

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

MASIMO CORPORATION,
Patent Owner.

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

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

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LIST OF EXHIBITS

- APPLE-1001 U.S. Patent. No. 10,722,159 to Al-Ali (“the ’159 patent”)
- APPLE-1002 Prosecution History of the ’159 patent (Application No. 16/791,963)
- APPLE-1003 Declaration of Dr. Brian Anthony
- APPLE-1004 U.S. Patent No. 8,670,819 to Iwamiya
- APPLE-1005 U.S. Patent No. 9,392,946 to Sarantos
- APPLE-1006 U.S. Patent No. 8,446,275 to Utter
- APPLE-1007 U.S. Patent No. 6,483,976 to Shie
- APPLE-1008 U.S. Patent Pub. No. 2016/0058312 (“Han”)
- APPLE-1009 Design of Pulse Oximeters, J.G. Webster; Institution of Physics Publishing, 1997 (“Webster”)
- APPLE-1010 U.S. Patent No. 10,470,695 (the “’695 patent”)
- APPLE-1011 *Apple v. Masimo*, Case No. IPR2020-01722, Paper 29 (Final Written Decision) (PTAB May 5, 2022) (the “’695 FWD”)
- APPLE-1012 *Masimo Corporation, et al. v. Apple Inc.*, Redacted Complaint, ITC Inv. No. 337-TA-1276
- APPLE-1013 RESERVED
- APPLE-1014 Pang et al., A Neo-Reflective Wrist Pulse Oximeter, IEEE Access, Volume 2 (January 12, 2015)
- APPLE-1015 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)
- APPLE-1016 Cai et al., Implementation of a Wireless Pulse Oximeter Based on Wrist Band Sensor, 3rd International Conference on Biomedical Engineering and Informatics

- APPLE-1017 International Publication No. WO 2001/17421 to Lindberg et al.
- APPLE-1018 Maattala et al., Optimum Place for Measuring Pulse Oximeter Signal in Wireless Sensor-Belt or Wrist-Band, 2007 International Conference on Convergence Information Technology
- APPLE-1019 Fitbit Surge Fitness Super Watch User Manual, Version 1.3 (2015) available at https://help.fitbit.com/manuals/manual_surge_en_US.pdf
- APPLE-1020 Duffy, Jill, Fitbit Surge Review, pcmag.com (Jan. 29, 2015) available at <https://www.pcmag.com/reviews/fitbit-surge>
- APPLE-1021 U.S. Patent Pub. No. 2006/0253010 (“Brady”)
- APPLE-1022 U.S. Patent No. 6,014,576 (“Raley”)
- APPLE-1023 Excerpts from Bronzino, The Biomedical Engineering Handbook, CRC Press, Inc. (1995) (“Bronzino”)
- APPLE-1024 Severinghaus et al., Recent Developments in Pulse Oximetry, Anesthesiology, Vol. 76, No. 6 (June 1992)
- APPLE-1025 Duffy, MIO Alpha BLE Review, PC Magazine (Jan. 28, 2013) available at <https://www.pcmag.com/reviews/mio-alpha-ble>
- APPLE-1026-1032 RESERVED
- APPLE-1033 U.S. Patent No. 6,801,799 (“Mendelson”)
- APPLE-1034 Mendelson et al., A Wearable Reflectance Pulse Oximeter for Remote Physiological Monitoring, Proceedings of the 28th IEEE EMBS Annual International Conference (Sept. 3, 2006)
- APPLE-1035 U.S. Patent Pub. No. 2013/0267854 (“Johnson”)
- APPLE-1036 U.S. Patent Pub. No. 2005/0116820 (“Goldreich”)
- APPLE-1037 U.S. Patent No. 5,164,858 to Aguilera

- APPLE-1038 U.S. Patent No. 5,830,137 to Scharf
- APPLE-1039 U.S. Patent Pub. No. 2005/0267346 (“Faber”)
- APPLE-1040 ITC Inv. No. 337-TA-1276 Exhibit RX-0508 (Jianchu Yao and Steve Warren, Stimulating Student Learning with a Novel “In-House” Pulse Oximeter Design (2005))
- APPLE-1041 U.S. Patent Pub. No. 2014/0323829 (“LeBoeuf”)
- APPLE-1042 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>
- APPLE-1043 U.S. Patent No. 7,468,036 to Rulkov
- APPLE-1044 International Publication No. WO 2011/051888 (“Ackermans”)
- APPLE-1045 International Publication No. WO 2012/140559 (“Shmueli”)
- APPLE-1046 U.S. Patent No. 7,650,176 to Sarussi
- APPLE-1047 U.S. Patent Pub. No. 2002/0095092 (“Kondo”)
- APPLE-1048 U.S. Patent Pub. No. 2015/0355604 (“Fraser”)
- APPLE-1049 U.S. Patent No. 6,398,727 to Bui
- APPLE-1050 Beam Shaping with Cylindrical Lenses, *available at* <https://www.newport.com/n/beam-shaping-with-cylindrical-lenses>
- APPLE-1051 U.S. Patent No. 9,316,495 to Suzuki et al.
- APPLE-1052 U.S. Patent Pub. No. 2010/0261986 to Chin et al.
- APPLE-1053 Dickey, Laser Beam Shaping Theory and Techniques, Second Edition, Taylor & Francis Group, LLC (2014)
- APPLE-1054 U.S. Patent Pub. No. 2014/0051955 to Tiao et al.

APPLE-1055-1059 RESERVED

- APPLE-1060 Combined Civil and Criminal Federal Court Management Statistics (Sep. 30, 2023) | United States Courts (uscourts.gov), https://www.uscourts.gov/sites/default/files/data_tables/fcms_nadistprofile0630.2023.pdf
- APPLE-1061 Memorandum, Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (USPTO June 21, 2022) (“*Director’s Guidance*”)
- APPLE-1062 Apple’s Complaint for Patent Infringement (Design), *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01377 (D. Del. Oct. 20, 2022)
- APPLE-1063 Apple’s Complaint for Patent Infringement (Utility), *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (D. Del. Oct. 20, 2022)
- APPLE-1064 Defendant Masimo Corporation’s Answer to Complaint and Counterclaims, *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (D. Del. Dec. 12, 2022)
- APPLE-1065 Order Granting Joint Motion to Amend the Case Schedule, *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (D. Del. Sep. 21, 2023)
- APPLE-1066 Stipulation by Apple Inc.
- APPLE-1067 Email Identifying Masimo’s District Court Invalidity Grounds (Nov. 16, 2023)
- APPLE-1068 Excerpt of Apple’s District Court Expert Invalidity Report, *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (Nov. 22, 2023)

- APPLE-1069 Order Granting Unopposed Motion to Stay Certain Patent Counterclaims, *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (Jan. 10, 2023)
- APPLE-1070 RESERVED
- APPLE-1071 U.S. Patent No. 10,687,745 to Al-Ali (“the ’745 patent”)
- APPLE-1072 Institution Decision, *Apple Inc. v. Masimo Corp.*, IPR2022-01291 Pap. 15 (PTAB Feb. 1, 2023)
- APPLE-1073 U.S. Patent No. 10,470,695 to Al-Ali (“the ’695 patent”)
- APPLE-1074 Final Written Decision, *Apple Inc. v. Masimo Corp.*, IPR2020-01722 Pap. 29 (PTAB May 5, 2022)
- APPLE-1075 Joint Letter for March 20, 2024 Case Management Conference, *Apple Inc., v Masimo Corporation, et al.*, Case No. 1-22-cv-01378 (Mar. 16, 2024)
- APPLE-1076 Combined Civil and Criminal Federal Court Management Statistics (Dec. 31, 2023) | United States Courts (uscourts.gov), available at:
https://www.uscourts.gov/sites/default/files/fcms_na_distprofile1231.2023_0.pdf
- APPLE-1077 Median Time to Disposition in Cases Terminated After Hearing or Submission | United States Court of Appeals for the Federal Circuit (Sep. 30, 2023), available at: [MedDispTimeMERITSTable-FY23.pdf](#) (uscourts.gov)
- APPLE-1078 *Sotera* Stipulation by Apple Inc.
- APPLE-1079 CONFIDENTIAL - Supplemental Declaration of Dr. Brian Anthony
- APPLE-1080 CONFIDENTIAL - Transcript of the Deposition of Dr. R. James Duckworth (August 9, 2023)
- APPLE-1081 U.S. Patent Application Pub. No. 2010/0324387 to Moon et al. (“Moon”)

- APPLE-1082 CONFIDENTIAL - ITC Inv. No. 337-TA-1276 Hearing Transcript of Dr. Saahil Mehra
- APPLE-1083 CONFIDENTIAL – Transcript of Testimony of Dr. Vivek Venugopal from June 6-10, 2022 Hearing Transcript, *Masimo Corp. et al. v. Apple Inc.*, ITC Inv. No 337-TA-1276
- APPLE-1084 CONFIDENTIAL - ITC Inv. No. 337-TA-1276 Hearing Transcript of Dr. Ueyn Block
- APPLE-1085 ITC Inv. No. 337-TA-1276 Exhibit RX-0498 (Takatani et al., Optical Oximetry Sensors for Whole Blood and Tissue, IEEE Engineering in Medicine and Biology (June/July 1994))
- APPLE-1086 CONFIDENTIAL - Transcript of the first session of the Deposition of Dr. Vijay K. Madiseti (February 4, 2025)
- APPLE-1087 CONFIDENTIAL - Transcript of the second session of the Deposition of Dr. Vijay K. Madiseti (February 7, 2025)
- APPLE-1088 U.S. Patent No. 6,580,086 to Schulz et al.

Contrary to Masimo's assertions, Sarantos describes and is enabled to achieve measurement of oxygen saturation at the wrist, and both Sarantos and Sarantos-Shie render obvious all elements of the Challenged Claims, including the claimed functionality of changing a first shape of light into a second shape.

I. SARANTOS DISCLOSES CHANGING A FIRST SHAPE INTO A SECOND SHAPE (ELEMENTS [1.2], [19.3])

A. Masimo misrepresents Apple's positions in both the ITC proceeding and the instant Petition

The Patent Owner's Response ("POR") misrepresents Apple's positions before the ITC proceeding involving the related '745 Patent, Apple's positions in the instant Petition, and the statements of Apple's experts Dr. Vonugopal (ITC) and Dr. Anthony (IPR).

For example, the POR asserts that Apple's positions are at odds with its prior ITC arguments. POR, 1-2, 8-9, 14-18. However, Apple's ITC arguments were based on the structure of the accused Apple Watch, while Apple's positions here are based on the specific structures of a different device: Sarantos's wearable fitness monitor.

Specifically, before the ITC, Apple established non-infringement of the '745 Patent because the specific arrangement of the Apple Watch changed light "from a circular shape to a larger circular shape" and thus did not change the shape of the

light from a “first shape into a second shape.”¹ EX2093, 187-191.

Here, Dr. Anthony consistently testified that Sarantos discloses changing the emitted light from a first shape into a second shape that is geometrically distinct from the first, not only due to the refractive properties of translucent and transparent materials, but also “due to the shape defined by the in-mold label.” APPLE-1003, ¶35.

B. Sarantos’s “first shape”

Sarantos discloses a first shape of light “characterized by the specific location, arrangement, and/or shape of each light emitting device.” Pet., 7-9 (citing APPLE-1003, ¶¶31-33; APPLE-1005, 2:18-19, 13:34-53, 14:5-22, 17:1-25, 19:33-35, FIGs. 22, 25); APPLE-1079, ¶¶56-59.

Sarantos’s device “may utilize one or more light sources, each of which may include one or more light-emitting devices.” APPLE-1005, 15:27-31, 13:34-53, 2:18-19, 3:58-62. The multiple light sources/light-emitting devices can be arranged in a variety of spatial configurations, including “spaced apart from one another”/“distributed across the PPG sensor face” or “closely grouped”/“closely

¹ The ITC further found that Masimo’s expert’s testimony “was unreliable and conclusory” and that he had failed to provide “any reliable methodology in his infringement analysis.” *Id.*, 188-190.

clustered together.” *Id.*, 13:34-14:1.

Even in the “closely clustered” arrangements of light emitters, the individual arrangement and gaps between the plurality of emitters would only become indiscernible at a distance of “approximately two to three feet from the light emitting devices.” *Id.*, 14:5-22. A POSITA would have understood that at the vastly shorter distances of the configuration in FIG. 22 (on the order of millimeters), the light reaching the window region 2226 would have had a first shape defined by the spatial arrangement, and gaps between, the multiple light-emitting devices. APPLE-1079, ¶59.

For example, in Sarantos, four light emitters arranged equidistantly around a center point would produce a clover shape, while the same four light emitters arranged linearly would have produced approximately a linear, oblong, or oval shape. *Id.* As another example, FIG. 25 shows a circular arrangement of light-emitting devices emitting a circular first shape:

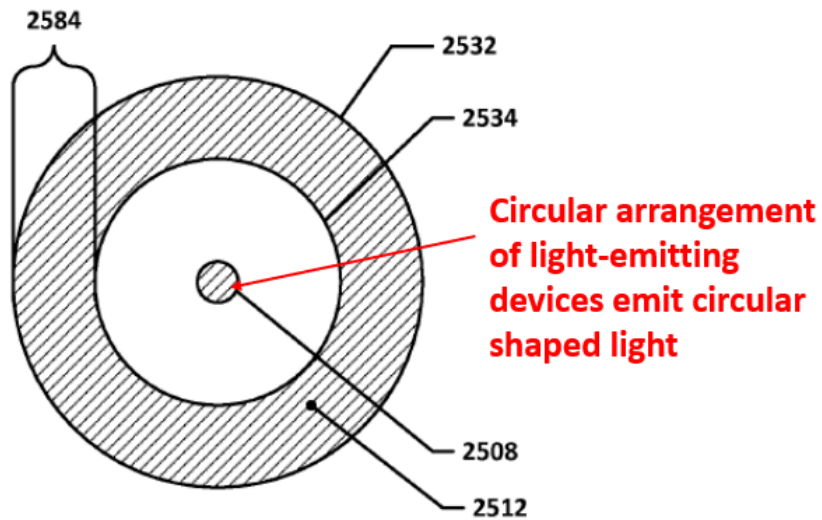


FIG. 25

APPLE-1005, FIG. 25, 19:33-35; APPLE-1079, ¶57; APPLE-1003, ¶¶32-33.

In another example, FIG. 18 shows an arrangement with “multiple light-emitting devices” arranged linearly which would have produced an oblong or rectangular shape:

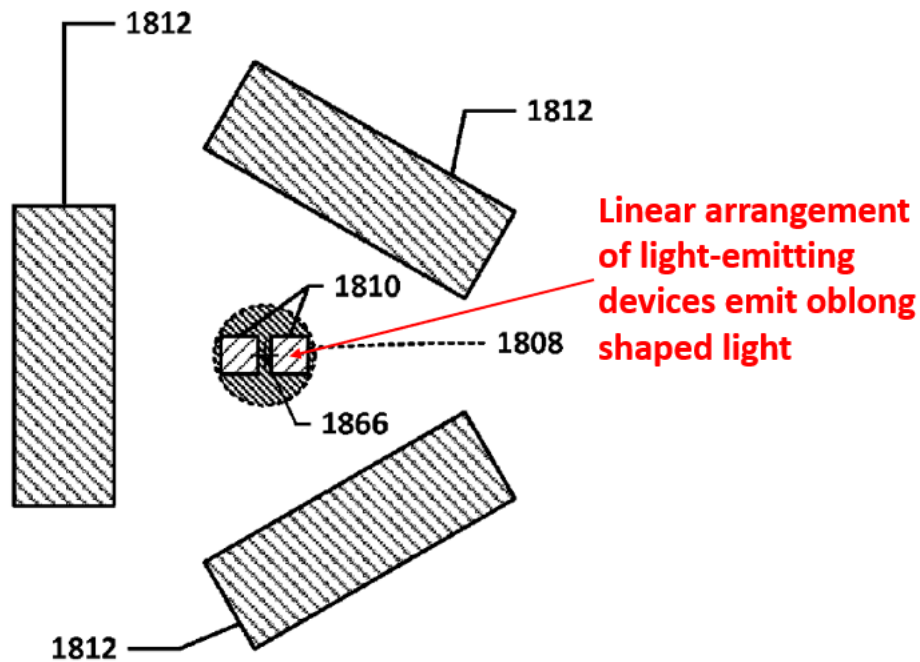


FIG. 18

APPLE-1005, FIG. 18, 6:39-42, 15:24-36; APPLE-1079, ¶59.

Sarantos also makes clear that all disclosed embodiments may be implemented “in combination with” other disclosed embodiments. APPLE-1005, 21:3-9.

C. Sarantos provides changing the first shape into a second shape

Sarantos provides, or at least renders obvious, a second, different shape shape defined by the refractive properties of the window *and* due to the shape defined by the in-mold label. Pet., 9-10; APPLE-1003, ¶¶34-35. Put simply, the first shape of light is defined by the specific location and arrangement of Sarantos’s multiple light emitting devices, and the second shape of the light is

defined by the refractive properties and shape of the window region over the light-emitting devices. APPLE-1079, ¶¶60-61.

As an initial matter, Sarantos expressly contemplates configurations having “optical windows that may slightly *refract light*.” APPLE-1005, 18:23-31.

Sarrantos also contemplates multiple different spatial arrangements for the light-emitting devices (including “spaced apart” or “closely clustered” and specific side-by-side and circular arrangements) and multiple configurations for its window region defined by the mask/in-mold label. APPLE-1005, 13:34-14:1, 19:33-52 (discussing an annular “first boundary”), 6:39-42, 15:24-36, 17:1-18:16, FIGs. 18, 25; APPLE-1079, ¶¶60-61; APPLE-1003, ¶¶32-35.

Sarrantos also discloses that various aspects of the different configurations can be employed with, and are interchangeable with, other arrangements. APPLE-1005, 21:3-9; APPLE-1079, ¶61. As such, a POSITA would have “at once envisage[d]” from Sarantos’s disclosures as a whole that all possible combinations of light-emitting device arrangements and window region shapes that are not same geometric shape would have changed the light from a first shape to a different second shape. APPLE-1079, ¶61 (describing an example of changing an oblong shape to a circular shape); *Kennametal, Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376 (Fed. Cir. 2015).

D. Apple is not estopped from arguing that Sarantos's window region changes the first shape into a second shape

As discussed in Section I.A, *supra*, Apple's positions before the ITC were based on the specific configuration of the Apple Watch, while Apple's arguments in Ground 1A of the Petition are based on the disclosure of Sarantos and all that it teaches. As such, Apple is not estopped from arguing that Sarantos provides elements [1.2] and [19.3].

The statements of Apple's counsel during the oral hearing for the related '745 patent also do not estop Apple for arguing that Sarantos provides elements [1.2] and [19.3]. Specifically, The statement "Sarantos doesn't describe the material as configured to change the first shape of light..." was referring to a lack of an express statement by Sarantos that the specific window region 2226 of the embodiment of FIG. 22 changes the shape of light. POR, 9; APPLE-1005, 18:6-19:9. Here, Apple's arguments are based on what a POSITA would have understood from Sarantos's disclosure as a whole with respect to all possible configurations suggested by Sarantos. *See supra*, §§I.B-C; APPLE-1079, ¶¶61-62.

Additionally, estoppel does not apply because the answer given by Apple's counsel during an oral hearing was not an issue "adversely resolved against" Apple or "essential to a final judgment in the first action." *Ohio Willow Wood Co. v. Alps South, LLC*, 735 F.3d 1333, 1342 (Fed. Cir. 2013); *Google LLC v. Hammond Dev.*

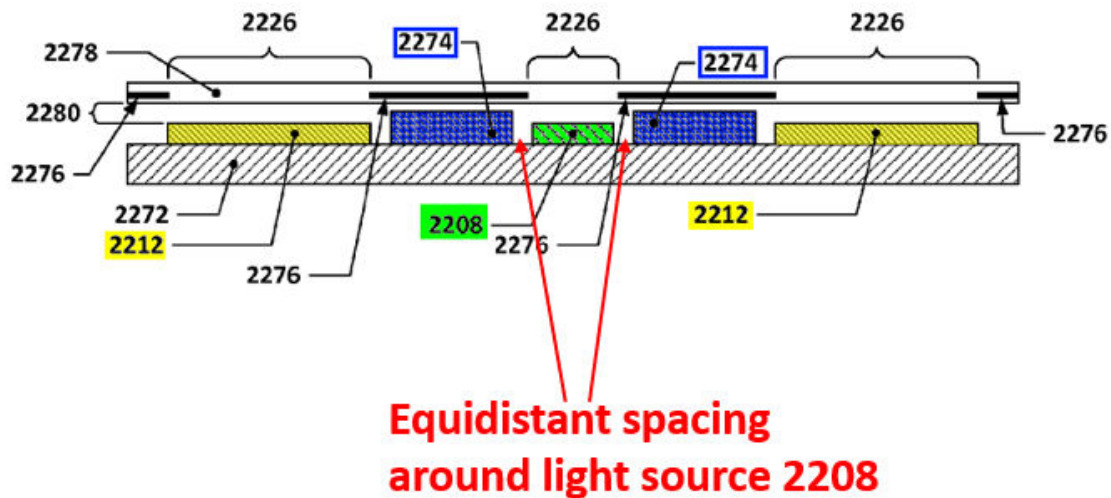
Int'l, Inc., 54 F.4th 1377, 1379 (Fed. Cir. 2022).

II. SARANTOS DISCLOSES CLAIMS [5], [25] AND ELEMENT [14.4]

A. Sarantos renders obvious a light block having a circular shape

Sarantos's light block 2274 is arranged equidistantly around the light source

2208:



APPLE-1005, FIG. 22 (annotated), 16:60-17:32; APPLE-1003, ¶¶60-62.

FIG. 25 shows one of the “various example implementations” in which the light source (having multiple light-emitting devices) and photodetectors have a circular arrangement.

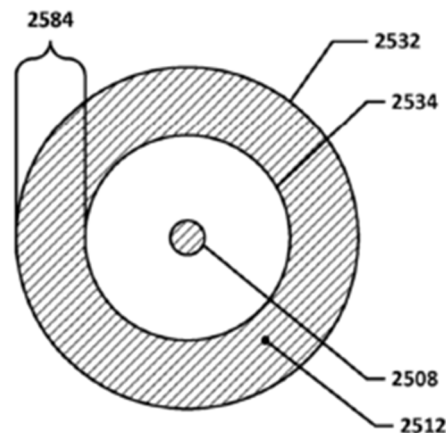


FIG. 25

APPLE-1005, 19:22-35, Fig. 25; APPLE-1003, ¶61.

As Dr. Anthony testified, these circular arrangements combined with the light block 2274 being positioned equidistantly around the light source in FIG. 22 demonstrate that “the most obvious design choice” for the light block would be “a circular arrangement...due to the annular configuration of detectors around a circular light source, the small form factor of the device overall, and the limited space in Sarantos’ PPG sensor.” APPLE-1003, ¶62; Pet., 19-21; APPLE-1079, ¶¶63-64, 66-68, 71; *see also* APPLE-1080, 102:19-103:22; APPLE-1042, 29 (depicting a predictable circular “optical shield” for a circular photodiode and circular light source configuration); APPLE-1085, 8; *In re Kuhle*, 526 F.2d 553, 555 (CCPA 1975) (finding a generic feature that “provides no novel or unexpected result” as “an obvious matter of design choice”); *Apple Inc. v. Masimo Corp.*, IPR2021-00193, Paper 30, 76-80 (PTAB June 2022); APPLE-1087, 406:4-411:18

(Masimo's expert unable to identify any functional significance to the shape of the light block).

A POSITA would have found Masimo's assertion that Sarantos's device would include "separate walls" to be unfounded, as gaps between the walls would have defeated the light-blocking purpose of the walls 2274. APPLE-1005, 17:26-42; APPLE-1079, ¶69.

Additionally, Masimo's assertions that "square" or "rectangular" shapes for the light block were possible does not change the fact that a circular arrangement for the light block would have been the most obvious design choice given the circular arrangement of both the light source and photodetectors. APPLE-1003, ¶62; FIG. 25, 19:33-35; APPLE-1079, ¶64.

Masimo's assertion that FIGs. 22 and 25 depict "different embodiment[s]" is also incorrect. APPLE-1079, ¶62. To start, Sarantos treats FIG. 25 as a natural extension of the device that would incorporate the relevant features of FIG. 22. *Id.*; APPLE-1005, 16:60-62, 19:31-35. Each of the described "aspects" and "implementations" of Saranto's device "may be employed...in combination with one or more of the other aspects and/or implementations." APPLE-1005, 21:3-9. Thus, no express combination FIGs. 22 and 25 was required to show unpatentability. APPLE-1079, ¶62. Furthermore, it is well-established that "[c]ombining two embodiments disclosed adjacent to each other in a prior art

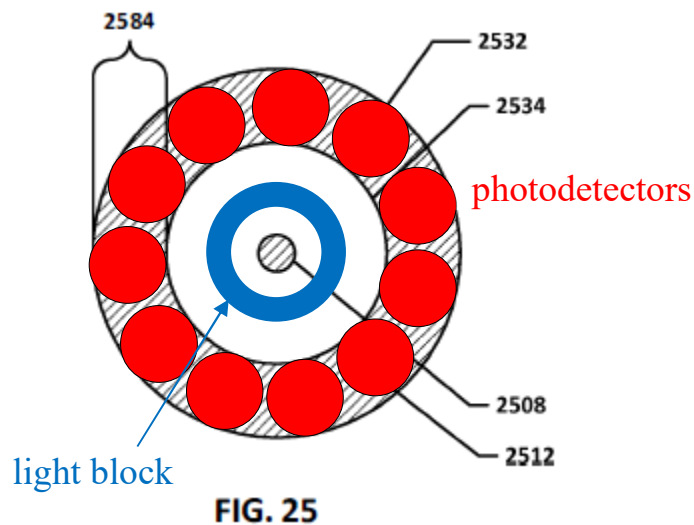
patent does not require a leap of inventiveness.” *Boston Scientific Scimed, Inc. v. Cordis Corp.*, 554 F.3d 982, 991 (Fed. Cir. 2009); APPLE-1005, 17:1-3, 17:26-42, 19:33-35.

Masimo’s assertions that “Figure 25 does not show any light block at all” (POR, 19) are similarly not relevant because FIG. 25 does not purport to show a wholly separate embodiment for a PPG sensor but rather only displays a possible configuration for the light source and photo detectors for use with any of the device configurations of FIGs. 22-24. APPLE-1005, 19:33-35, 16:60-67 (“...various example implementations”); APPLE-1079, ¶62.

Sarantos therefore renders obvious a circular light block.

B. Sarantos discloses a plurality of photodiodes arranged in an array having a spatial configuration corresponding to the circular light block

Sarantos is clear that “any of the implementations above with respect to a single photodetector element spaced apart from a light source may also be implemented *using a plurality of photodetector elements.*” APPLE-1005, 20:52-57. Therefore, a POSITA would have understood that the annular photodetector element 2512 of FIG. 25 can be implemented using a plurality of photodetector elements (depicted by red circles) arranged about the light source in an annular configuration, as depicted below. APPLE-1003, ¶¶63-64.



APPLE-1005, FIG. 25 (modified)

Even if these individual photodetectors had been implemented to have shapes other than circular (e.g., arched shapes, rectangular, etc.), a POSITA would have recognized that they still would have conformed to the annular shape shown in FIG. 25. APPLE-1079, ¶65.

Sarantos additionally describes that “*each photodetector element* in the pattern may be *equidistant from the center of the light source* and/or *evenly spaced within the pattern*.” APPLE-1005, 2:26-29, 3:64-4:2. A POSITA would have recognized that a pattern of photo detectors arranged “equidistant from the center of the light source” and “evenly spaced” corresponds to a circular arrangement. APPLE-1079, ¶65. Sarantos also describes that the various different shapes disclosed for its HAR photodetectors are applicable to all embodiments. APPLE-1005, 12:34-37, 21:3-9; APPLE-1079, ¶65. As such, Apple has not

proposed a “multi-step modification” as Masimo asserts (POR, 21) but rather has explained example arrangements of photodetectors that directly result from Sarantos’s collective disclosures.

Finally, Masimo’s complaint that “three photodetectors cannot correspond to a circular shape” (POR, 22) does not affect the relevant analysis because Sarantos includes examples expressly describing arrangements of “*four* Har photodetector elements 1612...arranged in a *circular array* about a light source.” APPLE-1005, 14:62-64, 2:44-47, 4:19-22; APPLE-1079, ¶70.

III. SARANTOS-SHIE RENDERS OBVIOUS CHANGING THE FIRST SHAPE INTO A SECOND SHAPE (ELEMENTS [1.2], [19.3], CLAIM 18)

A. Apple is not estopped from arguing that a POSITA would have applied Shie to Sarantos in the proposed manner

Masimo attempts to improperly limit Apple’s arguments in view of the Board’s decision in IPR2022-01465 that involved a different patent and different factual record.

For starters, Masimo relies on cases in which estoppel attaches to a finding of invalidity of claims that are not materially distinct to the claims in a present case, rather than the issue of motivation to combine. *See e.g., Ohio Williw Wood*, 735 F.3d, 1342; *Google*, 54 F.4th, 1379.

Furthermore, Masimo misstates the finding of the Board in IPR2022-01465

and, as such, the issue in the present proceeding is not “identical to one *decided* in the first action.” *In re Freeman*, 30 F.3d 1459, 1465 (Fed. Cir. 1994); *Google*, 54 F.4th, 1379. Specifically, in IPR2022-01465 what the Board *decided* is “Apple’s *case for obviousness fails to provide a persuasive motivation* for combining Sarantos and Shie to practice the invention of claim 13” and that “*Apple d[id] not explain sufficiently* why a person of ordinary skill in the art would have been led to use a light shape changing lens within the context of Sarantos’s sensor.” EX2036, 142-143, 145.

In contrast to the holding in *SynQor, Inc. v. Vicor Corp.*, the Board in IPR2022-01465 ***did not find*** a fundamental incompatibility between the two references or otherwise decide that the references could not be combined. *Id.* 988 F.3d 1341, 1353 (Fed. Cir. 2021). Rather, what was decided by the Board in IPR2022-01465 is that the record in that specific case did not “explain sufficiently” why a POSITA would have combined the references. EX2036, 142-143, 145. Therefore, at most, Apple is estopped from arguing that ***the record in the IPR2022-01465 proceeding*** established a motivation to combine Sarantos with Shie.

However, in the present case, Apple has presented a substantially different set of arguments and evidence to establish specific modifications to Sarantos’s

device based on specific lenses discussed in Shie.² As such, Masimo’s assertion that “Apple presented the same arguments regarding Sarantos and Shie in IPR2022-01465” is simply not true.

Looking first at the earlier IPR2022-01465 proceeding, the Petition’s analysis of motivation to apply Shie to Sarantos was—partially due to word count constraints—limited to four sentences spanning half a page with no citation to corroborating evidence other than the declaration of Dr. Anthony. IPR2022-01465, Paper 3, 40-41.

By contrast, the present Petition dedicates over four and a half pages to describing the combination of Sarantos with Shie and motivation to combine. Pet., 31-35. This includes citation to additional analysis by Dr. Anthony and discussion of additional corroborating evidence that was not cited or discussed in the earlier IPR2022-01465 Petition. Pet., 31-35 (citing APPLE-1023, 10, 60, 62; APPLE-1022, 3:40-48; APPLE-1009, 51, 68-70, 76, 105; APPLE-1008, [0061]-[0064]; APPLE-1016, APPLE-1025, 1; APPLE-1003, ¶¶98-102). The present Petition

² In the Institution Decision, the Board instructed the parties to “address[] any differences in the record here compared to that in the -1465 IPR.” Inst. Dec., 34. As discussed in this section, the record in the present proceeding substantially differs from that in IPR2022-01465.

also presents descriptions of how specific lenses described in Shie would have been applied to Sarantos to change the shape of the light. Pet., 36-38.

The present Petition also articulated numerous motivations to combine Sarantos and Shie beyond the three included in the earlier IPR proceeding (or the three mentioned in the POR (POR, 32)), including:

- “to more precisely direct the light emitted toward the tissue so as to increase power efficiency”
- to “increase[] the signal level of the light detected by the photodiodes”
- to “direct[] light towards a larger area to decrease irregular readings” and “reduce measurement errors caused by moles and skin aberrations”
- “to tune the light intensity to provide the most accurate physiological parameter detection”
- “to obscure appearance of the light source from a user”

Pet., 32-35.

In short, the Board in the earlier IPR2022-01465 *did not* find that Sarantos and Shie could not have been combined or that a POSITA would not have combined the references but rather that the record of that specific case did “not establish[] a sufficient motivation.” EX2036, 145.

The issue of whether the substantially different arguments and record of the

present proceeding supports a finding that a POSITA would have been motivated to apply Sarantos to Shie is distinct from the issue of whether the more limited record in the IPR2022-01465 supported such a combination. The substantially different arguments and corroborating evidence in the present proceeding demonstrates that there is a “material difference” between the issue decided in IPR2022-01465 and the issue before the Board in the present proceeding. *See Nestlé USA, Inc. v. Steuben Foods, Inc.*, 884 F.3d 1350, 1352 (Fed. Cir. 2018).

B. A POSITA would have been motivated to combine Sarantos and Shie

Contrary to Masimo’s assertions (POR, 31-40), the Petition identified specific lenses disclosed by Shie that, when applied to Sarantos, would have achieved the benefits discussed in the Petition. APPLE-1079, ¶¶74-78. For example, Apple identified lenses having “directing characteristics” such as “a parabolic convex lens...designed to shape the light *into a narrow distribution*” to achieve the benefit of more precisely directing light to achieve power efficiency. Pet., 36-37. Apple also discussed corroborating evidence regarding the knowledge of a POSITA on how to achieve more precise light direction using a lens. Pet., 32-33.

Furthermore, Shie describes lens “to shape the light output *into a desired distribution pattern*” and a POSITA would have been able to perform the routine

experimentation required to accurately direct the light “to result in transmitted signals that have sufficient amplitude to provide accurate readings.” APPLE-1007, 5:29-45, 9:36-45; APPLE-1022, 3:40-48; APPLE-1009, 105; APPLE-1008, [0064]; APPLE-1003, ¶¶100, 108; APPLE-1079, ¶7; Pet., 36-37. Such tuning of the light intensity would have also achieved the stated benefit of “provid[ing] the most accurate physiological parameter detection.” APPLE-1079, ¶¶74, 77; Pet., 34; APPLE-1003, ¶102; APPLE-1016. A POSITA would have recognized the importance of shaping the light to direct “light into an optical receiving area of light sensor” such as by using “a Fresnel lens.” APPLE-1008, [0050], [0064]; APPLE-1003, ¶100.

Regarding the benefit of directing light towards a larger area to decrease irregular readings caused by skin aberrations, the Petition identified specific lenses disclosed by Shie configured to “spread” light while discussing specific shape changes that would have achieved this effect. Pet., 37 (citing APPLE-1007, 1:20-24; APPLE-1003, ¶¶109-110); *see also* APPLE-1007, 7:8-27 (describing using microstructures to “provide a broader light distribution pattern”); APPLE-1079, ¶76.

Additionally, each of these lenses disclosed by Shie would have achieved the benefit of obscuring the appearance of the light source from a user. APPLE-1003, ¶¶100-101; APPLE-1008, [0061]-[0063]; APPLE-1016; APPLE-1079, ¶78.

C. Sarantos-Shie changes a first shape of light into a second shape

The Petition identified multiple examples of specific shape changes that would have occurred due to application of specific lenses described by Shie to Sarantos's device, such as a change to length but not width or from a non-circular to a circular shape. Pet., 35-38; APPLE-1003, ¶¶106-111, 98; APPLE-1079, ¶73;.

IV. SARANTOS PROVIDES MEASURING OXYGEN SATURATION AT THE WRIST (CLAIMS 8 AND 17)

A. Sarantos discloses and renders obvious measuring oxygen saturation at the wrist

Sarantos expressly describes embodiments where its device would measure blood oxygenation levels using red and infrared light and structural adaptations that can be made to accommodate multiple red/infrared LEDs. APPLE-1005, 13:34-36, 13:44-14:22; APPLE-1079, ¶¶72, 25; APPLE-1003, ¶¶68-69.

Masimo's narrow focus on Sarantos's use of the word "or" ignores both Sarantos's disclosures and the POSITA's knowledge regarding common wavelengths of light for determining blood oxygen saturation. Pet., 24-26; APPLE-1079, ¶¶26-27; APPLE-1003, ¶¶68-69, 71-72; APPLE-1009, 94-96 (discussing the well-known "wavelengths of interest in pulse oximetry (660 nm and 940 nm)"); APPLE-1021, [0052]-[0054]; APPLE-1017, 49-50.

Sarantos measures "blood oxygenation levels" by implementing each light source to "predominantly emit[] light in the red or infrared spectrum" such that

multiple light sources would collectively emit red and infrared light. APPLE-1005, 13:44-14:5, 18:44-51; APPLE-1079, ¶26; APPLE-1003, ¶¶68-69. Indeed, Sarantos expressly describes embodiments having “two light-emitting devices that predominantly emit light of different wavelengths.” APPLE-1005, 3:60-62.

Furthermore, the *background* section of the ’159 Patent itself states that it was known in the prior art to “derive oxygen saturation” by transmitting light “of one or more wavelengths into a tissue site.” APPLE-1001, 1:54-2:1.

A POSITA reviewing Sarantos’s alternative embodiments for measuring blood oxygen levels at col. 13:36-14:22 would have understood and found obvious that the ratios/dimensions of Sarantos’s HAR photodetectors could and would be suitably optimized for the detection of red/infrared light. APPLE-1079, ¶25; APPLE-1003, ¶69.

B. A POSITA would have reasonably expected success in measuring oxygen saturation at the wrist as disclosed by Sarantos

Even apart from Sarantos, 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.³

³ The bulk of these references were not previously submitted during the ’745 patent ITC proceeding.

APPLE-1003, ¶¶71-84 (citing APPLE-1014–APPLE-1018, APPLE-1021, APPLE-1036, APPLE-1038, APPLE-1042–APPLE-1048); APPLE-1079, ¶¶72, 34-53.

A POSITA would have known of these references as the law “presumes that all prior art references in the field of the invention are available to this hypothetical skilled artisan.” *In re Carlson*, 983 F.2d 1032, 1037-38 (Fed. Cir. 1993); *In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998).

Notably, the evidence reviewed by Dr. Anthony includes engineering and scientific papers describing actual studies and experimental results confirming feasibility of determining oxygen saturation at the wrist.

Maattala 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”:

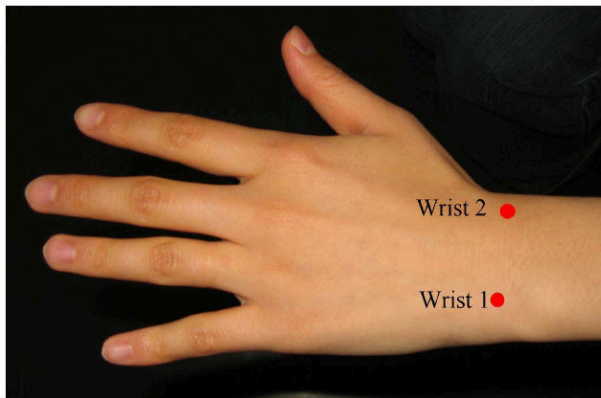


Figure 8. Measurement spots on the outer wrist

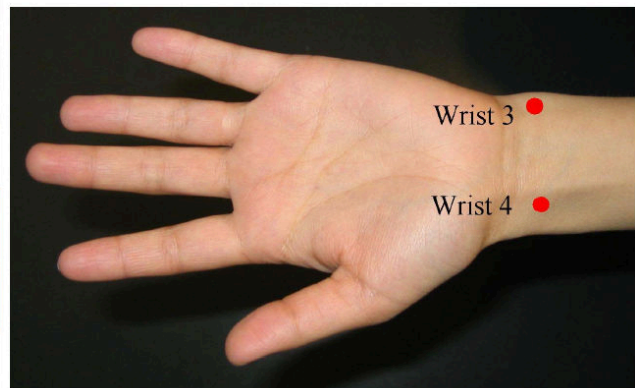


Figure 9. Measurement spots on the inner wrist

APPLE-1018, Abstract, 3-5; APPLE-1003, ¶76.

In Cai, the authors “confirmed the feasibility of our oximeter” that employed “[a] wrist located reflectance sensor.” APPLE-1016, 1-2 (“...effectively detect the change of oxygen saturation.”); APPLE-1003, ¶77.

Pang describes a “wrist pulse oximeter” that “*detected the pulse wave signal efficiently*” (confirmed by “experimental results”) such that “*oxygen saturation can then be calculated.*” APPLE-1014, 1, 5; APPLE-1003, ¶¶81-82.

Li’s pulse oximeter “gather[ed] high integrity data at...wrist...locations from a group of 48 subjects.” APPLE-1015, Abstract. Li’s “experimental data from the wrist” confirmed “suitable PPGs” for measuring blood oxygenation. *Id.*, 8.

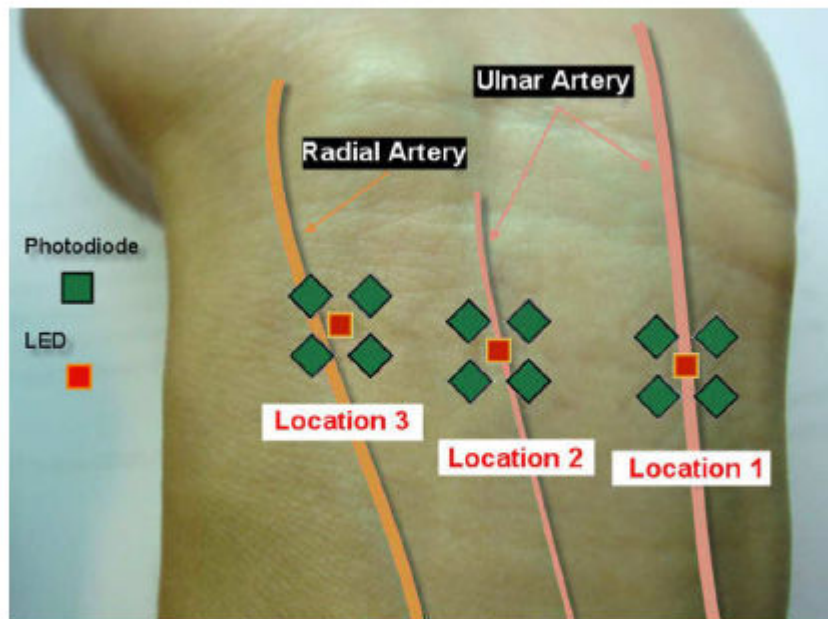


Fig. 14. Pulse oximeter measurement locations on the left wrist.

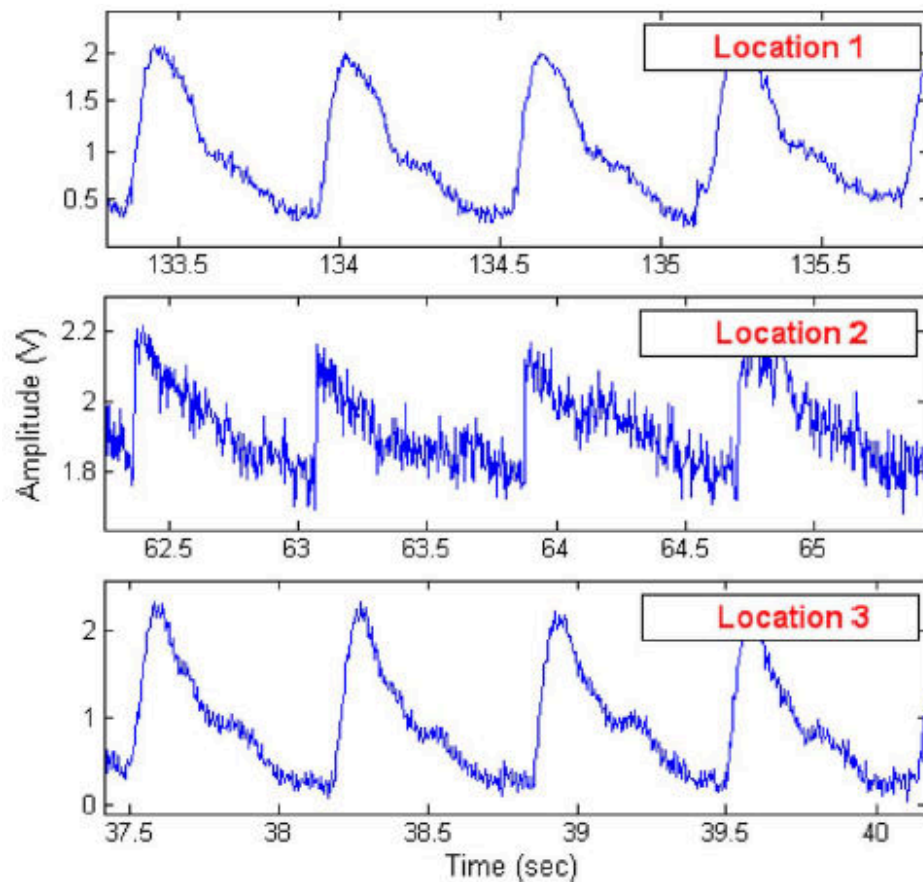


Fig. 13. Wrist PPGs corresponding to the placement locations in Fig. 14.

APPLE-1015, 8; APPLE-1003, ¶78.

Notably, claims 8 and 17 do not require any degree of consistency or high quality PPG signals and thus Li sufficiently demonstrates a reasonable expectation of success with respect to determining oxygen saturation to the degree required by the claims of the '159 patent.

Fontaine demonstrates that in 2013, a group of undergraduates were able to accurately measure within an error of + 1% and $\pm 3\%$ for SpO₂ and PR [pulse rate] respectively from the wrist.” APPLE-1042, Abstract; APPLE-1003, ¶79.

Table 7.1: Calculated accuracy for the average SpO₂ and PR for each data set

Average Measurements	Reference		Prototype		Percent Errors	
	SpO ₂ (%)	PR (bpm)	SpO ₂ (%)	PR (bpm)	SpO ₂	PR
Wrist Standing	97.9	92.6	97.3	92.8	0.6	0.2
Wrist Sitting	98.2	82.4	98.4	83.3	0.2	1.1
Chest Standing	98.1	96.7	98.5	96.5	0.4	0.1
Chest Sitting	97.8	83.8	98.1	83.9	0.3	0.1

APPLE-1042, 60-101; APPLE-1003, ¶79.

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.” APPLE-1021, [0004], [0033], [0046]-[0048], [0051]-[0054], [0058]; APPLE-1079, ¶36.

Numerous other references demonstrate a reasonable expectation of success in determining oxygen saturation at the wrist by 2015. APPLE-1017, 10, 18, 49, 52, 80-81; APPLE-1043, Abstract, 4:1-22, 6:30-63, 7:14-35; APPLE-1044, 1:2-5, 2:12-14, 3:8-12, 6:15-18, 10:30-11:3, FIG. 7; APPLE-1036, [0002], [0014]-[0015], [0035]-[0036], [0104], [0124], FIG. 5; APPLE-1045, Abstract, 2, 9, 12, FIGS. 1A-

4; APPLE-1046, 3:55-61, 4:14-21, 6:63-7:22, 12:36-43, 14:50-15:3, FIGS. 15A-15C; APPLE-1038, Abstract, 3:66-5:7, 9:15-17, 17:43-45, FIGS. 3-4; APPLE-1047, [0010], [0014], [0025], [0086], [0108]-[0109], FIGS. 1, 5A-5B; APPLE-1048, [0015], [0020]; APPLE-1003, ¶¶100-109; APPLE-1079, ¶¶35-38.

Masimo's assertions that "detecting a PPG signal or modulation ratio...is not determining oxygen saturation" (POR, 55) ignores both that: (1) Sarantos expressly discloses techniques "for measuring blood oxygenation levels" and (2) additional prior art references demonstrate that a POSITA would have had a reasonable expectation of success in obtaining the signals used for calculating oxygen saturation at a user's wrist, and would have known how to implement a device to calculate oxygen saturation using such signals. APPLE-1005, 13:40-14:22, 18:44-48; APPLE-1003, ¶¶68-84; APPLE-1079, ¶¶34-35, 37.

Additionally, a finding of obviousness "does not require absolute predictability of success." *Almirall, LLC v. Amneal Pharms. LLC*, 28 F.4th 265, 275 (Fed. Cir. 2022).

Masimo's assertions that "none of the researchers involved with Apple's cited references ever" marketed a wrist-worn device for measuring oxygen saturation are of no import. The 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. Indeed, with respect to Fitbit and

other companies mentioned in the POR, the evidence is equivocal concerning the *reason* why such devices were not commercially available in 2015.

Masimo's arguments about the alleged shortcomings of the prior art stand directly at odds with the limited disclosure of the '159 Patent itself, which makes only passing reference to pulse oximetry at the wrist.⁴ APPLE-1079, ¶¶39-41; APPLE-1001, 2:57-58; 10:45-47; 12:16-20; APPLE-1003, ¶¶85-88.

Masimo's '745 Patent IPR expert conceded that the forehead would provide a much stronger signal for measuring oxygen saturation than the wrist APPLE-1080, 37:6-8), and yet the '159 Patent discloses no reflectance sensor adaptations that would be made to successfully determine oxygen saturation at the wrist. APPLE-1079, ¶¶4041; APPLE-1003, ¶¶85-88. The '159 Patent instead assumes that a POSITA would have known how to implement such measurements at the wrist despite the weaker signal. *Id.*; APPLE-1080, 17:19-22, 29:2-31:17, 48:17-22.

If the '159 Patent is enabled with its own minimal guidance, a POSITA would have reasonably expected success implementing the same features as earlier described in the prior art. APPLE-1079, ¶41.

⁴ The majority of the '159 Patent describes an attenuation oximeter for a finger. APPLE-1001, FIGs. 1-5, 8, 5:41-10:10.

Masimo's '745 IPR expert was likewise unable to identify any specific feature or combination of features recited in the claims that allows for pulse oximetry at the wrist. APPLE-1080, 33:12-19, 37:9-38:7⁵, 39:9-45:22, 47:10-16, 49:1-15, 58:6-59:2, 83:20-84:4. And, the differences between claims 1/19 and 14 show that a shape-changing material (elements [1.2]/[19.3]), a dark-colored coating (elements [1.4]/[19.5]), or a specific spatial configuration of the photodiodes (element [14.4]) are not required for measuring oxygen saturation at the wrist because none of these features appear in every independent claim. APPLE-1079, ¶41.

To the extent a POSITA would have understood the '159 Patent's disclosure as enabling oxygen saturation determinations at the wrist, a POSITA would also have had a level of skill sufficient to enable corresponding prior art techniques for determining oxygen saturation at the wrist that are disclosed with at least the same level of detail. *See In re Epstein*, 32 F.3d 1559, 1568 (Fed. Cir. 1994); *Uber Techs., Inc. v. X One, Inc.*, 957 F.3d 1334, 1339 (Fed. Cir. 2020); *In re Publicover*, 813 F. App'x 527, 532 (Fed. Cir. 2020); APPLE-1003, ¶¶85-88.

Regarding the evidence of challenges that Apple successfully overcame to

⁵ Duckworth identified FIG. 7A's "light concentrator 708," which does not correspond to any claimed feature.

develop pulse oximetry for the Apple Watch, the fact that Apple's engineers

██
██ demonstrates that a POSITA would have had a reasonable expectation of success. *See* EX2085, 4-9, 13.

Testimony of Apple's engineers' 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). APPLE-1079, ¶¶42-53.

As noted above, a POSITA is attributed knowledge of all the prior art. The engineers did not testify at the ITC from the perspective of a POSITA, and indeed, there is no evidence that the engineers were even aware (as a POSITA would have been) of the vast majority of prior art references and studies that had established the feasibility of determining oxygen saturation at the wrist before the '159 Patent. *See In re Sneed*, 710 F.2d 1544, 1550 (Fed. Cir. 2012).

The POR also fails to place the Apple engineers' testimony in its proper context, instead cherry-picking soundbites. APPLE-1079, ¶¶43-53. But when the engineers' testimony and related evidence is considered in its entirety, it is clear that the challenges confronting the engineers with respect to Apple Watch did not

merely entail determining an oxygen saturation parameter [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] APPLE-1079, ¶¶43, 45, 50.

Unlike the Watch, the claims do not require regulatory approval, [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] *Id.* To

the contrary, the claims merely refer to “determin[ing]” some unspecified oxygen saturation parameter at the wrist, which could be satisfied by far more rudimentary functions than that implemented on the Watch. APPLE-1079, ¶¶52-53.

In this context, Masimo’s reliance on evidence of Apple’s own successes is not probative of a lack of reasonable expectation of success in the instituted

grounds. Challenges overcome in Apple Watch development involved design constraints that are not required by the claims, and the related evidence is therefore not legally relevant to assessing reasonable expectation of success in achieving the oxygen saturation feature claimed without those design constraints. *Intelligent Bio-Systems, Inc. v. Illumina Cambridge, Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir. 2016); *Sound View Innovations, LLC v. Hulu, LLC*, 818 F. App'x 1009, 1013 (Fed. Cir. 2020); *Huawei Techs. Co. v. Iancu*, 813 F. App'x 505, 511 (Fed. Cir. 2020); *Dr. Falk Pharma GmbH v. GeneriCo, LLC*, 774 F. App'x 665, 675-76 (Fed. Cir. 2019).

That the challenges addressed by the Apple engineers stemmed from features not required by the claims is apparent from portions of the engineers' ITC testimony not cited in the POR. And the challenges involved in developing pulse oximetry for the Apple Watch extended far beyond anything required by the '159 Patent claims. APPLE-1079, ¶¶45-53; APPLE-1083, 832:23-833:10; APPLE-1082, 878:4-16; EX2076, 958:19-24, 963:19-964:1, 964:7-11, 965:15-22, 970:15-972:5; APPLE-1084, 902:13-19; EX2078, 925:6-12, 949:10-16; EX2081, 167:18-169:10, 173:13-174:8; EX2082, 108:15-109:20; EX2080, 136:19-137:1, 160:21-161:2; EX2077, 999:7-11, 1000:6-1001:1, 1006:6-21, 1015:13-1016:1; EX2085, 4-5; EX2083, 7, 23.

V. SARANTOS AND UTTER (WITH OUR WITHOUT SHIE) RENDER OBVIOUS CLAIM 24

While 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.

VI. DR. MADISETTI'S TESTIMONY IS ENTITLED TO LITTLE OR NO WEIGHT

As explained below, Dr. Madisetti's testimony is entitled to little or no weight because it is insufficiently supported by objective evidence or analysis, because Dr. Madisetti was repeatedly non-responsive during deposition, and because the answers that Dr. Madisetti did provide revealed that he was either unable or unwilling to identify how the '159 Patent's specification examples relate to claim terms on which he had opined and premised alleged distinctions over the applied prior art. *See* 37 C.F.R. § 42.65(a); *Nobel Biocare Services AG v. Intradent USA, Inc.*, 903 F.3d 1365, 1382 (Fed. Cir. 2018); *10X Genomics, Inc. v. The University of Chicago*, IPR2015-01157, Paper 30 at 2 (PTAB May 26, 2016) (“...non-responsiveness of a witness...would go to the weight given to that witness's direct testimony.”); *Juniper Networks, Inc. v. Swarm Tech. LLC*, IPR2021-01445, Paper 62 at 14 (PTAB Feb. 7, 2023) (“In judging the credibility of experts, we focus on...cross-examination testimony”).

Despite having previously appeared in numerous IPR proceedings, Dr. Madisetti incorrectly insisted during deposition that he was only required to answer questions “if asked by the court to do so.” APPLE-1086, 144:6-145:13, 146:13-17, 158:6-159:8. Consistent with that erroneous view, Dr. Madisetti repeatedly refused to answer straightforward questions regarding evidence of record, responding that he would “defer to the specification” or “defer to whatever is in my declaration” or had “no opinion.” APPLE-1086, 22:14-24:8, 44:1-46:7, 47:2-19, 65:13-22, 73:2-16, 74:22-75:15 (refusing to answer questions because “*Anything that is not in my declaration is not part of my opinions in this particular matter.*”), 96:3-16, 104:1-105:9, 113:12-114:1, 134:10-14, 156:5-11, 157:20-159:8, 162:9-164:17, 171:21-172:8, 224:22-225:20, 228:3-19, 236:12-242:8, 283:17-284:10; APPLE-1087, 448:2-449:8, 370:9-18, 373:14-378:14, 382:21-383:6, 386:14-22, 388:12-17, 391:9-15, 392:9-395:6, 396:2-398:7, 400:17-401:10, 406:4-12, 408:21-409:11, 431:6-16, 435:3-437:16, 452:21-453:9.

For example, Dr. Madisetti was unwilling or unable to say whether specific ’159 Patent embodiments included, or could even be compatible with, a light block. APPLE-1087, 396:2-399:16, 370:9-18, 374:14-379:21, 382:21-386:6, 388:21-390:15, 392:9-394:3, 363:6-19. And Dr. Madisetti further could or would not opine on the meaning of terms such as “annular” or “circumference” as used in the applied prior art references, and appeared to not know that annular refers to a

specific shape. *See* APPLE-1087, 442:11-443:18, 445:4-446:7 (“Q. So could a square-shaped light guide unit be annular? A. I don’t know.”), 446:12-450:7 (“the word ‘annular’ is a qualifier for ‘light guide,’ nothing more. It doesn’t mention about a shape.”) 450:15-460:9.

Given the conclusory nature of Dr. Madisetti’s declaration testimony and his non-responsiveness during deposition, Apple respectfully submits that Dr. Madisetti’s testimony is entitled to little or no weight. *See* 37 C.F.R. § 42.65(a); *Nobel Biocare*, 903 F.3d at 1382; *10X Genomics* at 2; *Juniper Networks* at 14.

Respectfully submitted,

Dated: February 14, 2025

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CERTIFICATION UNDER 37 CFR § 42.24(d)

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petitioner's Reply to Patent Owner's Response totals 5,554, which is less than the 5,600 allowed under 37 CFR § 42.24.

Respectfully submitted,

Date: February 14, 2025

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§ 42.6(e)(1) and 42.6(e)(4)(iii), the undersigned certifies that on February 14, 2025, a complete and entire copy of this Petitioner's Reply to Patent Owner's Response and exhibits were provided via email to the Patent Owner by serving the email correspondence addresses of record as follows:

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