

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,

Petitioner,

v.

MASIMO CORPORATION,

Patent Owner.

Case IPR2024-00242
U.S. Patent 10,687,743

DECLARATION OF VIJAY K. MADISETTI

I declare that all statements made herein on my own knowledge are true and that all statements made on information and belief are believed to be true, and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

I reserve the right to supplement my opinions in the future to respond to any arguments or positions Apple may raise, taking account of new information as it becomes available to me.

Date: 4/9/24



Vijay K. Madiseti, Ph.D.

4/9/24

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I, Vijay K. Madisetti, declare as follows:

1. My name is Vijay K. Madisetti. I have been retained by Knobbe, Martens, Olson & Bear, LLP, counsel for Patent Owner Masimo Corporation (“Masimo”) as an independent expert witness in this proceeding. I am making this declaration at the request of Masimo in the matter IPR2024-00242, which concerns certain claims of U.S. Patent No. 10,687,743.

2. I have also been retained by Knobbe, Martens, Olson & Bear, LLP, counsel for Masimo Corporation in the cases *Apple, Inc. v. Masimo Corp. et al.*, Nos. 22-1377-MN-JLH and 22-1378-MN-JLH, pending before the U.S. District Court for the District of Delaware (collectively, the “Delaware Litigation”). In the Delaware Litigation, I also presented opinions concerning Apple’s infringement of the ’743 Patent and the validity of the ’743 Patent. I was also previously retained by Knobbe, Martens, Olson & Bear, LLP, counsel for Masimo Corporation, in the ITC Investigation *Certain Light-Based Physiological Measurement Devices and Components Thereof*, Inv. No. 337-TA-1276 (“ITC Investigation”). In the ITC Investigation, I also presented opinions concerning Apple’s infringement of a related U.S. Patent No. 10,687,745 (“’745 Patent”) and the validity of the ’745 Patent, including based on the same prior art references that are applied in this IPR.

3. I am being compensated by Masimo for my work in this matter at my standard hourly rate for expert consulting services. My compensation is in no way dependent on the outcome of this proceeding.

I. QUALIFICATIONS

4. My qualifications are set forth in my curriculum vitae, a copy of which is included as Exhibit 2001. A summary of my qualifications follows.

5. I obtained my Ph.D. in Electrical Engineering and Computer Science at the University of California, Berkeley, in 1989. While there, I received the Demetri Angelakos Outstanding Graduate Student Award and the IEEE/ACM Ira M. Kay Memorial Paper Prize.

6. I joined Georgia Tech in the Fall of 1989 and am now a tenured full professor in Electrical and Computer Engineering and more recently in the College of Computing. Among other things, I have been active in the areas of digital signal processing, wireless communications, integrated circuit design (analog & digital), system-level design methodologies and tools, and software engineering. I have been the principal investigator (“PI”) or co-PI in several active research programs in these areas, including DARPA’s Rapid Prototyping of Application Specific Signal Processors, the State of Georgia’s Yamacraw Initiative, the United States Army’s Federated Sensors Laboratory Program, and the United States Air Force Electronics Parts Obsolescence Initiative. I have received an IBM Faculty Award and NSF’s

Research Initiation Award. I have been awarded the 2006 Frederick Emmons Terman Medal by the American Society of Engineering Education for contributions to Electrical Engineering, including authoring a widely used textbook in the design of VLSI (very large scale implementation) digital signal processors.

7. During the past 30 years at Georgia Tech, I have created and taught undergraduate and graduate courses in hardware and software design for signal processing, computer engineering (software and hardware systems), computer engineering and wireless communication circuits.

8. I have been involved in research and technology in the area of digital signal processing since the late 1980s, and I am the Editor-in-Chief of the CRC Press's 3-volume Digital Signal Processing Handbook (1998, 2010). I am the author of VLSI Digital Signal Processors (1995). I have been on the Editorial Board for the International Journal in VLSI Signal Processing since 1995. I am an author of numerous journal publications in this field, including, for example: (1) Efficient VLSI Architectures for the Arithmetic Fourier Transform (AFT) (1993); (2) The Georgia Tech digital signal multiprocessor (1993); (3) LMSGEN: a prototyping environment for programmable adaptive digital filters in VLSI (1994); (4) Fixed-point co-design in DSP (1994); (5) Rapid prototyping on the Georgia Tech digital signal multiprocessor (1994); (6) Low-power signaling in asymmetric noisy

channels via spectral shaping (1994); and (7) A quantitative methodology for rapid prototyping and high-level synthesis of signal processing algorithms (1994).

9. For decades I have been involved in research and technology in the area of hardware design. I am one of the authors of the Standard Language for Hardware Design (VHDL), which is an IEEE standard. I also authored or edited: (1) Quick-Turnaround ASIC Design in VHDL (1996); (2) VHDL: Electronics Systems Design Methodologies (2000); and (3) A Platform-Centric Approach to System-on-Chip (SoC) Design (2004). Additionally, I authored numerous journal publications in this field including, for example: (1) Modeling COTS components in VHDL (1996); (2) VHDL-Based Rapid Systems Prototyping (1996); and (3) VHDL models supporting a system-level design process: a RASSP approach (1997).

10. I have founded three companies in the areas of signal processing, embedded software, military chipsets involving imaging technology, and software for computing and communications systems. I have supervised Ph.D. dissertations of over twenty engineers in the areas of computer engineering, signal processing, communications, rapid prototyping, and system-level design methodology.

11. I have designed several specialized computer and communication systems over the past two decades at Georgia Tech for such tasks as wireless audio and video processing and protocol processing for portable platforms, such as cell phones and PDAs. I have designed systems that are efficient in view of performance,

size, weight, area, and thermal considerations. I have developed courses and classes for industry on these topics, and many of my lectures in advanced computer system design, developed under the sponsorship of the United States Department of Defense in the late 1990s, are available for educational use at <http://www.eda.org/rassp> and have been used by several U.S. and international universities as part of their course work. Some of my recent publications in the area of design of computer engineering and wireless communications systems and associated protocols are listed in Exhibit 2002.

12. In the mid-2006–2007 timeframe, I collaborated with Professor John Scharf and his colleagues at Emory Healthcare system in developing FFT-based pulse oximetry system prototypes on FPGAs (field-programmable gate arrays), which extended technologies developed by Prof. Scharf and his colleagues from the 1996 time frame (*See* T. Rush, R. Sankar, J. Scharf, “Signal Processing Methods for Pulse Oximetry,” *Comput. Bio. Med.*, Vol. 26, No. 2, 1996). Some of my more recent publications in the area of biological signal processing and bioinformatics are listed in my CV and include, A. Bahga, V. Madiseti, “Healthcare Data Integration and Informatics in the Cloud,” *IEEE Computer*, Vol. 48, Issue 2, 2015, and “Cloud-Based Information Integration Informatics Framework for Healthcare Applications,” *IEEE Computer*, Issue 99, 2013. In addition to my signal processing experience specific to pulse oximetry, I also have experience in developing systems

for other physiological signals. Beginning in the early 1990s, I worked, in particular, with ECG/EKG signals, and, in general, with biomedical signals and systems.

13. In addition to my signal processing experience specific to pulse oximetry, I also have experience in developing algorithms and systems for other physiological signals. I worked with ECG/EKG signals in particular, and biomedical signals and systems in general, beginning in the early 1990s. In particular, I worked with graduate student Dr. Shahram Famorzadeh, in 1990 and 1991, to analyze and apply pattern recognition (a category of signal processing algorithms that is based on correlation with a set of templates) to ECG/EKG waveforms to identify physiological conditions.

14. I have experience with biomedical signals and devices in the field of speech and image processing since the late 1980s. I developed deconvolution algorithms for use with physiological signals in the 1993-1998 timeframe. These signal processing techniques can be applied to pulse oximetry signals, and I have been working with these techniques since the mid-1980s.

15. I have studied, researched, and published in the area of adaptive filter signal processing for noise reduction and signal prediction, using correlation-based approaches since the mid-1980s, both in the time-domain and frequency domain, and also to ray-tracing applications, such as Seismic Migration for oil and shale gas exploration. See, e.g., V. Madisetti and D. Messerschmitt, Dynamically Reduced

Complexity Implementation of Echo Cancellers, IEEE International Conference on Speech, Acoustics and Signal Processing, ICASSP 1986, Tokyo, Japan; M. Romdhane and V. Madiseti, “All-Digital Oversampled Front-End Sensors” IEEE Signal Processing Letters, Vol. 3, Issue 2, 1996; “LMSGEN: A Prototyping Environment for Programmable Adaptive Digital Filters in VLSI,” VLSI Signal Processing, pp. 33–42, 1994.

16. Deconvolution of symmetric (seismic) and asymmetric (pulse oximetry) signals has gained much importance and some of my early work on “Homomorphic Deconvolution of Bandpass Signals” in IEEE Transactions on Signal Processing, October 1997, established several new methods for deconvolution of such signals that had several advantages of robustness, increased accuracy, and simplicity.

17. For over 20 years, I have worked in the area of user interfaces as part of my extensive development of applications for mobile devices. For example, in the late 1990s and early 2000s, I developed user interfaces for tools used by the United States Air Force, Lockheed Martin, and Boeing for automating the electronic design of complex chipsets and the reverse engineering of such components. As another example, from 1999–2003, I consulted with a team of engineers to design an integrated Soft Switch & Media Server, the SNX 850/8500, that was being sold and installed in Asia. The SNX 8500 was a one-box solution to VOIP, LAN

switching, and iPBX/PBX solutions for enterprise customers. I worked with that team of engineers to develop the user interfaces for the SNX 8500 product. More recently, I worked to develop a web-based document management environment called CatchUp, and developed the user interface for this product, which was subsequently commercialized as CatchUp Cloud.

18. I have studied, researched, and published in the area of user interface development, including on the development of user interfaces for applications on mobile platforms such as iPhone's iOS, Google's Android, or RIM's Blackberry. *See, e.g.*, N. Radia, Y. Zhang, M. Tatipamulaa, and V. Madisetii, "Next-Generation Applications on Cellular Networks: Trends, Challenges, and Solutions," Vol. 100, No. 4, April 2012, Proceedings of the IEEE.

19. I am a named inventor on 32 issued or allowed U.S. patents. Several of my patents disclose techniques for efficient user interface design, including the use of multi-level hierarchies and other innovations in user interface design. *See, e.g.*, U.S. Patent No. 11,741,052, U.S. Patent No. 11,314,695, U.S. Patent No. 11,226,938, U.S. Patent No. 11,080,240.

20. I have authored several peer-reviewed papers in the area of computer systems, instruments, and software design, and these include:

- Madisetti, et al., "The Georgia Tech Digital Signal Multiprocessor," IEEE Transactions on Signal Processing, Vol. 41, No. 7, July 1993.

- V. Madisetti et al., “Rapid Prototyping on the Georgia Tech Digital Signal Multiprocessor,” IEEE Transactions on Signal Processing, Vol. 42, March 1994.
- V. Madisetti, “Reengineering legacy embedded systems,” IEEE Design & Test of Computers, Vol. 16, Vol. 2, 1999.
- V. Madisetti et al., “Virtual Prototyping of Embedded Microcontroller-based DSP Systems,” IEEE Micro, Vol. 15, Issue 5, 1995.
- V. Madisetti, et al., “Incorporating Cost Modeling in Embedded-System Design,” IEEE Design & Test of Computers, Vol. 14, Issue 3, 1997.
- V. Madisetti, et al., “Conceptual Prototyping of Scalable Embedded DSP Systems,” IEEE Design & Test of Computers, Vol. 13, Issue 3, 1996.
- V. Madisetti, Electronic System, Platform & Package Codesign,” IEEE Design & Test of Computers, Vol. 23, Issue 3, June 2006.
- V. Madisetti, et al., “A Dynamic Resource Management and Scheduling Environment for Embedded Multimedia and Communications Platforms,” IEEE Embedded Systems Letters, Vol. 3, Issue 1, 2011.
- N. Radia, Y. Zhang, M. Tatipamulaa, and V. Madisetii, “Next-Generation Applications on Cellular Networks: Trends, Challenges, and Solutions,” Vol. 100, No. 4, April 2012, Proceedings of the IEEE.

21. Given my education and experience, I have been previously admitted as an expert witness in cases in the field of physiological monitoring technologies and user interfaces. For example, I have provided opinions regarding the validity of the '743 Patent and its related patent family members, U.S. Patent No. 10,687,745 ('745 Patent) and U.S. Patent No. 10,722,159 ("159 Patent") in the ITC Investigation and the Delaware Litigation. Therefore, I am familiar with the pulse oximetry technology described in the '743 Patent and the parties' dispute surrounding said technology.

II. MATERIALS AND INFORMATION CONSIDERED

22. I have been asked to provide technical expert opinions relating to the validity of the claims of the '743 Patent. In forming my opinions expressed in this Declaration, I have reviewed and considered the '743 Patent's claims, specification, drawings, and file history. I have also reviewed and considered Apple's petition, the prior art references that Apple relies on, the Declaration of Dr. Brian Anthony accompanying each petition, and all other exhibits Apple submitted in this proceeding. Additionally, I was asked by Masimo to provide opinions with respect to all four IPRs that Apple filed challenging claims of the '743 and '159 Patents (IPR2024-00241, -00242, -00243, and -00244). I have also reviewed the petitions and materials submitted in connection with those IPRs.

23. As mentioned above in Section I, I have provided my opinions regarding the validity of the '159 Patent, the '745 Patent, and the '743 Patent in other related cases. I thus have also considered the documents and information referenced expressly or implicitly in my expert reports or declarations in those related cases. I have also been provided with and considered all publicly filed papers and exhibits from IPR2022-01291 and IPR2022-01465 relating to the '745 patent. I note that various documents in IPR2022-01291 and IPR2022-01465 were filed under seal. While counsel has not provided me with copies of the papers and exhibits that were filed under seal in IPR2022-01291 and IPR2022-01465, I understand that the information under seal originated from testimony and documents in the ITC Investigation and relate to reasonable expectation of success and objective indicia of nonobviousness. I previously provided expert testimony in the ITC Investigation based on what I understand to be the same documents. I also provided opinions based on what I understand to be the same documents in the Delaware Litigation, as well as additional documents from the Delaware Litigation that are not yet available in these IPRs. I reserve the right to supplement my opinions if/when those additional documents become available for me to rely upon in these IPRs.

24. I have further reviewed and considered at least the following materials in preparing this Declaration:

Exhibit No.	Description
2003	Commission Opinion (Public), Certain Light-Based Physiological Measurement Devices and Components Thereof, Inv. No. 337-TA-1276, EDIS No. 808521 (ITC Oct. 26, 2023)
2029	June 6–10, 2022 Public Hearing Transcript, ITC Inv. No. 337-TA-1276
2032	November 17, 2023 Letter from U.S. Food & Drug Administration to Masimo Corp. re Masimo W1 510(k) Clearance
2035	Final Written Decision (Public Version), Apple Inc. v. Masimo Corp., IPR2022-01291 (Jan. 30, 2024)
2036	Final Written Decision (Public Version), Apple Inc. v. Masimo Corp., IPR2022-01465 (Feb. 2, 2024)
2037	Redacted Excerpt of the December 15, 2023 Rebuttal Report of Dr. Majid Sarrafzadeh (Apple's expert in the Delaware Litigation)
2038	Joint Claim Construction Statement Regarding Masimo Asserted Patents, Apple Inc. v. Masimo Corp., No. 22-1378-MN-JLH (Aug. 31, 2023)
2039	Petitioner's Reply (Public Version), Apple Inc. v. Masimo Corp., IPR2022-01291
2042	Masimo's Post-Hearing Brief (Public Version), ITC Inv. No. 337-TA-1276
2043	ITC Final Initial Determination (Public Version), ITC Inv. No. 337-TA-1276
2050	Apple Inc.'s Post-Hearing Brief (Public Version), ITC Inv. No. 337-TA-1276
2056	Excerpts of File History of App. No. 16/532,065

Exhibit No.	Description
2057	Excerpts of File History of App. No. 15/195,199
2072	Excerpt of Webster's II New College Dictionary (2001)
2074	Nonconfidential Excerpt of Page 65 from June 6-10, 2022 Hearing Transcript, ITC Inv. No. 337-TA-1276

To the extent not listed above, I have also reviewed any other materials referenced expressly or implicitly herein.

25. In forming my opinions in this Declaration, I have also relied upon my educational and professional experience. I understand that my analyses and opinions should be made from the perspective of one of ordinary skill in the art (i.e., a “POSITA”) related to the ’743 Patent at the relevant time, which is July 2, 2015.

26. Any figures appearing in this Declaration were prepared with the assistance of counsel and reflect my understanding of the ’743 Patent and the materials discussed in this Declaration.

III. APPLICABLE LEGAL STANDARDS

27. I am not an attorney and I will not offer opinions of law. However, I have been informed of several principles of law concerning patent claim construction and validity, which I apply in addressing the challenged claims.

A. Claim Construction

28. I understand that, in assessing the patentability of a patent claim, the Patent Office generally construes claim terms by giving them their ordinary and

customary meaning, as they would have been understood by a POSITA at the time of the invention in view of the intrinsic record (patent specification and file history). However, I understand that the inventors may, in the patent specification, expressly define a claim term to have a meaning that differs from the term's ordinary and customary meaning. I also understand that the inventors may disavow or disclaim certain claim scope, thereby departing from the ordinary and customary meaning, when the intrinsic record demonstrates that a clear and unambiguous disavowal or disclaimer has occurred. I understand that extrinsic evidence, such as relevant technical literature and dictionaries, may be useful in ascertaining how a POSITA would have understood a claim term, but the intrinsic record is the primary source for determining the meaning of claim terms. I further understand that claim terms should be construed the same way for purposes of validity and infringement. For the purposes of this review, and to the extent necessary, I have interpreted each claim term in accordance with the principles set forth in this paragraph.

B. Obviousness

29. I understand from counsel that, under 35 U.S.C. § 103, a patent claim is obvious if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date (which is July 2, 2015 here) to a person having ordinary skill in the art to which the claimed invention pertains.

30. I understand from counsel that the factors to be considered in an obviousness inquiry include: (1) the scope and content of the prior art, (2) the differences between the claimed subject matter and the prior art, (3) the level of ordinary skill in the pertinent art, and (4) objective considerations of nonobviousness (also referred to as secondary considerations) such as commercial success, industry praise, teaching away, long-felt need, failure of others, skepticism, unexpected results, and copying. I understand that all of these factors must be considered in an obviousness analysis. I also understand that to establish any such evidence as objective considerations of nonobviousness, a nexus must be shown between the evidence and the claimed invention.

31. I understand from counsel that the obviousness inquiry must be made without hindsight. I also understand from counsel that the POSITA cannot use the knowledge only taught by the patented invention against the patentee. I understand from counsel that care must be taken to avoid hindsight reconstruction by using the patent as a guide to combine prior art references to achieve the result of the challenged claims.

32. I understand from counsel that a reference is available as prior art if it is analogous art. I understand that a reference is analogous art if it falls within the same field of endeavor as the claimed invention or, if not, if it is reasonably pertinent to the particular problem to which the inventor is involved.

33. I understand from counsel that that the motivation to combine or modify the prior art must be clear and particular and be supported by more than conclusory statements. I also understand from counsel that the following principles signal that a motivation to make a proposed combination is lacking:

- a. If the proposed modification would render the prior art being modified unsatisfactory or inoperable for its intended purpose;
- b. If the proposed modification or combination of the prior art would change the principle of operation of the prior art being modified; and/or
- c. If the prior art teaches away from modifying or combining certain known elements.

34. I understand from counsel that even if a skilled artisan would be motivated to combine two or more prior art references, there must be a reasonable expectation that the combination would be successful. I also understand from counsel that a “reasonable expectation of success” does not require that a skilled artisan would have been absolutely certain that the invention would work for its intended purpose.

35. I understand from counsel that when combining disclosures from multiple references, combining multiple embodiments from a single reference, or selecting from large lists of elements in a single reference, there must be a motivation to make the combination and a reasonable expectation that such a combination would be successful.

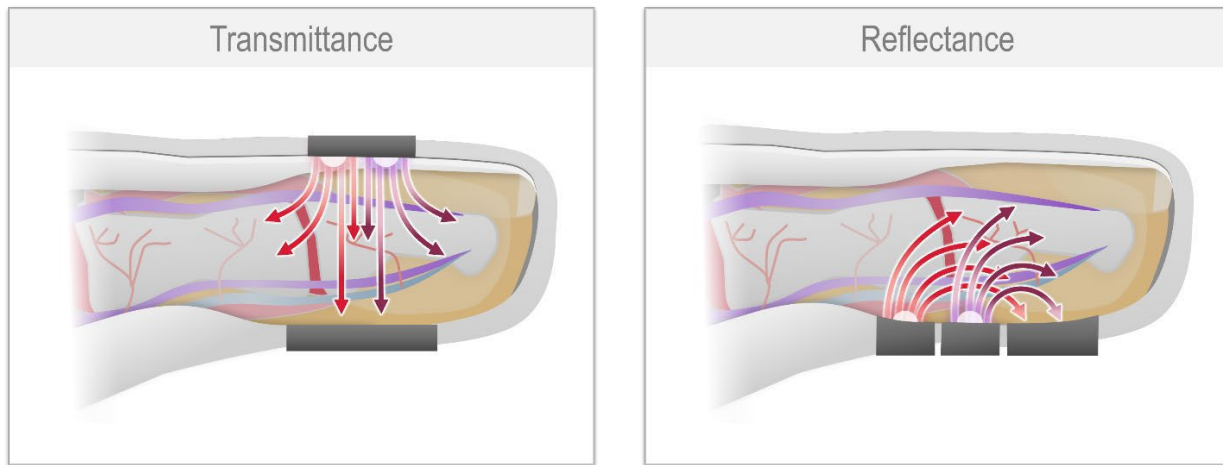
IV. BACKGROUND OF THE TECHNOLOGY

A. Light-Based Noninvasive Physiological Monitoring

36. Pulse oximetry is a noninvasive method of measuring the arterial oxygen saturation of a patient's blood. Pulse oximetry relies on the Beer-Lambert law, which allows the concentrations of oxygenated hemoglobin (oxyhemoglobin) and deoxygenated hemoglobin to be calculated by measuring the absorption of light through the user's blood at known wavelengths. *See* EX1001, 1:29–2:3; *see also* EX1013, 40, 44. Pulse oximeters typically use LEDs to emit light of at least two wavelengths, most commonly red and infrared. *See* EX1013, 34–36, 44; EX1001, 1:61–65. Red and infrared are typically chosen for use in pulse oximeters because hemoglobin absorbs more red light than oxyhemoglobin, while oxyhemoglobin absorbs more infrared light than hemoglobin. *See* EX1013 at 35, 44.

37. The emitted red and infrared light enters into the user's tissue where some of the light is absorbed by the blood and other tissue. *See* EX1013, 36–39. One or more photodetectors can then detect the amount of light that transmits through to the other side of the tissue or that reflects back out of the same side of the tissue that the light entered from. *See id.* A pulse oximeter where the photodetector and light emitters are placed on opposite sides of the tissue is known as a transmittance pulse oximeter, while a pulse oximeter that has the photodetector and light emitters on the

same side of the tissue is known as a reflectance pulse oximeter. *Id.* The following images illustrate a transmittance and reflectance pulse oximeter:



38. The photodetector(s) generate a photoplethysmography (PPG) signal for each wavelength of light. *See* EX1013, 35–36. The amount of blood in the patient’s arteries changes as the heart contracts (systole) and relaxes (diastole). *Id.* at 46–47. A PPG signal can be separated into a pulsatile (“AC”) component caused by arterial blood and a nonpulsatile (“DC”) component. *See id.* Complex algorithms can then be used to calculate a ratio of the AC/DC components for each of the red and infrared signals, resulting in a ratio of ratios. *Id.* at 48–51, 54. This ratio of ratios can then be mapped empirically to an oxygen saturation (SpO_2) value, which indicates the proportional amount of hemoglobin carrying oxygen. *Id.* at 54.

B. The ’743 Patent (EX1001)

39. The ’743 Patent is entitled “Physiological Measurement Devices, Systems, and Methods.” The ’743 Patent claims priority to a provisional application

filed July 2, 2015. The claimed devices and systems are the result of work conducted by inventor Ammar Al-Ali's research into measuring various physiological parameters, such as pulse oximetry, at the wrist in the 2014–2015 time frame. The sensor designs claimed in the '743 Patent include various features that improve the signals, which are typically obscured by noise, used to non-invasively measure physiological parameters, such as oxygen saturation, at difficult locations, such as the wrist. *See, e.g.*, '743 patent at 7:4–62, 8:54–9:10, 10:40–11:67, Figs. 7A–7B, Claims 1, 11, 14, 18.

40. For example, independent Claims 1 and 14 of the '743 Patent claim a novel sensor that measures from difficult locations such as the wrist using a device comprising an “optical transmission material ... configured to alter a direction of at least a portion of the light emitted from the one or more optical sources to shape an output light pattern ... the output light pattern comprising a different geometric shape than the initial light pattern.” Claims 1 and 14 also recite a “light block configured to prevent at least a portion of light” from the emitter from reaching the detectors without first reaching the tissue and a “surface comprising a dark-colored coating, the surface positioned between the plurality of detectors and the tissue, wherein an opening defined in the dark-colored coating is configured to allow at least a portion of light reflected from the tissue to pass through the surface.” The '743 Patent explains that the conventional two-dimensional approach to pulse

oximetry using a point optical source results in a problem known as “multiple scattering.” EX1001, 5:41–6:20. “Multiple scattering” refers to the phenomenon where the red and IR photon pathlengths vary through the tissue. *Id.* A study found that this variation in average pathlengths between the red and IR photons affects the calibration curve for a pulse oximeter, and therefore the accuracy of the measurements. *Id.* Al-Ali discovered that implementing the claimed devices, including the material that changes the shape of light, allowed for a three-dimensional approach which irradiates a large volume of tissue at the measurement site and improves accuracy. *Id.* at 6:21–7:3. Advantageously, the increased light interaction leads to more accurate oxygen saturation measurements. *Id.* at 6:64–7:3.

41. The additional features of a dark-colored coating and a light-block found in Claims 1 and 14 are also important to measurement accuracy. The ’743 Patent explains that the use of the dark-colored coating also addressed the “multiple scattering” problem caused by light reflecting back and forth between the user’s tissue and the sensor. EX1001, 8:54–9:7. The “light block” prevents unwanted LED light from reaching the photodiode detectors without first passing through the tissue. *Id.* at 10:49–51, 11:10–20, Figs. 7A-7B. This novel combination of features thus provides improved accuracy and ability to measure difficult physiological parameters, such as oxygen saturation at the wrist.

42. The novel combinations of features in the claimed inventions of the '743 Patent together allow improvement of the measurement of a user's physical parameters, such as oxygen saturation, at the user's wrist. *See, e.g.*, EX1001, 10:40-51, Figs. 7A-7B.

43. Based on Al-Ali's research and the resulting '743 Patent inventions, Masimo developed the Masimo W1™ which is a commercial medical-grade watch with a pulse oximeter that measures oxygen saturation continuously at the wrist. EX2029, 248:24-250:14.



44. I understand the Masimo W1™ has received FDA 510(k) clearance for over-the-counter (OTC) and prescription use (Rx) for oxygen saturation monitoring. EX2032. I also understand that as of today, Masimo remains the first and only

company in the world to have received FDA clearance for a pulse oximeter that measures continuously from the wrist.

C. Apple's Asserted References

1. Sarantos (EX1005)

45. U.S. Patent No. 9,392,946 to Sarantos et al. is titled “HEART RATE SENSOR WITH HIGH-ASPECT-RATIO PHOTODETECTOR ELEMENT” and was originally assigned to Fitbit, Inc. EX1005 at Title. Sarantos’s heart rate sensors have “high-aspect-ratio” (HAR) photodetector elements that differ from conventional square photodetector elements. *Id.* at 9:48–10:15. Compared to the conventional square photodetectors, Sarantos proposes using HAR photodetectors to improve light collection capabilities while maintaining substantially the same active area. *See id.* at 10:27–50, FIG. 5. Sarantos explicitly limits its discussion on HAR photodetectors to be “*primarily with respect to light sources that emit green light*, e.g., wavelengths in the range of 500 nm to 550 nm,” which are “particularly well-suited for photoplethysmographic techniques for measuring heart rate.” *Id.* at 18:35–44 (emphasis added). Sarantos cautions that “although it is contemplated that the photodetector element concepts discussed herein may see similar performance with light sources that emit light predominantly in the 500 nm to 600 nm range, which *includes yellow light as well as some light orange light*,” the invention is “*not* tailored for use in other spectrums, *such as the red or infrared spectra*,” which

Sarantos recognizes as the wavelengths used in blood oxygenation measurements.

Id. at 18:35–51 (emphasis added).

2. Shie (EX1007)

46. U.S. Patent No. 6,483,976 to Shie et al. is titled “OPTICAL ELEMENT HAVING AN INTEGRAL SURFACE DIFFUSER” and was originally assigned to Physical Optics Corporation. EX1007 at Title. Shie relates “generally to the field of optics, and more particularly to various optical elements incorporating an integral surface diffuser as a portion of the optical element.” *Id.* at Background of the Invention. Across 22 figures, Shie describes over a dozen different types of optical elements. *Id.* at FIGS. 1a-11. Shie is not related to health monitoring technologies and does not teach or suggest any application of its optical elements in any physiological sensor. *See generally id.* Shie makes no mention of a pulse oximeter. *See generally id.*

3. Han and Utter (EX1008, EX1006)

47. Apple also relies upon two additional references, Han (EX1008), and Utter (EX1006) for various limitations. However, as explained below, all of Apple’s grounds fail to demonstrate obviousness because Apple fails to demonstrate that Sarantos in combination with Shie would render the independent claims obvious. I reserve all rights to supplement my opinions regarding these references and Apple’s arguments based on these references if IPR is instituted.

V. LEVEL OF ORDINARY SKILL IN THE RELEVANT ART

48. The relevant field of art is devices and sensors for the non-invasive measurement of physiological parameters such as blood oxygen saturation. *See, e.g.*, EX1001 at 1:21–25 (“The present disclosure relates to the field of non-invasive optical-based physiological monitoring sensors, and more particularly to systems, devices and methods for improving the non-invasive measurement accuracy of oxygen saturation, among other physiological parameters.”).

49. I understand that the level of ordinary skill in the art for the ’743 Patent is measured as of July 2, 2015, which is the effective filing date of the ’743 Patent. In my opinion, a person of ordinary skill in the art as of the effective filing date of the ’743 Patent would have been 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 also had a Master of Science degree in a relevant academic discipline with less than a year of related work experience in the same discipline.

50. As explained above, based on my education and experience, I met and exceeded the qualifications for a POSITA prior to the effective filing date of the '743 Patent.

51. I have reviewed Apple's definition of a POSITA for the '743 Patent. Apple's definition is slightly different than mine. However, the difference is not material to the issues in this proceeding. I also met and exceeded the qualifications for a POSITA as defined by Apple.

VI. CLAIM CONSTRUCTION

A. "shape an output light pattern"

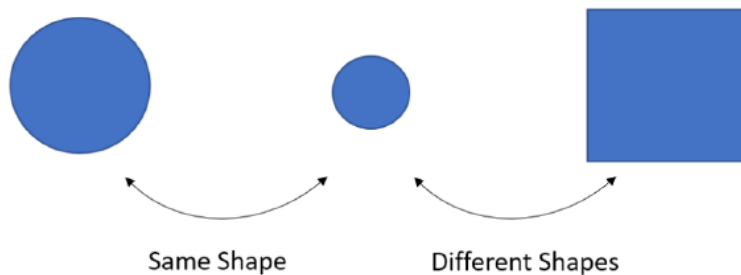
52. Apple's Petition argues that "no claim terms need be construed to resolve issues of controversy." Petition at 7. However, in the Delaware Litigation, Apple previously agreed to a construction of "shape an output light pattern" in independent Claims 1 and 14 to mean "change the shape (not just the size) of the light pattern that exits the optical transmission material from the shape of the light pattern received by it." EX2038, 5. In my opinion, the claims should be construed consistently with the parties' agreed-upon construction. As I explain further below, Apple failed to demonstrate that the Sarantos-Shie combination meets the "shape an output light pattern" limitation as the parties agreed it should be construed.

53. Claims 1 and 14 both recite an "optical transmission material ... wherein the optical transmission material is configured to alter a direction of at least

a portion of the light emitted from the one or more emitters to *shape an output light pattern* by which the emitted light is directed toward a surface of the tissue measurement site, wherein the output light pattern comprises a different geometric shape than the initial light pattern.” The parties’ agreed-upon construction confirms two points: (1) that merely changing the size of the light pattern is not within the scope of the claim, and (2) the relevant comparison is between the light pattern that is received by the optical transmission material and the light pattern that exits the optical transmission material.

54. Regarding “change the shape (not just the size),” the plain language of Claims 1 and 14 indicates that the “output light pattern” must be “a different geometric shape than the initial light pattern.” For example, if the first light pattern were a circle, a smaller circle would not be considered “a different geometric shape.” But a square would be considered a different geometric shape than a circle, as illustrated below.¹

¹ Where appropriate, I may reproduce figures and annotations from Dr. Duckworth’s prior declarations in IPR2022-01291 and IPR2022-01465. I have reviewed the public versions of his declarations (EX2002, EX2070, and EX2100 in IPR2022-01291 and -01465) and his prior opinions are consistent with my opinions.



55. The specification also supports the parties’ previously agreed-upon construction. The ’743 Patent uses the term “shape” when describing light, in accordance with its ordinary and customary meaning, e.g., rectangular, squares, circles, and donuts. The specification contains several examples of a material changing a first shape into a second shape. *See* EX1001, 7:63–8:14, 10:65–11:2. For example, the specification explains that a diffuser 304 can “distribut[e] the emitted light on the surface of a plane (e.g., the surface of the tissue measurement site 102) in a predefined geometry (e.g., a rectangle, square, or circle), and with a substantially uniform intensity profile and energy distribution.” *Id.* at 8:9–14. As another example, the specification explains that in Figure 7A, a “light diffuser 704 receives the optical radiation emitted from the emitter 702 and homogenously spreads the optical radiation over a wide, donut-shaped area.” *Id.* at 10:65–11:2. Thus, for example, intensity can, but not necessarily, affect shape if it can create new geometries, like for example, a circle inside another circle, as in the difference between a circular disk and a donut.

56. Additionally, the prosecution history of a related application (App. No. 16/532,065) supports the construction that a change in size is not a change in shape as required by the claims. Although the '065 Application is not in the direct continuity chain for the '743 Patent, it shares the same specification as the '743 Patent and claims priority to the same nonprovisional application (15/195,199) and provisional application (62/188,430). *See* EX1001 at 2. I also understand that Masimo filed a terminal disclaimer based on the '065 Application. *See* EX1002 at 63. During prosecution of the '065 Application, Masimo submitted a preliminary amendment which introduced a new claim 2 reciting the limitation: “a material positioned between the plurality of emitters and the tissue measurement site, the material configured to alter a shape of the light emitted from one or more of the plurality of emitters before the light reaches the tissue measurement site.” EX2056 at 40 (Sept. 16, 2019 Preliminary Amendment at 4).

57. On October 21, 2019, the Patent Office rejected the then-pending claim 2 based on two prior art references, Fei (U.S. Pat. App. 2014/0361147) and Scharf (U.S. Pat. 5,830,137). EX2056 at 59–60, 69–71 (Oct. 21, 2019 Office Action at 3–4, 13–15). In the office action, the Examiner relied on lenses in Fei and Scharf for teaching the “material is configured to alter a shape of the light.” *Id.* at 59.

58. In a November 14, 2019 response to the office action, Masimo amended the relevant portion of claim 2 as follows:

a material positioned between the plurality of emitters and a[[the]] tissue measurement site, the material configured to ~~alter a shape of~~ distribute the light emitted from one or more of the plurality of emitters ~~before the light reaches the tissue measurement site~~ to form a customized shape on a surface of the tissue measurement site;

a plurality of detectors configured to detect the light after attenuation by tissue, the plurality of detectors further configured to output at least one signal responsive to the detected light;

EX2056 at 82 (Nov. 14, 2019 Amendment at 2).

59. Then, on January 7, 2020, Masimo filed a supplemental amendment, further amending claim 2 as follows:

a material positioned between the plurality of emitters and a[[the]] tissue measurement site, the material configured to alter a shape [[of]]by which the light emitted from one or more of the plurality of emitters is distributed onto a surface of~~before the light reaches the tissue measurement site;~~

EX2056 at 113 (Jan. 7, 2020 Amendment at 2).

60. On February 13, 2020, Masimo interviewed the application with the Examiner. *Id.* at 162 (March 23, 2020 Summary of Interview at 1). The interview summary stated: “Agreement was reached that Applicant’s proposed claim amendments, which reflect *a change in shape of emitted light beyond a change in size*, defined over the Examiner’s citation of judicial notice of emitted light passing through a lens.” *Id.* (emphasis added).

61. On March 9, 2020, the Examiner issued a Notice of Allowability. *Id.* at 151 (March 9, 2020 Notice of Allowance). With Masimo’s authorization during

an interview, the Examiner amended claim 2 by inserting the “first shape” and “second shape” limitations:

a material positioned between the plurality of emitters and a tissue measurement site on a wrist of a user, the material configured to alter ~~the~~ a first shape into a second shape by which the light emitted from one or more of the plurality of emitters is distributed onto a surface of the tissue measurement site;

Id. at 157 (March 9, 2020 Notice of Allowance at 2).

62. Thus, based on the prosecution history, a POSITA would understand that the “shape an output light pattern” does not encompass changing the size of the light pattern.

63. Additionally, because it is the “optical transmission material” that is “configured to alter a direction of at least a portion of the light emitted from the one or more emitters to shape an output light pattern,” the relevant comparison is between the light pattern received by the optical transmission material and the light pattern exiting the optical transmission material. This conclusion, which Apple and Masimo both agreed to in the Delaware Litigation, also reflects Apple’s representation regarding the related ’745 Patent during the ITC Investigation. *See* EX2074 at 65:13–23 (Apple’s counsel representing “the relevant comparison is between the shape of the light when it reaches the MLA [material] and the shape of the light when it emerges from the MLA [material].”).

64. Thus, based on the intrinsic evidence and the parties' previous agreement and statements, "shape an output light pattern" in Claims 1 and 14 should be construed to mean "change the shape (not just the size) of the light pattern that exits the optical transmission material from the shape of the light pattern received by it."

VII. SUMMARY OF OPINIONS

65. It is my conclusion, from a technical point of view, that Claims 1, 3–14, and 16–25 of the '743 Patent would not have been obvious to a POSITA based on the grounds asserted by Apple in the '242 Petition. In particular, it is my opinion that:

- (Ground 2A)² Claims 1, 3–6, 9–13, and 22–25 would not have been obvious over Sarantos and Shie;
- (Ground 2B) Claim 7 would not have been obvious over Sarantos, Shie, and Utter;
- (Ground 2C) Claim 8 would not have been obvious over Sarantos, Shie, and Han;
- (Ground 2D) Claims 14 and 16–21 would not have been obvious over Sarantos, Shie, Utter, and Han.

² There is no Ground 1 in the Petition.

VIII. ANALYSIS

A. Claims 1 and 14 and Dependent Claims: Apple Failed to Demonstrate that the Sarantos-Shie Combination Shapes the Output Light Pattern

66. As discussed above with respect to claim construction, Claims 1 and 14 recite an “optical transmission material” which is “configured to alter a direction of at least a portion of the light emitted from the one or more emitters to shape an output light pattern by which the emitted light is directed toward a surface of the tissue measurement site, wherein the output light pattern comprises a different geometric shape than the initial light pattern” (limitations [1b] and [14b]). Apple addresses Claim 1 in Ground 2A. *See* Petition at 15. Apple addresses Claim 14 in Ground 2D by cross-referencing its Ground 2A argument. *See id.* at 57-58. Apple fails to demonstrate that the Sarantos-Shie combination discloses or renders obvious this limitation.

67. First, it is unclear what the Sarantos-Shie combination even entails. Despite presenting this combination of references in multiple proceedings, including the ITC Investigation, the Delaware Litigation, and other IPRs, Apple has not identified what disclosure in Shie is to be combined with Sarantos. Shie has nothing to do with physiological monitoring. Instead, Shie provides descriptions of over a dozen different types of optical elements across 22 figures, including a Fresnel lens, two different cylindrical lenses, a parabolic convex lens, a fiber optic cable, a

prismatic element, a polarizer, a wave guide filter grating, and a parabolic concave lens. *See* EX1007 at Figs. 1a-11, 4:49–5:25. In the Petition, Apple argues that it would have been obvious to a POSITA “to use the light shape changing material of Shie in the window region ... of Sarantos’s wristwatch sensor.” Petition at 10. But Apple never explained *which* particular optical element from Shie is the “light shape changing material” that a POSITA would supposedly use in Sarantos. Instead, Apple vaguely referred to numerous optical elements disclosed by Shie. For example, Apple stated, “Shei [sic] provides *numerous examples of various lens shapes and structures* that provide the disclosed light shaping functionality” but did not explain which one would be integrated into Sarantos. Petition at 11 (emphasis added). Apple then broadly references numerous different optical elements in Shie’s Figures 1a, 1b, 3a, 3b, 8a, 8b, 5a, 5b, 6a, and 6b and even “[o]ther embodiments/examples described in Shie.” *Id.* at 11–12. But those referenced figures describe a Fresnel lens, a parabolic convex lens, a parabolic concave lens, a prismatic optical element, and a polarizer. *See* EX1007 at 4:49–5:25 (describing Shie’s figures). Without clearly identifying the proposed combination, it is impossible to evaluate whether the Sarantos-Shie combination satisfies the limitation of an “optical transmission material” which is “configured to alter a direction of at least a portion of the light emitted from the one or more emitters to shape an output light pattern by which the emitted light is directed toward a surface of the tissue measurement site, wherein the

output light pattern comprises a different geometric shape than the initial light pattern.”

68. Moreover, Apple does not demonstrate that the Sarantos-Shie combination is “configured to alter a direction of at least a portion of the light emitted from the one or more emitters to shape an output light pattern by which the emitted light is directed toward a surface of the tissue measurement site, wherein the output light pattern comprises a different geometric shape than the initial light pattern.” At best, Apple relies on vague references in Shie’s disclosure that mention the words “shape” or “shaping” and then incorrectly equates the claimed “optical transmission material” with a mere diffuser. Neither is sufficient to demonstrate that the Sarantos-Shie combination results in “a different geometric shape than the initial light pattern” which is not just a change in size.

69. For example, Apple referenced vague disclosures in Shie that use the words “shape” or “shaping”:

- “Shie describes a diffuser that has a ‘light diffusing and shaping advantages’ and changes a first shape of light into a second shape regardless of the first shape of light.” Petition at 10 (citing Shie at 6:61–7:7).
- “As Shei [sic] describes, each disclosed light shaping element includes ‘micro-structures’ that function ‘to control the direction of light output

from a light source so as to *shape* the light output into a desired distribution pattern or envelope.” Petition at 11 (citing Shie at 5:35–45) (emphasis added).

- “[T]he window 2226 includes Shie’s diffuser ... which has ‘light diffusing and shaping advantages’ and can increase light transmission.”

Petition at 18 (citing Shie at 6:61–7:7).

However, these vague references are not sufficient to demonstrate that the Sarantos-Shie combination “change[s] the shape (not just the size) of the light pattern that exits the optical transmission material from the shape of the light pattern received by it,” as the parties agreed the claim should be construed, or that it results in an output light pattern with a “different geometric shape than the initial light pattern.” Shie contains no such disclosure about changing the shape of the light pattern that is received by an optical material into a different geometric shape exiting the optical material. *See generally* EX1007.

70. Apple also incorrectly equates the claim limitation with a mere diffuser. Specifically, Apple argues that “[i]t would have been obvious to a POSITA that when light passes through a diffuser, the diffusion action generally causes the multiple directions of the light to increase or spread and alter and impact the shape of the output light pattern.” Petition at 19. That is incorrect. Diffusion does not, in and of itself, result in changing the shape, not just the size, of the light pattern. A POSITA

also would not understand that “diffusion action” is sufficient to meet the claim limitation. The ’743 Patent explains that a diffuser is something that must be “*further configured* to define a surface area shape.” EX1001, 3:7–10 (emphasis added). Moreover, claim differentiation also confirms that a diffuser is not sufficient to meet the claim language. Specifically, independent Claim 22 recites “a diffuser” and dependent Claim 23 further recites that “the diffuser comprises an optical transmission material configured to ... shape an output light pattern ... wherein the output light pattern comprises a different geometric shape than the initial light pattern.” Thus, a POSITA would understand from the specification and the plain language of the claims that a “diffuser” is broader than the claimed “optical transmission material” and does not necessarily produce an “output light pattern comprising a different geometric shape than the initial light pattern.” I understand that the ITC also came to the same conclusion about the related ’745 Patent. *See* EX2043, 190 n.71 (finding that “light diffusion, in itself, does not necessarily provide changes in ‘shape.’”).

71. I also note that Apple’s argument is inconsistent with the parties’ agreed-upon construction. As noted above, the parties agreed that the “shape an output light pattern” limitation does not encompass a mere change in size. However, Apple argued in the petition that “diffusion action generally causes the multiple directions of the light to *increase or spread and alter and impact the shape* of the

output light pattern.” Petition at 19 (emphasis added). That describes increasing the size of the light pattern, not the geometric shape. Under the parties’ agreed-upon construction, that does not satisfy the “shape an output light pattern” limitation. I also note that Apple included a citation to [9]. *See* Petition at 19 (citing [9]). But Apple’s discussion in [9] about a cylindrical lens is unrelated to and does not support Apple’s contention that “diffuser action” is sufficient to demonstrate a “different geometric shape.” *See* Petition at 33–36.

72. Accordingly, in my opinion, Apple has not demonstrated that the Sarantos-Shie combination discloses or renders obvious limitations [1b] and [14b] in Grounds 2A and 2D. Accordingly, Apple has not demonstrated that Claims 1 and 14 and their dependent claims would have been obvious in Grounds 2A–2D.

B. All Claims: Apple Fails to Demonstrate a Motivation to Combine Sarantos and Shie

73. Apple’s challenges to all claims in all grounds of this Petition also fail because Apple failed to demonstrate that a POSITA would have been motivated to combine Sarantos and Shie. I understand that the Board previously found in IPR2022-01465 that Apple failed to demonstrate a motivation to combine Sarantos and Shie. *See* EX2036 (IPR2022-01465, Final Written Decision) at 143–144. Based on my review, Apple’s Petition presents substantially the same arguments regarding motivation to combine Sarantos and Shie that it previously presented in IPR2022-

01465, and therefore also fails to demonstrate a motivation to combine for the same reasons.

74. First, a motivation to combine is necessary because Sarantos and Shie have nothing to do with each other. Sarantos describes improvements to a heart rate sensor by replacing conventional square photodetector elements with high-aspect-ratio (HAR) photodetector elements to improve light collection capabilities. *See generally* EX1005. Sarantos does not discuss shaping the light by configuring a material between the LED and the user's skin. *Id.* In contrast, Shie has absolutely no relation to physiological sensors at all. *See generally* EX1007. Shie is not related to health monitoring technologies and does not teach or suggest any application of its optical elements in any physiological sensor, pulse oximeter or heart rate sensor. *Id.* Instead, it discusses “automotive applications” such as “interior dome lights, simple trailer lights” and “vehicle taillamp construction.” *Id.* at 6:8–11. Nor does Shie solve any problem related to photoplethysmography that would have motivated an inventor to look towards combining Sarantos with Shie. There is no reason why a POSITA would have looked to Shie at all.

75. The Petition provides the same three rationales for why a POSITA would supposedly combine Sarantos and Shie that the Board previously rejected. *See* Petition at 12–15. First, Apple argues the combination would “direct more of the emitted light toward the tissue so as to increase power efficiency by shining light

closer to photodiodes.” *Id.* at 12. Second, Apple argues the combination would “increase accuracy of measurements by directing light towards a sufficient spatial area to decrease the likelihood of irregular readings caused by moles or other small or local aberrations on the skin.” *Id.* at 13. Third, Apple argues the combination would “obscure appearance of the light source from a user.” *Id.* at 14. But like in IPR2022-01465, Apple failed to identify *which* optical element from Shie could provide these alleged benefits and *how*. Instead, as discussed above, Apple left the Sarantos-Shie combination vague by broadly referencing “numerous examples of various lens shapes and structures” without explaining which of those various structures is to be evaluated. Petition at 11.

76. I have been informed and understand that to establish a motivation to combine with a reasonable expectation of success, one must provide a clear and evidence-supported account of the contemplated workings of the combination. But without clearly explaining what the Sarantos-Shie combination even entails, it is impossible to evaluate whether the Sarantos-Shie combination can provide the three alleged motivations to combine. Indeed, I understand that the Board previously found that Apple’s motivations to combine Sarantos and Shie failed for this exact reason. In IPR2022-01465, the Board concluded, “[I]t is impossible to evaluate the merits of these assertions without first identifying a particular lens structure for use in Sarantos’s Figure 22 sensor. We reject the notion that *any* light shape changing

material would have achieved these three benefits in Sarantos’s Figure 22 sensor.” EX2036 (IPR2022-01465, Final Written Decision) at 143–144. I agree with the Board’s prior conclusion. Because Apple has not clearly explained what the Sarantos-Shie combination is, it is impossible to evaluate whether a POSITA would have been motivated by the three alleged benefits.

77. Moreover, Apple’s first and second purported benefits contradict each other as directing the light closer to the photodetectors and directing light “towards a sufficient spatial area” describe opposite effects. Petition at 12–13. Neither Apple nor Anthony have ever explained in this or any other related IPR against the ’743, ’159, and ’745 Patents how an optical element can simultaneously precisely direct light towards the photodetectors and direct light toward a larger area.

78. I also note that under the second argument, Apple further alleged that “a POSITA would have found it obvious that light diffusion would have allowed the designers of the resulting device to match the light intensity to the general shape of the body, or to provide sufficient illumination over a heterogeneous region of tissue, so as to be insensitive to local tissue variations, and provide the most accurate physiological parameter detection.” Petition at 14 (citing EX1003, ¶48). That is incorrect for several reasons. First, the statement does not make any sense on its face. Neither Apple nor Dr. Anthony explain what it means to “match the light intensity to the general shape of the body.” Second, neither Apple nor Dr. Anthony cited any

evidence suggesting that a POSITA would have been so motivated. Rather, Apple appears to have relied on its own confidential information from its development of the Apple Watch blood oxygen sensor, based on documents submitted in previous IPRs, as the basis for the alleged motivation. *See* EX2035 (IPR2022-01291, Paper 76) at 84 (public decision describing “unpredictable tissue heterogeneity” as a challenge that Apple’s engineers had to solve for oxygen saturation at the wrist). In other words, Apple relied on impermissible hindsight, using information that no POSITA would have had access to in mid-2015, to provide a motivation to combine.

79. For at least the foregoing reasons, Apple has not demonstrated that a POSITA would have been motivated to combine Sarantos and Shie. Thus, Apple has not demonstrated that any claim of the ’743 Patent would have been obvious based on its various grounds, all of which rely on a combination of Sarantos and Shie.

80. In view of the above, it is my opinion that Apple has not demonstrated that any of the independent claims of the ’743 Patent would have been obvious. Accordingly, Apple also has not demonstrated that any dependent claims would have been obvious either. Thus, it is my opinion that none of Apple’s grounds would render any of the challenged claims obvious.

IX. CONCLUSION

81. As set forth in this Declaration, it is my opinion that Apple has failed to demonstrate that any of the challenged claims of the '743 Patent would have been obvious to a POSITA at the time of the invention of the '743 Patent.