

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

MASIMO CORPORATION,
Patent Owner.

IPR2024-00243
Patent 10,722,159 B2

Before ROBERT L. KINDER, RICHARD H. MARSCHALL, and
DAVID COTTA, *Administrative Patent Judges*.

MARSCHALL, *Administrative Patent Judge*.

JUDGMENT

Final Written Decision

Determining Some Challenged Claims Unpatentable

35 U.S.C. § 318(a)

Dismissing Petitioner's Motion to Exclude and
Patent Owner's Motion to Strike

37 C.F.R. § 42.64(c)

Granting Petitioner's Motions to Seal

37 C.F.R. §§ 42.14, 42.54(a)

Petitioner Apple Inc. (“Petitioner” or “Apple”) challenges claims 1–25 of U.S. Patent No. 10,722,159 B2 (Ex. 1001, “the ’159 patent”), which is assigned to Patent Owner Masimo Corporation (“Patent Owner”). We have jurisdiction under 35 U.S.C. § 6, and we issue this Final Written Decision pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons set forth below, we determine that Petitioner has proved by a preponderance of the evidence that claims 1–11, 13–23, and 25 are unpatentable in this proceeding, but has not proved by a preponderance of the evidence that claims 12 and 24 are unpatentable. We also dismiss as moot Patent Owner’s Motion to Strike and Petitioner’s Motion to Exclude, and grant Petitioner’s five Motions to Seal.

BACKGROUND

A. Summary of Filings

Petitioner filed a Petition requesting *inter partes* review of claims 1–25 of the ’159 patent. *See* Paper 2 (“Pet.”), 1–2. Patent Owner filed a Preliminary Response to the Petition. Paper 6. With our authorization, Petitioner filed a Preliminary Reply (Paper 9), and Patent Owner filed a Preliminary Sur-reply (Paper 10). Pursuant to 35 U.S.C. § 314, we instituted an *inter partes* review as to all challenged claims and all grounds raised in the Petition. Paper 11 (“Institution Decision” or “Inst. Dec.”).

After institution, Patent Owner filed a Response (Paper 19, “PO Resp.”), Petitioner filed a Reply (Paper 27, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 41, “PO Sur-reply”).¹ Patent Owner filed a

¹ Patent Owner’s Response, Petitioner’s Reply, and Patent Owner’s Sur-reply include material that the parties assert is confidential. The record

Motion to Strike (Paper 31) and Petitioner filed an Opposition to that Motion (Paper 36). Petitioner also filed a Motion to Exclude (Paper 38), Patent Owner filed an Opposition to that Motion (Paper 40), and Petitioner filed a Reply (Paper 42). Petitioner also filed various unopposed Motions to Seal (Papers 23, 28, 43, 45, 48).

The record includes a transcript of an oral hearing held on April 16, 2025. Papers 50 (public session), 51 (confidential session). With our authorization, Patent Owner filed a post-hearing brief (Paper 49, “PO Post-hearing”) and related evidence. Ex. 3007.

B. Real Parties-in-Interest and Related Matters

Petitioner identifies itself as its only real party-in-interest. Pet. 88. Patent Owner identifies itself as its only real party-in-interest. Paper 4, 1.

There are two related matters involving the ’159 patent. Petitioner challenges claims of the ’159 patent in concurrently-filed IPR2024-00244 (the “-244 IPR”). Pet. 89. We issue our Final Written Decision in the -244 IPR concurrently with this Decision. In addition, Patent Owner asserts the ’159 patent in *Apple Inc. v. Masimo Corp.*, No. 1-22-cv-01378 (D. Del.) (“Delaware Litigation”). *Id.*; Paper 4, 1.

Petitioner identifies a number of *inter partes* review proceedings challenging Patent Owner’s patents and describes three *inter partes* review proceedings as “particularly relevant due to related subject matter and claim scope”: IPR2020-01722 (involving US 10,470,695), IPR2022-01291 (the “-1291 IPR,” involving US 10,687,745 (the “’745 patent”)), and IPR2022-

includes redacted, public versions of all three documents. See Paper 24 (Patent Owner’s Response), Paper 32 (Petitioner’s Reply), and Paper 46 (Patent Owner’s Sur-reply).

01465 (the “-1465 IPR,” also involving the ’745 patent). Pet. 89. Petitioner also identifies an ITC proceeding between the parties involving the ’159 patent. *Id.* (citing *Masimo Corp. v. Apple Inc.*, ITC Inv. No. 337-TA-1276).

Patent Owner identifies the following *inter partes* review proceedings related to patents asserted by Patent Owner in the above-referenced Delaware Litigation as related matters:

Petitioner	Case No.	Patent No.
Apple Inc.	IPR2024-00290	8,190,223
Apple Inc.	IPR2024-00296	10,984,911
Apple Inc.	IPR2024-00244	10,722,159
Apple Inc.	IPR2024-00293	10,736,507
Apple Inc.	IPR2024-00294	10,736,507
Apple Inc.	IPR2024-00241	10,687,743
Apple Inc.	IPR2024-00242	10,687,743

Paper 4, 2. Patent Owner also identifies a number of patents and applications that share a priority claim with the ’159 patent. *Id.* at 1; Paper 7, 1.

C. The ’159 Patent

The ’159 patent is directed to a non-invasive, optical-based physiological monitoring device. Ex. 1001, code (57). In one embodiment, the device is utilized to measure a patient’s arterial blood oxygen saturation, sometimes shorthand as “SpO2.” *See id.* at 1:22–26, 1:53–2:3, 2:15–17. In other embodiments, the device is utilized to measure other blood constituent characteristics. *See id.* at 2:39–49 (stating the device can measure “oxygen, carboxyhemoglobin, methemoglobin, total hemoglobin, glucose, proteins, lipids, a percentage

thereof (e.g., saturation), pulse rate, perfusion index, oxygen content, total hemoglobin, Oxygen Reserve Index™ (ORI™) or . . . many other physiologically relevant patient characteristics”).

Figure 3 of the '159 patent is reproduced below.

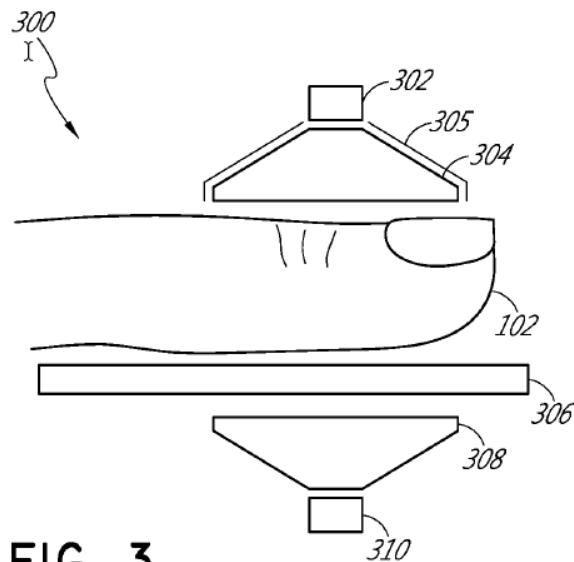


FIG. 3

Figure 3 is a schematic side view of pulse oximetry sensor 300 and tissue measurement site 102 (i.e., a patient's fingertip). Ex. 1001, 5:12–14, 7:4–9. Sensor 300 includes reflector 305, emitter 302, light diffuser 304, light-absorbing detector filter 306, light concentrator 308, and detector 310. *Id.* at 7:12–14, 7:17–18.

Emitter 302 emits light toward tissue site 102, and diffuser 304 spreads the light over an area. *See* Ex. 1001, 7:12–14, 7:30–49. “In some embodiments, the light diffuser 304 is a beam shaper that can homogenize the input light beam from the emitter 302, shape the output intensity profile of the received light, and define the way (e.g., the shape or pattern) the emitted light is distributed to the tissue measurement site 102.” *Id.* at 7:44–49; *see also id.* at 7:63–66 (“Advantageously, the diffuser 304 can receive

emitted light in the form of a point optical source and spread the light to fit a desired surface area on a plane defined by the surface of the tissue measurement site 102.”). Reflector 305 prevents the emitted light from escaping out of the top portion of diffuser 304, thereby maximizing the light that reaches tissue site 102. *Id.* at 7:14–29.

The light enters tissue site 102, interacts with the patient’s blood flowing through the tissue site, and exits the tissue on the opposite side from which the light entered the tissue. Ex. 1001, Fig. 3, 6:55–64, 7:6–22. Filter 306 is coated with a “light-absorbing” material “such as, for example, black pigment,” and it has an opening (not shown in Figure 3) through which the transmitted light may pass to reach light concentrator 308 and light detector 310. *Id.* at 7:12–14, 8:32–38, 8:54–59; *see also id.* at 9:31–51 (describing the light absorbing filter 306 in Figure 4A as having a “rectangular opening 402,” through which light may pass to the light concentrator 308 and light detector 310). Detector 310 outputs a signal responsive to the transmitted light, and the signal is communicated to a processor which utilizes the signal to determine a physiological parameter of interest, such as blood oxygen saturation. *Id.* at 9:19–30; *see also id.* at 12:1–14:29 (describing embodiment depicted in Figure 8).

Figures 7A and 7B of the '159 patent are reproduced below.

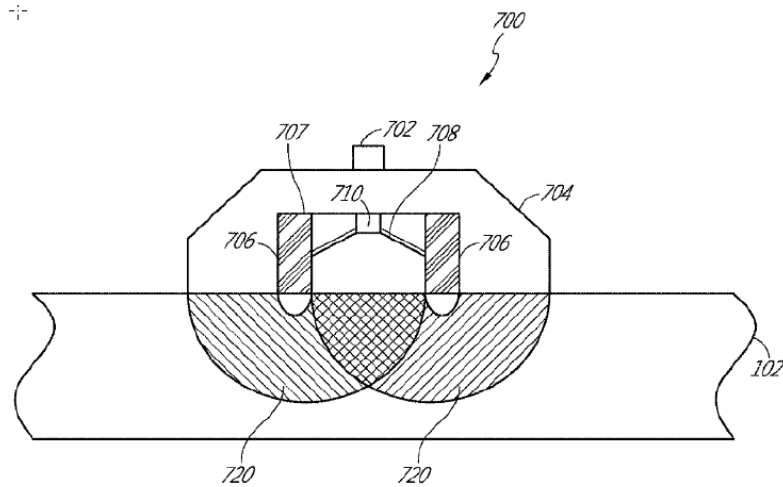


FIG. 7A

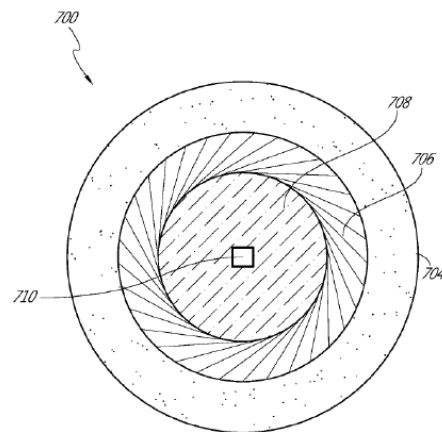


FIG. 7B

Figure 7A is a schematic side view of pulse oximetry sensor 700 and tissue measurement site 102, and Figure 7B is a schematic top view of sensor 700 with some components removed. Ex. 1001, 5:28–33, 10:40–42, 11:54–56. The '159 patent describes sensor 700 as useful in connection with a tissue site having a “relatively flat surface, such as, for example a wrist, because the emitter 702 and detector 710” are located on “the same side of the tissue measurement site 102.” *Id.* at 10:43–49. Sensor 700 includes light diffuser 704 and light concentrator 708, and components 702, 704, 708, and 710 function substantially the same as the corresponding components 302, 304,

308, and 310 of sensor 300 as described above. *Id.* at 10:49–11:9, 11:21–43. One difference, however, is that diffuser 704 spreads the light “over a wide, donut-shaped area . . . outlined by the light diffuser 704” (seen best in Figure 7B) to enter tissue site 102. *Id.* at 10:65–11:6. Sensor 700 additionally includes light blocker 706 and cover 707, which prevent light from emitter 702 from passing directly into light detector 710 without first traversing light path 720 within tissue site 102. Ex. 1001, 11:10–20, 11:44–67.

D. Challenged Claims

The ’159 patent includes 25 claims, all of which Petitioner challenges here, including independent claims 1, 14, and 19. Pet. viii–xii, 1. Claims 1 and 14, which are illustrative of the subject matter of the challenged claims, are reproduced below.

1. [1.0] A physiological monitoring device comprising:
 - [1.1] a plurality of emitters configured to emit light in a first shape;
 - [1.2] a material positioned between the plurality of emitters and a tissue measurement site on a wrist of a user when the physiological monitoring device is in use, the material configured to change the first shape into a second shape by which the light emitted from one or more of the plurality of emitters is projected towards a surface of the tissue measurement site;
 - [1.3] a plurality of detectors configured to detect at least a portion of the light after passing through tissue, the plurality of detectors further configured to output at least one signal responsive to the detected light;
 - [1.4] a surface comprising a dark-colored coating, the surface positioned between the plurality of detectors and the tissue when the physiological monitoring device is in use,

[1.5] 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;

[1.6] a light block configured to prevent at least a portion of the light emitted from the plurality of emitters from reaching the plurality of detectors without first reaching the tissue; and

[1.7] a processor configured to receive and process one or more signals responsive to the at least one outputted signal and determine a physiological parameter of the user responsive to the one or more signals.

14. [14.0] A physiological monitoring device comprising:

[14.1] a plurality of optical sources configured to emit light proximate a wrist of a user;

[14.2] a diffuser configured to be positioned between the plurality of optical sources and a tissue measurement site on the wrist of the user when the physiological monitoring device is in use;

[14.3] a light block having a circular shape;

[14.4] a plurality of detectors configured to detect at least a portion of the light after the light passes through a portion of the tissue measurement site bounded by the light block, wherein the plurality of detectors are 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, wherein the plurality of detectors are further configured to output at least one signal responsive to the detected light, and wherein the plurality of optical sources and the plurality of detectors are arranged in a reflectance measurement configuration;

[14.5] wherein the light block is configured to prevent at least a portion of light emitted from the plurality of optical sources from reaching the plurality of detectors without first reaching tissue;

[14.6] a processor configured to receive and process one or more signals responsive to the at least one outputted signal and

determine a physiological parameter of the user responsive to the one or more signals; and

[14.7] wherein the physiological monitoring device is configured to transmit physiological parameter data to a separate processor.

Ex. 1001, 15:31–58, 16:28–58 (with bracketed designations added by Petitioner (*see* Pet. viii–xii)).

E. Asserted Grounds of Unpatentability

Petitioner asserts that claims 1–25 are unpatentable on the following grounds:

Claim(s) Challenged	35 U.S.C. § ²	Reference(s)/Basis
1, 2, 4–13	103	Iwamiya, ³ Sarantos ⁴
3	103	Iwamiya, Sarantos, Han ⁵
14–25	103	Iwamiya, Sarantos, Utter ⁶

Petitioner relies on the Declarations of Brian W. Anthony, Ph.D. Exs. 1003, 1079). Patent Owner relies on the Declarations of Vijay K. Madiseti, Ph.D. Exs. 2002, 2100. In its post-hearing brief, Patent Owner relies on the Declarations of R. James Duckworth, Ph.D., filed in the -1291 IPR. *See* PO Post-hearing 1; Exs. 2121, 2122.

² The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, 125 Stat. 284, 285–88 (2011), revised 35 U.S.C. §§ 102, 103 effective March 16, 2013. The date of the earliest patent document to which the ’159 patent claims priority is July 2, 2015. *See* Ex. 1001, codes (63), (60). Because that date falls after the effective date of the applicable AIA amendments, we apply the AIA versions of §§ 102 and 103 here.

³ US 8,670,819 B2, issued Mar. 11, 2014 (Ex. 1004, “Iwamiya”).

⁴ US 9,392,946 B1, issued July 19, 2016 (Ex. 1005, “Sarantos”).

⁵ US 2016/0058312 A1, published Mar. 3, 2016 (Ex. 1008, “Han”).

⁶ US 8,446,275 B2, issued May 21, 2013 (Ex. 1006, “Utter”).

ANALYSIS

A. Legal Standards

To prevail in its challenges, Petitioner must prove unpatentability by a preponderance of the evidence. 35 U.S.C. § 316(e) (2018); 37 C.F.R. § 42.1(d). “In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden of persuasion never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burdens of proof in an *inter partes* review).

Petitioner relies on obviousness in its challenges. Pet. 1. A claim is unpatentable as obvious under 35 U.S.C. § 103 if the differences between the claimed invention and the prior art are such that the subject matter, as a whole, would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains. 35 U.S.C. § 103; *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called secondary considerations, also known as objective indicia of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

In determining the level of skill in the art, we consider the problems encountered in the art, the art’s solutions to those problems, the rapidity with which innovations are made, the sophistication of the technology, and the educational level of active workers in the field. *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986).

Petitioner describes a person of ordinary skill in the art (“POSITA”) as follows:

A person of ordinary skill in the art relating to the subject matter of the ’159 Patent (“POSITA”) would have had a working knowledge of physiological monitoring technologies. The person would have had a Bachelor of Science degree in an academic discipline emphasizing the design of electrical, computer, or software technologies, in combination with training or at least one to two years of related work experience with capture and processing of data or information, including but not limited to physiological monitoring technologies. APPLE-1003, [¶¶ 20–22]. Alternatively, the person could have had a Master of Science degree in a relevant academic discipline with less than a year of related work experience in the same discipline. *Id.*

Pet. 4.

Patent Owner notes that we “adopted Petitioner’s definition of the level of ordinary skill in the art” in our Institution Decision and contends that Petitioner “failed to show unpatentability under any proposed level of skill.” PO Resp. 6–7. Patent Owner does not dispute Petitioner’s proposed definition in its Response or argue that any issues in this case turn on the definition of a POSITA. *See id.*; *see also* Inst. Dec. 14 (“If the parties continue to propose differing levels of ordinary skill in the art during trial, they should state whether any issue in the case turns on those differences.”).

Based on our review of the record, we find Petitioner’s proposal consistent with the level of skill exemplified by the prior art of record and the disclosure of the ’159 patent. Accordingly, we apply Petitioner’s proposal in our analysis in this Decision. *See Okajima*, 261 F.3d at 1355 (“the prior art itself” may reflect an appropriate level of the ordinary level of skill in the art) (quoting *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 163 (Fed. Cir. 1985)).

C. Claim Construction

We construe each claim “using the same claim construction standard that would be used to construe the claim in a civil action” under 35 U.S.C. § 282(b). 37 C.F.R. § 42.100(b). Under this standard, claim terms are generally given their ordinary and customary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (en banc) (“We have frequently stated that the words of a claim ‘are generally given their ordinary and customary meaning.’” (citations omitted)). “The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

Here, we address two arguments relating to (1) the claim term “opening” and (2) the claim language requiring a “plurality of detectors” that are “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.”

1. “Opening”

The term “opening” appears in independent claims 1 and 19. *See* Pet. viii, xi. Petitioner submits that “no claim terms need be construed to resolve issues of controversy in the present Petition.” Pet. 5. Patent Owner contends that, as applied to the term “opening” in independent claims 1 and 14, Petitioner’s position in this proceeding is inconsistent with Petitioner’s claim construction in the Delaware Litigation and that Petitioner’s challenge fails as a result. PO Resp. 8–11; PO Sur-reply 1–3. We address the parties’ arguments below.

We begin by considering whether the parties dispute the meaning of the term “opening.” We determine that there is no dispute. Neither party contends that the term “opening needs” to be construed. Pet. 5 (arguing that “no claim terms need to be construed”); PO Resp 8–11 (arguing that Petitioner interprets the term “opening” differently here and in the Delaware Litigation, but not advancing a claim construction or arguing that the claims need to be construed); PO Sur-reply 3 n.2 (“Because Apple’s Petition fails as a procedural matter, the Board need not decide the correct construction.”). Indeed, in this proceeding, the parties ascribe the same meaning to the term “opening.” Pet. Reply 1 (“With respect to the term ‘opening,’ [Petitioner] properly applied the prior art to the challenged claims consistent with the positions taken by [Patent Owner] . . . for purposes of asserting infringement.” . . . “[A]n ‘opening’ is an area through which light is configured to pass, which could be empty space or transparent material.”); PO Sur-reply 3 n.2 (“[Patent Owner] maintains the correct construction is the construction it offered in the district court, which encompasses both

empty space and transparent material.”). Accordingly, we decline to provide an express claim construction for the term “opening.”

We turn now to Patent Owner’s argument regarding Petitioner’s allegedly inconsistent positions. Patent Owner argues that, in the Delaware Litigation, Petitioner’s expert “opined that the plain meaning of ‘opening’ is ‘empty space,’ and that ‘[a] POSITA would not regard solid material as an ‘opening.’” PO Resp. 9 (citing Ex. 2098 ¶ 465). Patent Owner describes Petitioner’s position as “materially inconsistent” with its position here that Iwamiya’s optical filter, comprised of a solid material, falls within the scope of “opening.” *Id.* As a result, Patent Owner argues, Petitioner failed to comply with the Board’s rules requiring “that a petition explain ‘[h]ow the challenged claim is to be construed’ and ‘[h]ow the construed claim is unpatentable.’” *Id.* at 8 (citing 37 C.F.R. § 42.104(b)(3)–(4)) (first emphasis added). We disagree.

Patent Owner correctly notes that our rules require that Petitioner explain how the challenged claim is construed and how the claim is unpatentable. 37 C.F.R. § 42.104(b)(3)–(4). But Petitioner complied with these requirements by explaining that Iwamiya’s optical filter 17 and Sarantos’s window 2278 both meet the claim requirement for an “opening.” Pet. 23 (arguing that Sarantos’s “window 2278, . . . satisfies the definition of “opening” that Masimo has advanced for purposes of infringement”), 24 (arguing that Iwamiya’s ““optical filter 17 is configured to transmit a specific wavelength band of 900 nm or more,’ and thus, is configured to allow at least a portion of light reflected from tissue to pass through to this surface”). By identifying Sarantos’s window 2278 and Iwamiya’s optical filter 17 as meeting the requirement for an “opening,” Petitioner made clear

that, in this proceeding, it was construing the term “opening” to encompass transparent material. Accordingly, we find that Petitioner has explained both “[h]ow the challenged claim is to be construed” and “[h]ow the construed claim is unpatentable” in compliance with 37 C.F.R. § 42.104(b)(3)–(4).

As we did in our Institution Decision (Inst. Dec. 17), we acknowledge that Petitioner’s interpretation of the term “opening” in its invalidity assertions here is potentially inconsistent with its interpretation of “opening” in its non-infringement positions in the Delaware Litigation.⁷ Since our Institution Decision, however, neither party has offered an express construction of “opening” in this proceeding, and, as discussed above, both parties agree that the term “opening” encompasses transparent material like that in Sarantos’s window 2278 and Iwamiya’s optical filter 17. Further, as discussed above, Petitioner has explained with particularity how and why it contends the challenged claims are unpatentable. Accordingly, we do not find any insufficiency or inconsistency in Petitioner’s claim construction positions.

2. *“Plurality of detectors . . . arranged in an array . . .”*

Claim 14 requires “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.” Pet. x (claim limitation 14.4). Petitioner does not propose an express construction for this claim language. Pet. 5. Patent Owner contends that we should

⁷ We issued our Institution Decision before *Cambridge Mobile Telematics, Inc. v. Sfara, Inc.*, IPR2024-00952, Paper 12 (PTAB Dec. 13, 2024) issued or was designated precedential.

construe this language as we did in the Institution Decision to exclude arrangements of two or three detectors. PO Resp. 7.

Our Institution Decision relied heavily on statements made during prosecution when addressing this limitation. Inst. Dec. 17–19. During prosecution of the ’199 Application,⁸ claim 1 was amended to recite: a “tissue measurement site . . . having an at least partially circular shape bounded by a light block”; the light block comprising “an annular ring having a circular shape”; and a “plurality of detectors . . . arranged in an array having a spatial configuration corresponding to the shape of the irradiated portion of the tissue measurement site.” Ex. 2057, 311. Patent Owner argued to the Examiner that the “array” limitation had support in the ’199 Application specification because:

The ordinary meaning of the claim term “correspond” means to “have a close similarity; match or agree almost exactly” or “be analogous or equivalent in character, form, or function” or “represent.” New Oxford American Dictionary, 390 (3rd Edition 2010). Consistent with this exemplary definition and the originally-filed application, the phrase “arranged in an array having a spatial configuration corresponding to the shape of the irradiated portion of the tissue measurement site” . . . would be understood by a person having ordinary skill in the art as requiring a sufficient number of detectors such that, when arranged together in an array, can “match,” “have a close similarity,” or “represent” the “at least partially circular shape” of the irradiated portion of the tissue measurement site. . . .

In order for the claimed “plurality of detectors” to “match” or “represent” an “at least partially circular shape” or an “annular shape,” the “plurality of detectors” must

⁸ The ’159 patent claims priority to U.S. Application No. 15/195,199 (the “’199 Application”), filed on June 28, 2016. See Ex. 1001, code (63).

include sufficient detectors to represent such shapes. For example, six or more detectors could be arranged in an annular shape and meet the recited limitation. ***However, two detectors, for example, can only be arranged in a spatial configuration representing a line and three detectors, for example, can only be arranged in a spatial configuration representing a line or a triangle.*** Thus, when read in view of the originally-filed application, the recited “plurality of detectors” would be understood by a person having ordinary skill in the art as including a sufficient number of detectors to represent the desired geometric shape.

Id. at 320–322 (emphasis added).

The plain and ordinary meaning of the “plurality of detectors . . . arranged in an array” language in claim 14 is that the detectors are arranged to have a spatial configuration that corresponds to the circular shape of the light block. Pet. x. Considered in light of the prosecution history, the current record supports Patent Owner’s position that this language requires more than three photodiodes, because two photodiodes “can only be arranged in a spatial configuration representing a line” (not a circle), and three photodiodes “can only be arranged in a spatial configuration representing a line or a triangle” (not a circle). Ex. 2057, 322. Petitioner does not dispute this. Pet. Reply 1–3 (addressing claim construction without discussing this claim language). Accordingly, we construe the “plurality of detectors . . . arranged in an array” claim language to exclude arrangements of two or three detectors.

D. Obviousness Based on Iwamiya and Sarantos

Petitioner contends that the combination of Iwamiya and Sarantos renders claims 1, 2, and 4–13 obvious. See Pet. 1, 5–50. Patent Owner raises several arguments against these challenges. See PO Resp. 11–67. We

first provide a brief overview of Iwamiya and Sarantos, and then address the parties' arguments.

1. Iwamiya

Iwamiya discloses a light-based biological information detecting apparatus. *See* Ex. 1004, code (57), 1:17–22. In one embodiment, the measured biological information is a patient's "pulse wave." *Id.* at 1:34–42, 4:13–16, 8:61–9:7.

Figure 4 of Iwamiya is reproduced below.

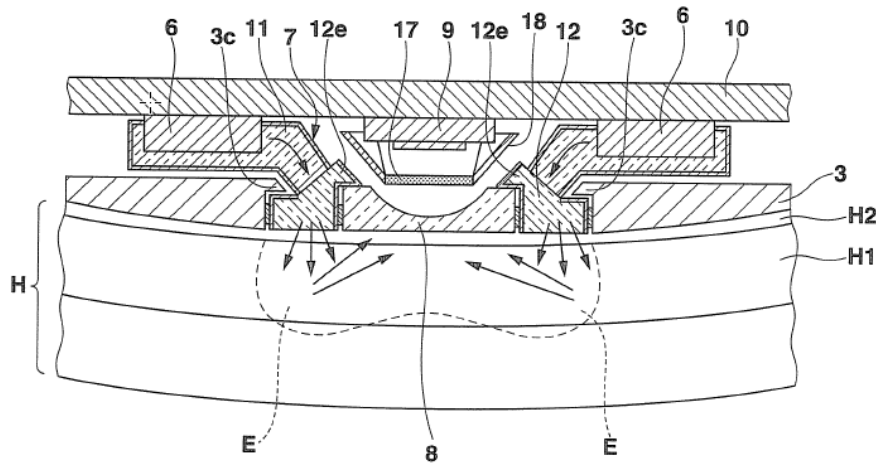


Figure 4 is a cross-sectional view of a wristwatch case including back cover 3, and enclosing a biological information detecting apparatus 5 (shown in Figure 1), pressed against a patient's skin H. *See id.* at Figs. 1–4, 4:5–16, 5:54–6:21, 9:61–63.

Detecting apparatus 5 comprises several components mounted on circuit board 10. *See* Ex. 1004, 6:22–31. Two light emitting units 6, located at the 3 o'clock and 9 o'clock positions of the watch face, emit observation light to enter annular light guide unit 7. *See id.* at 6:7–14, 6:34–39, 6:49–52. Unit 7 comprises light guiding ring portion 11 and diffusion ring portion 12, which guide the light to the surface of skin H, as shown by arrows in Figure 4. *See id.* at 6:10–14, 6:41–7:24, 10:18–33. Diffusion ring portion

12 “is formed in almost a ring shape, using a clouded or milky resin with a light diffusing property” in order to “uniformly diffuse and irradiate the observation light over a wide area of a ring shape with respect to the skin H.” *Id.* at Fig. 2, 7:4–24, 10:25–33. Unit 7 includes reflection layers 13 and 15 on its external surfaces, to prevent observation light from leaking out of unit 7 except where the bottom surface of diffusion ring portion 12 contacts skin H. *See id.* at Fig. 3, 6:62–7:3, 7:41–49, 8:14–19.

The light emitted from light emitting units 6 enters skin H, interacts with the patient’s blood flowing through the skin in annular irradiation area E, and back-scatters to exit the skin from the same surface it entered the skin, all as shown by arrows in Figure 4. *See Ex. 1004*, 1:28–34, 2:26–31, 6:14–21.

The back-scattered light enters scattered light taking unit 8, which is a transparent lens to focus the light on light receiving unit 9. *See Ex. 1004*, 6:14–21, 7:50–8:13, 10:62–11:3, 12:55–67. The focused light encounters optical filter 17 mounted on the lower side of light shielding frame 18. *See id.* at 8:38–42. Light that passes through filter 17 then reaches light receiving unit 9, which outputs a signal responsive to the received light, and the signal is communicated (not shown in Figure 4) to a processor that utilizes the signal to determine biological information of interest, such as a pulse wave. *See id.* at 6:17–21, 8:29–37; *see also id.* at 8:58–9:43 (describing Figure 10 as illustrating a circuit configuration of the biological information detecting apparatus, including unit 9 sending signals to CPU 20).

Iwamiya discusses how previously known pulse wave measuring devices generally used observation light wavelengths “shorter than 600 nm”

(nanometers), because absorbance of light by hemoglobin in the blood is “very high” below 600 nm versus longer wavelengths. Ex. 1004, 1:43–52. However, according to Iwamiya, when the patient’s skin contains a large amount of melanin,⁹ then observation light in the ultraviolet to visible band (i.e., below about 700 nm)¹⁰ may be absorbed by melanin pigment instead of hemoglobin, so biological information such as a pulse wave cannot be measured accurately. *See id.* at 1:53–2:6.

Accordingly, Iwamiya’s light emitting units 6 emit infrared light at a wavelength of 940 nm, “where absorbance of melanin[] pigment contained in the skin H is low.” Ex. 1004, Fig. 6, 6:31–34, 10:15–18, 10:34–38, 11:43–49. Similarly, “light receiving unit 9 has a spectral sensitivity characteristic of reacting strongest with light of a specific wavelength band of about $\lambda = 940$ nm,” with a “gradually lowered” sensitivity at lower wavelengths. *Id.* at 8:29–37, Fig. 9. In addition, optical filter 17 “transmit[s]” light wavelengths greater than 900 nm and “shield[s]” light wavelengths less than 900 nm, in order to “alleviate[] an influence from a measurement change due to external light, such as sunlight.” *Id.* at 8:42–57, 11:3–8, 13:1–23.

2. Sarantos

Sarantos discloses a fitness monitor worn on a user’s wrist like a wristwatch, which utilizes photoplethysmography (PPG) sensors (i.e., light-based sensors) to measure the wearer’s heart rate. *See* Ex. 1005, code

⁹ Iwamiya indicates this may occur, for example, if the patient has a dark skin color. *See* Ex. 1004, 1:64–66.

¹⁰ The visible light band spans about 400–700 nm, and the ultraviolet light band falls below the visible band with a maximum wavelength of about 400 nm. Ex. 1004, Fig. 6.

(54), 1:7–24, 1:36–56 (describing prior art monitor 100 shown in Fig. 1), 6:66–7:23 (describing Sarantos’s monitor 200 shown in Fig. 2). Figure 22 of Sarantos is reproduced below.

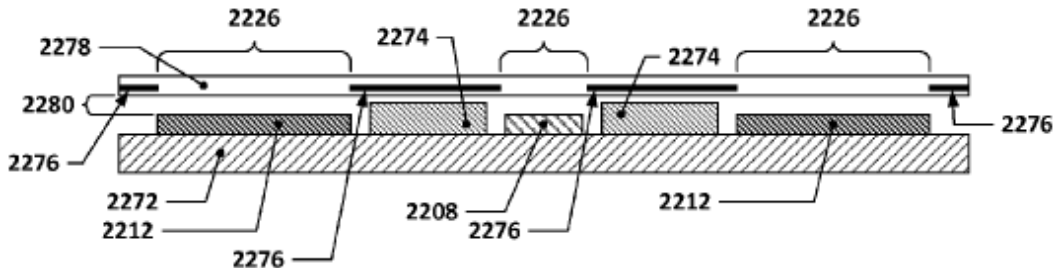


Figure 22 is a cross-sectional view of a PPG sensor. Ex. 1005, 6:52–54, 16:60–62. The PPG sensor has central light source 2208 flanked by two photodetector elements 2212 disposed on substrate 2272, with walls 2274 disposed in between. *See id.* at 17:1–3, 17:26–32. In this way, the sensor “may be held against a person’s skin, e.g., by being held in place with a strap” so light emitted by light source 2208 shines “into the person’s skin, where the light then diffuses into the surrounding flesh and is then emitted back out of the person’s skin and into the . . . photodetector elements 2212” to measure the person’s heart rate. *Id.* at 17:16–25, 17:39–42.

Sarantos’s PPG sensor includes window 2278 composed of a transparent material such as acrylic, “with an in-mold label 2276 embedded within it.” Ex. 1005, 17:3–6. Label 2276 “may be black or otherwise rendered opaque to light to prevent light from entering or exiting the PPG sensor through the window 2278 except through window regions 2226.” *Id.* at 17:6–10. Also, “other masking techniques, such as a painted or silk-screened mask applied to the window 2278, may be used.” *Id.* at 17:10–12. In this way, “label 2276 or the masking may prevent stray light from other sources, e.g., ambient light, from reaching . . . photodetector elements 2212

and affecting the heart rate signal obtained by the PPG sensor.” *Id.* at 17:12–16.

3. Independent Claim 1

We begin with Petitioner’s argument that independent claim 1 would have been obvious in view of Iwamiya and Sarantos. *See* Pet. 7–27. Petitioner asserts that claim 1 would have been obvious over the combination of Iwamiya and Sarantos and sets forth an element-by-element comparison of the challenged claims to the asserted art. *See id.*

Patent Owner disputes two aspects of Petitioner’s showing as to claim 1. First, Patent Owner argues that a POSITA would not have been motivated to combine Iwamiya and Sarantos as set forth in the Petition. PO Resp. 11–23. Second, Patent Owner argues that Petitioner does not identify in the combination of Iwamiya and Sarantos an “opening defined in the dark-colored coating” configured to allow light to “pass through the surface.” *Id.* at 23–26. As to the unchallenged claim limitations, we have reviewed the evidence and arguments of record and find that Petitioner has shown, by a preponderance of the evidence, that they are disclosed by the combination of Iwamiya and Sarantos for the reasons set forth in the Petition. *See* Pet. 13–27. We focus our discussion on the disputed issues.

a. Motivation to Combine

Independent claim 1 requires “a surface comprising a dark-colored coating . . . positioned between the plurality of detectors and the tissue.” Pet. viii. Petitioner asserts that this limitation is satisfied by the combination of Iwamiya’s light shielding frame and Sarantos’s black or opaque coating such as its in-mold label or its silk-screened mask. Pet. 7–13 (explaining

combination), 21–23 (addressing limitation 1.4). More specifically, Petitioner contends:

[A] POSITA would have been motivated to implement Iwamiya’s light shielding frame 18 to include a black or opaque dark-colored coating such as an in-mold label, silk-screened mask, or other technique (as taught by Sarantos) such that the resulting 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, thus increasing accuracy of the sensor.

Pet. 9 (citing Ex. 1003 ¶ 48). According to Petitioner, a POSITA would have understood that Sarantos’s dark coating would not only block light, but also limit reflections. *Id.* Petitioner also asserts that “Iwamiya is silent as to the material or coating used to implement the light shielding frame 18” and, thus, a POSITA, seeking to implement Iwamiya’s device would have “looked to other references, such as Sarantos, . . . to identify materials and/or coatings for implementing Iwamiya’s light shielding frame 18 to best block errant light from reaching the photodiodes 9.” *Id.* at 11–12. Patent Owner argues that a POSITA would not have been motivated to add a dark-colored to Iwamiya’s light shielding frame because (1) there was no reason to look beyond Iwamiya for a light shielding material; and (2) Petitioner’s alleged benefits in adding the dark-colored coating lacked support. *See id.* at 11–18.

In the -1291 IPR, the Board found Petitioner’s proposed reasons why a POSITA would have used Sarantos’s dark coating on Iwamiya’s light shielding frame persuasive. Petitioner advances much the same rationale here, and we find Petitioner’s reasoning persuasive on this record for the same reasons the Board did in the -1291 IPR. As the Board explained:

[W]e agree with [Petitioner's] position that Iwamiya provides no detail concerning the *structural* configuration of frame 18, apart from the illustrations of frame 18 in Figures 1–4. Iwamiya simply identifies the frame as “a light shielding frame,” which is a functional description apart from the word “frame.” Ex. 1004, 8:38–47. We do not discern, and [Patent Owner] does not cite, any disclosure in Iwamiya concerning a specific material or structure of frame 18 that achieves the light shielding function. Thus, Iwamiya leaves it to a person of ordinary skill in the art to choose a material or structure to incorporate within frame 18 to shield light away from reaching light receiving unit 9 without passing through optical filter 17. *See id.* at 8:38–57, Fig. 4. We find [Petitioner's] reliance on Sarantos as disclosing a suitable light-shielding material or structure for use with Iwamiya's frame 18 is invited by Iwamiya's disclosure. . . .

Sarantos in turn provides a light-based sensor incorporating photodetector elements 2212 shielded from stray light by in-mold label 2276, or alternatively by a painted or silk-screened mask. *See* Ex. 1005, Fig. 22, 17:1–25. In particular, these structures “may be black or otherwise rendered opaque to light to prevent light from” reaching photodetector elements 2212 except through window regions 2226, such as “stray light” from sources other than light source 2208. *Id.* at Fig. 22, 17:6–16. That function is similar to the function of Iwamiya's light shielding frame 18 shielding light away from reaching light receiving unit 9 without passing through optical filter 17, discussed above. . . .

We conclude that Iwamiya's leaving the selection of a light-shielding material or structure to incorporate within frame 18 open to the designer's choice, coupled with Sarantos's disclosure of a dark-colored coating as performing a light-shielding function, provides ample motivation for [Petitioner's] combination. Thus, we are persuaded by Dr. Anthony's testimony to this effect. *See* Ex. 1003 ¶¶ 40–

42;^[11] Ex. 1042 ¶¶ 7–8; *KSR*, 550 U.S. at 417 (“[A] court must ask *whether the improvement is more than the predictable use of prior art elements according to their established functions.*” (emphasis added)). “A person of ordinary skill is also a person of ordinary creativity, not an automaton,” and “in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle.” *KSR*, 550 U.S. at 420–21.

Ex. 2035, 38–39.

Patent Owner argues that a POSITA would have had no reason to add a dark-colored coating due the presence of an opaque, light shielding frame in Iwamiya. PO Resp. 12–18. More specifically, Patent Owner contends that Petitioner’s “motivation to combine Iwamiya with a dark-colored coating was premised on the wrong assumption that ‘Iwamiya lacks [] express disclosure of materials that would be suitable to achieve the desired ‘light shielding’ function of frame 18.’” PO Sur-reply 3 (alteration in original). According to Patent Owner, “Iwamiya does, in fact, disclose reflective materials for light shielding.” *Id.* (citing PO Resp. 13–15). For example, Patent Owner points to Iwamiya’s disclosure that “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.” PO Resp. 15 (quoting Ex. 1004, 18:61–65). Indeed, Patent Owner argues that the Board in the -1291 IPR recognized

¹¹ Petitioner also relies on the testimony of Dr. Anthony in this proceeding. *See generally* Ex. 1003. The testimony from Dr. Anthony that the Board in the -1291 IPR cited corresponds to Ex. 1003 ¶¶ 45–53 in this proceeding. The material cited in this proceeding includes substantially all of the material relied upon by the Board in the -1291 IPR as well as some additional testimony elaborating on why a POSITA would have employed a dark coating on Iwamiya’s light shielding frame 18.

holder portion 43 as providing an example of a structure that “may be used in frame 18 to perform its light shielding function.” *Id.* at 14–15 (citing Ex. 2035, 40–41). Because Iwamiya already discloses a light shielding material, Patent Owner argues, a POSITA “would have had no reason to turn to a different reference.” PO Sur-reply 3. Instead, a POSITA “would have chosen metal . . . for the light shielding frame 18 precisely because the frame itself is ‘light shielding’ and Iwamiya described metal as providing a ‘light shielding property.’” PO Resp. 17 (citing Ex. 1004, 18:61–64; Ex. 2100 ¶¶ 64).

The Board addressed much the same argument in the -1291 IPR and found it unpersuasive. Ex. 2035, 40–41. We find it unpersuasive for the same reasons. Namely, we find that frame 18 and holder portion 43 are different structures used in different embodiments. Ex. 1079 ¶¶ 10–12 (Dr. Anthony testifying these are different embodiments), *cited at* Pet. Reply 6; Ex. 1080, 88:1–94:8 (Dr. Madisetti agreeing these are different embodiments). Patent Owner argues that frame 18 and holder portion 43 are “analogous structures.” PO Resp. 16. Even if that were true, Iwamiya’s disclosure that “holder portion 43 of the light receiving unit 33 is formed of a metal with a light shielding property, such as aluminum” (Ex. 1004, 18:61–65) simply provides one example of a material that can be used to perform Iwamiya’s functionally-described “light-shielding frame 18” (*id.* at 8:38–42). Accordingly, even crediting Patent Owner’s argument that metal provides another solution to the problem of how to implement a light shield, implementing a known solution, like using a dark coating, to predictably solve that problem would have been obvious. *PAR Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1197-98 (Fed. Cir. 2014) (“Our precedent . . .

does not require that the motivation be the best option, only that it be a suitable option from which the prior art did not teach away.”); *In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004) (“The prior art’s mere disclosure of more than one alternative does not constitute a teaching away from . . . alternatives because such disclosure does not criticize, discredit, or otherwise discourage the solution claimed.”); *KSR*, 550 U.S. at 416 (“The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.”).

Patent Owner argues that a POSITA “would have understood that light shielding frame 18 is already opaque without the need to add a separate coating to accomplish that function.” PO Resp. 18 (citing Ex. 2100 ¶ 66). According to Patent Owner, “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.*

We do not agree with this argument because, although Iwamiya describes its light shielding frame as opaque, it does not speak to how its opacity is achieved, i.e., what materials and/or coatings are employed in order to render its frame opaque. Sarantos teaches that one way to achieve opacity is to use a black “in-mold label” or “other masking techniques, such as a painted or silk-screened mask.” Ex. 1005, 17:6–12. We view Petitioner’s proposal to use Sarantos’s specific materials, i.e., in-mold label or other masking techniques, as implementing the opacity of Iwamiya’s light shielding frame rather than adding to it. Pet. 15 (“[B]ecause Iwamiya is silent as to the material or coating used to implement the light shielding frame 18, a POSITA implementing Iwamiya’s device would have looked to other references, such as Sarantos, . . . to identify materials and/or coatings

for implementing Iwamiya’s light shielding frame 18 to best block ambient light from reaching the photodiodes 9.” (citing Ex. 1003 ¶¶ 40–42)); Ex. 1003 ¶¶ 40–42.

Patent Owner argues that Petitioner’s “argument rests on *adding* a coating that was not previously disclosed.” PO Resp. 16–17 (citing Pet. 12; Ex. 1004, 8:38–42). According to Patent Owner, “[i]f 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.” *Id.* at 17 (citing Ex. 2100 ¶ 63). Patent Owner cites the testimony of Dr. Madisetti to support this assertion, but Dr. Madisetti simply repeats the content of the Petition. As such, we give his opinion on this issue little weight. *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 at 15 (PTAB Aug. 24, 2022) (Decision Denying Institution) (precedential) (finding that conclusory testimony that “does not cite to any additional supporting evidence or provide any technical reasoning to support [that testimony] . . . is entitled to little weight”); *see also* 37 C.F.R. § 42.65(a) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”). On this record, we see no basis for distinguishing between two known ways of shielding light: using a material that itself shields light and using structure coated with a light blocking material.

For the reasons discussed above, we find that Petitioner has established by a preponderance of the evidence that a POSITA would have been motivated to combine Iwamiya and Sarantos in the manner set forth in the Petition.

b. Opening in the Coating Configured to Allow Light to Pass Through the Surface

Independent claim 1 requires “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.” Pet. viii. Before considering the parties’ contentions with respect to this claim limitation, it is helpful to consider the configuration of the structures in Iwamiya that Petitioner contends meet this limitation. The annotated and excerpted version of Iwamiya’s Figure 4 provided in the Petition and reproduced below helps to illustrate Petitioner’s contentions. Pet. 24.

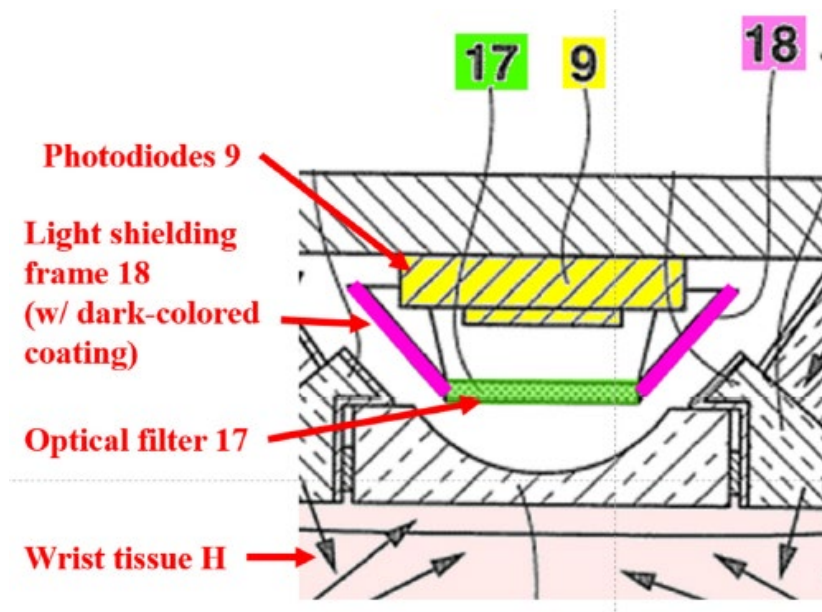
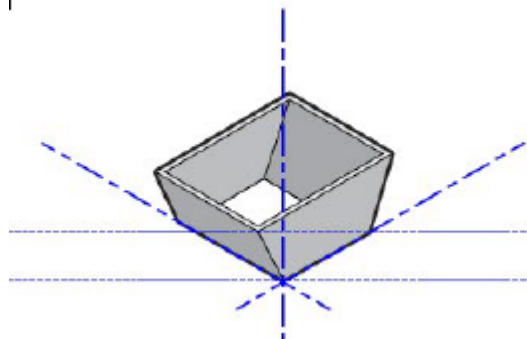


Figure 4 shows a cross-sectional view in which the back cover of Iwamiya’s wristwatch contacts the skin of an arm. Ex. 1004, 4:13–16. In the annotated version of Figure 4, Petitioner has colored light shielding frame 18 magenta, optical filter 17 green, photodiode 9 yellow, and wrist tissue H pink. Pet. 24. As shown in Figure 4, optical filter 17 is mounted on light shielding frame 18. Ex. 1004, 8:38–42; *see also* Pet. Reply 7–10 (citing Ex. 1079 ¶¶ 14–21).

Iwamiya's "light shielding frame 18 has four sides, each with its own surface." PO Sur-reply 6. Patent Owner provides its own isometric drawing, reproduced below, showing the configuration of Iwamiya's light shielding frame 18. *Id.* at 7.



The isometric drawing illustrates what is "essentially a box without a top" or bottom. *Id.* at 8. The four sides of the "box" are trapezoids, and the box is wider at the top than at the bottom. As Patent Owner points out, "none of the four side surfaces of the light shielding frame 18 includes an opening." *Id.* at 7. However, the top and bottom of the structure are open such that light can pass from top to bottom (or vice versa).

Although not shown in Patent Owner's isometric drawing, "the light shielding frame 18 holds the optical filter 17 at the bottom of the rectangular box, on a plane largely perpendicular to each of the four sides of the light shielding frame." PO Sur-reply 8. Thus, Patent Owner points out, "Iwamiya's optical filter 17 sits on a different plane and has a surface different than the four sides of the light shielding frame 18."¹² *Id.*

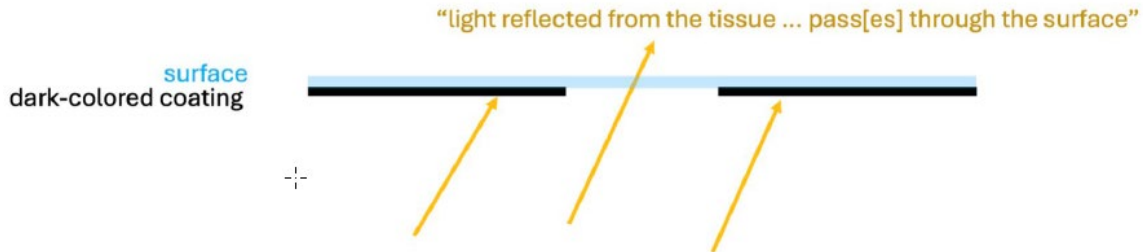
¹² As Patent Owner points out, Petitioner incorrectly labeled Iwamiya's light shielding frame 18 in its Reply, highlighting concave lens 8 rather than frame 18. PO Sur-reply 4–5. At oral argument, Petitioner acknowledged this error. Paper 50, 14–15. We do not deem this mistake to be material as the Petition consistently identifies Iwamiya's light shielding frame 18 and

Petitioner contends that Iwamiya “describes an ‘an optical filter 17’ that ‘is mounted on the lower side of a light shielding frame 18’ (the surface) between the photodiodes 9 and the tissue H.” Pet. 23 (quoting Ex. 1003 ¶ 64; Ex. 1004, 8:39–42). Petitioner also asserts that Iwamiya describes its optical filter 17 as “configured to allow at least a portion of light reflected from the tissue to pass through this surface to the photodiodes 9.” *Id.* at 24 (citing Ex. 1003 ¶ 65; Ex. 1004, 8:42–44). We agree. We find that when Sarantos’s dark-colored coating is applied to Iwamiya’s light shielding frame 18—i.e., to the structure Petitioner identifies as the surface—there is an opening occupied by optical filter 17 within four-sided frame 18 that allows light to pass through that surface. *See* Ex. 1004, Fig. 4, 8:42–44 (“As illustrated in FIG. 8, the optical filter 17 is configured to transmit light of a specific wavelength band of 900 nm or more.”); Ex. 1003 ¶¶ 59–65 (explaining that Iwamiya “is configured to allow at least a portion of light reflected from the tissue to pass through to the photodiodes 9”).

Patent Owner argues that optical filter 17 is “not an ‘opening *defined in the dark-colored coating*, . . . [r]ather it is a separate structure that is mounted to the light shielding frame.” PO Resp. 24 (citing Ex. 2100 ¶ 77). According to Patent Owner, “the plain language of the claim requires that

optical filter 17 rather than concave lens 8 in connection with the claim language at issue.

light ‘pass *through the surface*.’ ” *Id.* at 25 (citing Ex. 2100 ¶ 78). Patent Owner illustrates its argument using a figure, reproduced below.



In the figure above, Patent Owner uses a thick blue line to depict a “surface.” Beneath the bottom left and bottom right ends of the “surface” are thick black lines, which Patent Owner has labeled “dark-colored coating.” The center portion of the “surface” does not have a “dark-colored coating.” In the figure, three tan diagonal arrows, representing light, extend upward from the bottom of the figure. The middle arrow bisects the thick black lines representing a dark-colored coating, and thus “passes through,” the thick blue line representing a “surface.” The left and right arrows contact the dark-colored coating and do not pass through the surface. *See id.*

A question posed in our Institution Decision and answered in Patent Owner’s Response helps to illustrate Patent Owner’s position. In our Institution Decision, we asked “whether the claim requires light to actually penetrate the ‘surface’ it passes through . . . or whether it is instead sufficient that light is allowed to pass through an opening in the surface”? Inst. Dec. 33. Patent Owner responded that it is not sufficient that light pass through an opening in the surface “because the [claimed] opening is ‘defined in the dark-colored coating,’ not in the ‘surface,’ and the opening must allow light to ‘pass through *the surface*.’ ” PO Resp. 26; *see also* Paper 50, 57–58 (Patent Owner’s counsel, arguing: “It’s not an issue of light passing next to

or adjacent to the surface or, you know, through empty space . . . the light still has to pass through the surface.”).

Applying this reasoning to the Iwamiya/Sarantos combination, Patent Owner argues that light does not pass through light shielding frame 18 (the structure Petitioner identifies as the claimed “surface”) because it instead passes through optical filter 17. PO Resp. 26. As noted above, Patent Owner describes Iwamiya’s optical filter as a “separate structure that is mounted to the light shielding frame” rather than an ‘opening *defined in the dark-colored coating*.’” *Id.* at 24.

We do not find Patent Owner’s reasoning persuasive because Petitioner does not contend that Iwamiya’s optical filter 17 meets the “opening” limitation, as Patent Owner suggests when it argues that optical filter 17 “not an ‘opening *defined in the dark-colored coating*.’” PO Resp. 24. Petitioner relies on an opening in frame 18, not optical filter 17, to meet the claimed “opening:” “[b]ecause Sarantos’s dark-colored coating is applied to Iwamiya’s light shielding frame in the combination, there is an opening defined in the dark-colored coating that allows light to pass through the surface.” *See* Pet. Reply 8 (“[L]ight shielding frame 18, ‘surround[s]’ the light receiving units 9 and has an opening that allows light to pass through the surface.” (second alteration in original)) (citing Ex. 1003 ¶¶ 64–65; Ex. 1079 ¶ 17); Ex. 1079 ¶¶ 14–20. This structure satisfies the claim limitation, and the presence of optical filter 17 within the opening does not change that outcome because it still allows light to pass through the opening in the surface, frame 18. *See* Pet. 23–24; Ex. 1004, Fig. 4; Ex. 1003 ¶¶ 64–65; Pet. Reply 8. Light passes through Iwamiya’s frame 18 in the same way

light (or air, or a liquid) would pass “through” a box with holes cut in both ends. For this reason alone, Patent Owner’s argument fails.

In addition, as Petitioner points out, and as Patent Owner acknowledges, Patent Owner’s argument regarding this issue implicitly requires that the claimed “opening” include a transparent or translucent material—i.e., a physical barrier that the light contacts on one side and emerges from on the other side. Pet. Reply 8 (“[Patent Owner’s] arguments . . . imply that the claimed opening is *required* to include a transparent or translucent material.”); Paper 50, 57–58 (Patent Owner’s counsel, arguing: “It’s not an issue of light passing next to or adjacent to the surface or, you know, through empty space . . . the light still has to pass through the surface.”). This creates a problem for Patent Owner because, despite describing the dimensions and shape of the opening in great detail, “there is not a single embodiment within the ’159 patent that describes the opening as including material.” Pet. Reply 9; Ex. 1001, 8:32–53, 9:31–10:3 (all describing the dimensions, shape, and/or relative position of the “opening” without mentioning any material used in the opening); *see also id.* Figs. 4A, 4B, 5; Ex. 1079 ¶ 20 (testimony of Dr. Anthony regarding absence of disclosure in the ’159 patent of the “opening” including material); Pet. Reply 9 (citing Ex. 1079 ¶ 20).

Even if we were to accept Patent Owner’s position that light must penetrate a transparent or translucent material in order to “pass through” a surface, Dr. Anthony explains, in Iwamiya, “light shielding frame 18 and optical filter 17 together define a surface” with an opening that light passes through. Ex. 1079 ¶ 21; *see also* Pet. Reply 9 (citing Ex. 1079 ¶ 21). Dr. Anthony illustrates this point using as annotated version of Iwamiya’s Figure 3 (reproduced below).

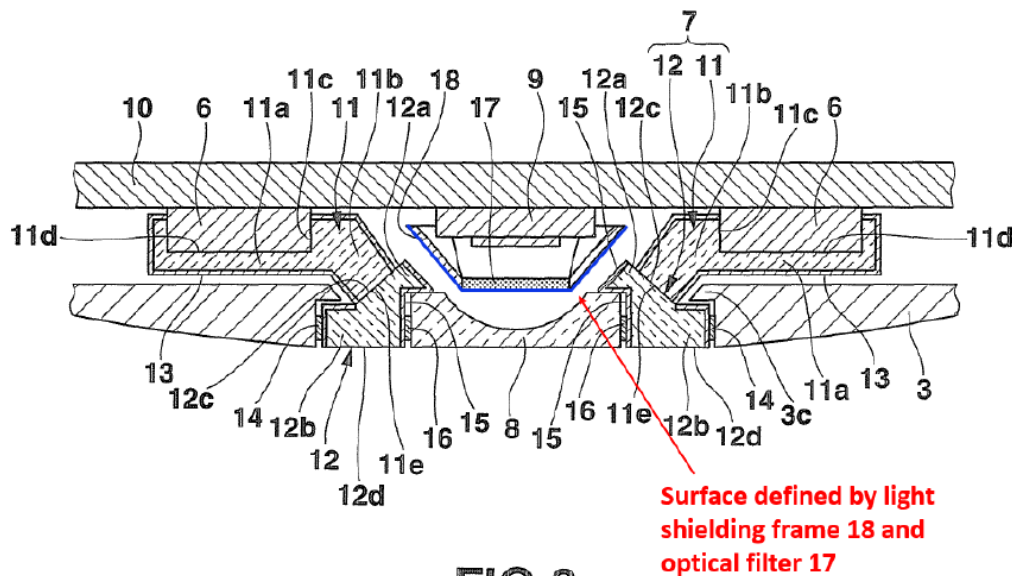


FIG.3

Figure 3 is a cross-sectional view of an embodiment of Iwamiya’s optical biological information detecting apparatus. Ex. 1004, 4:5–12. In the annotated version, Dr. Anthony marked the lower surface of frame 18 and filter 17 with contiguous blue lines that together form an angular bowl. Dr. Anthony labels the contiguous lines “[s]urface defined by light shielding frame 18 and optical filter 17.” Ex. 1079 ¶ 21. We agree with Petitioner that “the combination of Iwamiya’s light shielding frame 18 and optical filter 17 provides . . . a surface” that light passes through. Pet. Reply 9.

For the reasons discussed above, we find that Petitioner has established by a preponderance of the evidence that Iwamiya's frame 18 (which corresponds to the claimed surface) includes an opening that allows light to pass through the frame/surface.

c. Conclusion as to Claim 1

Having reviewed all of the arguments and evidence of record, we find that Petitioner has demonstrated by a preponderance of the evidence that the combination of Iwamiya and Sarantos discloses all of the limitations of claim 1 and a motivation to combine the references in the manner Petitioner proposes. Patent Owner does not rely on objective indicia of nonobviousness with respect to claim 1. *See* PO Resp. 54–59 (arguing objective indicia in the context of dependent claims 8 and 17 only). We determine that Petitioner proves by a preponderance of the evidence that claim 1 would have been unpatentable as obvious over the combination of Iwamiya and Sarantos.

4. Dependent Claims 2, 4, 6, 7, 9–11, and 13

Claims 2, 4, 6, 7, 9–11, and 13 all depend from claim 1. *See* Pet. viii–ix. Patent Owner does not challenge Petitioner's showing with respect to any of the additional limitations recited in dependent claims 2, 4, 6, 7, 9–11, and 13. *See generally* PO Resp. As to these unchallenged claim limitations and claims, we have reviewed the evidence and arguments of record and find that Petitioner has shown, by a preponderance of the evidence, that they are disclosed by the combination of Iwamiya and Sarantos for the reasons set forth in the Petition, which we adopt as our own. Accordingly, we find that Petitioner has established, by a preponderance of the evidence, that claims 2,

4, 6, 7, 9–11, and 13 would have been obvious over the combination of Iwamiya and Sarantos.

5. Dependent Claim 5

Dependent claim 5 depends from claim 1 and further recites that “the plurality of detectors are arranged in an array having a spatial configuration corresponding to a shape of a portion of the tissue measurement site bounded by the light block.” Pet. ix. Petitioner contends that Iwamiya discloses a “plurality of detectors . . . arranged in an array” as required by claim 5. Pet. 20, 29–35. More specifically, Petitioner contends that although Iwamiya only exemplifies devices with one light receiving unit 9 (i.e., detector), “Iwamiya describes that the physical monitoring device includes a plurality of detectors.” *Id.* at 20 (citing Ex. 1003 ¶ 56; Ex. 1004, 14:36–41, 8:20–23); *see also id.* at 31 (citing Ex. 1003 ¶¶ 76–77). As to the claimed spatial configuration, Petitioner relies on Iwamiya’s disclosure of plural light receiving units 9 “disposed on the same circumference centered on an optical axis of the scattered light taking unit 8.” Ex. 1004, 14:36–41. Petitioner explains:

That Iwamiya’s plural photodiodes 9 are arranged in “a spatial configuration corresponding to a [circular] shape” is evident from the fact that the photodiodes 9 are arranged “on the same *circumference* centered on an optical axis” of the circular light taking unit 8. [Ex. 1004], 14:36–41. From this disclosure, a POSITA would have understood and it would have been obvious that the photodiodes 9 are thus arranged in an array having a spatial configuration corresponding to the circular shape of the tissue measurement site encircled by the circular light block.

Pet. 32 (citing Ex. 1003 ¶ 77) (first alteration in original).

Petitioner illustrates its understanding of how a POSITA would have interpreted Iwamiya's disclosure of "plural light receiving units 9 . . . disposed on the same circumference" using an annotated version of Figure 2, reproduced below. Pet. 33.

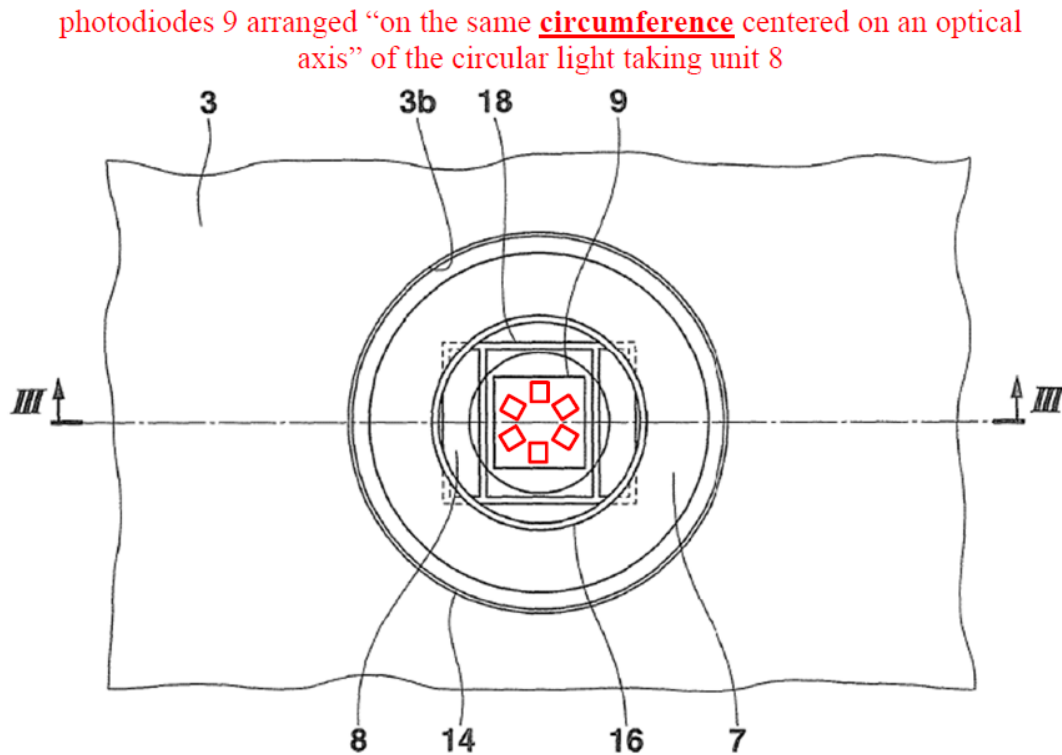


Figure 2 is a plan view of an embodiment of Iwamiya's optical biological information detecting apparatus. Ex. 1004, 4:5–10. Petitioner annotates Figure 2 by adding the legend "photodiodes 9 arranged 'on the same circumference centered on an optical axis' of the circular light taking unit 8" at the top of the Figure and by drawing six red photodiodes arranged in a circle at the center of scattered light taking unit 8. Pet. 32 (emphasis omitted). Although Petitioner illustrates six photodiodes in its annotated figure, Petitioner notes that "Iwamiya leaves the choice of the number of photodiodes to a POSITA, who would have known from Iwamiya's teaching that the photo diodes are arranged around a 'circumference centered on an

optical axis’ to select a sufficient number of photodiodes (such as the six depicted in the above example) to position around the circumference to beneficially increase” detection area and light sensitivity. *Id.* at 34 (citing Ex. 1003 ¶¶ 77, 81).

Patent Owner argues that Petitioner “relies on Iwamiya’s vague description of an alternate embodiment.” PO Resp. 62.¹³ According to Patent Owner, this is insufficient because “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.” *Id.* at 63 (citing Ex. 2100 ¶ 134).¹⁴

The Board in the -1291 IPR addressed much the same issue, and we agree with that analysis. In that case, the claim language at issue required a “plurality of photodiodes . . . arranged in an array having a spatial configuration corresponding to a shape of the portion of the tissue measurement site encircled by the light block.” Ex. 2035, 114. The Board found that Iwamiya met that limitation, explaining:

¹³ Patent Owner addresses claim 5 in the same group as claims 14 and 25, which contain similar limitations, and focuses on claim 14. *See* PO Resp. 61–67. Accordingly, we treat Patent Owner’s arguments directed to claim 14 as if they were directed to claim 5 as well.

¹⁴ Unlike claim 14, claim 5 does not require that the photodetectors be 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.” *See* Pet. x (emphasis added). However, Petitioner asserts that a POSITA would understand Iwamiya’s photodetectors to be so arranged. Pet. 29–35. Accordingly, our analysis focuses on whether a POSITA would, in fact, have understood Iwamiya’s photodetectors to be arranged in a circle.

Iwamiya expressly discloses that its wrist-worn sensor device shown in Figures 1–4 includes “light receiving unit 9” which “is composed of a silicon photo diode”—that is, unit 9 is composed of a single photodiode. Ex. 1004, 4:5–16, 8:20–28; *see also id.* at 14:32–36 (“In the first embodiment . . . *one* light receiving unit is provided.” (emphasis added)).

Iwamiya also expressly discloses, albeit not in any of its figures, that Iwamiya’s “invention is not limited thereto” and “plural light receiving units 9 [i.e., plural photodiodes] may be two-dimensionally disposed . . . in the scattered light taking unit 8.” *Id.* at 14:32–39. In addition, “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.” *Id.* at 14:39–41.

We find the foregoing descriptions plainly disclose using more than one (“plural”) photodiodes 9, which are disposed in a circular array having its center located at the optical axis of the scattered light taking unit 8 (“disposed on the same circumference centered on”). In particular, Iwamiya states its photodetectors 9 are disposed on “the *same* circumference” (emphasis added), which must be a circle rather than an oval or some other more generic circumference, because the “same” term reflects a constant radius from the center. This also is consistent with the generally circular configuration of Iwamiya’s biological information detecting apparatus, as best seen in Figure 2, and with Iwamiya’s disclosure that its light receiving unit(s) 9 are placed “in the vicinity of the focal position on an optical axis of the scattered light taking unit 8.” *Id.* at Figs. 1–4, 5:57–66, 8:20–28.

Id. at 123–124 (alterations in original).

Here, Petitioner directs us to the same disclosure in Iwamiya that the Board in the -1291 IPR found to disclose an almost identical claim limitation. *See* Pet. 20, 29–35. We find that Petitioner has established, by a preponderance of the evidence, that Iwamiya discloses a plurality of

photodetectors arranged as claimed for the same reasons the Board in the -1291 IPR found Iwamiya to disclose the corresponding limitation in the patent challenged in that proceeding.

Patent Owner argues that Petitioner’s understanding of how a POSITA would have interpreted Iwamiya’s disclosure of “plural light receiving units 9 . . . disposed on the same circumference” is wrong, in part because it relies the incorrect assumption such an arrangement would increase sensitivity. PO Resp. 63–64; *see also* Ex. 1004, 14:36–41 (disclosure of Iwamiya at issue). Patent Owner explains:

Apple argued that a [POSITA] would have understood [the arrangement depicted in annotated Figure 2, reproduced above] would “increas[e] detection area and light sensitivity.” Pet., 39. 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.

PO Resp. 63–64. This argument is not persuasive because it misunderstands Petitioner’s position. Petitioner attributed increased sensitivity to increasing the number of photodiodes not to the disposition of photodiodes in a circle. Pet. 34 (“Iwamiya leaves the choice of the number of photodiodes to a POSITA, who would have known . . . to select a sufficient number of photodiodes (such as the six depicted in the above example) to position around the circumference to beneficially increase . . . light sensitivity.”) (citing Ex. 1003 ¶¶ 77, 81).

Patent Owner argues that Iwamiya uses a “scattered light taking unit 8, which is a transparent lens to focus the light on light receiving unit 9” and that it would “make no sense for Iwamiya’s sensor design to focus light to a

spot without photodetector coverage,” like the empty spot at the center of a circle of photodiodes. PO Resp. 64 (citing Ex. 1004, 6:14–21, 7:50–8:13, 10:62–11:3, 12:55–67; Ex. 2035, 17; Ex. 2100 ¶ 137). Instead, according to Patent Owner, a POSITA would have interpreted Iwamiya’s disclosure of “plural light receiving units 9 . . . disposed on the same circumference” to “refer to the photodetectors’ relative location (*i.e.*, that a circle can be drawn through the center of each of the photodetectors).” *Id.* (citing Ex. 2100 ¶ 138). Patent Owner then proposes alternative ways to dispose photodetectors “on the same circumference,” including by placing them in a “triangular array” and in a “square-shaped array.” *Id.* at 64–65. According to Patent Owner, and Dr. Madisetti, “[m]ore than four photodetectors could not be ‘disposed on the same circumference’ without running into the problem of leaving an empty spot in the center without photodetector coverage.” *Id.* at 66 (citing Ex. 2100 ¶ 139). Therefore, Patent Owner argues, a POSITA “would not have understood Iwamiya’s description . . . to describe an array of photodetectors in a circular array” as claimed. *Id.*

This argument is unavailing. We acknowledge Dr. Madisetti’s testimony that arranging the photodiodes in a circle leaves a “large empty spot” in the center of the circle, which “would be severely detrimental to sensor performance.” Ex. 2100 ¶ 137. However, we are not persuaded that the potential for an empty spot would have caused a POSITA to understand Iwamiya’s disclosure of photodiodes “disposed on the same circumference” to refer to a non-circular arrangement. We also acknowledge that one could conceive of arrangements of photodetectors—like the “triangular array” and the “square-shaped array” posited by Patent Owner—that are, technically speaking, disposed on the same circumference. PO Resp. 65–66; Ex. 2100

¶¶ 138–139. However, such an interpretation of Iwamiya’s disclosure seems unduly strained. We agree with Dr. Anthony that “the use of the most logical inference that a POSITA would have drawn from the use of the term ‘circumference’ by Iwamiya (rather than describing the photodiodes as being in a square or triangular arrangement) is that the photodiodes were arranged in a circle about the circumference.” Ex. 1079 ¶ 24; *see also* Pet. Reply 28–29 (citing Ex. 1079 ¶ 24).

For the reasons discussed above, having considered the evidence and arguments of record, we find that Petitioner has established by a preponderance of the evidence that Iwamiya discloses photodiodes arranged in an array having a spatial configuration corresponding to the circular shape of the tissue measurement site encircled by a circular light block, thus meeting the additional requirements of claim 5. Accordingly, we determine that Petitioner proves by a preponderance of the evidence that the combination of Iwamiya and Sarantos renders claim 5 obvious.

6. Dependent Claim 8

Claim 8 depends from claim 1 and further recites that “the physiological parameter comprises oxygen saturation.” Pet. ix. Petitioner contends that the combination of Iwamiya and Sarantos renders claim 8 obvious. Pet. 38–45. Patent Owner opposes. PO Resp. 26–59.

The parties’ arguments addressing claim 8 are extensive and to facilitate discussion, we break them down into three categories: 1) whether Sarantos discloses measuring oxygen saturation, 2) whether a POSITA would have been motivated to combine Iwamiya and Sarantos to arrive at the device recited in claim 8, and 3) whether a POSITA would reasonably have expected success.

a. Does Sarantos disclose measuring oxygen saturation?

Petitioner relies on Sarantos as disclosing measuring oxygen saturation. Sarantos discloses:

[P]hotoplethysmographic techniques may also be used to measure other physiological parameters besides heart rate, such as blood oxygenation levels. It may, in such situations, be desirable to utilize an LED that predominantly emits light in the red or infrared spectrum for such purposes. Thus, it may be desirable to include separate light-emitting devices that are each able to emit different wavelengths of light; each light-emitting device may be used to supply light for a different type of photoplethysmographic measurement.”

Ex. 1005, 13:44–53.

Patent Owner asserts that “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” and that “[n]either Iwamiya nor Sarantos discloses the determination of oxygen saturation at a user’s wrist.” PO Resp. 27. Patent Owner acknowledges that Sarantos makes “passing mention of ‘techniques’ to measure ‘other physiological parameters’ like oxygenation using ‘red *or* infrared’ light,” but points out that “Sarantos only refers to red “‘or’ infrared LEDs disjunctively.” *Id.* According to Patent Owner, “oxygen saturation is not measured using either ‘red or infrared’ light. Rather, the measurement uses red **and** infrared light.” *Id.* Therefore, Patent Owner argues a POSITA “would have understood that Sarantos does not disclose measuring oxygen saturation.” *Id.* at 28. As further evidence to support that Sarantos does not disclose measuring oxygen saturation, Patent Owner points to Sarantos’s statement that it is “not tailored for use in other spectrums, such as the red or

infrared spectra.” *Id.* (citing Ex. 1005, 18:42–51). Patent Owner’s argument that Sarantos does not disclose measuring oxygen saturation is unavailing.

Sarantos teaches that “photoplethysmographic techniques may . . . be used to measure other physiological parameters besides heart rate, such as blood oxygenation levels.” Ex. 1005, 13:44–47. In arguing that Sarantos is limited to the use of only a single wavelength of light for measuring oxygen saturation, Patent Owner reads Sarantos too narrowly. Sarantos discloses that in situations such as when measuring blood oxygen levels, “[i]t may . . . be desirable to include an LED that predominately emits light in the red or infrared spectrum.” *Id.* at 13:44–49; *see also id.* at 18:42–48 (disclosing that “[l]ight sources emitting light in the green spectrum are particularly well-suited for photoplethysmographic techniques for measuring heart rate” but “[i]n contrast, other photoplethysmographic techniques, such as techniques for measuring blood oxygenation levels, may be most effective using light of dramatically different wavelengths, such as in the red wavelengths, e.g., 660 nm, or in the infrared spectrum”). We recognize that Sarantos uses the term “or” rather than “and,” but find that in this instance, the term “or” is used inclusively rather than disjunctively. This interpretation is supported by Sarantos’s disclosure of using multiple wavelengths of light. *See, e.g., id.* at 13:49–53 (disclosing that “it may be desirable to include separate light-emitting devices that are each able to emit different wavelengths of light”). It is also supported by Dr. Anthony’s credible testimony that “the term ‘or’ is generally read to be inclusive unless specified otherwise, especially when being read by engineers.” Ex. 1079 ¶ 26; *see also* Pet. Reply 11 (citing Ex. 1003 ¶¶ 87, 94–98; Ex. 1079 ¶¶ 26–27). And it is consistent with the knowledge in the art to use “one or more wavelengths” of light to detect

oxygen saturation. Ex. 1001, 1:61–2:3 (’159 patent’s background section teaching that pulse oximetry relies on transmitting “optical radiation of one or more wavelengths into a tissue site”); Ex. 1028 ¶ 52 (reference from 2006, disclosing that “a pulse oximetry device with a light source 135 that typically includes LEDs that generate both red ($\lambda \sim 660$ nm) and infrared ($\lambda \sim 900$ nm) radiation”); Ex. 1013, 77 (reference from 1997 entitled “Design of Pulse Oximeters,” disclosing that “[t]he designer should keep in mind the wavelengths of interest in pulse oximetry (660 nm and 940 nm) when deciding on an appropriate photodiode”).

Accordingly, we find that the preponderance of the evidence supports that a POSITA would have understood that Sarantos discloses measuring blood oxygen saturation.

b. Motivation to combine

Based on Sarantos’s disclosure of measuring blood oxygen saturation, Petitioner contends that, a POSITA “would have been motivated to determine oxygen saturation using Iwamiya’s wrist-worn physiological sensor device . . . to expand the range of physiological parameters measured by Iwamiya’s sensor, thereby improving that sensor’s functionality and utility.” Pet. 39 (citing Ex. 1003 ¶¶ 87–88; Ex. 1005, 13:40–14:22). According to Petitioner, a “POSITA would have known that such additional functionality in a wrist-worn sensor would have benefited users of the sensor in a variety of ways,” including allowing patients with certain conditions to monitor blood oxygen continuously, and generally increase the flexibility of the device so that it can be used outside hospital settings. *Id.* at 39–41 (citing Ex. 1003 ¶¶ 89–93).

We agree with Petitioner that Sarantos would have provided a POSITA with motivation to expand the functionality of Iwamiya's sensor to include measuring oxygen saturation. Patent Owner argues that Petitioner's proposed motivation is "generic" and argues, at length, that Iwamiya teaches away from the claimed combination. We address both arguments below.

Patent Owner argues that Petitioner's proposed "motivation is generic and says nothing more than the combination would have added oxygen saturation as a feature." PO Resp. 34. According to Patent Owner, Petitioner "raised the same generic motivation to modify Iwamiya based on Sarantos during the ITC Investigation and the ITC rejected it as too generic." *Id.* at 35 (citing Ex. 2093, 230).

We disagree with Patent Owner that the motivation identified by Petitioner in this proceeding is "too generic." Sarantos expressly teaches that its photoplethysmographic techniques can detect multiple physiological parameters using the same device, including, specifically, blood oxygenation levels. Ex. 1005, 13:44–48. Dr. Anthony testifies that applying this teaching to Iwamiya's device would "expand the range of physiological parameters measured by Iwamiya's sensor, thereby improving the functionality and utility of the sensor." Ex. 1003 ¶ 87; *see also id.* at ¶¶ 88–93 (providing additional specific motivations to combine). We find this motivation sufficiently specific and persuasive. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007) ("[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.").

Patent Owner argues that “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.” PO Resp. 29; *see also id.* at 29–34 (citing Ex. 2100 ¶¶ 87–93) (Patent Owner’s entire teaching away argument). According to Patent Owner, melanin absorbs eight times more light in the red spectrum and twenty times more light in the green spectrum than it does 940 nm infrared light. *Id.* at 30–31. To avoid the problem that melanin absorbs light, Patent Owner argues, “Iwamiya tailors multiple aspects of its sensor design to measurement of 940 nm infrared light.” *Id.* at 31. For example, Patent Owner asserts, Iwamiya uses a detector that has “very little sensitivity to measurements using visible light,” and “includes an optical filter 17 that transmits light above 900 nm but blocks light below 900 nm from being detected by the detector.” *Id.* at 32.

Petitioner responds that “Iwamiya discloses detecting pulse rate using a **single** wavelength of infrared light at 940 nm” but “never criticizes, discredits, or otherwise discourages the use of two wavelengths of red and infrared light **for the purpose of measuring oxygen saturation.**” Pet. Reply 13. Petitioner then points out that its proposed combination would continue to use Iwamiya’s preferred 940 nm wavelength because “940 nm light is also commonly used for determining oxygen saturation.” *Id.* at 13. According to Petitioner, the device resulting from the proposed combination “would have retained the advantages of the original with respect to measuring pulse rate of users with high melanin in the skin.” *Id.* In addition, Petitioner argues, “even if such a teaching away existed (it does not), it applies only to users having ‘a large amount of melanin[] pigment’

and therefore the proposed modifications would be suitable for other users.”
Id. at 14.

We agree with Petitioner that Iwamiya does not teach away from the claimed device. We acknowledge that Iwamiya teaches that “if a large amount of melanin[] pigment is contained in the epidermis, the observation light may be absorbed by the melanin[] pigment.” Ex. 1004, 1:57–59. We further acknowledge that Iwamiya teaches that using a wavelength of 940 nm light avoids this problem. *See, e.g.*, 10:34–38 (“[E]ven though the epidermis H2 contains the large amount of melanin[] pigment, the observation light is of an infrared band of $\lambda_p=940\text{nm}$. For this reason, the amount of light absorbed by the melanin[] pigment is small.”). However, as Petitioner points out, the Iwamiya/Sarantos combination device would retain the 940 nm light source. Pet. Reply 13; Ex. 1079 ¶¶ 29–30. And Iwamiya never criticizes or disparages the known technique of using multiple light sources. Ex. 1079 ¶ 29 (explaining that Iwamiya does not criticize using two wavelengths and that a POSITA would have been aware of the benefits of doing so). As we noted in the previous section, it was known in the art to use “one or more wavelengths” of light to detect oxygen saturation. *See, e.g.*, Ex. 1005, 13:44–53 (Sarantos, teaching that when using photoplethysmographic techniques to measure parameters other than heart rate, such as blood oxygenation levels, “it may be desirable to emit different wavelengths of light; each light emitting device may be used to supply light for a different type of photoplethysmographic measurement”). For these reasons, we find that Iwamiya does not teach away from adding an additional light source to its existing 940 nm light source.

In addition, we agree with the Board in the -1291 IPR that Iwamiya's teachings with respect to melanin only apply to users with a large amount of melanin in their skin. The Board explained:

[T]o the extent Iwamiya teaches away from using visible light such as red light in its device, this teaching away applies 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." Ex. 1004, 1:53–2:6, 6:31–34, 10:34–38, 11:43–49. Thus, so far as Iwamiya is concerned, using visible observation light in a biometric sensor will work for users having less than a "large amount" of melanin in their skin. *See, e.g., id.* at 1:28–52 (discussing how wristwatch type sensors had "generally used" light with a wavelength shorter than 600 nm to determine heart rate prior to Iwamiya's use of infrared light (940 nm) to determine heart rate); *id.* at Fig. 6 (illustrating light absorption coefficients of oxy-hemoglobin and melanin in the visible light range (400–700 nm) and the near infrared light range (700–1000+ nm)). Federal Circuit "precedent . . . does not require that the motivation be the *best* option, only that it be a *suitable* option from which the prior art did not teach away." *PAR Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1197–98 (Fed. Cir. 2014)).

Ex. 2035, 65. We agree with and adopt this analysis.

Patent Owner argues that the Board's decision in the -1291 IPR engaged in speculation "about how Iwamiya might work when changing its device to use red light." PO Resp. 33. According to Patent Owner "no evidence" supports that a POSITA would have proceeded "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.* We do not find Patent Owner's criticism persuasive because Iwamiya makes clear that melanin is only a problem when there are large amounts of melanin present. Ex. 1004, 1:57–59 (Iwamiya, disclosing that "if a large

amount of melanin[] pigment is contained in the epidermis, the observation light may be absorbed” and “biological information . . . cannot be accurately detected” (emphasis added)). There is no evidence in Iwamiya or elsewhere that such concerns apply when the epidermis does not contain “a large amount of melanin[.]” *Id.*

Having considered all of the arguments and evidence of record, we find that Iwamiya does not teach away from using visible light, including red light, in its sensor design. To the contrary, we find that a preponderance of the evidence supports that a POSITA would have been motivated to determine oxygen saturation using Iwamiya’s physiological sensor in order to expand the range of physiological parameters measured.

c. Reasonable expectation of success

According to Petitioner, a POSITA would have “reasonably expected success in adapting Iwamiya’s sensor . . . at least because wrist-worn pulse oximetry sensors, such as that described in Sarantos, were well-known in the art, including in engineering and scientific papers published by well-respected and authoritative organizations such as IEEE.” Pet. 41–42 (citing Ex. 1003 ¶¶ 94–113; Ex. 1005, 13:40–14:22, Fig. 2; Ex. 1014, 2; Ex. 1015, Abstract; Ex. 1016, Abstract; Ex. 1018; Ex. 1028 ¶¶ 7, 32–33, 51–54, 58). Petitioner also contends that “a POSITA would have known how to adapt Iwamiya’s device to measure oxygen saturation levels using red/infrared light as taught in Sarantos” and that it would have been “straightforward to augment” Iwamiya’s device with one or more LEDs emitting red light.” *Id.* at 42 (citing Ex. 1003 ¶¶ 95–99; Ex. 1004, 6:31–39, 8:29–37; Ex. 1009, 94, 96). As further support for this proposition, Petitioner’s expert Dr. Anthony describes references “that antedate the ’159 Patent and that underscore how

determining oxygen saturation at the wrist was not only well known, but had actually been successfully and repeatedly performed.” Ex. 1003 ¶¶ 100–109; *see also* Pet. 42 (citing Exs. 1015, 1016, 1018, 1028); Pet. Reply 15–19 (reviewing references).

Patent Owner disputes that a POSITA would have reasonably expected success on several grounds. In this regard, Patent Owner’s arguments, and the dispute between the parties, focus on three topics: 1) whether the prior art references cited by Petitioner (in addition to Sarantos and Iwamiya) support a reasonable expectation of success, 2) whether testimony and documents from engineers involved in designing the Apple Watch detract from a reasonable expectation of success, and 3) whether the absence of commercial products detracts from a reasonable expectation of success. We address each of these three topics in turn.

Before turning to Patent Owner’s arguments, however, we are mindful that the correct inquiry centers on whether a skilled artisan would have combined the art with a reasonable expectation of success in arriving at what is actually claimed. *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir. 2016). One need not show a reasonable expectation of success concerning features or results that the claims do not require. *Id.* Claim 8 requires determining oxygen saturation, but it does not specify any performance benchmarks for doing so, such as a degree accuracy of measurement. Pet. ix. Nor does claim 8 impose any requirements on the, size, shape, or overall form factor of the device that takes the measurements. *Id.*

(1) References teaching determination of oxygen saturation as relating to a reasonable expectation of success

Petitioner argues that “over a dozen references of record demonstrate that a POSITA would have reasonably expected success implementing the combinations to determine oxygen saturation at the wrist before the ’159 Patent.” Pet. Reply 15. Patent Owner disputes this, offering reference-specific arguments as to why the references cited by Petitioner do not support a reasonable expectation of success. PO Resp. 48–53; PO Sur-reply 20–23. We address the parties’ reference-specific arguments below.

The Petition cited Määttä¹⁵, Li,¹⁶ Cai,¹⁷ Pang,¹⁸ and Brady¹⁹ as support for the proposition that “wrist-worn pulse oximetry sensors, such as that described in Sarantos, were well-known in the art, including in engineering and scientific papers published by well-respected and authoritative organizations such as IEEE.” Pet. 41–42; *see also* Ex. 1003 ¶¶ 101–103, 106–109 (testimony of Dr. Anthony discussing expectation of

¹⁵ Määttä et al., *Optimum Place for Measuring Pulse Oximeter Signal in Wireless Sensor-Belt or Wrist-Band*, 2007 International Conference on Convergence Information Technology (Ex. 1018, “Määttä”).

¹⁶ Li et al., *A Wireless Reflectance Pulse Oximeter With Digital Baseline Control for Unfiltered Photoplethysmograms*, IEEE Transactions on Biomedical Circuits and Systems, Vol. 6, No. 3 (June 2012) (Ex. 1015, “Li”).

¹⁷ Cai et al., *Implementation of a Wireless Pulse Oximeter Based on Wrist Band Sensor*, 3rd International Conference on Biomedical Engineering and Informatics (2010) (Ex. 1016, “Cai”).

¹⁸ Pang et al., *A Neo-Reflective Wrist Pulse Oximeter*, IEEE Access, Digital Object Identifies 10.1109/Access.2104.2382179, published December 18, 2014 (Ex. 1014, “Pang”).

¹⁹ Brady et al., United States Patent Publication No. 2006/0253010 A1, published Nov. 9, 2006 (Ex. 1028, “Brady”).

success in view of these references). For example, Petitioner contends that Määttälä “identified an ‘optimum place’ on a user’s ‘wrist so that it would provide reliable oxygen saturation (SpO₂) readings’ for its wrist band to achieve ‘many benefits.’” Pet. Reply 15–16. According to Petitioner, “[i]n Cai, the authors ‘confirmed the feasibility of our oximeter’ that employed ‘[a] wrist located reflectance sensor.’” *Id.* at 16. And Petitioner cites Li as teaching that its “pulse oximeter ‘gather[ed] high integrity data at . . . wrist . . . locations from a group of 48 subjects’” and “confirmed ‘suitable PPGs’ for measuring blood oxygenation at the wrist.” *Id.* (alterations in original). As to Pang, Petitioner asserts that it “describes a ‘wrist pulse oximeter’ that ‘detected the pulse wave signal efficiently’ (confirmed by ‘experimental results’) such that ‘oxygen saturation can then be calculated.’” *Id.* Petitioner also contends that “Brady demonstrates that as early as 2006, a POSITA was aware of techniques for implementing ‘a wrist worn article for monitoring a user’s vital signs’ including ‘oxygen saturation level data.’” *Id.* at 18–19.

In its Reply, Petitioner also cites and discusses Fontaine,²⁰ which, according to Petitioner, “demonstrates that in 2013, a group of undergraduates were ‘able to accurately measure within an error of + 1% and ±3% for SpO₂ and PR [pulse rate] respectively from the wrist.’” *Id.* at

²⁰ Fontaine et al., *Reflectance-Based Pulse Oximeter for the Chest and Wrist*, Worcester Polytechnic Institute (April 2013), available at <https://digital.wpi.edu/show/6969z2326> (Ex. 1042, “Fontaine”).

18.²¹ Petitioner provides a chart from Fontaine showing the accuracy test data for oxygen saturation measurements at the wrist. *See id.*

Patent Owner dismisses Petitioner’s reliance on the references cited in the Petition by arguing that the references merely “report detecting a PPG signal or modulation ratio . . . [b]ut that is not determining oxygen saturation at the wrist.” PO Resp. 48. Patent Owner addresses Pang, Li, Cai, Määttälä, and Brady in more detail. *Id.* at 48–52 (citing Ex. 2100 ¶¶ 112–117). Patent Owner stresses throughout that Petitioner’s engineers were aware of these references while attempting to develop their own device. *See id.*

With respect to Pang, Patent Owner argues that it presented “separate red and IR waveforms,” did “not present any oxygen saturation determinations from the wrist,” and relied on simulated “rather than actual data.” *Id.* at 48–49. In addition, according to Patent Owner, Pang “used a ‘special design’” and does not provide a reasonable expectation of success for the Iwamiya-Sarantos combination. *Id.* at 49. As to Li, Patent Owner asserts that it fails to “report any measurement of oxygen saturation from the wrist” and fails to supply measurements of two wavelengths of light

²¹ Patent Owner moves to strike allegedly new arguments in the Reply and a number of references that were not addressed in the Petition. As noted below in our discussion of the Motion to Strike, we dismiss the Motion as moot. Petitioner also filed a number of exhibits with the Petition and Dr. Anthony opined on them, but they were not cited in or discussed in the Petition. *See* Paper 31, 3–4 (citing Exs. 1017, 1036, 1038, and 1042–1048). Petitioner relies on these exhibits to some extent in its Reply in a string cite, but that approach arguably violates our rules against incorporation by reference, and we do not rely on these exhibits to reach any conclusions in this Decision. *See* Pet. Reply 19; *see also* PO Post-hearing 2–4 (addressing several references referred to in Petitioner’s Reply and/or Dr. Anthony’s testimony).

necessary to make the calculation. *Id.* at 49–50. With respect to Cai, Patent Owner argues that it fails to supply the require measurements and the “R” value reported does not supply “an oxygen saturation determination.” *Id.* at 50–51. As to Määttälä, Patent Owner asserts that it not only fails to show actual determinations of oxygen saturation, but it also noted that “[m]any problems still have to be overcome.” *Id.* at 51 (quoting Ex. 1018, 1860). With respect to Brady, Patent Owner stresses that it “mentions oxygen saturation but much of its disclosure is actually focused on calculating burned calories” and its “under-the-wrist sensor is applied to a completely different site than Sarantos, which is for the top of the wrist.” *Id.* at 52. Patent Owner does not address Fontaine in its Response or Sur-reply. *See* PO Resp. 48–52; PO Sur-reply 20.

For the reasons discussed below, we find that at least Pang, Li, Cai, and Määttälä support that a POSITA would have reasonably expected success in detecting blood oxygen saturation at the wrist, and we need not reach whether Brady and/or Fontaine further support Petitioner’s arguments. We discuss each of Pang, Li, Cai, and Määttälä in turn.²²

Pang describes in December 2014 “a genuine wrist pulse oximeter . . . that can measure the pulse rate and oxygen saturation level in a person’s blood,” which had “been developed and calibrated, and the calibration curve

²² Our analysis of Li, Cai, Määttälä, and Pang mirrors that in IPR2022-01291 with minor alterations to reflect differences in the evidence of record. *See* Ex. 2035, 92–95. For readability and convenience, we do not use block quotes or otherwise quote IPR2022-01291 even in instances where the language is identical. We also note that our findings find support in Dr. Anthony’s testimony, although we do not cite to each instance where that testimony supports our interpretations. *See* Ex. 1003 ¶¶ 100–103, 106–108; Ex. 1079 ¶¶ 34–35.

was analyzed.” Ex. 1014, 1562 (Publication Date and Abstract). Pang describes its wrist-worn sensor device, which utilized red and infrared observation light, and included photographs of the device used for testing. *Id.* at 1563–66. Pang concludes that its device “detected the pulse wave signal efficiently” such that “oxygen saturation can then be calculated by the ratio of the light intensity change rates under the two different [red and infrared] wavelengths.” *Id.* at 1566. Pang recognizes that “[t]he calibration of an oxygen oximeter can be a complicated task,” and concludes “a second-order relationship between the R value and the oxygen saturation can provide a better fit with the data.” *Id.* at 1566, 1567 (conclusion #4). We find these disclosures provide support for the proposition that a POSITA would have had a reasonable expectation of success in utilizing red and infrared light to determine oxygen saturation at the wrist in July 2015, which is the earliest-claimed priority date of the ’159 patent.

Li discloses “a small, low-cost pulse oximeter design appropriate for wearable and surface-based applications that also produces quality, unfiltered photo-plethysmograms (PPGs)” which are “high-fidelity.” Ex. 1015, 269 (Publication Date and Abstract). Further: “[t]his sensor has demonstrated an ability to gather high-integrity data at fingertip, *wrist*, earlobe, palm, and temple locations from a group of 48 subjects (20 to 64 years old).” *Id.* (emphasis added); *see also* Ex. 1014, 1563 (Pang, characterizing Li as having “developed a small and low-cost wireless reflectance oximeter suitable for wearable and surface-based applications including at the wrist location”). Li describes its sensor device, which utilized red and infrared observation light, and provides experimental data using the sensor device at three locations on the wrist. *See* Ex. 1015, 274–

275 (describing sensor device using a “bi-color LED” to generate light at 660 nm and 910 nm, shown as “Red” and “Infrared” in Figure 11), 276 (experimental data). Li concludes “all three” wrist locations provided “suitable PPGs,” even though “[a]t present, it is difficult to consistently obtain high quality PPG data from the wrist” due to the pressure required, which Li solved by bending the wrist at a 45° angle. *Id.* at 276. We find that these disclosures provide support for the proposition that a POSITA would have had a reasonable expectation of success in utilizing red and infrared light to determine oxygen saturation at the wrist in July 2015.

Cai is a study presented in 2010, entitled “Implementation of a Wireless Pulse Oximeter Based on Wrist Band Sensor.” Ex. 1016, 1897. Cai describes efforts “to develop a wrist band pulse oximeter” implementing “[a]n oxygen saturation measurement system,” and presents “preliminary . . . experimental results” that “confirmed the feasibility of this wrist-band oximeter.” *Id.* (Abstract); *see also* Ex. 1014, 1562 (Pang, disclosing that “[a] wrist-worn pulse oximeter is described in [Cai] which has illustrated the feasibility of reflectance oximetry based on a sensor mounted onto a wrist band.”). Cai describes its wrist-worn sensor device, which utilized red and infrared observation light, and concludes its “system efficiently detected the human pulse wave signal” such that “the oxygen saturation is deduced” from the red and infrared light. Ex. 1016, 1898–99 (Sections III.A–C). Cai also provides experimental results “indicat[ing] that this system can effectively detect the change of oxygen saturation.” *Id.* at 1900. We find these disclosures provide support for the proposition that a POSITA would have had a reasonable expectation of success in utilizing red and infrared light to determine oxygen saturation at the wrist in July 2015.

Määttälä presented in 2007 a “study . . . done in order to solve the optimum place for integrated pulse oximeter in case of a belt around human chest *or wrist* so that it would provide reliable oxygen saturation (SpO₂) readings for non-invasive constant health monitoring.” Ex. 1018, 1856 (Publication Date and Abstract) (emphasis added). Määttälä concludes: “Results were promising and showed that an easy portable monitoring device is possible but also many problems, that should be overcome, were detected.” *Id.* Määttälä investigates a PPG sensor, utilizing red and infrared light (*see id.* at 1857–58), and determines: “[m]any problems still have to be overcome but this study proves that wireless *integrated pulse oximeter implanted in a chest belt or wrist band is possible to achieve with many benefits and practical applications.*” *Id.* at 1860 (emphasis added). We find these disclosures support that as early as 2007, researchers considered wrist-based blood oxygen saturation determinations to be possible using red and infrared light, although in that early time frame many problems had not yet been overcome.

Patent Owner correctly notes that Pang relied on simulated “rather than actual data.” PO Resp. 48–49. And Patent Owner also correctly points out that none of the references disclose an actual calculation of oxygen saturation from the wrist. *Id.* at 48. But as the Board in the -1291 IPR observed, Patent Owner “does not cite, and we are not aware of, any legal authority that requires *actual* success in the prior art as a prerequisite of obviousness.” Ex. 2035, 96 (citing *Almirall, LLC v. Amneal Pharms. LLC*, 28 F.4th 265, 275 (Fed. Cir. 2022)) (“A finding of a reasonable expectation of success does not require absolute predictability of success.”). Moreover, the references disclose methods to obtain the signals used in the oxygen

saturation calculation. The alleged failure to actually use those signals to perform an SpO₂ calculation does not, standing alone, support Patent Owner’s argument that the references fail to support a likelihood of success, particularly where those references expressly disclose that their devices can be used to calculate SpO₂. *See, e.g.*, Ex. 1035, 1900 (Cai, disclosing: “This oximeter can obtain oxygen saturation.”); Ex. 1036 (Määttälä, disclosing: “[T]his study proves that wireless integrated pulse oximeter implanted in . . . [a] wrist band is possible to achieve.”); *see also* Ex. 1079 ¶¶ 34–35 (referring to the references as demonstrating “that detection of the physiological signals at the wrist used for determining blood oxygen saturation was successfully conducted prior to the ’159 patent”); Pet. Reply 19 (citing Ex. 1003 ¶¶ 100–109; Ex. 1005, 13:40–14:22, 18:44–48; Ex. 1079 ¶¶ 34–35) (arguing that “Sarantos expressly discloses techniques ‘for measuring blood oxygenation levels’” and additional references show “obtaining the signals used for calculating oxygen saturation at a user’s wrist”). We conclude, as did the panel in the -1291 IPR, that Pang, Li, Cai, and Määttälä provide support for the proposition that a person of ordinary skill in the art would have had a reasonable expectation of success in determining oxygen saturation at the wrist in July 2015.

(2) Testimony and documents relating to development of the Apple Watch

Patent Owner argues that testimony elicited during the ITC proceeding from several of Apple’s “key engineers who worked on developing a wrist-worn oxygen saturation sensor at the time of the ’159 [p]atent. . . . 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.” PO Resp. 37; *see also id.* at 36–47 (citing Ex. 2100

¶¶ 94–108) (addressing testimony of Apple engineers and related documents and issues). In particular, Patent Owner points to the testimony of Mr. Brian Land, Dr. Paul Mannheimer, Dr. Stephen Waydo, and Dr. Tao Shui. *Id.* at 37–40. Patent Owner also points to several documents generated by Apple during the Apple Watch design process. *Id.* at 40–43. We summarize that testimony and documentation below, analyzing the parties’ respective arguments concerning this evidence.²³

i. Brian Land’s Testimony

Mr. Brian Land, a “distinguished engineer” at Apple who leads the Health Sensing Hardware development team including health sensors for the Apple Watch, was asked upon direct examination by Apple’s counsel about Apple’s development of a blood oxygen sensor for use in the Apple Watch. *See* Ex. 2076 (Mr. Land’s trial testimony), 954:15–955:9, 962:15–963:21. Specifically, he was asked: “What were some of the challenges that you and your team faced in developing the blood oxygen sensor for the Apple Watch?” *Id.* at 963:19–21. He responded as follows:

The challenges were -- were many. The first was we had to fit into the small form factor of the watch and we were trying to hit a moving target, because every—it seemed like as every year went by the watch got a little smaller.

And we also had to work across—at the wrist, which was unprecedented—at the time that we kicked off the blood oxygen sensing at the wrist, there were no commercially available products that did blood oxygen sensing at the wrist.

²³ Our summary of the testimony and documentation elicited from the ITC proceeding mirrors that of the Board in IPR2022-01291 with minor alterations to reflect difference in the evidence of record. *See* Ex. 2035, 71–77. For readability and convenience, we generally do not use block quotes or otherwise quote IPR2022-01291 even in instances where the language is identical.

We also had to fit into a product that had very little space for the resources needed were accurate, and, of course, we had to work across all of the human variation that existed in the world. Those were some major challenges.

Id. at 963:22–964:11. Patent Owner asserts the time frame of these development efforts was “late 2014.” PO Resp. 40 (citing Ex. 2076, 962:25–963:9, 964:2–6; Ex. 2084).

ii. Paul Mannheimer’s Testimony

Dr. Paul Mannheimer was hired by Apple in 2014 due to his

[REDACTED]
[REDACTED] and he became “one of the [REDACTED] contributors for the blood oxygen development” in the Apple Watch. Ex. 2076 (Mr. Land’s trial testimony), 962:14–963:15; *see also* Ex. 2077 (Dr. Mannheimer’s trial testimony), 994:6–7, 996:25–997:8. Dr. Mannheimer holds a Ph.D. in biomedical engineering, and prior to joining Apple he spent about twenty years developing pulse oximetry sensors, monitoring techniques, and alarm handling techniques, specializing in the physio-optics of pulse oximetry. *See* Ex. 2077, 994:2–25; Ex. 2080 (Dr. Mannheimer’s deposition testimony), 180:22–181:4. Dr. Mannheimer’s first assignment at Apple was “[t]o work on the blood oxygen app, [REDACTED]

[REDACTED] Ex. 2080, 173:9–13; *see also* Ex. 2077, 996:25–997:5 (testifying that he was “asked to look into doing pulse oximetry at the wrist for the Apple Watch”), 1012:12–16 (testifying that he was assigned “to work on [REDACTED] [REDACTED]”). Dr. Mannheimer was asked: “What was your reaction to receiving the assignment of trying to develop a pulse oximeter for the wrist?” Ex. 2080, 173:14–16. He answered:

It was not a complete surprise. I was sort of guessing that was why I was being interviewed, although I only learned of it after joining [Apple]. My first reaction when actually hearing it was internally to my head rolling my eyes, thinking, as I'd thought of it in the past with other clients, like good luck with that.

But I shared with my boss that -- I said, that's going to be a challenge and to the effect of -- I certainly -- I don't know if it can be done, but I don't know if it can't be done. So let's go try.

Id. at 173:16–174:6; *see also* Ex. 2077, 1012:17–25 (repeating same testimony).

Dr. Mannheimer was then asked: “Why did you believe it to be a challenge?” Ex. 2080, 174:7–8. He answered:

So 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. [REDACTED]

[REDACTED] signal is just enormously weak.

Id. at 174:9–18; *see also* Ex. 2077, 1013:1–6 (repeating same testimony).

Dr. Mannheimer was also asked how the blood oxygen sensor developed at Apple differed from sensors he had previously worked on, and he answered:

To me, [REDACTED] difference is that it's intended to be used at the wrist. The clinical products that I worked on previously for adults, peds, neonates and fetuses operated on a much more vascularized tissue bed, usually fingers or forehead, or on the fetus it was the cheek.

The wrist is just an incredibly different beast. [REDACTED]
[REDACTED] shrinking things down to be much smaller package and use substantially less power and to be used by a

consumer in a nonprescription environment would ultimately add to additional challenges to think through and work through.

Ex. 2077, 998:15–999:11. Dr. Mannheimer testified that it ultimately took Apple’s engineers close to six years to develop the blood oxygen feature for the Apple Watch. *See* Ex. 2080, 174:19–175:5.

iii. Stephen Waydo’s Testimony

Dr. Stephen Waydo is the director of Apple’s Human Interface Devices Health group, which is responsible for health sensor algorithms in the Apple Watch. *See* Ex. 2078 (Dr. Waydo’s trial testimony), 918:3–919:9. Dr. Waydo was asked: “What challenges, if any, are associated with attempting to do pulse oximetry on the wrist as opposed to other parts of the body?” Ex. 2081 (Dr. Waydo’s deposition testimony), 166:4–6. He answered:

The wrist is one of the most difficult places on the body to do almost every physiological measurement. [REDACTED]

So the signals we have access to on the wrist are, in general, much smaller [REDACTED]

Furthermore, at the wrist we’re doing what’s called a reflectance measurement, meaning we’re shining light in and capturing what comes back, versus a more traditional oximeter that attaches to a fingertip or an earlobe or a toe or something gets to shine light through the tissue and catch it on the other side. [REDACTED]

Id. at 166:7–167:5; *see also* Ex. 2078 (Dr. Waydo’s trial testimony), 938:21–24 (Dr. Waydo was asked “And, in fact, it was extremely challenging to develop the blood oxygen feature in the Apple Watch, correct?,” to which he

answered “Yes”), 925:23–926:6 (Dr. Waydo testifying that his team of engineers spent “something like 20 or 30,000 hours of engineering time just on [the blood oxygen] algorithm architecture” in the Apple Watch).

Dr. Waydo was also asked: “Can you give an example of one of the challenges your team faced in developing the blood oxygen feature?” Ex. 2078, 923:24–25. He answered:

[REDACTED]
[REDACTED] the wrist, which, in general, is
a difficult area to do physiological measurements.
[REDACTED]
[REDACTED]
[REDACTED]

Id. at 924:1–11.

iv. Tao Shui’s Testimony

Dr. Tao Shui is an engineer at Apple. *See* Ex. 2082 (Dr. Shui’s deposition testimony), 11:19–12:11. [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED] *Id.* at 106:4–

108:12. He was asked: “What was . . . the most challenging part of that work?” *Id.* at 108:13–14. He answered:

[REDACTED] challenging part of the work is 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. [REDACTED]
[REDACTED]

Id. at 108:15–21.

v. Apple's R&D Documentation

Apple's research and development documentation also discusses technical challenges posed by measuring blood oxygen saturation at the wrist using light-based sensors in the Apple Watch. For example, an internal status update presentation dated July 30, 2015 (*see* Ex. 2085, 1) stated "[t]he wrist is a challenging location [REDACTED]

[REDACTED] for "SpO₂ measurement" (*id.* at 8–9, 13). The presentation concludes that "Invention is required," for example:

[REDACTED]
[REDACTED]
[REDACTED] *Id.* at 13. As another example, [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED] (*id.* at 9).

vi. Discussion

Patent Owner argues that the testimony of Apple's engineers supports that a POSITA would not have reasonably expected success. PO Resp. 36–40. In particular, with respect to Mr. Land, Patent Owner points to his testimony that measuring oxygen saturation at the wrist was "unprecedented" and that "there were no commercially available products that did blood oxygen sensing at the wrist." *Id.* at 37 (citing Ex. 2076, 9:62:25–963:9, 964:2–6; Ex. 2084).

With respect to Dr. Mannheimer, Patent Owner focuses on testimony that his first assignment was [REDACTED] and that his reaction to that assignment was to "*roll[] his eyes, thinking . . . good luck with that.*"

Id. at 38. Patent Owner also points and testimony that Dr. Mannheimer [REDACTED] and his testimony that he told his boss, in regard to measuring oxygen at the wrist, “*I don’t know if it can be done.*” *Id.*

With respect to Dr. Waydo, Patent Owner directs us to his testimony that it was “extremely challenging” to develop the blood oxygen feature, so much so that the assignment “intimidated” him. *Id.* at 39. Patent Owner also cites his testimony that “[t]he wrist is one of the most difficult places on the body to do almost every physiological measurement” and his explanation that “the signals we have access to on the wrist are, in general, much smaller [REDACTED]

[REDACTED] *Id.* Patent Owner explains that in view of these challenges, Dr. Waydo and his team of highly skilled engineers spent “something like 20 or 30,000 hours of engineering time just on that [oxygen saturation] algorithm architecture.” *Id.* at 40.

With respect to Dr. Shui, Patent Owner points to testimony 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.” *Id.* at 39–40.

Finally, with respect to Apple’s research and development documents, Patent Owner focuses on a document that it characterizes as showing that [REDACTED] and that states that “‘*Invention is required*’ to measure oxygen saturation at the wrist.” *Id.* at 40–42. Patent Owner quotes this document as reporting that [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED] *Id.* at 42.

Patent Owner explains why the testimony on documents relating to development of the Apple Watch reflect the absence of a reasonable expectation of success as follows:

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, ¶109.

PO Resp. 43.

Petitioner disputes the relevance of the testimony and documents relating to development of the Apple Watch on several bases. *See* Pet. Reply 22–25 (citing Ex. 1079 ¶¶ 43–53). First, it contends that “the engineers’ testimony regarding their subjective experiences developing pulse oximetry for the Apple Watch does not bear on whether a POSITA would have reasonably expected success in performing the claimed function.” Pet.

Reply 22 (emphasis omitted). Second, Petitioner argues that there is “no evidence that the engineers were even aware (as a POSITA would have been) of the majority of prior art references and studies that had established the feasibility of determining oxygen saturation at the wrist before the ’159 Patent.” *Id.* at 23. Third, Petitioner asserts that Apple Watch design requirements were far more rigorous than the requirements set forth in the claims, which do not impose any limitation on the degree of accuracy, form-factor, or time-frame for acquiring measurement signals. *Id.* at 23–24.

With respect to Petitioner’s first point, we agree with Petitioner that the questions the Apple engineers were asked in their ITC testimony does not mirror the question presented here. As the Board in the -1291 IPR explained:

Apple’s engineers were asked about the challenges they faced in developing an oxygen saturation determination feature in a future iteration of the pre-existing Apple Watch product. *See* Ex. 1036, 902:13–14 (Dr. Block’s trial testimony, confidential version); Ex. 2008, 938:21–23 (Dr. Waydo’s trial testimony); Ex. 2076, 963:19–21 (Mr. Land’s trial testimony); Ex. 2077, 996:25–997:5, 1012:12–25 (Dr. Mannheimer’s trial testimony); Ex. 2078, 923:1–25 (Dr. Waydo’s trial testimony); Ex. 2080, 173:9–16 (Dr. Mannheimer’s deposition testimony); Ex. 2081, 165:1–166:6 (Dr. Waydo’s deposition testimony); Ex. 2082, 108:2–14 (Dr. Shui’s deposition testimony). They were not asked to address the issue presented here, which is whether a person of ordinary skill in the art would have reasonably expected success in determining oxygen saturation at the wrist, using the light shape changing material disclosed by Iwamiya.

Ex. 2035, 99–100. Nonetheless, as Patent Owner correctly points out, even though Apple’s engineers were not testifying from the perspective of a POSITA, they were “skilled artisans who were working on the same problem addressed by the ’159 Patent at the time of that patent.” PO Resp.

45. We find that the cited testimony of Apple’s engineers is relevant and that the weight of that testimony is only modestly diminished by the fact that their testimony was not framed from the perspective of a POSITA considering the expectation of success in combining Iwamiya and Sarantos to measure oxygen saturation at the wrist.

With respect to Petitioner’s second point, Patent Owner argues that “Apple’s engineers were . . . aware of Li” because it was “in the possession of one of Apple’s engineers.” PO Resp. 50 (citing Ex. 2101). According to Patent Owner, Apple’s engineers were also aware of Cai, because [REDACTED]

[REDACTED] *Id.* at 50–51 (citing Ex. 2102, 9, 78). And Patent Owner argues that “Apple’s engineers were also aware of Maattala” because, in a related litigation, it was “produced . . . from the files of Ueyn Block, one of Apple’s engineers working on developing the oxygen saturation sensor.” *Id.* at 51 (citing Ex. 2103). Patent Owner does not direct us to evidence that *every* reference relied upon by Petitioner was known to Apple’s engineers, Petitioner, however, does represent that the techniques employed in many of its references were “well-known,” and these references may have supplied that knowledge. *See e.g.*, Pet. 38 (asserting that Sarantos’s “wrist-worn physiological sensor” involves “well-known” techniques to measure physiological parameters). Based on the foregoing, , we find some support for Patent Owner’s argument that Apple’s engineers were “aware” of the references in question. The inability to develop a device in 2015, even after knowing about these references, tends to support that a POSITA lacked a reasonable expectation of success. *See* PO Resp. 48–53. However, as Petitioner persuasively points out, Apple’s engineers

were tasked with developing a commercial Apple Watch product with requirements going well beyond the claimed devices here. Accordingly, the alleged inability to create a device in 2015, even with knowledge of these references, does not suggest that a POSITA would have been unable to implement a basic device merely capable of meeting the broad requirements of claim 8. Pet. Reply 23–25. For these reasons, we do not discount the testimony of Apple’s engineers on the basis that they were unaware of the prior art. To the contrary, we find the engineers’ awareness of the references aids, but only slightly, Patent Owner’s arguments as to reasonable expectation of success.

With respect to Petitioner’s third point, as discussed above, we are mindful that the correct inquiry centers on whether a POSITA would have combined the art with a reasonable expectation of success in arriving at what is actually claimed. *Intelligent Bio-Systems*, 821 F.3d at 1367. Here, claim 8 merely refers to “determin[ing] a physiological parameter of the user responsive to the one or more signals” (part of claim 1) and recites “wherein the physiological parameter comprises oxygen saturation.” Pet. viii–ix. These requirements could have been satisfied by far more rudimentary functions than that implemented on the Apple Watch.

With that in mind, we find that many of the challenges faced by the Apple engineers would have no application to designing a device that merely meets the base-level requirements of claim 8. For example, the testimonial evidence supports that design challenges relating to the Apple Watch included: fitting the pulse oximeter into a “tiny form factor” (*see, e.g.*, Ex. 2076, 958:19–24, 963:19–964:11 (testimony of Mr. Land); Ex. 2077, 999:5–11 (testimony of Dr. Mannheimer); Ex. 2035, 100 n.17 (opinion in the -1291

IPR citing evidence)); designing a sensor with low power requirements (*see, e.g.,* Ex. 2076, 958:19–24 (testimony of Mr. Land); EX2077, 999:5–11 (testimony of Dr. Mannheimer)), ensuring that the sensor would work for wide range of human physiology, a variety of skin tones, and across genders, (*see e.g.,* Ex. 2076, 958:19–24, 963:19–964:11, 965:15–22 (testimony of Mr. Land); Ex. 2078, 8:6–12 (testimony of Dr. Waydo); Ex. 2081, 167:18–169:10 (testimony of Dr. Waydo); Ex. 2035, 101 n.18 (opinion in -1291 IPR citing evidence)); accounting for interference from transmitters [REDACTED]
[REDACTED]
[REDACTED] (*see, e.g.,* Ex. 2076, 970:12–972:5 (testimony of Mr. Land); Ex. 2082, 108:15–109:20. (testimony of Dr. Shui)); and [REDACTED] (*see, e.g.,* Ex. 2077, 1000:6–1001:1 (testimony of Dr. Mannheimer)). All of these challenges have only tangential connection to the rudimentary device recited in claim 8.

On the otherhand, Apple’s engineers also testified that designing a sensor that measured blood oxygenation at the wrist was “unprecedented,” because the wrist [REDACTED]
[REDACTED] was “well known for its lack of signal.” Ex. 2076, 963:19–964:11 (testimony of Mr. Land); Ex. 2077, 998:15–999:11 (testimony of Dr. Mannheimer); Ex. 2082, 108:15–109:20 (testimony of Dr. Shui). The difficulty of measuring oxygen saturation at the wrist is confirmed by [REDACTED]
[REDACTED] Ex. 2085, 8–9. The challenge posed by measuring blood oxygenation at the wrist would apply even to the rudimentary device recited in claim 8.

Ultimately the task before us is to weigh the testimony and documents relating to the design of the Apple Watch and determine to what extent, if at all, they detract from²⁴ any reasonable expectation of success a POSITA might have had in detecting blood oxygen saturation at the wrist. This task is complicated by the fact that the difficulties faced by Apple's engineers were the result of a multitude of interrelated factors, some of which are not commensurate with the scope of claim 8. Having considered all of the evidence and arguments of record on this topic, we find that the testimony and documents relating to the design of the Apple Watch evinces that measuring oxygen saturation at the wrist posed a significant challenge and that this evidence weighs against a reasonable expectation of success. This weight of this evidence, however, is diminished because Apple's design efforts were all in the context of designing a watch that had constraints well beyond what is required by the claims. Thus, the testimony and documents relating to the design of the Apple Watch are entitled to some weight in Patent Owner's favor and somewhat detract from a POSITA's reasonable expectation of success.

(3) Absence of commercial wrist-worn pulse oximeters

Patent Owner argues that 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.” PO Resp. 36 (citing Ex. 2100 ¶ 94). Patent Owner points out that “Sarantos is a patent assigned to Fitbit” and that “Fitbit did not release a device that could measure oxygen saturation at the wrist until

²⁴ There is no argument that design efforts for the Apple Watch support a reasonable expectation of success.

2020, five years after the '159 Patent.” *Id.* (citing Ex. 1005; Ex. 2100 ¶ 95; Ex. 2091; Ex. 2092; Ex. 2088, 4 (Washington Post article quoting Fitbit’s director of research as stating that measuring SpO₂ at the wrist was “a pretty hard technical problem”). Patent Owner also points out that another medical device company, Withings, has a wrist-worn device that “required to remove the device from the wrist strap and place it on a finger to measure oxygen saturation,” a feature that at least one review found “seriously annoying.” *Id.* at 36–37 (citing Ex. 2095, 3–5; Ex. 2100 ¶ 96); Ex. 2095, 3–5 (review of Withings device). According to Patent Owner, “[f]ar from being ‘well-known,’ Apple also recognized at the time of the '159 Patent that measuring oxygen saturation at the wrist was speculative.” *Id.* at 37 (citing Ex. 2076, 962:25–963:9, 964:2–6; Ex. 2084; Ex. 2100 ¶ 97) (discussing testimony of Mr. Land (discussed above) that when Apple began developing an oxygen saturation sensor for the wrist in late 2014 “there were no commercially available products that did blood oxygen sensing at the wrist”).

We give this evidence limited weight. As Petitioner points out, “[t]he motivations and resources of researchers are not inherently aligned with market forces and companies having the available capital for bringing such a product to mass market.” Pet. Reply 20; *see also*, PO Resp. 44 (arguing that “[t]he approval of businesspeople 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”). It may very well be, as Patent Owner suggests, that the absence of commercial products was attributable to difficulties in determining blood oxygen saturation at the wrist. *See* Ex. 2088, 4 (quoting Fitbit’s director of research as stating “[i]t’s a pretty hard technical problem to measure SpO₂ on the wrist”). It may also

be that the other companies did not seek to develop or introduce products because of a perceived lack of interest. *See id.* (posing the question “what . . . are we supposed to use oxygen apps for?” as follows: “Fitness? You can’t use these sensors while you work out. . . . That leaves us with the industry’s term ‘wellness.’ So are we supposed to get together with friends over drinks and talk about O₂ stats? ‘Hey, bud, my hemoglobin works better than yours!’”); Ex. 2091, 1–2 (article from Forbes stating that “[b]lood oxygen saturation monitoring has gained prominence in 2020, in part because it can be a sign of a Covid-19 infection”). The current record does not allow us to do more than speculate as to the reasons for the absence of commercial products at the time of the invention.

Moreover, claim 8 does not require a commercial-grade product. As discussed above, these claims are met by a rudimentary blood oxygen detecting device. And the evidence reflects that such devices were, in fact, made and tested well before the critical date of the ’159 patent. *See, e.g.,* Ex. 1016, 1900 (Cai, disclosing: “This paper describes the system design of a wristband pulse oximetry and completes the prototype fabrication. This oximeter can obtain oxygen saturation and heart rate information continuously and non-invasively through a wearable reflection sensor placed on the inner wrist.”); Ex. 1018, 1856, 1860 (Määttälä reporting on study where a “pulse oximeter device, which was built in the University of Oulu . . . was used in order to find the best place on human’s . . . wrist to provide the highest accuracy for pulse oximeter signal with lowest noise and disturbances” and concluding that “this study proves that wireless integrated pulse oximeter implanted in a . . . wrist band is possible to achieve with many benefits and practical applications”); Ex. 1014, 1562, 1566 (Pang,

describing a “genuine wrist pulse oximeter” and reporting that the oximeter “has been developed and calibrated, and the calibration curve [relating to oxygen saturation] was analyzed”).

For the reasons discussed above, we give little weight to the evidence supporting Patent Owner’s argument that a POSITA would not have reasonably expected success because pulse oximetry had never been done before in a commercial wrist-worn oximeter.

(4) Conclusion with respect to reasonable expectation of success

We determine that a POSITA would have reasonably expected success in adapting Iwamiya’s sensor by using LEDs that emit light in the red or infrared spectrum as taught by Sarantos, and modifying Iwamiya’s optical filter 17 to let light of corresponding wavelengths pass to obtain oxygen saturation measurements. *See* Pet. 41–42. In reaching this conclusion, we acknowledge the difficulties faced by the engineers of the Apple Watch. However, we find that many of these difficulties are not commensurate with the scope of claim 8. We give weight to the evidence that one of the principal difficulties faced by the Apple Watch engineers was taking oxygen saturation measurements at the wrist. However, particularly when considering that the claims require only a rudimentary device, we find that this evidence is outweighed by Määttälä, Cai, Li, and Pang—i.e., actual studies and experimental results that confirm the feasibility of determining oxygen saturation at the wrist. All four studies, particularly when considered collectively, support that a POSITA would have reasonably expected success. Although all four studies support an expectation of success, we find the disclosures of Määttälä and Cai particularly compelling. Ex. 1016, 1900 (Cai, reporting results of a study testing a wristband pulse

oximeter and concluding that “the experimental results have confirmed the feasibility of this wrist-band oximeter”); Ex. 1018, 1856, 1860 (Määttä, reporting study that used a pulse oximeter device built in the University of Oulu and concluding that although there are still many problems to overcome, “this study proves that wireless integrated pulse oximeter implanted in a chest belt or wrist band is possible to achieve with many benefits and practical applications”). These studies support Petitioner’s argument that a POSITA would have had a reasonable expectation of success in make a device that satisfies the limitations of claim 8, and outweighs the general skepticism shown in some of the testimony of the engineers working on the Apple Watch, and the documents related to the research and development of the Apple Watch.

d. Objective indicia of non-obviousness

Patent Owner argues that objective indicia support the nonobviousness of claim 8 due to industry skepticism, failure of others, and long-felt-but-unmet need, which we review in turn below. PO Resp. 54–59.

(1) Industry skepticism

Patent Owner contends that skepticism in the form of testimony from Apple’s engineers, and related documents, show those in the industry thought that determining oxygen saturation at the wrist would not work. PO Resp. 54–55 (citing Ex. 2077, 993:17–994:25, 1012:12–25; Ex. 2080, 174:2–174:6; Ex. 2100 ¶ 120). Patent Owner relies on largely the same evidence as we addressed above in the context of the reasonable expectation of success dispute. *See id.* (referring back to the “testimony and documents” discussed in its previous argument as supporting its industry skepticism argument) (citing PO Resp. 36–47). For industry skepticism, Patent Owner

focuses on the testimony of Dr. Mannheimer to the effect that his initial reaction to the project was “good luck with that” and “I don’t know if it can be done.” *Id.* (emphasis omitted) (citing Ex. 2077, 1012:12–25; Ex. 2080, 174:2–174:6).

Patent Owner asserts that the Board in the -1291 IPR “erroneously disregarded the skepticism” of Apple’s engineers by taking “such a narrow view of skepticism.” *Id.* at 55 (citing cases). In Patent Owner’s view, the fact that Apple “continued developing their oxygen saturation feature beyond 2015 does not negate the real skepticism” expressed by Apple’s engineers in 2015. *Id.* at 56–57. Patent Owner also contends that this skepticism went beyond the context of developing a future Apple Watch and extended to “the feasibility in 2015 of measuring oxygen saturation at the wrist at all.” *Id.* (citing Ex. 2080, 173:9–174:1, 174:7–174:18; Ex. 2100 ¶ 121). Patent Owner also argues that Apple’s other engineers expressed skepticism about “measuring oxygen saturation at the wrist . . . due to the physiology of the wrist.” *Id.* at 57–58 (citing Ex. 2081, 166:4–16; Ex. 2082, 108:13–21; Ex. 2085, 6, 12; Ex. 2089, 2; Ex. 2100 ¶ 122).

In its Reply, Petitioner does not specifically address Patent Owner’s objective indicia or industry skepticism by name, but Petitioner directly addresses the same evidence Patent Owner relies on for these arguments. *See* PO Resp. 54 (referring back to the “testimony and documents” discussed at PO Resp. PO Resp. 36–47); Pet. Reply 22–25 (addressing Patent Owner’s reliance on Apple engineer testimony at PO Resp. 36–44). Patent Owner argues in its Sur-reply that Petitioner’s Reply “fails to address” Patent Owner’s industry skepticism arguments. *See* PO Sur-reply 24.

As an initial matter, we disagree with Patent Owner’s argument that Petitioner’s Reply fails to address Patent Owner’s arguments as to industry skepticism. Patent Owner expressly relied on its previous, extensive arguments based on the testimony of Apple’s engineers, and cited to the previous pages in its Response that includes those arguments, and Petitioner cited those same specific arguments and responded to them in its Reply. *See* PO Resp. 54 (citing PO Resp. 36–47); Pet. Reply 22–25 (citing PO Resp. 36–44). Accordingly, we do not view Petitioner’s Reply as failing to respond to the substance of Patent Owner’s industry skepticism arguments.

Turning to the merits, we note that neither party addresses the nexus requirement for objective indicia evidence. *See, e.g.*, PO Resp. 54–58. The Federal Circuit has made clear on numerous occasions that “the evidence of secondary considerations must have a ‘nexus’ to the claims, *i.e.*, there must be ‘a legally and factually sufficient connection’ between the evidence and the patented invention.” *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019) (quoting *Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988)). Patent Owner bears the burden of establishing a nexus between the objective indicia and the claimed invention. *See Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (“[A] patentee is entitled to a rebuttable presumption of nexus between the asserted evidence of secondary considerations and a patent claim if the patentee shows that the asserted evidence is tied to a specific product and that the product ‘*is the invention disclosed and claimed.*’” (quoting *Demaco Corp.*, 851 F.2d at 1392)). Even absent a presumption of nexus, a nexus still exists between the objective indicia and the claimed invention when “the evidence of secondary considerations is the

‘direct result of the unique characteristics of the claimed invention.’” *Id.* at 1373–74.

Based on our review of the evidence and arguments, Patent Owner fails to meet its burden of establishing a nexus between claim 8 and its industry skepticism evidence. *See Fox Factory*, 944 F.3d at 1373. Not only did Patent Owner fail to even mention nexus, it did not perform the analysis required to establish a nexus, whether via a presumption of nexus or through evidence that would establish that the industry skepticism was tied to the unique characteristics of claim 8. *See id.* at 1373–74; PO Resp. 54–58. This failure to address the issue here is more glaring given that the parties dispute whether the testimony and documents at issue are directed to unclaimed features that are part of the Apple Watch. *See* Pet. Reply 22–23 (arguing that “the engineers’ testimony regarding their subjective experiences developing pulse oximetry for the Apple Watch does not bear on whether a POSITA would have reasonably expected success in performing the claimed function of ‘determining’ an oxygen saturation parameter at the wrist (with no claimed degree of accuracy, time-frame for gathering signals, or exact location” (emphasis omitted) (citing Ex. 1079 ¶¶ 42–53)).

While it may be possible to piece together competing implicit nexus arguments from the parties’ briefing, we cannot introduce an issue for the first time and make findings in support of it in a Final Written Decision without depriving Petitioner of the opportunity to address the nexus issue. *See* Paper 12, 9 (“Patent Owner is cautioned that any arguments not raised in the response may be deemed waived.” (emphasis omitted)). Under these circumstances, we are not persuaded that Patent Owner has established the required nexus.

Even if we assume a nexus exists, we would find Patent Owner's arguments only somewhat persuasive for the same reasons we provided above when addressing much the same evidence in connection with reasonable expectation of success. We acknowledge that Apple's engineers did express some degree of skepticism. *See e.g.*, Ex. 2077 1012:12–25 (testimony of Dr. Mannheimer that his initial reaction to being assigned to prove the feasibility of measuring oxygen saturation at the wrist was, “good luck with that” and “I don't know if it can be done”). And as discussed above, the evidence supports that Apple's engineers considered measuring at the wrist to pose a significant challenge. But, as also discussed above, the skepticism expressed by the Apple engineers was in the context of their development of the Apple Watch, not whether they could develop a device that measured oxygen saturation at the wrist at all, and not in the context of a rudimentary detector device as recited in claim 8. Although the engineers did express skepticism, it must be viewed in that context. Accordingly, even if we assume a nexus exists, the evidence of record shows only a moderate amount of industry skepticism directed toward the device of claim 8.

(2) Failure of others

Patent Owner argues that “the evidence discussed above demonstrates the failure of others, including Apple, Fitbit, and Withings to achieve a device that determines oxygen saturation from the wrist and a long-felt-but-unmet need for such a device.” PO Resp. 58 (citing PO Resp. 36–54; Ex. 2100 ¶ 123). Patent Owner asserts that Petitioner's “own engineers tried and failed in 2015 to determine oxygen saturation at the wrist.” *Id.* (citing Ex. 2085, 7–13; Ex. 2094, 28:3–9:19; Ex. 2100 ¶ 123). Patent Owner also contends that “Fitbit was unable to release a device that measured oxygen

saturation from the wrist until 2020” and that “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.” *Id.* at 58–59 (citing Ex. 2091; Ex. 2092; Ex. 2095, 3–5; Ex. 2100 ¶ 124). Patent Owner further asserts that Petitioner failed to address these arguments in its Reply. PO Sur-reply 24.

Our analysis of the failure of others objective indicia generally tracks our analysis of industry skepticism above. First, we disagree with Patent Owner’s argument that Petitioner ignored this issue. Patent Owner expressly relies on its earlier arguments addressing the testimony of Apple’s engineers and related documents, and Petitioner directly addresses those arguments in its Reply. *See* PO Resp. 60 (citing PO Resp. 36–54); Pet. Reply 20 (addressing “Fitbit and other companies mentioned” in Patent Owner’s Response), 22–25 (citing PO Resp. 36–44). Second, Patent Owner again never mentions nexus in its analysis, and for the same reasons noted above in our analysis of the industry skepticism issue, we find that Patent Owner fails to meet its burden of showing a nexus to the alleged failure of others. *See* PO Resp. 58–59.²⁵ Finally, even if we assume a nexus exists, the mere absence of commercial products from Fitbit and Withings does not support nonobviousness for the reasons discussed above. And the efforts of Apple

²⁵ *See Purdue Pharma L.P. v. Accord Healthcare, Inc.*, No. 2023-1953, 2024 WL 5244764, at *10 (Fed. Cir. Dec. 30, 2024) (affirming finding of no nexus between alleged failure of others and claimed invention); *Oscar Mayer Foods Corp. v. ConAgra, Inc.*, 45 F.3d 443 (Fed. Cir. 1994) (“[O]bjective indicia of nonobviousness are helpful only where there exists a nexus between the indicia and the patented invention. For example, the failure of others is probative only if they sought to overcome the problem the applicant claims to have solved.”)

and other companies to make a commercially successful watch that measures oxygen saturation at the wrist are far more complicated than making a rudimentary device that satisfies claim 8, such that any “failure” in the short term in making those commercial devices bears little relationship to claim 8. Accordingly, we give little weight to Patent Owner’s evidence relating to the alleged failure of others.

(3) Long-felt-but-unmet need

Patent Owner contends that the references Petitioner “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.” PO Resp. 59 (citing Ex. 2100 ¶ 125). According to Patent Owner, the fact 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.* Patent Owner also relies on the statement in an Apple status update that “there were still [REDACTED] in 2015 impeding development of such a sensor.” *Id.* (citing Ex. 2085, 13). Patent Owner again asserts that Petitioner failed to address these arguments in its Reply. PO Sur-reply 24.

Our analysis here also tracks our analysis of industry skepticism above. First, we disagree with Patent Owner’s argument that Petitioner ignored this issue. Patent Owner’s argument hinges on its assumption that “no such devices were available in 2015,” yet Petitioner contends that at least some devices showed that oxygen saturation could be measured at the wrist in 2015, even if no commercial devices were available. *See* Pet. Reply 15–19. Accordingly, the substance of this dispute was addressed by Petitioner in the context of reasonable expectation of success. Second,

Patent Owner again never mentions nexus in its analysis, and for the same reasons noted above, we find that Patent Owner fails to meet its burden of showing a nexus to the alleged long-felt-but-unmet need. *See* PO Resp. 59.

Finally, even if we assume a nexus exists, the record here fails to show a long-felt-but-unmet need for the device at issue in claim 8. Patent Owner cites to its expert for support, but neither Patent Owner's Response nor the cited testimony provide any time period where the industry allegedly desired but lacked the claimed device, and therefore no context from which we can conclude that any unmet need was "long felt." *See* Ex. 2100 ¶ 125; PO Resp. 59. The cited testimony cites to several references without identifying a specific time frame where the industry desired but lacked the claimed device. And, as discussed above, non-commercial devices for testing blood oxygen levels at the wrist had been assembled and tested well before 2015. *See* Exs. 1014, 1016, 1018. At best, even if we agree with Patent Owner that no device existed in 2015 that met the requirements of claim 8, and multiple groups sought to make such a device, Patent Owner does not provide persuasive evidence that the need for such a device was "long felt."

e. Conclusion with respect to claim 8

For the reasons discussed above, we find Petitioner's following arguments persuasive: (1) the combination of Iwamiya and Sarantos discloses all of the limitations of claim 8; (2) a POSITA would have been motivated to combine the references for the reasons provided by Petitioner; and (3) a POSITA would have had a reasonable expectation of success when making the combination. We also find Patent Owner's objective indicia of nonobviousness arguments unpersuasive because Patent Owner fails to meet

its burden to show a nexus between claim 8 and its arguments and evidence. In addition, if we assume a nexus, the evidence of industry skepticism would be entitled to moderate weight, and the evidence of failure of others and long-felt-but-unmet need would be entitled to little weight. Considering the evidence adduced by Petitioner that claim 8 would have been obvious, and even giving moderate weight to Patent Owner's evidence of industry skepticism, we determine that the preponderance of the evidence supports that claim 8 would have been obvious based on Iwamiya and Sarantos, even had Patent Owner established a nexus.

7. Dependent Claim 12

Claim 12 depends from claim 1 and recites “wherein the opening defined in the dark-colored coating comprises a width and a length, and wherein the width is larger than the length.” Pet. ix. Petitioner argues, based on Sarantos, that “it would have been obvious to implement the window (which provides the claimed “opening” under the definition advanced by [Patent Owner] for purposes of infringement) defined by Iwamiya’s light shielding frame 18 (implemented to have a dark-colored coating based on the teachings of Sarantos),” “such that the width of the window is larger than the length.” Pet. 47 (citing Ex. 1003 ¶¶ 118–120). Petitioner relies on Figure 22 in Sarantos, which allegedly “depicts a surface with a dark-colored coating (window 2226 with in-mold label 2276) positioned between the photodiodes 2212 and tissue of user’s wrist, wherein windows 2226 in the dark-colored coating allow light reflected from the tissue to reach photodiodes 2212.” *Id.* at 47–48 (citing Ex. 1003 ¶ 118; Ex. 1005, 17:1–51, Fig. 22). According to Petitioner, “Sarantos discloses that the photodiodes have a “high-aspect ratio” (“HAR”),” which “can have a

width larger than their length.” *Id.* at 48–49 (citing Ex. 1003 ¶ 119; Ex. 1005, 9:47–65; 9:48–10:26, Figs. 15–16, 18). Petitioner asserts that “window regions 2226 are mutually coextensive with their respective HAR photodetector elements 2212,” such that the window regions would “have a width that is larger than the length, in at least some configurations.” *Id.* at 49 (citing Ex. 1003 ¶ 120; Ex. 1005, 17:42–47).

Patent Owner argues that Petitioner “did not explain how the Iwamiya-Sarantos combination discloses this limitation.” PO Resp. 59 (citing Pet. 47–49; Ex. 2100 ¶ 127). Patent Owner argues that Petitioner relies on a different claimed “opening” for claim 1, based on Iwamiya’s optical filter, and now improperly relies on the Sarantos window regions as disclosing the opening for dependent claim 12. *Id.* at 60 (citing Pet. 23–24, 47–49; Ex. 2100 ¶ 128). Patent Owner also asserts that Petitioner does not even include the HAR photodetectors in its proposed combination, which forms the basis for Petitioner’s argument for claim 12. *Id.* at 60–61 (citing Ex. 1005, 8:39–11:3, Figs. 4–6; Ex. 2100 ¶¶ 129–130; Ex. 2107, 81:12–82:17).

In its Reply, Petitioner argues that “[i]n the Iwamiya-Sarantos combination, the optical filter is positioned in the opening in the dark-colored coating, . . . [a]nd that opening is an opening in Sarantos’s dark-colored coating as applied to Iwamiya.” Pet. Reply 25 (citing Pet. 23–25, 47–49). Petitioner also contends that it relies on the window openings and HAR detectors from Sarantos as part of its proposed combination, including the shapes of the openings in the coating and the benefits of using HAR photodetectors. *See* Pet. Reply 25–26.

Patent Owner argues that Petitioner’s Reply “still relies on the HAR photodetectors without addressing that they are not part of the Iwamiya-Sarantos combination.” PO Sur-reply 14–25. Patent Owner also asserts that Petitioner fails to identify “how the alleged ‘opening’ in Iwamiya-Sarantos has a different length and width.” *Id.* at 25.

We find that Patent Owner has the better position on this issue. Petitioner relies on an opening in Iwamiya’s frame 18, which includes Iwamiya’s optical filter 17, as the claimed opening, and Iwamiya’s photodetector(s) 9 as the claimed detector(s). *See e.g.*, Pet. 20–21 (citing only Iwamiya for the proposition that the Iwamiya/Sarantos combination a plurality of detectors); 23–24 (relying on Iwamiya alone for limitation 1.5, which includes the “opening” limitation); *see also* 31–34 (relying only on Iwamiya’s disclosure of “plural light receiving units 9 preferably disposed on the same circumference” as meeting the requirements of claim 5); Pet. Reply 8 (relying on opening in Iwamiya’s frame 18 as claimed “opening”: “the light shielding frame 18, ‘surround[s]’ the light receiving units 9 and has an opening”). The Petition includes a lengthy discussion explaining, in detail, how and why a POSITA would have implemented the Iwamiya/Sarantos combination. Pet. 7–13. But this discussion does not discuss modifying the shape of Iwamiya’s optical filter 17 or the opening in frame 18 it occupies, or implementing Iwamiya’s photodetector(s) using Sarantos’s HAR photodiodes. *Id.*

The Petition’s mapping for claim 12 mentions that HAR photodiodes have a maximum first dimension that is at least twice as large as a maximum second dimension, and discusses that Sarantos’s window regions overlap and are coextensive with the HAR photodiodes. Pet. 47–49. But the

Petition never articulates a reason why a POSITA would include HAR photodiodes in the proposed combination or explains how HAR photodiodes would be implemented in the combination consistent with Petitioner's showing for claim 1. *Id.*; *see also*, Ex. 1003 ¶¶ 118–120 (testimony of Dr. Anthony suffering from the same deficiency).

At oral argument, counsel for Petitioner argued that “the citations for the portion of Sarantos that were in the Petition identify why those high aspect ratio photodiodes would’ve been desirable.” Paper 50, 25.

Presumably, Petitioner's counsel was referring to the citation to column 9, line 48 – column 10, line 26 of Sarantos on page 48 of the Petition. This disclosure does describe benefits of using HAR photodetectors. But, particularly in the face of Petitioner's reliance on a different photodiode in connection with claim 1, it is too much to expect Patent Owner in its Response, and the Board in this Decision, to infer from this bare citation Petitioner's intent to rely on Sarantos's HAR photodetectors for the first time in the context of dependent claim 12 when the combination relied on for claim 1 contains no mention of the HAR photodetectors. 37 C.F.R. § 42.104(b). Petitioner's Reply provides quotes a portion of Sarantos's disclosure discussing the benefits of using HAR photodetectors, but continues not to address the problem that the Petition does not propose to include them in the Iwamiya-Sarantos device. Pet. Reply 26.²⁶

²⁶ We do not consider Petitioner's quotation of a passage discussing the benefits of HAR photodetectors to contend that the Iwamiya/Sarantos device includes such photodetectors. To the extent Petitioner contends that its Reply makes that argument, it is new argument that we decline to consider. *See* 37 C.F.R. § 42.23(b).

In sum, the Petition does not adequately explain why the claimed opening Iwamiya's device has a width that is larger than its length. The Petition does not rely on Sarantos's HAR photodetectors and, absent such reliance, Sarantos's disclosure of window regions that overlap and are coextensive with the HAR photodiodes does not speak to whether the "opening" in the Iwamiya-Sarantos device (i.e., the space filled by Iwamiya's optical filter) has a width that is larger than its length. For these reasons, Petitioner has not established, by a preponderance of the evidence, that claim 12 would have been obvious over the combination of Iwamiya and Sarantos

E. Obviousness Based on Iwamiya, Sarantos, and Han

Petitioner argues that claim 3 would have been obvious based on Iwamiya, Sarantos, and Han. Pet. 1, 50–53. Patent Owner does not address this challenge.

Claim 3 depends from claim 1 and further recites "wherein the display is a touch-screen display." Pet. viii. Petitioner asserts that Han discloses the claimed display, and that a POSITA would have found it obvious to combine Iwamiya, Sarantos, and Han. *See id.* at 50–53. As to these unchallenged claim limitations, we have reviewed the evidence and arguments of record and find that Petitioner has shown, by a preponderance of the evidence, that they are disclosed by the combination of Iwamiya, Sarantos, and Han for the reasons set forth in the Petition, which we adopt as our own. *See id.* Accordingly, we find that Petitioner has established, by a preponderance of the evidence, that claim 3 would have been obvious over the combination of Iwamiya, Sarantos, and Han.

F. Obviousness Based on Iwamiya, Sarantos, and Utter

Petitioner contends that the combination of Iwamiya, Sarantos, and Utter renders claims 14–25 obvious. *See* Pet. 1, 53–74. With the exception of dependent claim 24, which we address below, the parties rely on the arguments and evidence previously addressed in this Decision, with the same outcome.

1. Claims 14–23 and 25

As to independent claim 14 and dependent claim 25, Patent Owner combines these claims with claim 5 when arguing that the combination of Iwamiya and Sarantos (with or without Utter), fails to disclose the claimed “circular” array of detectors. PO Resp. 61–67. The parties group claims 5, 14, and 25 together for this argument, and we apply the same analysis to claims 14 and 25 as to these limitations as we did for claim 5. *See id.*; Pet. 60–63 (addressing claim 14, and referring back to claim 5 analysis for limitation 14.4), 74 (addressing claim 25 and referring back to analysis of claim 5). Accordingly, for the same reasons discussed in the context of claim 5, we determine that Petitioner met its burden of proving that the combination of Iwamiya, Sarantos, and Utter discloses 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” as required by claim 14 and a “plurality of detectors arranged in an array having a spatial configuration corresponding to a shape of a portion of the tissue measurement site bounded by the light block” as required by claim 24.

Claim 17 depends from claim 14 and further recites the same language as dependent claim 8, which requires “the physiological parameter

comprises oxygen saturation.” Pet. x. In combination with claim 14, claim 17, like claim 8, requires determining oxygen saturation at the wrist. Petitioner and Patent Owner rely on the same arguments and evidence when addressing claims 8 and 17. *See* Pet. 38–44 (claim 8), 64 (addressing claim 17 by referring back to analysis of claim 8); PO Resp. 26–59 (grouping claims 8 and 17 together). Accordingly, for the same reasons discussed in the context of claim 8, we determine that Petitioner establishes that the combination of Iwamiya, Sarantos, and Utter discloses the limitations of claim 17, and that a POSITA would have been motivated to make the combination for the reasons provided by Petitioner, with a reasonable expectation of success.

As to independent claim 19, which largely tracks the language of claim 1, the parties group their arguments as to claim 19 with claim 1 and treat the claims as rising and falling together. *See* Pet. 64–70 (addressing claim 19 and referring to analysis of claim 1 for limitations at issue in this Decision); PO Resp. 8–26 (addressing claim 1 and 19 together when arguing that the proposed combinations fails to meet certain limitations or have an adequate motivation to combine). Accordingly, our analysis of claim 1 above, where we found in favor of Petitioner as to the disputed issues, applies to the same limitations found in claim 19.

Other than as noted above, Patent Owner does not address the remaining limitations in claims 14, 17, 19, and 25 or any of the aspects of the challenge to claims 15, 16, 18, and 20–23 based on Iwamiya and Sarantos, and Utter. *See generally*, PO Resp. As to these unchallenged claim limitations and claims, we have reviewed the evidence and arguments of record and find that Petitioner has shown, by a preponderance of the

evidence, that they are disclosed by the combination of Iwamiya, Sarantos, and Utter for the reasons set forth in the Petition, which we adopt as our own. *See* Pet. 53–74.

Based on the foregoing, we find that Petitioner has established, by a preponderance of the evidence, that claims 14–23 and 25 would have been obvious based on the combination of Iwamiya, Sarantos, and Utter.

2. Claim 24

Claim 24 depends from claim 19 and further recites “wherein the second shape comprises a width and a length, and wherein the width is different from the length.” Pet. xii. 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. In the Petition, Petitioner relied solely on its argument for claim 12 when addressing claim 24. *See id.* at 74.

Patent Owner argues that Petitioner improperly relies solely on its claim 12 analysis for claim 24 because claim 12, unlike claim 24, recites an “opening” having a width larger than its length. *See* PO Resp. 67–68. In its Reply, Petitioner argues that “[w]hile the recitations of claim 24 are not identical to claim 12, the teachings of the prior art discussed in the Petition with respect to claim 12 are equally applicable to claim 24.” Pet. Reply 29.

We agree with Patent Owner that Petitioner’s analysis of claim 24 improperly relies on its analysis of claim 12. As noted, claim 12 recites an “opening” having a width larger than its length, while claim 24 refers to a second shape of light that have width different than its length. *See* Pet. ix, xii. The second shape of light and the opening are not the same, and

Petitioner's argument and evidence as to claim 12 fails to allude to the second shape of light. *See* Pet. 47–49. Accordingly, we determine that Petitioner has not proven that claim 24 would have been obvious based on Iwamiya, Sarantos, and Utter.

G. Patent Owner's Motion to Strike

Patent Owner's Motion to Strike relates to three categories of documents and arguments. Paper 31, 1–7. The first category includes Exhibits 1017, 1036, 1038, and 1042–1048 and arguments related to them in Petitioner's Reply. *Id.* at 1, 3–6. These documents and arguments relate to the parties' dispute over the reasonable expectation of success in determining oxygen saturation at the wrist, which relates to dependent claims 8 and 17. *See id.*; PO Resp. 26–59. The second category relates to arguments in Petitioner's Reply that allegedly fail to respond to any argument in the Patent Owner Response and introduce “new combinations and modifications of Iwamiya and Sarantos” with certain Exhibits. Paper 31, 6–7. The third category of information Patent Owner seeks to strike relates to Petitioner's reliance on Patent Owner's expert testimony in the -1291 IPR from Dr. Duckworth. Paper 31, 1, 8–9. Petitioner cited to Dr. Duckworth's testimony from the -1291 IPR, which Patent Owner alleges it “cannot adequately address without Duckworth's direct testimony” from Dr. Duckworth's declarations. *See id.* In its Motion, Patent Owner notes that it “originally requested the Board allow [Patent Owner] to file this motion or, alternatively, allow [Patent Owner] to submit rebuttal evidence” such as Dr. Duckworth's declarations. *Id.* at 9–10 (citing Ex. 3003). After the hearing, we granted Patent Owner's request to file various rebuttal evidence as well as a post-hearing brief. *See* Exs. 3005, 3007.

We need not reach the merits of Patent Owner’s Motion to Strike for two independent reasons. First, after the hearing, we granted Patent Owner’s alternative request to file certain evidence in lieu of striking the material at issue in the Motion, which obviates the need to strike any of the material in question. *See* Exs. 3003 (Patent Owner seeking authorization to file a motion to strike, or “[a]lternatively,” to permit Patent Owner to file evidence with its Sur-reply), 3005 (listing evidence Patent Owner sought to introduce), 3007 (granting Patent Owner’s request to submit evidence); PO Post-hearing 1–3, Paper 31, 9–10. Second, we would have reached the same conclusions in this case even if we granted Patent Owner’s Motion to Strike and deciding the Motion would have no impact on the outcome of any issues in this proceeding.²⁷ Based on the foregoing, we dismiss Patent Owner’s Motion to Strike as moot.

H. Petitioner’s Motion to Exclude

Petitioner “moves to exclude Exhibits 2076–2078, 2080–2086, 2089, 2094, and portions of Exhibit 2100.” Paper 38, 1. Petitioner argues that Patent Owner’s Response “does not establish the relevance of Exhibits 2076–2078, 2080–2086, and 2094 to the issues in the present proceeding.” *Id.* at 2. Petitioner also argues that these Exhibits should be excluded as hearsay. *Id.* at 8–11. The Exhibits at issue generally relate to ITC testimony from Petitioner’s employees and the patentability of dependent claims requiring determination of oxygen saturation at the wrist. *See id.* at 2–6. The portions of Exhibit 2100 that Petitioner seeks to exclude relate to Dr.

²⁷ Our discussion above, including summaries of the parties’ arguments, refers to some of the material Patent Owner sought to strike, but none of the disputed material is necessary to the findings in this Decision.

Madisetti’s opinions addressing similar issues. *See id.* at 11–13; *see also* PO Resp. 35–54 (relying in part on disputed exhibits when addressing dependent claims 8 and 17).

We need not reach the merits of Petitioner’s Motion to Exclude because we find Petitioner’s challenges to the claims in this proceeding persuasive or unpersuasive for reasons that do not relate to the evidence Petitioner seeks to exclude. For example, virtually all of the evidence Petitioner seeks to exclude relates to dependent claims 8 and 17, and we find that Petitioner met its burden as to those claims even if we consider the evidence Petitioner seeks to exclude, and we would reach the same conclusion if we did not consider the information. Similarly, the disputed evidence had no bearing on our consideration of claims where Petitioner failed to meet its burden of proving unpatentability. Accordingly, we dismiss Petitioner’s Motion to Exclude as moot.

I. Petitioner’s Motions to Seal

Petitioner filed five unopposed Motions to Seal. *See* Papers 23, 28, 43, 45, 48. Although the Motions seek to seal distinct information in the papers and exhibits, they rely on common arguments and themes. *See id.* We refer to the arguments made in Petitioner’s first Motion to Seal (Paper 23) as representative.

In its various Motions to Seal, Petitioner seeks to seal certain information it deems confidential business information (“CBI”). *See* Paper 23, 1. According to Petitioner, this information includes “sensitive information regarding Apple’s Watch products, including proprietary research and development (R&D) information, trade secrets, proprietary processes, and confidential business operations information.” *Id.* The

produced documents generally originate from related proceedings in the ITC and the Board, including the -1291 IPR and -1465 IPR. *See id.* at 2.

Petitioner contends that some documents should be sealed in their entirety, while others may be sealed in part, with the public and redacted versions of these documents striking the correct balance between the public's interest in providing a complete and understandable record the parties' interest in protecting sensitive information. *See id.* at 2–4. In some cases, the material in question was already sealed in previous proceedings before the Board. *See id.* at 3 n.2.

In an *inter partes* review, the moving party bears the burden of showing that the relief requested should be granted. 37 C.F.R. § 42.20(c). A party moving to seal must show “good cause” for the relief requested. *Id.* § 42.54(a). The “good cause” standard for granting a motion to seal reflects the strong public policy for making all information in Board proceedings open to the public. *See Argentum Pharms. LLC v. Alcon Res., Ltd.*, IPR2017-01053, Paper 27 at 3 (PTAB Jan. 19, 2018) (informative). When assessing if the good cause standard has been met, we may consider whether (1) the information at issue is confidential, (2) harm would result upon public disclosure, (3) there exists a genuine need to rely in the trial on the specific information sought to be sealed, and (4) the interest in maintaining confidentiality as to the information outweighs the strong public interest in an open record. *Id.* at 4.

In the Motions, Petitioner identifies the documents and information it seeks to seal with particularity, and identifies the CBI it contends supports sealing the information. *See* Paper 23, 3–4. Petitioner also addresses each of the factors set forth in *Argentum* and contends that they support sealing

the information in question. *See id.* at 4–12. Petitioner also notes that Patent Owner does not oppose the Motions, although the parties dispute the extent of redactions necessary to protect Petitioner’s CBI. *See id.* at 13–15.

Based on our review of the material in the Exhibits and Petitioner’s representations, we agree that the documents contain confidential, potentially sensitive information, that Petitioner would be harmed by not sealing the information, and that the interest in maintaining the information as confidential outweighs the public interest in having the information unsealed. We have also reviewed Petitioner’s redactions, which appear to be consistent with our rules and practices, and allow the public to ascertain the nature of the arguments and evidence at issue. *See, e.g.*, Paper 24 (public version of Patent Owner’s Response with redactions), Paper 32 (public version of Petitioner’s Reply with redactions), 46 (public version of Patent Owner’s Sur-reply with redactions). Accordingly, we conclude that good cause exists to seal the information as set forth in Petitioner’s Motions to Seal. *See* Papers 23, 28, 43, 45, 48.

CONCLUSION²⁸

Based on the foregoing, we determine that (1) Petitioner establishes that claims 1–11, 13–23, and 25 are unpatentable; (2) Petitioner fails to

²⁸ Should Patent Owner wish to pursue amendment of the Challenged Claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding, 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. §§ 42.8(a)(3), (b)(2).

establish that claims 12 and 24 are unpatentable; (3) Patent Owner's Motion to Strike is dismissed as moot; (4) Petitioner's Motion to Exclude is dismissed as moot; and (5) Petitioner's Motions to Seal are granted.

The following chart summarizes our patentability determinations:

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
1, 2, 4– 13	103	Iwamiya, Sarantos	1, 2, 4–11, 13	12
3	103	Iwamiya, Sarantos, Han	3	
14–25	103	Iwamiya, Sarantos, Utter	14–23, 25	24
Overall Outcome			1–11, 13–23, 25	12, 24

ORDER

Accordingly, it is:

ORDERED that Petitioner has proven by a preponderance of the evidence that claims 1–11, 13–23, and 25 of the '159 patent are unpatentable

FURTHER ORDERED that Petitioner has not proven by a preponderance of the evidence that any of claims 12 and 24 of the '159 patent are unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Strike is *dismissed* as moot;

FURTHER ORDERED that Petitioner's Motion to Exclude is *dismissed* as moot;

FURTHER ORDERED that Petitioner's Motions to Seal (Papers 23, 28, 43, 45, 48) are *granted*; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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Patent 10,722,159 B2

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