a length, and wherein the width is larger than the length.” Apple did not explain how the Iwamiya-Sarantos combination discloses this limitation. Pet., 47-49; EX2100, ¶127.

For Claim 1, Apple relied on Iwamiya’s optical filter as the “opening defined in the dark-colored coating.” *Id.*, 23-24. But for Claim 12, Apple did not explain how the optical filter comprises a different width and a length. Instead, Apple discussed how the window regions in Sarantos’s Figure 22 could be co-extensive with their respective high-aspect-ratio (HAR) photodiodes underneath them. *Id.*, 47-49. Apple then concluded that “the window regions” in Iwamiya “each include a width and a length corresponding to the width and length of their respective HAR photodiodes, and thus have a width that is larger than the length.” Pet., 49; EX2100, ¶128.

Apple’s argument does not make sense because it is completely divorced from the Iwamiya-Sarantos combination presented in the Petition. Apple referenced “the window regions defined in the dark-colored coating” with respect to Iwamiya, but there are not multiple “window regions” in the Iwamiya-Sarantos combination because Apple identified the single optical filter as the supposed “opening.” EX2100, ¶129. Moreover, Apple referenced “respective HAR photodiodes” in the Iwamiya-Sarantos combination, but Apple’s combination does not include Sarantos’s HAR photodetectors. *See* Pet., 20 (not relying on Sarantos’s HAR photodiodes to disclose “a plurality of detectors...”); EX2100, ¶129; EX2107, 81:12-82:17.

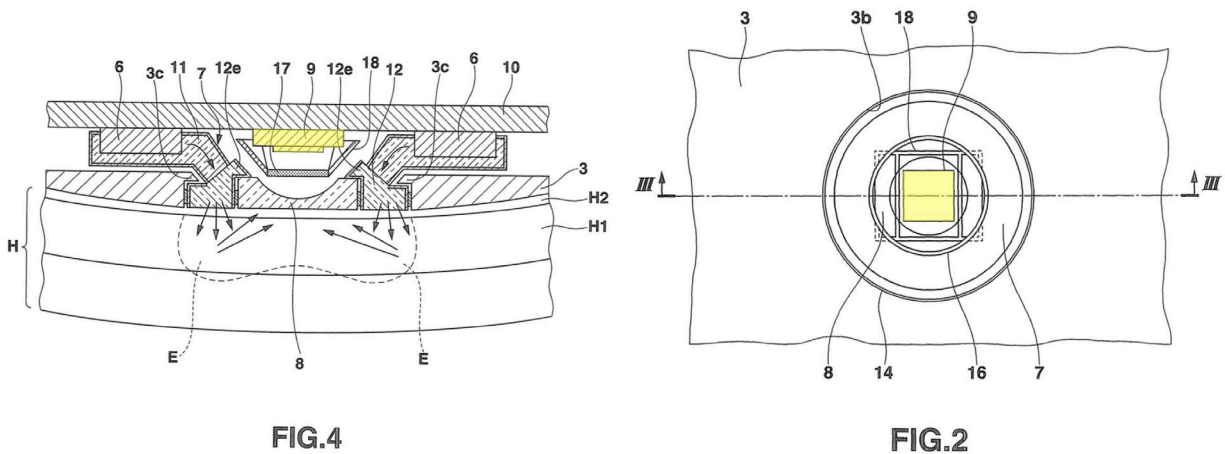
Apple never presented an obviousness theory that combined Iwamiya with Sarantos's HAR photodetectors, much less argued that there would be multiple window regions in Iwamiya each corresponding to a HAR photodetector. Such a combination also would not make sense because Sarantos used HAR photodetectors to better capture light after it has been scattered by a centrally located emitter. In contrast, Iwamiya has the opposite configuration where light is gathered and focused towards a central detector. EX2100, ¶130; EX1005, Figs. 4-6, 8:39-11:3. Apple failed to reconcile those fundamental differences and therefore failed to provide a "clear, evidence-supported account of the contemplated workings of the combination." *Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 994 (Fed. Cir. 2017); *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398, 418 (2007) ("[A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art."). Because the combination does not include Sarantos's HAR photodiodes at all, Apple cannot rely on "respective HAR photodiodes" as allegedly corresponding to different width and length. Thus, Apple failed to demonstrate obviousness for Claim 12. EX2100, ¶131.

F. Iwamiya Does Not Disclose a Circular Array of Detectors (Independent Claim 14 and Dependent Claims 5 and 25)

Claim 14 recites a "plurality of detectors ... arranged in an array having a spatial configuration corresponding to a shape of the portion of the tissue measurement site bounded by the circular shaped light block." Apple's argument

regarding this limitation relied on a cross-reference to its argument for Claim 5. *See* Pet., 62 (citing [5]). There, Apple argued that a POSITA would have interpreted Iwamiya as disclosing a circular array of photodiodes in the center of its device. Pet., 29-35. Although the Board’s Institution Decision adopted the prior finding in Apple’s favor from IPR2022-01291 (Inst., 35-39), the reasoning from that prior IPR was in error. EX2100, ¶132.

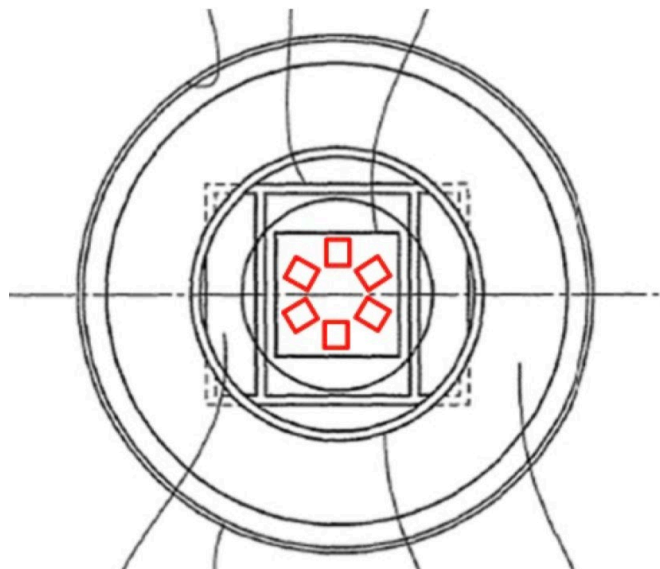
Iwamiya’s figures depict only a single photodetector 9, highlighted yellow below.



EX1004, Figs. 4, 2 (annotated); EX2100, ¶133. Apple thus relied on Iwamiya’s vague description of an alternate embodiment where “plural light receiving units 9 may be two-dimensionally disposed in the places positioned at the side opposite to the skin H in the scattered light taking unit 8” and “the plural light receiving units 9 are preferably disposed on the same circumference centered on an optical axis of the scattered light taking unit 8.” Pet., 31 (citing EX1004, 14:32-41). In the Institution

Decision, the Board found that this statement was “sufficiently clear to support institution.” Inst., 38. But Iwamiya does not illustrate how these photodetectors would be arranged, and whether they would be “in an array having a spatial configuration corresponding to a shape of the portion of the tissue measurement site bounded by the circular shaped light block” as claimed. EX2100, ¶134. Because Iwamiya does not explain how the photodetectors actually would be arranged, whether Iwamiya discloses the claim limitation depends on how a POSITA would have understood Iwamiya’s disclosure.

Apple and its expert imagined that a POSITA would have understood Iwamiya’s statements as describing “six or more” smaller photodetectors in the following arrangement:

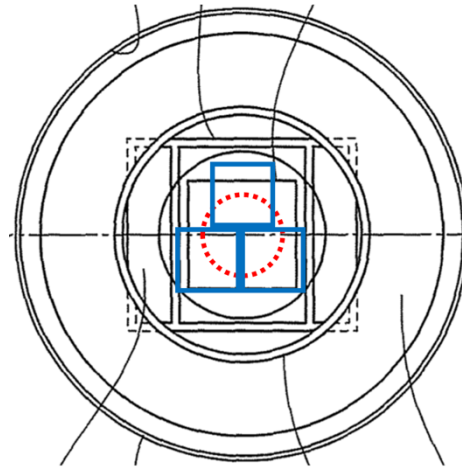


Pet., 33 (Apple’s annotation of EX1004, Fig. 2, cropped). Apple argued that a POSITA would have understood such an arrangement would “increase detection

area and light sensitivity.” Pet., 34. But those arguments defy common sense. A POSITA would not have understood such an arrangement to increase detection area or light sensitivity at all. EX2100, ¶¶135-136. Instead, Apple’s proposed arrangement reduces the overall detection area by more than 50% and leaves a large empty spot in the center without photodetector coverage. *Id.*, ¶136. Indeed, a POSITA would have understood such an arrangement would have been nonsensical because, as the Board previously found, Iwamiya uses a “scattered light taking unit 8, which is a transparent lens to focus the light on light receiving unit 9.” EX2035, 17; EX1004, 6:14-21, 7:50-8:13, 10:62-11:3, 12:55-67; EX2100, ¶137. It would make no sense for Iwamiya’s sensor design to focus light to a spot without photodetector coverage. EX2100, ¶137. Accordingly, a POSITA would not have understood Iwamiya’s description to disclose the claimed array of detectors, as Apple argued. *Id.*

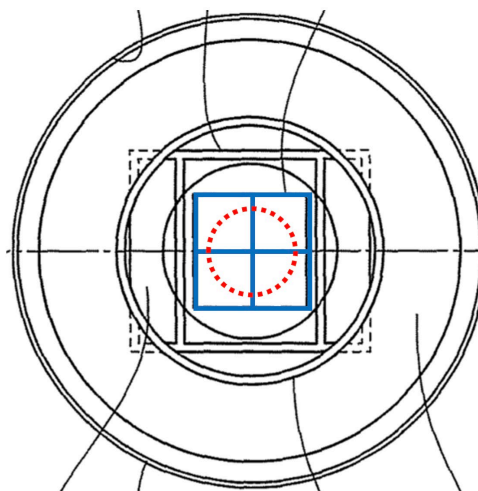
Instead, as Dr. Madisetti explains, a POSITA would have understood Iwamiya’s reference to photodetectors “disposed on the same circumference centered on an optical axis of the scattered light taking unit 8” to refer to the photodetectors’ relative location (*i.e.*, that a circle can be drawn through the center of each of the photodetectors). EX2100, ¶138. That is different from the claimed array of detectors corresponding to a circular shape. For example, three

photodetectors can be placed in a triangular array and those photodetectors would be “disposed on the same circumference,” as shown below:



EX1004, Fig. 2 (annotated); EX2100, ¶138. But this arrangement would not meet the claim limitation because it is a triangular array, and three detectors are not sufficient. *Id.*

Similarly, four photodetectors can be placed in a square-shaped array that covers the same photodetector area as the original photodetector 9, and those photodetectors would also be “disposed on the same circumference”:



EX1004, Fig. 2 (annotated); EX2100, ¶139. But this arrangement also does not satisfy the claim limitation because it is a square-shaped array, just like the original square photodetector 9. *Id.* More than four photodetectors would not be “disposed on the same circumference” without running into the problem of leaving an empty spot in the center without photodetector coverage. *Id.* Thus, a POSITA would not have understood Iwamiya’s description of an alternative embodiment to describe an array of photodetectors in a circular array. *Id.*

Finally, the Board reasoned in IPR2022-01291 that Iwamiya’s reference to “the *same* circumference” indicated a circular arrangement and is “consistent with the generally circular configuration” of Iwamiya’s device. EX2035, 123-124 (original emphasis). But that reasoning was flawed because the triangular and square arrangements described above satisfy Iwamiya’s “same circumference” description but do not satisfy the limitations requiring a circular array. And Iwamiya’s sensor design is not “generally circular”—Iwamiya illustrated a square photodetector, not a circular one. EX2035, 124; EX1004, Fig. 2; EX2100, ¶140. Moreover, the Board incorrectly substituted its own interpretation in place of how a POSITA would have understood Iwamiya’s disclosure. Iwamiya positions its photodetector at the center of its device. EX1004, Fig. 2. As a result, a POSITA would have known that a circular array of detectors would substantially decrease the signal strength by failing to detect the light that has been focused by the scattered

light taking unit 8 to the center of the device. EX2100, ¶140. Such an arrangement would have made no sense to a POSITA and would have been inconsistent with their understanding of Iwamiya. *Id.*

Accordingly, Apple failed to show obviousness for Claim 14 based on Iwamiya. EX2100, ¶140. For at least the same reasons, Apple failed to show obviousness for Claims 5 and 25. *Id.*

G. Apple Failed to Address Claim 24

Claim 24 recites “[t]he system of claim 19, wherein the second shape comprises a width and a length, and wherein the width is different from the length.” Claim 24’s reference to “the second shape” refers to the “second shape by which the light emitted from one or more of the plurality of emitters is projected towards the tissue measurement site” in Claim 19.

Apple’s argument for Claim 24 consisted solely of a cross-reference to Claim 12. Pet., 74. But Claim 12 does not recite a similar limitation to Claim 24. Claim 12 recited “The physiological monitoring device of claim 1, wherein the opening defined in the dark-colored coating comprises a width and a length, and wherein the width is larger than the length.” Thus, Claim 12 concerned the opening in the dark-colored coating, *not* the “second shape” of light emitted towards the tissue measurement site. Apple’s argument for Claim 12 therefore did not address

Claim 24. EX2100, ¶141. Apple therefore failed to demonstrate Claim 24 would have been obvious.

VI. CONCLUSION

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

Respectfully submitted,

KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: November 5, 2024

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CERTIFICATE OF COMPLIANCE

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KNOBBE, MARTENS, OLSON & BEAR, LLP

Dated: November 5, 2024

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