

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

WILLOW LABORATORIES, INC.,¹
Patent Owner.

IPR2024-00296
Patent 10,984,911 B2

Before RICHARD H. MARSCHALL, DAVID COTTA, and
ALYSSA A. FINAMORE, *Administrative Patent Judges*.

FINAMORE, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

¹ U.S. Patent No. 10,984,911 B2 lists Cercacor Laboratories, Inc. as the assignee. Due to a change of name document recorded for the patent on May 16, 2024, the Office records indicate Willow Laboratories, Inc. is the assignee. Thus, Willow Laboratories, Inc. is the patent owner in this proceeding.

I. INTRODUCTION

Apple Inc. (“Petitioner”) filed a Petition (Paper 2, “Pet.”) requesting an *inter partes* review of claims 1–4, 6, 8, 10–13, 15, 17, 19–21, 23–26, and 28 of U.S. Patent No. 10,984,911 B2 (“the ’911 patent”) (Ex. 1001). Pet. 1. Cercacor Laboratories, Inc., now Willow Laboratories, Inc. (“Patent Owner”), filed a Preliminary Response (Paper 5, “Prelim. Resp.”). With our authorization, Petitioner filed a Preliminary Reply (Paper 6, “Prelim. Reply”), and Patent Owner filed a Preliminary Sur-reply (Paper 7, “Prelim. Sur-reply”).

We have authority, acting under the designation of the Director, to determine whether to institute an *inter partes* review. 35 U.S.C. § 314; 37 C.F.R. § 42.4(a). We may not authorize an *inter partes* review to be instituted “unless . . . the information presented in the petition filed under section 311 and any response filed under section 313 shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a).

Upon consideration of the arguments and evidence presented by both parties, we determine Petitioner has demonstrated a reasonable likelihood that it would prevail with respect to at least one of the claims challenged in the Petition. Accordingly, we institute an *inter partes* review of the challenged claims of the ’911 patent.

II. BACKGROUND

A. *Real Parties-in-Interest*

Petitioner identifies itself as a real party-in-interest. Pet. 104. Patent Owner identifies itself and Masimo Corporation as real parties-in-interest. Paper 4, 1.

B. Related Matters

Petitioner and Patent Owner identify the following district court action involving the '911 patent as a related matter: *Masimo Corp. v. Apple Inc.*, Case 1:22-cv-01378 (D. Del. filed Oct. 20, 2022) (“the Delaware Litigation”). Pet. 104; Paper 4, 1. Patent Owner also identifies as related matters the following *inter partes* review proceedings involving patents that Patent Owner is asserting in the Delaware Litigation:

Petitioner	Case No.	Patent No.
Apple Inc.	IPR2024-00290	8,190,223
Apple Inc.	IPR2024-00243	10,722,159
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.

C. The '911 Patent

The '911 patent, titled “MULTIPLE WAVELENGTH SENSOR EMITTERS,” issued on April 20, 2021, from an application filed on September 22, 2020. Ex. 1001, codes (22), (45), (54). The '911 patent claims priority to several applications and has an earliest-claimed priority date of March 1, 2005. *Id.* at codes (60), (63).

Spectroscopy is a technique for measuring the concentration of certain constituents of a solution from the intensity of light transmitted through the solution. Ex. 1001, 2:6–28. Pulse oximetry uses spectroscopy to noninvasively determine oxygen saturation and pulse rate. *Id.* at 2:28–30. Pulse oximetry involves transmitting optical radiation of red and infrared

wavelengths to a tissue site, responding to the intensity of the optical radiation after absorption by pulsatile arterial blood flowing within the tissue site, determining measurements for oxygen saturation and pulse rate based on the response, and outputting representative plethysmographic waveforms. *Id.* at 2:30–38. According to the '911 patent, there is a need to noninvasively measure multiple physiological components, in addition to oxygen saturation and pulse rate, such as carboxyhemoglobin, methemoglobin, fractional oxygen saturation, total hemoglobin, bilirubin, and blood glucose. *Id.* at 3:23–31.

The '911 patent describes a physiological measurement system having a multiple wavelength sensor assembly with enhanced measurement capabilities as compared to conventional pulse oximetry. Ex. 1001, 5:34–37. In particular, the multiple wavelength sensor assembly measures blood constituent and related parameters in addition to oxygen saturation and pulse rate and also measures oxygen saturation and pulse rate with increased accuracy. *Id.* at 5:39–45.

Figures 1 and 2A, reproduced below, show a physiological measurement system and a multiple wavelength sensor assembly, respectively. Ex. 1001, 3:62–65, 5:34–37, 5:52–54.

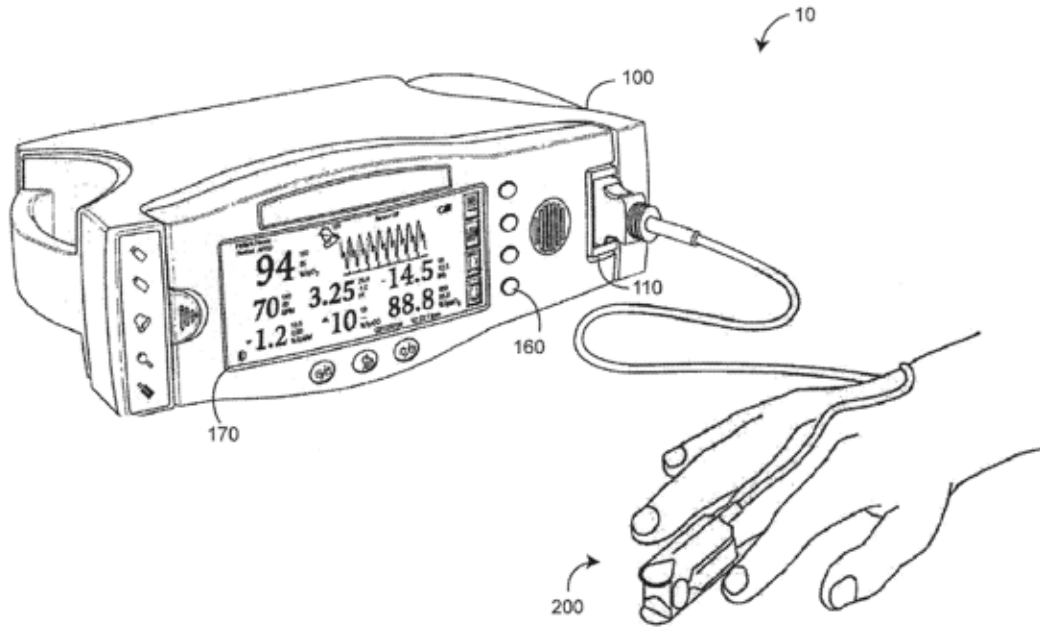


FIG. 1

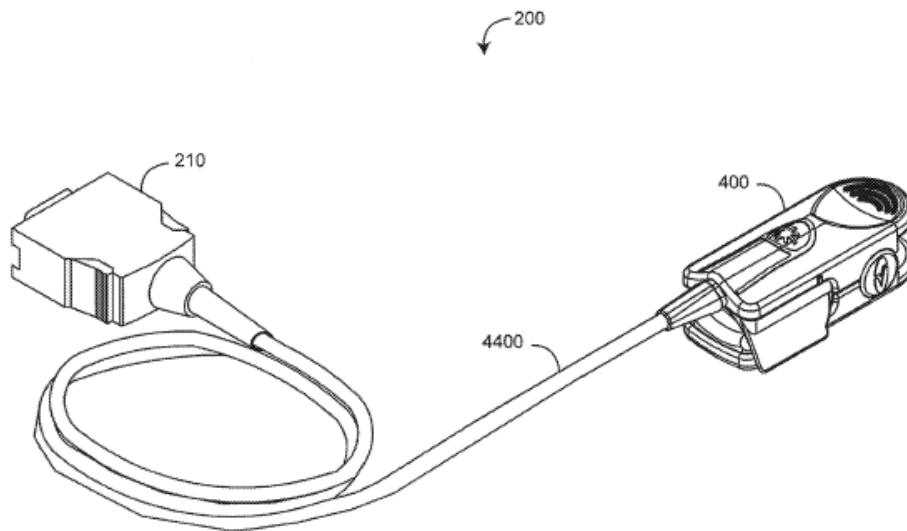


FIG. 2A

Figure 1 is a perspective view of physiological measurement system 10 including monitor 100 and multiple wavelength sensor assembly 200, and Figure 2A is a perspective view of multiple wavelength sensor assembly 200. *Id.* at 3:62–65, 5:34–37, 5:52–54. Monitor 100 includes

keys 106 for operating modes and alarms, display 170 for providing readouts of measured parameters, and monitor sensor port 110. *Id.* at 5:46–51.

Multiple wavelength sensor assembly 200 includes monitor connector 210 for plugging into monitor sensor port 110, sensor 400 adapted to attach to a tissue site, e.g., a patient's finger, and sensor cable 4400 extending between monitor connector 210 and sensor 400. *Id.* at 5:46–47, 5:52–54, Figs. 1, 2A.

Figure 46, reproduced below, shows sensor 400 in detail. Ex. 1001, 5:13–14, 19:5–7.

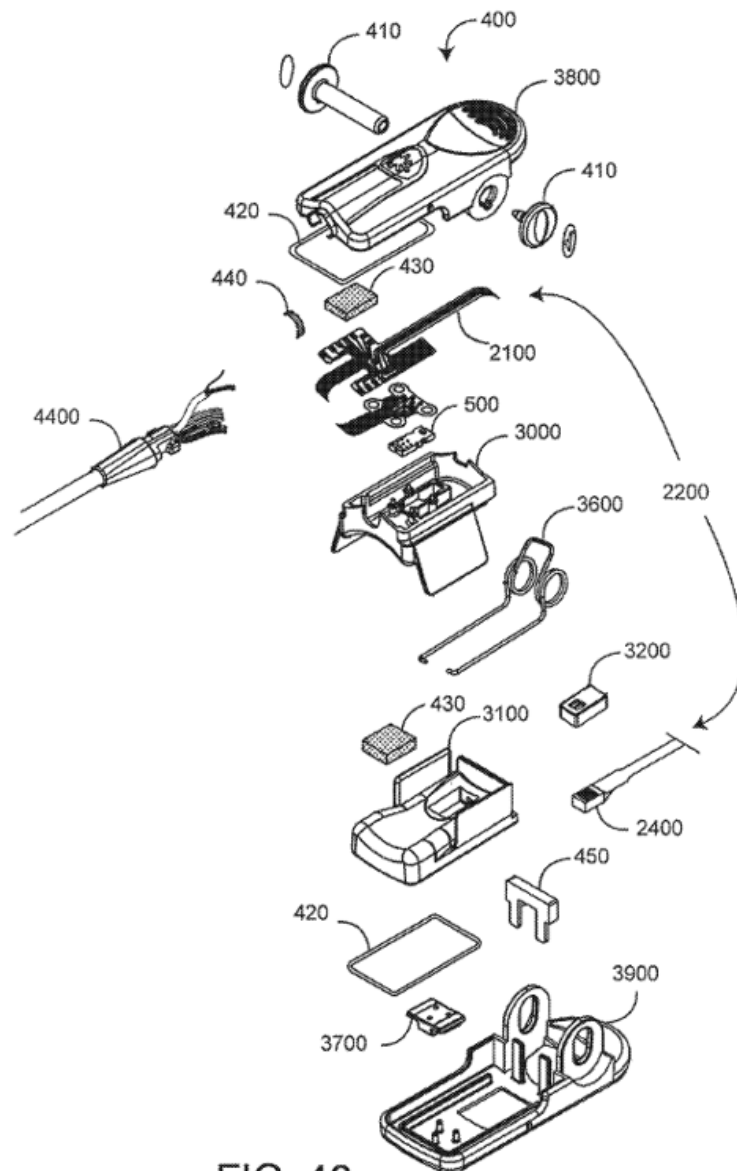


Figure 46 is a detailed exploded perspective view of multiple wavelength sensor 400. Ex. 1001, 5:12–13, 19:5–7. Sensor 400 includes flex circuit assembly 2200 that attaches to sensor cable 4400. *Id.* at 19:7–8, Fig. 2. Flex circuit assembly 2200 includes flex circuit 2100, emitter assembly 500, and detector assembly 2400. *Id.* at 19:8–10. Emitter assembly 500 responds to drive signals received from a sensor controller in monitor 100 via sensor cable 4400 and transmits optical radiation having a plurality of wavelengths to a tissue site. *Id.* at 6:6–10. Emitter assembly 500 includes an emitter array made up of multiple light emitting diodes (LEDs) for emitting optical radiation having multiple wavelengths of predetermined nominal values, thereby allowing for multiple parameter measurements. *Id.* at 7:10–21. Detector assembly 2400 provides a sensor signal to monitor 100 via sensor cable 4400 in response to optical radiation received after attenuation by the tissue site. *Id.* at 6:10–13.

Emitter assembly 500 and the portion of flex circuit assembly 2200 attached to sensor cable 4400 is housed in emitter shell 3800 and emitter pad 3000. *Id.* at 19:10–13. The portion of flex circuit assembly 2200 having detector assembly 2400 is housed in detector shell 3900 and detector pad 3100. *Id.* at 19:13–15. Detector assembly 2400 inserts into shoebox 3200, which in turn inserts into detector pad 3100. *Id.* at 15:14–15, 19:15–17. Emitter shell 3800 and detector shell 3900 are fastened by and rotate about hinge pins 410, which insert through coils of spring 3600. *Id.* at 19:17–20.

Figures 32A and 32B, reproduced below, show shoebox 3200 for housing detector assembly 2400. Ex. 1001, 4:47–49, 15:14–15.

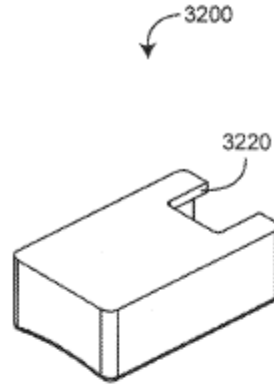


FIG. 32A

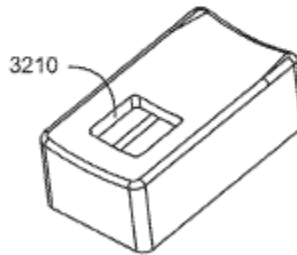


FIG. 32B

Figure 32A and 32B are perspective bottom and perspective top views of the shoebox, respectively. *Id.* at 4:47–49. As shown in Figure 32A, on a bottom surface, shoebox 3200 includes flex circuit notch 3220 that accommodates the tail of flex circuit 2200. *Id.* at 15:17–19. As shown in Figure 32B, on a top surface, shoebox 3200 includes detector window 3210 that provides an optical path from a tissue site to detector 2400. *Id.* at 15:15–17. In one embodiment, shoebox 3200 is colored black or other

substantially light absorbing color, while emitter pad 3000 and detector pad 3100 are each colored white or other substantially light reflecting color. *Id.* at 15:19–23.

D. Challenged Claims

Petitioner challenges claims 1–4, 6, 8, 10–13, 15, 17, 19–21, 23–26, and 28 of the ’911 patent. Pet. 1. Claims 1, 10, and 19 are independent. Independent claims 1 and 19, reproduced below with Petitioner’s labels² for the limitations in brackets and with emphasis added, are illustrative of the claimed subject matter.

1. 1[p] A physiological monitoring device comprising:
 - 1[a] at least three LEDs recessed into a cavity, the at least three LEDs configured to emit light of at least three different wavelengths;
 - 1[b] at least one detector configured to detect at least a portion of the light emitted from the at least three LEDs after at least a portion of the light has been attenuated by tissue, the at least one detector configured to output at least one signal responsive to the detected light;
 - 1[c] a light block surrounding the at least one detector, the light block comprising a shoebox structure configured to recess the at least one detector into the shoebox structure, 1[d1] wherein the shoebox structure is at least partially formed of a black material, 1[d2] ***wherein a top of the shoebox structure includes only one opening through which light is configured to pass***, 1[d3] ***the opening comprising an area smaller than a detection surface area of the at least one detector***; and
 - 1[e] a processor configured to receive and process one or more signals responsive to the outputted at least one signal and

² For independent claim 1, Petitioner’s labels listed under “Listing of Challenged Claims” (Pet. v) do not correspond to the labels in the analysis of the claim (*id.* at 20–59). We follow the labels in Petitioner’s analysis of independent claim 1.

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

19. 19[p] A method for determining a physiological parameter of a living patient, the method comprising:

19[a] positioning a sensor with respect to body tissue of a living patient, 19[b] the sensor comprising at least three LEDs, 19[c] at least one detector, 19[d1] and a light block at least partially surrounding the at least one detector, 19[d2] ***wherein a top of the light block comprises only one opening through which light is configured to pass;***

19[e] activating the at least three LEDs such that at least three wavelengths of light are emitted from the at least three LEDs;

19[f] detecting, at the at least one detector, at least a portion of the light emitted from the at least three LEDs after at least a portion of the light has been attenuated by the body tissue and passed through the opening of the top of the light block, wherein the at least one detector outputs at least one signal responsive to the detected light; and

19[g] determining a physiological parameter of the living patient responsive to the outputted at least one signal.

Ex. 1001, 19:36–57, 20:48–67.

Independent claim 10 is similar to independent claim 1 but additionally recites an “electromagnetic interference shield positioned between the at least three LEDs and the at least one detector” and does not recite a “light block comprising a shoebox structure . . . wherein a top of the shoebox structure includes only one opening through which light is configured to pass.” *Compare* Ex. 1001, 20:7–30, *with id.* at 19:36–57.

Claims 2–4, 6, and 8 depend from independent claim 1, and claims 11–13, 15, and 17 depend from independent claim 10. *Id.* at 19:58–63, 19:66–67, 20:3–4, 20:31–36, 20:40–41, 20:44–45. Apart from the dependency, claims 2–4, 6, and 8 are identical to claims 11–13, 15, and 17, respectively.

Id. Claims 20, 21, 23–26, and 28 depend from independent claim 19. *Id.* at 21:1–7, 21:11–18, 21:21–23.

E. Asserted Grounds and Evidence

Petitioner asserts the following two grounds of unpatentability for claims 1–4, 6, 8, 10–13, 15, 17, 19–21, 23–26, and 28 of the ’911 patent:

Claims Challenged	35 U.S.C. § ³	References/Basis
1, 6, 8, 10, 15, 17, 19–21, 26, 28	103(a)	Abdul-Hafiz, ⁴ Raley ⁵
2–4, 11–13, 23–25	103(a)	Abdul-Hafiz, Raley, Secker, ⁶

Pet. 1. In support of these grounds, Petitioner submits a Declaration of Dr. Thomas W. Kenny (Ex. 1003). *Id.* In opposition, Patent Owner submits a Declaration of Dr. Vijay K. Madiseti (Ex. 2002).

III. DISCRETIONARY DENIAL

A. Discretionary Denial Under 35 U.S.C. § 314(a) in View of Parallel District Court Litigation

The Board has discretion under 35 U.S.C. § 314(a) to deny institution in certain circumstances where there is parallel district court litigation.

Apple Inc. v. Fintiv, Inc., IPR2020-00019, Paper 11 at 5 (PTAB Mar. 20, 2020) (precedential). Patent Owner argues that we should deny

³ The ’911 patent has an uncontested priority date of March 1, 2005 (Ex. 1001, code (60)), which is before AIA revisions to 35 U.S.C. §§ 102 and 103 took effect on March 16, 2013. We therefore apply the pre-AIA version of the statute in this Decision. This Decision, however, is not impacted by which version of the statute applies.

⁴ Abdul-Hafiz et al., US 2004/0039272 A1, published Feb. 26, 2004 (“Abdul-Hafiz”) (Ex. 1004).

⁵ Raley, US 6,014,576, issued Jan. 11, 2000 (“Raley”) (Ex. 1005).

⁶ Secker, US 5,188,108, issued Feb. 23, 1993 (“Secker”) (Ex. 1006).

institution under *Fintiv* based on the Delaware Litigation. Prelim. Resp. 14–28.

The Director’s Memo⁷ guides our analysis under *Fintiv*. Pursuant to the Director’s Memo, we “will not discretionarily deny institution . . . where a petitioner presents a [*Sotera*] stipulation.” Director’s Memo 3 (citing *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 (PTAB Dec. 1, 2020) (precedential as to § II.A)). In this proceeding, Petitioner has offered a stipulation like that in *Sotera*, i.e., a stipulation to “not pursue for the instituted claims, in [the Delaware Litigation], the same grounds as in the IPR2024-00296 petition or any grounds that could reasonably have been raised in that petition.” Ex. 1078, 1.

Patent Owner argues that Petitioner’s stipulation “differs from *Sotera*, who filed its stipulation in the early stages of the parallel litigation” and that Petitioner “belatedly attaching the label ‘*Sotera* stipulation’ only after the Delaware Litigation is ready for trial does not protect against the concerns underlying the Director’s Guidance—gamesmanship and inefficiency.” Prelim. Sur-reply 2. This argument is not persuasive because the Director’s Memo does not afford us discretion to discount a *Sotera* stipulation based on how far a parallel district court litigation has progressed when the stipulation was made. Director’s Memo 7 (explaining, without qualification, that “the PTAB will not discretionarily deny institution of an [*inter partes* review] or [post-grant review] in view of parallel district court litigation where a

⁷ Memorandum from Katherine K. Vidal, Under Sec. of Commerce for Intellectual Property and Dir. of the USPTO, to Members of the PTAB (June 21, 2022), available at https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf (“Director’s Memo”).

petitioner stipulates not to pursue in a parallel district court proceeding the same grounds as in the petition or any grounds that could have reasonably been raised in the petition”). Thus, in view of Petitioner’s *Sotera* stipulation, we do not discretionarily deny institution under *Fintiv*.

B. Discretionary Denial Under 35 U.S.C. § 325(d)

Pursuant to 35 U.S.C. § 325(d), “the Director may take into account whether, and reject the petition or request because, the same or substantially the same prior art or arguments previously were presented to the Office.” In considering whether to exercise discretion to deny a petition under § 325(d), the Board uses a two-part framework, namely:

(1) whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office; and

(2) if either condition of the first part of the framework is satisfied, whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims.

Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte Advanced Bionics, GmbH, IPR2019-01469, Paper 6 at 8 (PTAB Feb. 13, 2020) (precedential) (footnote omitted). If a condition in the first part of the framework is satisfied, and absent a material error, the Director generally will exercise discretion not to institute *inter partes* review. *Id.* at 8–9.

There is no dispute that the first part of the *Advanced Bionics* framework is satisfied. As Patent Owner acknowledges, all of the references Petitioner is using to challenge the claims of the ’911 patent, namely Abdul-Hafiz, Raley, and Secker, are listed on an Information Disclosure Statement (IDS) including the Examiner’s signature. Prelim. Resp. 29 (citing Ex. 1002, 228, 235, 245); *see Advanced Bionics*, Paper 6 at 7–8

(“Previously presented art includes art made of record by the Examiner, and art provided to the Office by an applicant, such as on an [IDS], in the prosecution history of the challenged patent.”).

Turning to the second part of the *Advanced Bionics* framework, Petitioner has demonstrated the Office erred in a manner material to the patentability of challenged claims. As Petitioner points out, the Examiner, in the reasons for allowance, found:

the combination of Schultz et al. in view of Thomas et al. fails to disclose a light block surrounding the at least one detector, the light block comprising a shoebox structure configured to recess the at least one detector into the shoebox structure, wherein the shoebox structure is formed of a black material, the shoebox structure further comprising a window on a top portion of the shoebox structure, the window comprising an area smaller than a detection surface area of the at least one detector, in combination with remaining claimed features.

Pet. 90–91 (quoting Ex. 1002, 320). We agree with Petitioner that the Examiner committed material error by failing to realize that independent claims 10 and 19 do not require this combination of claim elements that the Examiner found distinguish the claimed invention from the prior art. *Id.* at 91. In particular, independent claim 19 does not recite that the light block is formed of a black material and has a window comprising an area smaller than a detection surface of the at least one detector. *Id.* (citing Ex. 1001, 20:48–67).⁸

Patent Owner argues that “the Examiner did not fail to appreciate differences in claim language” but rather “simply provided one generalized list of claim elements not disclosed by the prior art, only some of which

⁸ We note independent claim 19 begins at line 48 of column 20, not line 46 as Petitioner cites. Pet. 91.

apply to a given independent claim.” Prelim. Resp. 30 (citing Ex. 2002, 319–320). Patent Owner’s argument is unavailing because the list of claim elements does not include disjunctive language or any other indication that each listed claim element was not in the prior art.

Additionally, as discussed in detail below in section IV.D.5, Petitioner has persuasively identified each element of independent claim 19 in its proposed combination of Abdul-Hafiz and Raley, and we are persuaded the Examiner overlooked these teachings of the claim elements.

In view of the foregoing, we are persuaded that the Office erred in a manner material to the patentability of challenged claims. We, therefore, decline to discretionarily deny institution under 35 U.S.C. § 325(d).

IV. PATENTABILITY ANALYSIS

A. *Level of Ordinary Skill in the Art*

The level of ordinary skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). The prior art may reflect the level of ordinary skill in the art. *Id.*

Petitioner refers to Dr. Kenny’s declaration testimony for the definition of a person of ordinary skill in the art (“POSITA”). Pet. 7 (citing Ex. 1003 ¶ 22). Dr. Kenny testifies:

In my opinion, a person of ordinary skill in the art relating to the subject matter of the ’911 Patent as of March 1, 2005 (“POSITA” or “one of ordinary skill”) would have had a Bachelor of Science degree in electrical engineering, mechanical engineering, biomedical engineering, computer engineering, physics, or a related field, with at least one to two years of relevant work experience with capture and processing of data or information including but not limited to physiological

information, or equivalents thereof. A greater amount of education, *i.e.*, a doctorate in electrical engineering, mechanical engineering, biomedical engineering, computer engineering, physics, or a related field would also qualify for the hypothetical person of ordinary skill in the art in lieu of fewer years of work experience. Additional education or industry experience may compensate for a deficit in one of the other aspects of the requirements stated above.

Ex. 1003 ¶ 22.

Patent Owner relies on Dr. Madisetti's declaration testimony for the definition of a POSITA. Prelim. Resp. 6–7 (citing Ex. 2002 ¶ 37).

Dr. Madisetti testifies:

It is my opinion that a person of ordinary skill in the art at the time of the '911 Patent would be a person with a working knowledge of physiological monitoring technologies and/or optical sensors used in physiological monitoring technologies. The person would have had a Bachelor of Science degree in an academic discipline emphasizing the design of electrical, computer, software, or optical technologies, in combination with training or at least one to two years of related work experience with capture and processing of data or information, or designing and using optical sensors or systems, including but not limited to physiological monitoring technologies. 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.

Ex. 2002 ¶ 37.

The main differences between the parties' definitions of the POSITA appear to be that Patent Owner specifies that the POSITA's knowledge and experience may include optical sensors and that the POSITA may have a degree emphasizing software. On the present record, we do not deem these differences material, particularly because the optical sensors and technologies at issue are those used in physiological monitoring

technologies. Moreover, both parties agree that the POSITA would have a working knowledge of physiological monitoring technologies. Ex. 1003 ¶ 22; Ex. 2002 ¶ 37. Nonetheless, we find the additional specificity of Patent Owner’s definition to be helpful. Also, Patent Owner’s definition appears to be consistent with the level of skill in the art reflected in the prior art of record and the disclosure of the ’911 patent.

Accordingly, for purposes of this Decision, we adopt Patent Owner’s proposed definition of the POSITA. We note, however, that we would reach the same outcome under either definition of the POSITA. *See also* Prelim. Resp. 7 (“[Patent Owner] agrees that the claims’ patentability is confirmed regardless of the level of skill.”).

B. Claim Construction

We interpret a 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) (2023). Under this standard, we construe the claim “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” *Id.* Furthermore, at this stage in the proceeding, we expressly construe the claims to the extent necessary to determine whether to institute *inter partes* review. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

Petitioner asserts that “[a]ll claim terms should be construed according to the *Phillips* standard” and that “no express constructions are required to institute review and find the [c]hallenged [c]laims unpatentable.”

Pet. 7–8. Patent Owner similarly asserts that “the claims have their plain meaning and thus require no construction” and notes that this is the same position it took in the Delaware Litigation. Prelim. Resp. 9 (citing Ex. 2031, 57–84). On the current record and for the reasons set forth below in sections IV.D–E, we determine that no claim term requires an express construction for the purpose of determining whether to institute *inter partes* review.

Additionally, Patent Owner argues Petitioner presents inconsistent claim constructions in this proceeding and the Delaware Litigation that necessitate denial of the Petition. Prelim. Resp. 9–14. According to Patent Owner, in contrast to its claim construction position in this proceeding, Petitioner provided express and narrow constructions in the Delaware Litigation for the claim terms “cavity,” “light block,” “a top” of the shoebox structure/light block, and “opening.” *Id.* at 9–10 (citing Ex. 2023 ¶¶ 473–474, 487–490, 498, 512–523, 528–539). Patent Owner maintains Petitioner’s inconsistent claim constructions warrant denial of the Petition for several reasons, including: the Petition fails to meet the requirements under 37 C.F.R. §§ 42.104(b)(3) and 42.104(b)(4) to set forth how the challenge claim is to be construed and how the construed claim is unpatentable because Petitioner did not apply its claim constructions from the Delaware Litigation to the prior art; Petitioner breached the duty of candor and good faith to the Office under 37 C.F.R. § 42.11(a) by not informing the Board of Petitioner’s constructions from the Delaware Litigation; and the asserted art in the Petition does not disclose a “cavity” and “a top” of the shoebox structure/light block under Petitioner’s constructions of these claim terms from the Delaware Litigation. *Id.* at 10–14; Prelim. Sur-reply 3–6.

Petitioner replies that the asserted grounds in the Petition render the claims unpatentable under Patent Owner's claim constructions in the Delaware Litigation. Prelim. Reply 3. Petitioner further replies that the asserted art in the Petition does indeed disclose a "cavity" and "a top" of the shoebox structure/light block under Petitioner's constructions from the Delaware Litigation. *Id.* at 3–6. According to Petitioner, Patent Owner is "creating a controversy where there should be none." *Id.* at 3.

We agree with Petitioner that, on this record, there is no dispute regarding the meaning of any claim term. Both parties assert that each claim term should be given its ordinary and customary meaning and that no claim term requires an express construction. Pet. 7; Prelim. Resp. 9.

Neither Patent Owner nor the district court has adopted Petitioner's claim constructions from the Delaware Litigation. Patent Owner does not proffer any express claim construction in this proceeding and does not refute Petitioner's claim construction in this proceeding, other than arguing that Petitioner's construction in this proceeding is not the same as Petitioner's construction in the Delaware Litigation. Merely pointing out differences between Petitioner's claim construction in this proceeding and in the Delaware Litigation, where the district court has not adopted Petitioner's claim construction, does not create a dispute as to the meaning of a claim term in this proceeding.

Absent a dispute as to the meaning of a claim term, Petitioner's claim construction in this proceeding, namely that each claim term should have its ordinary and customary meaning, satisfies the requirements under 37 C.F.R. §§ 42.104(b)(3) and 42.104(b)(4) to construe a claim. As to Patent Owner's argument that Petitioner failed to fail comply with its duty of candor and good faith under 37 C.F.R. § 42.11(a), disclosing claim construction

positions from related district court litigation may be helpful and a best practice. We, however, do not see any material difference between Petitioner's claim construction in this proceeding and its claim construction in the Delaware Litigation because, as discussed in detail below in sections IV.D.1.b–c, Petitioner has persuasively identified a “cavity” and “a top” of the shoebox structure/light block in the asserted art under either construction. Petitioner's claim construction from the Delaware litigation does not create a dispute as to the meaning of a claim term, and, in this proceeding, Petitioner's claim construction position does not lack clarity as Patent Owner alleges.

For these reasons, we disagree with Patent Owner that Petitioner's inconsistent claim constructions in this proceeding and the Delaware Litigation warrant denial of the Petition. We, therefore, decline to deny institution based on the different claim constructions.

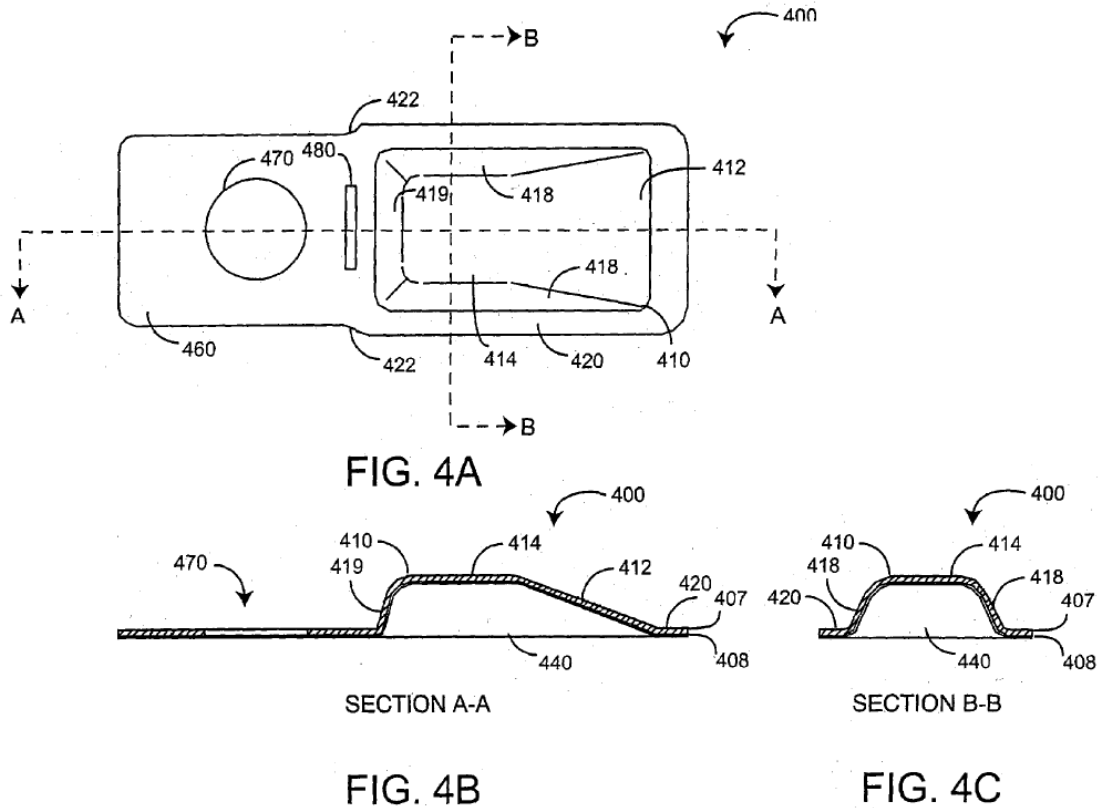
C. Overview of Asserted References Relevant to Disputed Issues

1. Abdul-Hafiz

Abdul-Hafiz is a U.S. patent application that published on February 26, 2004. Ex. 1004, code (43). At this stage of the proceeding, there is no dispute that Abdul-Hafiz is prior art under pre-AIA 35 U.S.C. § 102(b). Pet. 1.

Abdul-Hafiz discloses low noise optical housing 400 for a pulse oximetry system sensor comprising LEDs and a detector. Ex. 1004 ¶¶ 2–7, 33. Low noise optical housing 400 is configured to accept a detector and provide ambient light and piped light reduction. *Id.* ¶ 33. “In particular, the low noise optical housing 400 advantageously incorporates the functions of a light barrier, opaque cover, spacer and aperture . . . in a relatively small, easy to manufacture, one-piece design.” *Id.*

Figures 4A–4C, reproduced below, show low noise optical housing 400. Ex. 1004 ¶¶ 17, 33.



Figures 4A–C are top, side cross-section, and front cross-section views, respectively, of low noise optical housing 400. *Id.* ¶¶ 17, 33. Low noise optical housing 400 has protruding cover 410, generally flat flange 420 disposed around the periphery of cover 410, and generally flat base 460 adjoining flange 420. *Id.* ¶ 33. Base 460 defines generally centered aperture 470 and slot 480. *Id.* ¶ 37. Slot 480 partially extends across the width of base 460 and allows base 460 to be easily folded so that aperture 470 is in proper alignment with the detector active area. *Id.*

Figure 6A, reproduced below, shows low noise optical housing 400 in a closed position enclosing a detector. Ex. 1004 ¶ 37.

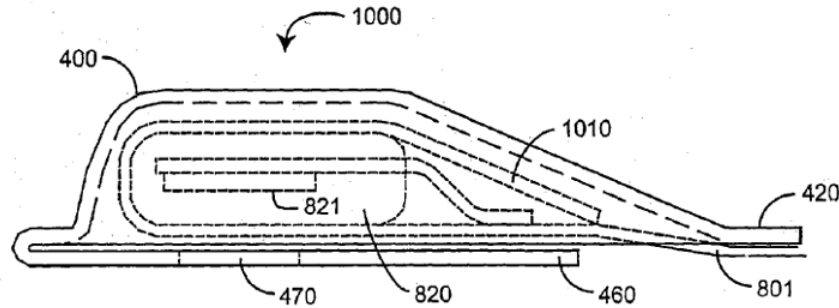


FIG. 6A

Figure 6A is a detailed side view of low noise optical housing 400 in the closed position enclosing detector 820. *Id.* ¶¶ 20, 37. “In a closed position . . . base 460 provides a bottom for the cover 410 and pocket 440 and optically shields the detector 820.” *Id.* ¶ 37. Detector 820 is enclosed in low noise optical housing 400 so that the active area of photodiode chip 821 is aligned with aperture 470. *Id.* ¶ 39. Figure 6A additionally depicts shielded detector assembly 1000 in which EMI shield 1010 also encloses detector 820. *Id.*

Low noise optical housing 400 is constructed of a flat substrate which is a laminate of two materials including outer white layer 407 and inner black layer 408. Ex. 1004 ¶ 34, Figs. 4B–C. “By utilizing a laminate of both white and black material, the low noise optical housing 400 advantageously functions both as a light absorber and as a light reflector.” *Id.* ¶ 34.

2. *Raley*

Raley is a U.S. patent that issued on January 11, 2001. Ex. 1005, code (45). At this stage of the proceeding, there is no dispute that *Raley* is prior art under pre-AIA 35 U.S.C. § 102(b). Pet. 1.

Raley relates to “medical monitoring probes used in photoplethysmographic monitors and, in particular, to a probe architecture that enables the user of a photoplethysmographic monitor to use a universal probe-end for all monitors in combination with a probe-interconnect cable which is designed for a specific type of monitor.” Ex. 1005, 1:6–11. “One of the primary uses of photoplethysmography has been the monitoring of the oxygen saturation of a patient’s blood,” but the use of photoplethysmography is expanding “into the monitoring of additional blood analytes such as carboxyhemoglobin, methemoglobin and other dyshemoglobins.” *Id.* at 1:39–45. According to Raley, pulse oximeter instruments use a plurality of light-emitting devices, each of which transmits light at a predetermined wavelength that is “selected such that at least one is highly absorbed by oxygenated hemoglobin in the arterial blood and at least one is highly absorbed by reduced hemoglobin in the arterial blood.” *Id.* at 3:17–23. Raley explains that it is “also possible to measure additional analytes in the arterial blood, such as additional dyshemoglobins, with one additional wavelength of light for each component.” *Id.* at 3:33–36.

Raley discloses probe 40 for use with photoplethysmographic monitor architectures. Ex. 1005, 3:52–55. Probe 40 consists of two releasable connected segments: disposable probe-end 10 that accommodates interconnect cable segment 20. *Id.* at 5:16–23. Figures 1, 3, and 4, reproduced below, show probe 40. *Id.* at 3:52–55, 5:16–19.

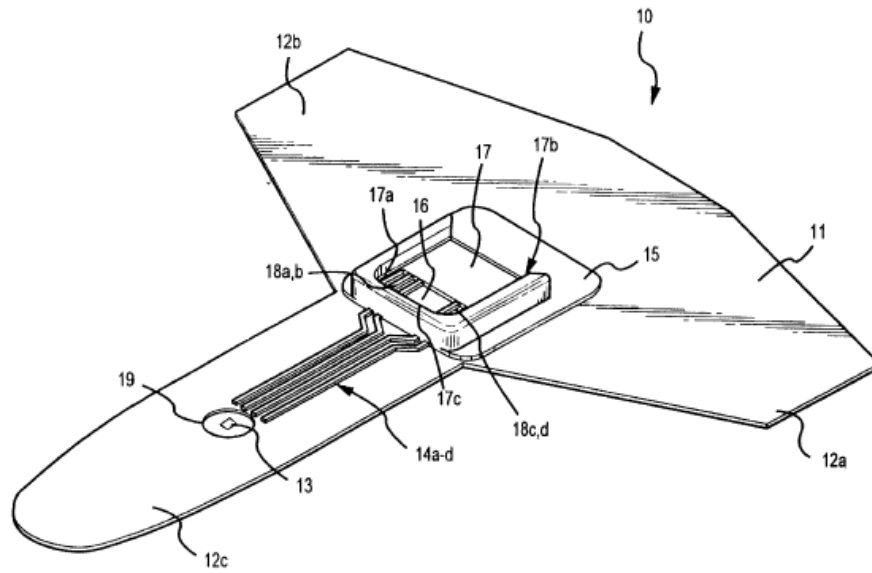


FIG. 1

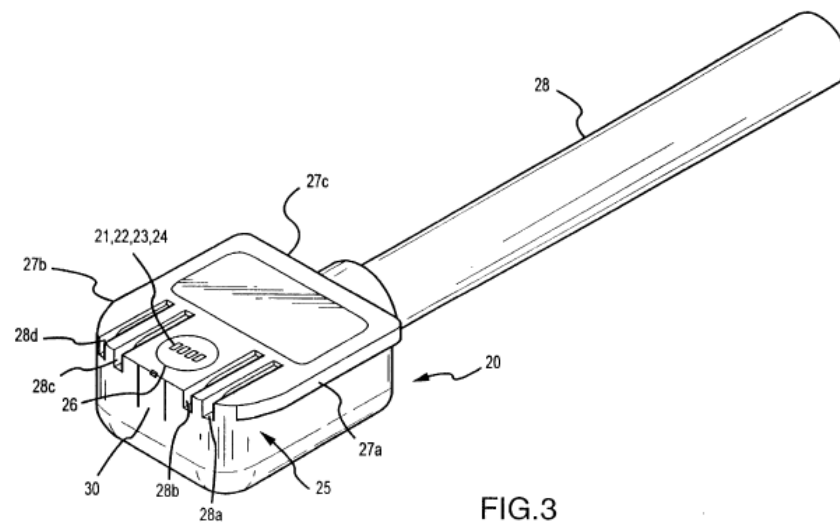


FIG. 3

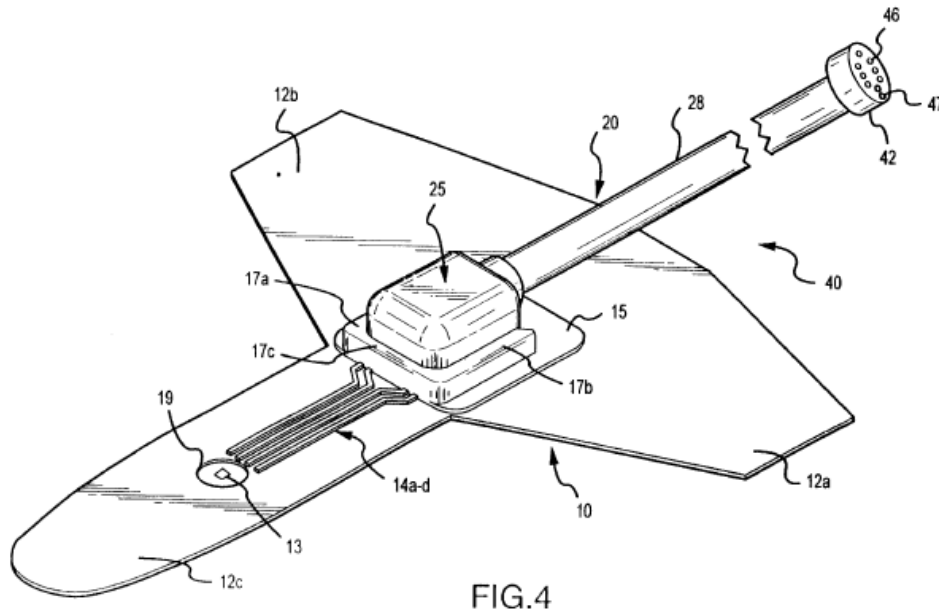


Figure 1 is a top perspective view of the disposable probe-end, and Figure 2 is a bottom perspective view of the interconnect cable segment. *Id.* at 2:47–48, 2:51–52. Figure 4 is a top perspective view of the combined probe-end and interconnect cable segment. *Id.* at 2:57–59.

As shown in Figure 1, probe-end 10 consists of flexible substrate 11 having three portions 12a–c that are designed to wrap around a patient's appendage, e.g., finger. *Id.* at 5:23–28. Substrate portion 12c includes photodetector 13 which is mounted in optically transmissive window 19 in substrate 11 and connected to connector 17 through flexible electrical circuits 14a–d. *Id.* at 5:35–38. Connector 17 has three lip portions 17a–c to accommodate connector-end 25 of interconnect cable segment 20. *Id.* at 5:38–41. Connector 17 also includes optically transmissive window 16 and electrical contacts 18a–c which connect flexible electrical circuits 14a–d with interconnect cable segment 20. *Id.* at 5:44–47.

As shown in Figure 3, connector-end 25 of interconnect cable segment 20 includes opening 26 for receiving four emitters 21, 22, 23, 24, which are useful in a photoplethysmographic monitor for measuring three or

four analytes such as oxyhemoglobin, deoxyhemoglobin, carboxyhemoglobin, and methemoglobin. Ex. 1005, 4:63–68, 5:65–6:2, Fig. 3. Ridges 27a–c fit under lip portions 17a–c to hold connector-end 25 onto probe-end 10. *Id.* at 6:6–8.

When interconnect cable segment 20 is combined with probe-end 10, light from emitters 21, 22, 23, 24 passes through opening 26 in connector-end 25 of interconnect cable segment 20 and window 16 in connector 17 of probe-end 10 and impinges on a patient's tissue. Ex. 1005, 4:63–68. Window 16 allows light to pass from emitters 21, 22, 23, 24 to a patient while protecting the patient from excess heat and also protecting the interconnect cable segment 20. *Id.* at 5:48–51.

D. Obviousness Based on Abdul-Hafiz and Raley

Petitioner challenges claims 1, 6, 8, 10, 15, 17, 19–21, 26, and 28 under pre-AIA 35 U.S.C. § 103(a), contending the claimed subject matter would have been obvious over Abdul-Hafiz and Raley. Pet. 8–74. Patent Owner argues that this asserted ground fails to establish obviousness. Prelim. Resp. 11–14, 31–70. We discuss the parties' contentions for each of the claims.

1. Independent Claim 1

Petitioner sets forth an element-by-element comparison of independent claim 1 to Abdul-Hafiz and Raley. Pet. 20–59. Petitioner also articulates reasons why a POSITA would have combined the teachings of Abdul-Hafiz with a reasonable expectation of success. *Id.* at 14–20.

In particular, Petitioner relies on Abdul-Hafiz's pulse oximetry system 100, red and infrared LEDs 112, photodiode 114, low noise optical housing 400, and data processing circuit 107 for disclosing the recited physiological monitoring device (limitation 1[p]), LEDs (limitation 1[a]), at

least one detector (limitation 1[b]), light block (limitations 1[c]–1[d3]), and processor (limitation 1[e]), respectively. Pet. 20–23, 32–59. For the at least three LEDs recessed into a cavity (limitation 1[a]), Petitioner relies on Raley’s plurality of emitters 21, 22, 23, 24, which may be LEDs, that are recessed into a cavity covered by opening 26 of interconnect cable segment 20 that is recessed into a cavity formed in connector 17 and covered by window 16 of probe-end 10. *Id.* at 23–31. According to Petitioner, a POSITA would have understood that Raley’s four LEDs recessed into a cavity formed in connector 17 and covered by window 16 provide the benefit of protecting the patient from excess heat emitted by the LEDs. *Id.* at 30.

Patent Owner argues that Petitioner’s proposed combination of the teachings of Abdul-Hafiz and Raley does not render obvious any challenged claim, and Patent Owner disputes Petitioner’s reasons for combining the teachings of Abdul-Hafiz and Raley. Prelim. Resp. 33–34, 49–70. Patent Owner also argues the asserted art does not disclose the recited cavity (limitation 1[a]) and top of the shoebox structure/light block (limitation 1[d2]) under Petitioner’s construction of these claim terms in the Delaware Litigation. *Id.* at 11–14. Patent Owner further argues Petitioner fails to establish that the asserted art discloses a light block with only one opening (limitation 1[d2]) comprising an area smaller than a detection surface area of the at least one detector (limitation 1[d3]). *Id.* 35–49. We focus our discussion on the aspects of Petitioner’s assertions that Patent Owner disputes, and we address each disputed aspect in turn below.

a) Proposed Combination and Motivation to Combine

Petitioner argues:

A POSITA seeking to implement Abdul-Hafiz’s pulse oximetry system would have found it obvious based on Raley’s teachings to arrive at a predictable configuration of a pulse oximetry system . . . having a sensor with at least four LEDs with distinct center wavelengths and one or more photodetectors to measure the intensity of the light emitted by the four LEDs, and a data processing circuit that executes data processing instructions stored in memory to determine an estimate of three or four blood analyte levels based on the intensity signals.

Pet. 15–16 (citing Ex. 1003 ¶¶ 65–66; Ex. 1005, 3:52–4:9, 4:29–44, 5:63–6:2). Petitioner further argues that “[a] POSITA would have found it obvious and would have been motivated to incorporate Raley’s teachings into Abdul-Hafiz’s pulse oximetry system to expand the use of photoplethysmography into the monitoring of additional blood analytes” (*id.* at 18 (citing Ex. 1003 ¶ 67; Ex. 1005, 1:39–45, 3:52–4:9, 5:63–6:2)) and that “[a] POSITA would have found it obvious and would have been motivated to incorporate Raley’s teachings into Abdul-Hafiz’s pulse oximetry system to further compensate for errors in the measurement of oxygen saturation due to the presence of carboxyhemoglobin and methemoglobin in the blood in above normal levels” (*id.* (citing Ex. 1003 ¶ 68; Ex. 1007, 1:63–2:14; Ex. 1008, 3:25–37)). Additionally, Petitioner argues “a POSITA would have viewed the implementation of Abdul-Hafiz’s pulse oximetry system in a manner that applied Raley’s teaches as merely the predictable result . . . of combining known prior art elements according to known methods, and would have expected success in enhancing Abdul-Hafiz’s system in this way.” *Id.* at 19 (citing Ex. 1003 ¶ 69; *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 405 (2007)). In particular, Petitioner asserts “[a]dding two LEDs

to a system that already contains two LEDs would be a straightforward modification for a POSITA that was already relying on the system of Abdul-Hafiz, which included circuits and data processing instructions for operating LEDs and gathering data associated with signals at two wavelengths.” *Id.* at 19–20 (citing Ex. 1003 ¶ 70).

Patent Owner argues Petitioner’s proposed combination of the teachings of Abdul-Hafiz and Raley does not render obvious any challenged claim. Prelim. Resp. 49–62. More specifically, Patent Owner argues that the prior art did not enable measuring carboxyhemoglobin and methemoglobin by combining the teachings of Abdul-Hafiz and Raley as Petitioner proposes and that a POSITA would not have reasonably expected success in achieving the proposed combination. *Id.*

Beginning with Patent Owner’s enablement argument, Patent Owner contends “[t]he prior art must enable a POSITA to make and use ***the specific disclosures being relied upon*** for obviousness.” Prelim. Resp. 51 (citing *Raytheon Techs. Corp. v. GE Co.*, 993 F.3d 1374, 1380–81 (Fed. Cir. 2021); *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 297 (Fed. Cir. 1985)). Patent Owner also contends “[r]ebutting any presumption of prior art enablement merely requires the patent owner to come forward with evidence showing that the prior art ‘would not produce or would not be expected to produce the claimed subject matter.’” Prelim. Resp. 51 (quoting *In re Kumar*, 418 F.3d 1361, 1368 (Fed. Cir. 2005)). According to Patent Owner, a POSITA would not have expected to successfully measure carboxyhemoglobin and methemoglobin by combining Abdul-Hafiz’s pulse oximetry system with Raley’s LEDs as Petitioner proposes because Patent Owner was the first to make such a device, namely a pulse CO-oximeter. *Id.* at 52–57 (citing Ex. 1005, 1, 1:41–45, 3:52–4:46, 5:63–6:2; Ex. 1006,

2:64–3:4; Ex. 1007, 1, 2:36–41, 3:21–27, 5:21–6:16; Ex. 1008, 6:35–49, Fig.; Ex. 1010, 7:33–8:22, 8:47–51; Ex. 1011, 45; Ex. 1012, 4:5–17, 4:30–38, 5:27–29; Ex. 2002 ¶¶ 98–108; Ex. 2046; Ex. 2047; Ex. 2048; Ex. 2049, 125; Ex. 2050; Ex. 2051, 8:53–60; Ex. 2052, 3:37–55; Ex. 2056, 3; Ex. 2057, 129).

We agree with Patent Owner that the prior art must enable the specific disclosures relied upon for obviousness. Patent Owner, however, does not address the enablement of the specific disclosures. Patent Owner does not challenge the enablement of Raley’s teaching of the recited at least three LEDs or Abdul-Hafiz’s disclosure of the recited detector, light block, or processor. Rather, Patent Owner attempts to rebut the enablement of Petitioner’s proposed combination of the teachings of Abdul-Hafiz and Raley. Because Patent Owner does not provide adequate support for the proposition that the enablement requirement pertains to the proposed combination of those disclosures, rather than the specific prior art disclosures, Patent Owner’s enablement argument is misplaced.

Turning to Patent Owner’s reasonable expectation of success argument, Patent Owner contends a POSITA would not have expected Petitioner’s proposed combination of the teachings of Abdul-Hafiz and Raley to successfully measure carboxyhemoglobin and methemoglobin. Prelim. Resp. 57 (citing Ex. 2002 ¶ 110), 62. Patent Owner also contends a POSITA would not have reasonably expected Petitioner’s proposed combination to succeed because the resulting structure would inject sources of inaccuracy into Abdul-Hafiz’s sensor. *Id.* at 57–61 (citing Ex. 1004 ¶¶ 39–42, Figs. 7A–C; Ex. 1005, 5:35–62, Figs. 1–4; Ex. 2002 ¶¶ 111–115; Ex. 2057 ¶ 128). Patent Owner further contends Petitioner’s statements

regarding the expectation of success are generic and unexplained assertions. *Id.* at 61–62.

Patent Owner’s contentions are unavailing. “The reasonable expectation of success requirement refers to the likelihood of success in combining references to meet the limitations of the claimed invention. ‘[F]ailure to consider the appropriate scope of the . . . patent’s *claimed invention* in evaluating the reasonable expectation of success . . . constitutes a legal error that [is] review[ed] without deference.’” *Intelligent Bio–Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir. 2016) (alterations in original) (quoting *Allergan, Inc. v. Apotex Inc.*, 754 F.3d 952, 966 (Fed. Cir. 2014)). The claimed invention does not require measuring carboxyhemoglobin and methemoglobin or specify any particular accuracy, and thus Patent Owner’s contentions regarding reasonable expectation of success are not commensurate with the scope of the claims. Moreover, Petitioner identifies each claim limitation in its proposed combination of the teachings of Abdul-Hafiz and Raley and explains how the combination would have resulted in each limitation. Pet. 19–59.

Additionally, Patent Owner disputes Petitioner’s reasons for combining the teachings of Abdul-Hafiz and Raley on several grounds. Prelim. Resp. 33–34, 62–70. Patent Owner argues Petitioner fails to provide a reason to combine Abdul-Hafiz’s pulse oximetry system with Raley’s entire probe, which consists of an interconnect cable segment and disposable probe-end. *Id.* at 62–64 (citing Ex. 2002 ¶¶ 118–119). We disagree with this argument. Raley expressly teaches that its probe with four emitters would be useful for measuring three or four blood analytes such as oxyhemoglobin, deoxyhemoglobin, carboxyhemoglobin, and methemoglobin. Ex. 1005, 5:65–6:2. Petitioner reasons a POSITA would

have found it obvious to incorporate Raley's teachings into Abdul-Hafiz's pulse oximetry system to expand the use of photoplethysmography into the monitoring of additional blood analytes. Pet. 18 (citing Ex. 1003 ¶ 67; Ex. 1005, 1:39–45, 3:52–4:9, 5:63–6:2). Moreover, "[t]he test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art." *In re Keller*, 642 F.2d 413, 425 (CCPA 1981).

Patent Owner argues that measuring additional blood analytes would not have motivated Petitioner's proposed combination of the teachings of Abdul-Hafiz and Raley. Prelim. Resp. 64–67. According to Patent Owner, Petitioner's assertions that these measurements may be useful do not show a POSITA would have been motivated to combine these functionalities with Abdul-Hafiz's pulse oximetry system, and a POSITA would not have expected Petitioner's proposed combination to successfully measure carboxyhemoglobin and methemoglobin. *Id.* at 64–65 (citing Ex. 2002 ¶¶ 121–122). Patent Owner also argues measuring additional blood analytes contradicts the purpose of Abdul-Hafiz's sensor, namely being low cost and disposable. *Id.* at 65–67 (citing Ex. 1004, claim 20, Figs. 1, 7A–C; Ex. 1005, 1:17–31, 2:64–67; Ex. 2002 ¶¶ 120–124; Ex. 2038).

Patent Owner's arguments are not convincing. As set forth above, Raley expressly teaches that four emitters enable measurement of three or four blood analytes such as oxyhemoglobin, deoxyhemoglobin, carboxyhemoglobin, and methemoglobin. Ex. 1005, 5:65–6:2. Furthermore, even if we agree with Patent Owner that measuring additional blood analytes would increase the cost and inconvenience of Abdul-Hafiz's

pulse oximetry system, Patent Owner does not contend that the increased cost and inconvenience would outweigh the benefit of having more functionalities. *See Winner Int’l Royalty Corp. v. Wang*, 202 F.3d 1340, 1349 n.8 (Fed. Cir. 2000) (“The fact that the motivating benefit comes at the expense of another benefit, however, should not nullify its use as a basis to modify the disclosure of one reference with the teachings of another. Instead, the benefits, both lost and gained, should be weighed against one another.”). In view of Raley’s express teaching of a probe that measures three or four blood analytes, we are persuaded, at this stage of the proceeding, that a POSITA would have been motivated to combine the teachings of Abdul-Hafiz’s pulse oximetry system and Raley’s probe to measure additional blood analytes.

Patent Owner further argues that a POSITA would not have been motivated to combine the teachings of Abdul-Hafiz and Raley as Petitioner proposes to more accurately measure oxygen saturation by compensating for errors due to the presence of carboxyhemoglobin and methemoglobin. Prelim. Resp. 67–70. In particular, Patent Owner asserts that a POSITA would have known measuring carboxyhemoglobin and methemoglobin could not be used to improve the accuracy of oxygen saturation measurements (*id.* at 67–68 (citing Ex. 2002 ¶ 127; Ex. 2059; Ex. 2060)) and that Datex-Ohmeda devices, including Raley’s probe, were more insensitive to carboxyhemoglobin and methemoglobin (*id.* at 69 (citing Ex. 1005; Ex. 2002 ¶ 130; Ex. 2063, 9)). Patent Owner also argues that, contrary to Petitioner’s assumption, there was no accuracy problem with Abdul-Hafiz’s oxygen saturation measurements. *Id.* at 68–69 (citing Ex. 2002 ¶¶ 128–129; Ex. 2038, 1–2; Ex. 2061, 3, 5; Ex. 2062, 1).

Patent Owner's arguments are unavailing. "[A]ny need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed." *KSR*, 550 U.S. at 420. As Petitioner correctly observes, Jarman⁹ and Barthelemy¹⁰ show that there was a known need in the art to compensate for errors in oxygen saturation measurements resulting from carboxyhemoglobin and methemoglobin. Pet. 18 (citing Ex. 1003 ¶ 68; Ex. 1007, 1:63–2:14; Ex. 1008, 3:25–37). And as we find above, Raley expressly teaches that its probe with four emitters would be useful for measuring three or four blood analytes such as oxyhemoglobin, deoxyhemoglobin, carboxyhemoglobin, and methemoglobin. Ex. 1005, 5:65–6:2. Given the need in the art to compensate for errors in oxygen saturation measurements resulting from carboxyhemoglobin and methemoglobin and Raley's express teaching of a probe that measures blood analytes such carboxyhemoglobin and methemoglobin, we are persuaded, at this stage of the proceeding, that a POSITA would have been motivated to combine the teachings of Abdul-Hafiz's pulse oximetry system and Raley's probe to compensate for errors in the measurement of oxygen saturation due to the presence of carboxyhemoglobin and methemoglobin.

In view of the foregoing, at this stage of the proceeding, Petitioner has persuaded us that a POSITA would have reasonably expected to successfully combine the teachings of Abdul-Hafiz and Raley to result in the claimed invention. Also, for purposes of institution, Petitioner has provided

⁹ Jarman et al., US 5,983,122, issued Nov. 9, 1999 ("Jarman") (Ex. 1007).

¹⁰ Barthelemy et al., US 5,413,100, issued May 9, 1995 ("Barthelemy") (Ex. 1008).

persuasive reasons why a POSITA would have combined the teachings of Abdul-Hafiz and Raley as Petitioner proposes.

b) “cavity” (limitation I[a])

Petitioner argues Raley teaches at least three LEDs recessed into a cavity. Pet. 28–31. According to Petitioner, Raley’s emitters 21, 22, 23, 24, which may be LEDs, are recessed into a cavity covered by opening 26 of interconnect cable segment 20 that is recessed into a cavity formed in connector 17 and covered by window 16 of probe-end 10. *Id.* (citing Ex. 1003 ¶¶ 79–80; Ex. 1004, 4:63–67, 5:38–51, Figs. 1, 3, 7C).

Patent Owner argues that Raley does not disclose a “cavity” under Petitioner’s construction of this claim term in the Delaware Litigation. Prelim. Resp. 11–13. According to Patent Owner, in the Delaware Litigation, Petitioner construes “cavity” as “a ***hollowed-out*** space ***within a solid body***” and argues the claims require setting the LEDs back into a pre-existing cavity. *Id.* at 11 (citing Ex. 2031, 57); Prelim. Sur-reply 5. Patent Owner contends that Raley’s emitters 21, 22, 23, 24 are flush with opening 26, not recessed into a hollowed-out space, and that Raley’s emitters 21, 22, 23, 24 are not recessed into a hollowed-out space within a solid body because interconnect cable segment 20 and probe-end 10 are separable components. Prelim. Resp. 12–13 (citing Ex. 1005, 5:15–23, 5:38–47, 5:57–62, 6:6–12, Figs. 1–4; Ex. 2002 ¶ 61); Prelim. Sur-reply 4–5 (citing Ex. 1005, 5:15–23, 5:38–47, 5:57–62, 6:6–12, Figs. 1–4; Ex. 2002 ¶ 61).

We agree with Petitioner that, in order for emitters 21, 22, 23, 24 to be flush with opening 26, emitters 21, 22, 23, 24 must be recessed in a hollowed-out space in connector-end 25 to accommodate the thickness of the emitters. Prelim. Reply 5. We also agree with Petitioner that

interconnect cable segment 20 and probe-end 10 being separable components is irrelevant because each of connector-end 25 and connector 17 is a solid body having a pre-existing hollowed-out space that receives emitters 21, 22, 23, 24 when interconnect cable segment 20 and connector 17 are combined. *Id.* at 5–6. Accordingly, at this stage of the proceeding, giving the claim term “cavity” its plain and ordinary meaning, Petitioner has sufficiently identified the recited cavity in Raley. Although neither Petitioner nor Patent Owner is asserting Petitioner’s construction of “cavity” from the Delaware Litigation in this proceeding, we are also persuaded that Raley teaches a “cavity” under that construction because Raley’s LEDs are “a ***hollowed-out*** space ***within a solid body***,” as required by Petitioner’s Delaware construction.

c) “a top” (limitation 1[d2])

Petitioner relies on Abdul-Hafiz’s low noise optical housing 400 for disclosing the recited light block comprising a shoebox structure and relies on a specific portion of substrate 460. Pet. 41–42. Specifically, Petitioner relies on the portion of substrate 460 that has aperture 470 therein and is folded to allow aperture 470 to align with the detector active area, for disclosing the recited top of the shoebox structure. *Id.* (citing Ex. 1003 ¶¶ 96; Ex. 1004, Abstract, ¶¶ 5–7, 37, Figs. 4A–B).

Patent Owner argues that Abdul-Hafiz does not disclose “a top” of the shoebox structure/light block under Petitioner’s construction of this claim term in the Delaware Litigation. Prelim. Resp. 13. According to Patent Owner, in the Delaware Litigation, Petitioner construes “a top” of the shoebox structure/light block as “the ***uppermost*** structure that covers the [shoebox structure/light block]” and argues “***the claims distinguish the ‘top’ portion of the [light block] structure from its ‘base’ and ‘side walls’ and***

recite that the ‘top forms an enclosure.’” *Id.* (citing Ex. 2031, 68); Prelim. Sur-reply 5 (citing Ex. 2031, 75; Ex. 2032 ¶ 528). Patent Owner contends that Petitioner relies on Abdul-Hafiz’s bottommost base 460, not the uppermost. Prelim. Resp. 13; Prelim. Sur-reply 5 (citing Ex. 2002 ¶ 62).

We agree with Petitioner that, in use, Abdul-Hafiz’s low noise optical housing 400 is positioned below a tissue site, e.g., a patient’s finger, to allow light passing through the tissue site to pass through aperture 470 in base 460 to detector 820 enclosed within low noise optical housing 400, making the portion of base 460 with aperture 470 the uppermost portion of low noise optical housing 400 enclosing detector 820. Prelim. Reply 4 (citing Ex. 1004, Fig. 6A). Accordingly, at this stage of the proceeding, giving the claim term “a top” its plain and ordinary meaning, Petitioner has sufficiently identified “a top” of the shoebox structure/light block in Abdul-Hafiz. Although neither Petitioner nor Patent Owner is asserting Petitioner’s construction of “a top” of the shoebox structure/light block from the Delaware Litigation in this proceeding, we are also persuaded that Abdul-Hafiz discloses “a top” of the shoebox structure/light block under this construction because the structure in Abdul-Hafiz that Petitioner identifies as the top is “the uppermost structure that covers the [shoebox structure/light block]” as required by Petitioner’s Delaware construction.

d) “wherein a top of the shoebox structure includes only one opening through which light is configured to pass” (limitation 1[d2])

Petitioner relies on aperture 470 in Abdul-Hafiz’s low noise optical housing 400 for disclosing the recited only one opening in the light block. Pet. 41–44. According to Petitioner, “‘detector 820 is enclosed in the optical housing 400’ ‘so that **the active area of the photodiode chip 821 is aligned with the housing aperture 470.**’” *Id.* at 42 (citing Ex. 1004 ¶ 39, Fig. 6A).

Petitioner argues “a POSITA would have understood that the aperture 470 is the only opening through which light is configured to pass.” *Id.* at 42–43 (citing Ex. 1003 ¶ 97).

Patent Owner argues Abdul Hafiz’s low noise optical housing 400 includes fixed shield 1005 and foldable EMI shield 1010 such that Abdul-Hafiz’s alleged light block includes four openings, not only one. Prelim. Resp. 36. In support of its argument, Patent Owner provides annotated versions of Abdul-Hafiz’s Figures 10A and 11B, reproduced below. *Id.* at 37 (citing Ex. 1004 ¶ 46, Figs. 10A, 11B; Ex. 2002 ¶ 71).

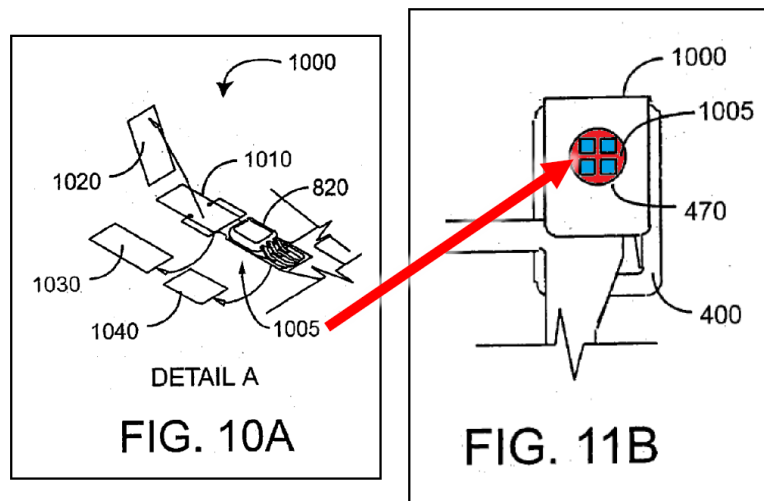


Figure 10A is a detailed perspective view of an unassembled EMI shield prior to low noise optical housing installation, and Figure 11B is a detailed bottom view of a neonate or infant sensor optical assembly. Ex. 1004 ¶¶ 26, 27. As shown in Figure 10A, fixed shield 1005 is located below detector 820, and foldable EMI shield 1010 is attached to fixed shield 1005 and folds over detector 820. *Id.* ¶ 39, Fig. 10A. In Figure 11B, detector 820 is located behind fixed shield 1005, and a portion of fixed shield 1005 is visible through aperture 470 in low noise optical housing 400. *Id.* ¶ 39, Fig. 11B. Patent Owner annotated Figure 11B to show in red the portion of

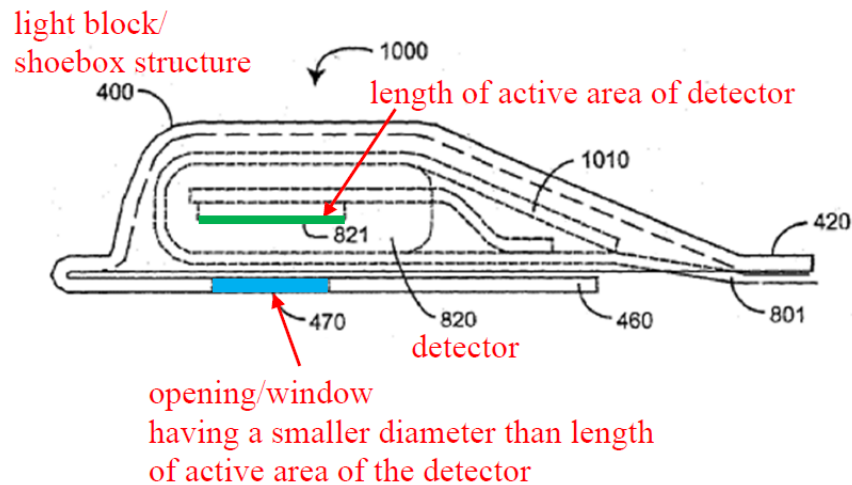
fixed shield 1005 visible through aperture 470 and to show in blue the portion of detector 820 visible through fixed shield 1005. Prelim. Resp. 37 (citing Ex. 1004 ¶ 47, Figs. 10–11; Ex. 2002 ¶ 71). According to Patent Owner, “a POSITA would have understood, that light passed through the four holes in the shield (1005) to the detector (820/821).” *Id.* (citing Ex. 1004 ¶ 47, Fig. 11B; Ex. 2002 ¶¶ 72–73).

Patent Owner’s argument is unavailing because Petitioner relies on Abdul-Hafiz’s low noise optical housing 400, not fixed shield 1005, for disclosing the recited light block. Pet. 35 (citing Ex. 1003 ¶¶ 85–87). Petitioner correctly asserts that light passes through the single aperture 470 in low noise optical housing 400 to detector 820. *Id.* at 42 (citing Ex. 1003 ¶ 96; Ex. 1004, Abstract, ¶¶ 5–7). For purposes of institution, we are persuaded that Abdul-Hafiz discloses the recited only one opening in the light block.

e) “the opening comprising an area smaller than a detection surface area of the at least one detector” (limitation 1[d3])

For the recited opening having an area smaller than a detection surface area, Petitioner argues aperture 470 in Abdul-Hafiz’s low noise housing 400 aligns with the active area of photodiode chip 821 of detector 820 and reduces light piping. Pet. 46 (citing Ex. 1004, Abstract, ¶¶ 5, 7, 37, 39). Petitioner also argues Figure 6A, which is a side view of low noise housing 400 enclosing detector 820, shows aperture 470 having a diameter that is smaller than the length of the active area of photodiode chip 821. *Id.* at 46–47 (citing Ex. 1003 ¶ 101; Ex. 1004, Fig. 6A). In support of this argument, Petitioner provides an annotated version of Abdul-Hafiz’s Figure 6A, reproduced below. *Id.* at 47.

Abdul-Hafiz+Raley's shielded detector assembly

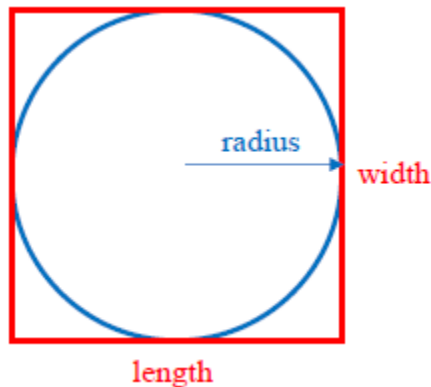


APPLE-1004, FIG. 6A

Figure 6A is a detailed side view of a low noise optical housing enclosing a detector. Ex. 1004 ¶ 20. Petitioner annotated the figure to show in green the surface of photodiode chip 821 facing aperture 470 and labeled this surface “length of active area of detector.” Petitioner also annotated the figure to show in blue the diameter of aperture 470 and labeled this portion of the figure “opening/window having a smaller diameter than length of active area of the detector.” As shown in Petitioner’s annotated version of Figure 6A, the diameter of aperture 470 in blue is shorter than the length of the surface of the photodiode chip 821 in green.

Petitioner further argues that detector 820 has a square or rectangular shape and that aperture 470 has a circular shape. Pet. 48–49 (citing Ex. 1003 ¶ 103; Ex. 1004, Figs. 4A, 5A, 10A–C, 11B). Petitioner asserts “[a] POSITA would have recognized that a circle, having a diameter that is equal to or smaller than each side length of a square or rectangle, has a smaller surface area than that of the square or rectangle.” *Id.* at 49 (citing Ex. 1003

¶ 104). In support of this argument, Petitioner provides the following drawing of a circle within a square. *Id.*



Petitioner's drawing shows a blue circle with a radius that is half the length of each side of a red square. Petitioner also asserts that, based on the purpose of Abdul-Hafiz's low noise optical housing 400 being to reduce ambient and piped light, a POSITA would have understood or found it obvious that limiting the diameter of aperture 470 would desirably reduce extraneous light entering through the aperture. *Id.* at 50 (citing Ex. 1003 ¶ 106; Ex. 1004 ¶¶ 3, 33).

Patent Owner argues that Petitioner fails to show Abdul-Hafiz discloses the recited opening with an area smaller than a detection surface of the detector. Prelim. Resp. 38–47. Patent Owner contends Abdul-Hafiz is silent regarding the dimensions of photodiode chip 821 and aperture 470. *Id.* at 38–41 (citing Ex. 1004 ¶¶ 5, 7, 33–34, 37, 39, 46; Ex. 2002 ¶¶ 76–78).

Patent Owner also contends Petitioner improperly ignores fixed shield 1005, which is folded over detector 820. Prelim. Resp. 41 (citing Ex. 1004 ¶¶ 46–47, Fig. 11B; Ex. 2002 ¶ 80). In support of this contention, Patent Owner provides two annotated versions of Abdul-Hafiz's Figure 11B, which are reproduced below. *Id.* at 43 (citing Ex. 1004, Fig. 11B; Ex. 2002 ¶ 82).

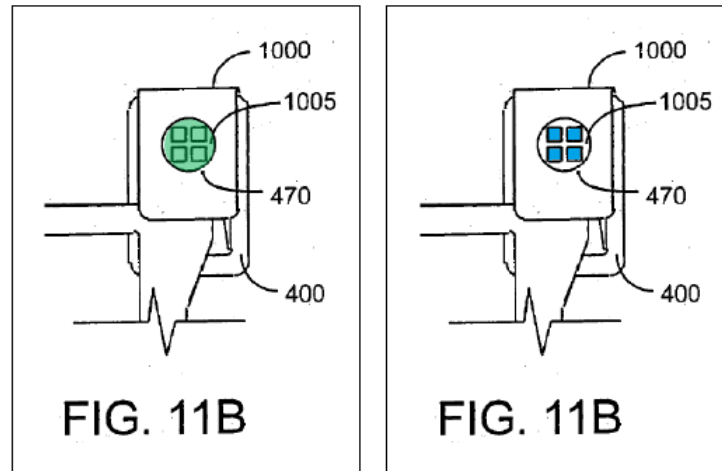
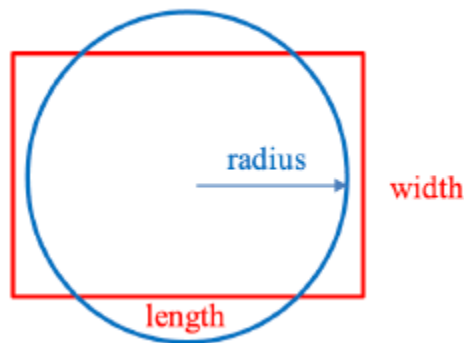


Figure 11B is a detailed bottom view of a neonate or infant sensor optical assembly. Ex. 1004 ¶ 27. In Figure 11B, detector 820 is located behind fixed shield 1005, and a portion of fixed shield 1005 is visible through aperture 470 in low noise optical housing 400. *Id.* ¶ 39, Fig. 11B. In its annotated version of Figure 11B on the left, Patent Owner annotated the figure to show in green the area of aperture 470. Prelim. Resp. 42–43 (citing Ex. 1004, Fig. 11B; Ex. 2002 ¶ 82). In its annotated version of Figure 11B on the right, Patent Owner annotated the figure to show in blue the area of detector 820 visible through fixed shield 1005. *Id.* (citing Ex. 1004, Fig. 11B; Ex. 2002 ¶ 82). According to Patent Owner with respect to its annotated versions of Figure 11B, “[a] POSITA would have understood that the four blue areas shown above are the detection surface area of the detector/photodiode (820/821) because the shield (1005) only permits light to reach those four areas of the detector/photodiode (820/821)” (*id.* at 42 (citing Ex. 2002 ¶¶ 80–81)), and “as one can simply observe, and a POSITA would have understood, the area of the ‘opening’/‘window’ alleged by [Petitioner] (green/left) . . . is **larger** than the detection surface area (blue/right) disclosed by Abdul Hafiz” (*id.* (citing Ex. 2002 ¶ 82)).

Patent Owner further contends Petitioner improperly assumes a detection surface area from Abdul-Hafiz's figures. Prelim. Resp. 44–47. According to Patent Owner, Abdul-Hafiz's Figures 10A–B show detector 820 has a rectangular shape, not a square shape like Petitioner asserts, and these figures show the width of detector 820 is noticeably smaller than the diameter of aperture 470. *Id.* at 45–46 (citing Ex. 1004, Figs. 10A–B; Ex. 2002 ¶¶ 87–88). In view of the width of detector 820 being smaller than the diameter of aperture 470, Patent Owner asserts “a POSITA would have understood that Abdul-Hafiz's aperture area . . . is not necessarily smaller—and may be larger—than its detection surface.” *Id.* at 46 (citing Ex. 2002 ¶ 88). In support of this assertion, Patent Owner provides the following drawing of a circle partially within a rectangle. *Id.* (citing Ex. 2002 ¶ 88).



Patent Owner's drawing shows a red rectangle having a width that is less than its length and further shows a blue circle with a radius that is less than half of the length and greater than half of the width.

Patent Owner's argument that Petitioner fails to show Abdul-Hafiz discloses the recited opening with an area smaller than a detection surface of the detector may have merit, based on the current record. The parties argue different portions of Abdul-Hafiz's detector are the recited detection surface area, and both parties provide testimony from their declarants in support of

these arguments. Specifically, Petitioner argues the entire surface of photodiode chip 821 facing aperture 470 is the recited detection surface area (Pet. 46–47 (citing Ex. 1003 ¶ 101)), and Patent Owner argues only the portion of this surface of photodiode chip 821 that fixed shield 1005 permits light to reach is the recited detection surface area (Prelim. Resp. 42 (citing Ex. 2002 ¶¶ 80–81)). Neither party, however, has provided an express construction for “detection surface area.” Even if we agree with Petitioner that the entire surface of photodiode chip 821 facing aperture 470 discloses the recited detection surface area, the shape and dimensions of photodiode chip 821 and detector 820 remain unclear from Abdul-Hafiz’s disclosure.

We, however, need not determine whether Petitioner has sufficiently identified, for purposes of institution, the recited opening with an area smaller than a detection surface in Abdul-Hafiz or whether Petitioner has shown a reasonable likelihood that it would prevail in demonstrating that independent claim 1 is unpatentable because, as set forth below in section IV.D.4, Petitioner has shown a reasonable likelihood that it would prevail in demonstrating independent claim 19 is unpatentable. As Petitioner has made a sufficient showing for institution for at least one claim, we institute an *inter partes* review on all challenged claims with respect to all grounds asserted in the Petition. *See SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1356 (2018) (“Section 314(a) does not require the Director to evaluate every claim individually. Instead, it simply requires him to decide whether the petitioner is likely to succeed on ‘at least 1’ claim. Once that single claim threshold is satisfied, it doesn’t matter whether the petitioner is likely to prevail on any additional claims; the Director need not even consider any other claim before instituting review.” (emphasis omitted)).

2. *Independent Claim 10*

Independent claim 10 is similar to independent claim 1, and, in particular, recites “the window having an area smaller than a detection surface area of the at least one detector.” *Compare* Ex. 1001, 20:7–30, *with id.* at 19:36–57. Petitioner’s arguments for independent claim 10 are similar to its arguments for independent claim 1. *Compare* Pet. 62–70, *with id.* at 20–59. Patent Owner’s arguments for independent claim 10 are the same as those for independent claim 1. Prelim. Resp. 11–14, 31–70. Our analysis for independent claim 1 above in section IV.D.1 applies to independent claim 10.

3. *Claims 6, 8, 15, and 17*

Claims 6 and 8 depend from independent claim 1, and claims 15 and 17 depend from independent claim 10. Ex. 1001 19:66–67, 20:3–4, 20:40–41, 20:44–45. Our analysis for independent claims 1 and 10 above in sections IV.D.1–2 applies to claims 6, 8, 15, and 17.

4. *Independent Claim 19*

Independent claim 19 is similar to independent claim 1 but does not recite “the opening comprising an area smaller than a detection surface area of the at least one detector.” *Compare* Ex. 1001, 20:48–67, *with id.* at 19:36–57. Petitioner’s arguments for independent claim 19 are similar to its arguments for independent claim 1. *Compare* Pet. 70–73, *with id.* at 20–59. Patent Owner’s arguments for independent claim 19 are the same as those for independent claim 1. Prelim. Resp. 11–14, 31–70.

Our analysis for independent claim 1 above in section IV.D.1, with the exception of the discussion of the parties’ arguments for the recited opening having an area smaller than a detection surface area in section IV.D.1.e, applies to independent claim 19. Having reviewed the

record at this stage of the proceeding and for the reasons discussed above in sections IV.D.1.a–e, we are persuaded, for purposes of institution, that each limitation of independent claim 19 is found in Petitioner’s proposed combination of the teachings of Abdul-Hafiz and Raley and that a POSITA would have combined the teachings of Abdul-Hafiz and Raley to result in the claimed invention with a reasonable expectation of success. Petitioner has shown a reasonable likelihood that it would prevail in demonstrating that independent claim 19 is unpatentable under pre-AIA 35 U.S.C. § 103(a) over Abdul-Hafiz and Raley.

5. *Claim 20*

Claim 20 depends from independent claim 19 and, like independent claim 1 (limitation 1[d3]), claim 20 recites “wherein an area of the opening is smaller than a detection surface area of the at least one detector.”

Ex. 1001, 21:1–3. Our analysis for independent claim 1 above in section IV.D.1 applies to claim 20.

6. *Claims 21, 26, and 28*

Claim 21, 26, and 28 depend from independent claim 19. Ex. 1001, 21:4–7, 21:17–18, 21:21–23. Petitioner identifies each limitation of the claims in its proposed combination of the teachings of Abdul-Hafiz and Raley. Pet. 74. Patent Owner does not separately argue these dependent claims. Having reviewed the record at this stage of the proceeding and for the reasons discussed above in section IV.D.4, we are persuaded Petitioner has shown a reasonable likelihood that it would prevail in demonstrating that claims 21, 26, and 28 are unpatentable under pre-AIA 35 U.S.C. § 103(a) over Abdul-Hafiz and Raley.

E. Obviousness Based on Abdul-Hafiz, Raley, and Secker

Petitioner challenges claims 2–4, 11–13, and 23–25 under pre-AIA 35 U.S.C. § 103(a), contending the claimed subject matter would have been obvious over Abdul-Hafiz, Raley, and Secker. Pet. 74–90. Petitioner relies on Abdul-Hafiz and Raley to address the requirements of the independent claims and adds Secker to address the requirements of the dependent claims.

1. Claims 2–4 and 11–13

Claims 2–4 depend from independent claim 1, and claims 11–13 depend from independent claim 10. Ex. 1001, 19:58–63, 20:31–36. Our analysis for independent claims 1 and 10 above in sections IV.D.2–3 applies to claims 2–4 and 11–13.

2. Claims 23–25

Claims 23–25 depend from independent claim 19. Ex. 1001, 21:11–16. Petitioner identifies the limitations of these claims in its proposed combination of the teachings of Abdul-Hafiz, Raley, and Secker. Pet. 86–90. Petitioner also provides reasons why a POSITA would have combined the teachings of Abdul-Hafiz, Raley, and Secker to result in the claimed subject matter and why a POSITA would have had a reasonable expectation of success in doing so. *Id.* at 76–86. Patent Owner does not separately argue these dependent claims. Having reviewed the record at this stage of the proceeding and for the reasons discussed above in section IV.D.4, Petitioner has shown a reasonable likelihood that it would prevail in demonstrating that claims 23–25 are unpatentable under pre-AIA 35 U.S.C. § 103(a) over Abdul-Hafiz, Raley, and Secker.

V. SECONDARY CONSIDERATIONS

Neither party submits evidence of secondary considerations at this stage of the proceeding. Patent Owner, however, maintains Petitioner's failure to inform the Board of known evidence of secondary considerations warrants denial of institution. Prelim. Resp. 70–73. According to Patent Owner, Petitioner knew of this evidence and its significance before filing the Petition because Patent Owner previously presented the evidence in the Delaware Litigation. *Id.* at 70 (citing Ex. 2064). The evidence includes Petitioner's own records. *Id.* at 71 (citing Ex. 2064). Patent Owner alleges the evidence shows that the Apple Watch Series 6, 7, 8, 9, Ultra, and Ultra 2 have been commercially successful and that the Watches' commercial success bears a nexus to the claims of the '911 patent. *Id.* at 72–73 (citing Ex. 2002 ¶¶ 132–133; Ex. 2064; Ex. 2075; Ex. 2076; Ex. 2077; Ex. 2078, 1:28–2:06).

The parties dispute whether Petitioner knew about evidence of secondary considerations specific to the '911 patent before filing the Petition and whether this evidence is fully developed. Prelim. Reply 7–8 (citing Ex. 1070); Sur-reply 6–7 (citing Ex. 2003, 45–46; Ex. 1064 ¶¶ 369–377). There is no dispute, however, that there is no evidence of secondary considerations in this proceeding. More specifically, Patent Owner has not submitted any evidence of secondary considerations in this proceeding. Given that Patent Owner has not submitted any evidence of secondary considerations in this proceeding, we cannot credit Patent Owner's argument that Petitioner's failure to address evidence of secondary considerations in its Petition merits denial.

VI. CONCLUSION

On this preliminary record, Petitioner has established a reasonable likelihood of prevailing in showing that at least one of the challenged claims is unpatentable based on the grounds advanced in the Petition.

VII. NOTICES

The Board shall deem waived any issue not raised by Patent Owner in a timely response to the Petition under 35 U.S.C. § 313 or as otherwise permitted by the Board in another manner during trial, even if the issue was raised in the Preliminary Response or discussed in this Decision.

Nothing in this Decision authorizes Petitioner, in a manner not otherwise permitted by the Board's rules or controlling precedent, to supplement the information supporting any ground advanced in the Petition.

VIII. ORDER

In consideration of the foregoing, it is:

ORDERED that the Petition is *granted*, and we institute an *inter partes* review of claims 1–4, 6, 8, 10–13, 15, 17, 19–21, 23–26, and 28 of the '911 patent based on the grounds asserted in this Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is given of the institution of trial, which will commence on the entry date of this Decision.

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Patent 10,984,911 B2

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