

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

WHOOP, INC.

Petitioner,

v.

OMNI MEDSCI, INC.,
Patent Owner

U.S. Patent No. 10,874,304

Case No. IPR2025-01584

PATENT OWNER'S PRELIMINARY RESPONSE

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LISTING OF EXHIBITS

Exhibit No.	Description
2001-2013	Reserved
2014	Roggo, Y., et al., “A review of near infrared spectroscopy and chemometrics in pharmaceutical technologies,” <i>Journal of Pharmaceutical and Biomedical Analysis</i> , 44, 683–700 (2007)
2015	Buttussi, F., et al., MOPET: A context-aware and user-adaptive wearable system for fitness training, <i>Artificial Intelligence in Medicine</i> (2008) 42, 153-163
2016	<i>Apple Inc. v. Omni MedSci, Inc.</i> , IPR2019-00912, Paper 1 (PTAB Apr. 10, 2019)
2017	<i>Apple Inc. v. Omni MedSci, Inc.</i> , IPR2019-00913, Paper 1 (PTAB Apr. 10, 2019)
2018	<i>Apple Inc. v. Omni MedSci, Inc.</i> , IPR2019-00914, Paper 1 (PTAB Apr. 10, 2019)
2019	<i>Apple Inc. v. Omni MedSci, Inc.</i> , IPR2019-00915, Paper 1 (PTAB Apr. 10, 2019)
2020	<i>Apple Inc. v. Omni MedSci, Inc.</i> , IPR2020-00029, Paper 1 (PTAB Oct. 17, 2019)
2021	<i>Apple Inc. v. Omni MedSci, Inc.</i> , IPR2020-00175, Paper 1 (PTAB Dec. 11, 2019)
2022	Defendant's Invalidity Contentions, <i>Omni MedSci, Inc. v. Apple Inc.</i> , Case No. 2: 18-cv-00134 (E.D. Tex.) (Aug. 28, 2018)
2023	Defendant's Invalidity Contentions - Exhibit A, <i>Omni MedSci, Inc. v. Apple Inc.</i> , Case No. 2:18-cv-134-RWS (E.D. Tex.) (Aug.

Exhibit No.	Description
	28, 2018)
2024	Defendant's Invalidity Contentions - Exhibit N, <i>Omni MedSci, Inc. v. Apple Inc.</i> , Case No. 2:18-cv-134-RWS (E.D. Tex.) (Aug. 28, 2018)
2025	Defendant's Invalidity Contentions - Exhibit P, <i>Omni MedSci, Inc. v. Apple Inc.</i> , Case No. 2:18-cv-134-RWS (E.D. Tex.) (Aug. 28, 2018)
2026-2030	Reserved
2031	First Amended Complaint, <i>Omni MedSci, Inc. v. Whoop, Inc.</i> , No. 1:25-cv-00140 (D. Del.) (May 5, 2025)
2032	Complaint, <i>Omni MedSci, Inc. v. Whoop, Inc.</i> , No. 1:25-cv-00140 (D. Del.) (Feb. 3, 2025)
2033	Defendant Whoop, Inc.'s Motion to Stay Pending Inter Partes and Post Grant Review, <i>Omni MedSci, Inc. v. Whoop, Inc.</i> , No. 1:25-cv-00140 (D. Del.) (October 22, 2025)
2034	Scheduling Order, <i>Omni MedSci, Inc. v. Whoop, Inc.</i> , No. 1:25-cv-00140 (D. Del.) (November 10, 2025)
2035	Transcript of Case Scheduling Hearing Conducted on October 24, 2025, <i>Omni MedSci, Inc. v. Whoop, Inc.</i> , No. 1:25-cv-00140 (D. Del.)
2036-2039	Reserved
2040	Complaint, <i>Cheetah Omni, LLC V. Whoop, Inc.</i> , 6:23-cv-478

Exhibit No.	Description
	(W.D. Tex.) (June 30, 2023)
2041	Reserved
2042	Plaintiff's Answering Brief in Opposition to Defendant's Motion To Stay Pending <i>Inter Partes</i> and Post Grant Review, <i>Omni Medsci, Inc. v. Whoop, Inc.</i> , No. 1:25-Cv-00140 (D. Del.) (November 5, 2025)
2043	Docket Navigator Statistics for United States Circuit Judge William C. Bryson, Pre-Institution Stay Requests
2044	Defendant's Answer to First Amended Complaint for Patent Infringement, <i>Omni Medsci, Inc. V. Whoop, Inc.</i> , No. 1:25-cv-00140 (D. Del.) (Sept. 29, 2025)
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2047	<i>Curriculum vitae</i> of Prof. Igor Efimov, Ph.D
2048	Statutory Disclaimer of U.S. Patent No. 10,874,304 dated November 11, 2025
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2050	<i>Apple Inc. v. Omni MedSci, Inc.</i> , IPR2019-00914, Paper 13 (PTAB Nov. 6, 2019)

Exhibit No.	Description
2051	<i>Whoop Inc. v. Omni MedSci, Inc.</i> , PGR2026-00003, Petition for Post Grant Review of Patent No. 12,193,790 (Paper 1) (PTAB Oct. 12, 2025)
2052	Pretto JJ, Roebuck T, Beckert L, Hamilton G., Clinical use of pulse oximetry: <i>Official guidelines from the Thoracic Society of Australia and New Zealand</i> , <i>Respirology</i> (2014) 19:38–46.
2053	Declaration of Igor Efimov (Exhibit 2031), <i>Samsung Elecs. Co. et al. v. Omni MedSci, Inc.</i> , IPR2025-01251 (P.T.A.B. Nov. 12, 2025) ('304 IPR)
2054	Statutory Disclaimer of U.S. Patent No. 10,874,304 dated January 2, 2026.
2055-2057	Reserved
2058	U.S. Patent No. 12,193,790

Omni MedSci, Inc. ("Patent Owner") submits this Preliminary Response under 37 C.F.R. § 42.107 to the Petition for *Inter Partes* Review ("Petition") of U.S. Patent No. 10,874,304 ("the '304 Patent"), filed by WHOOP, Inc. ("Petitioner").

I. INTRODUCTION

Patent Owner respectfully requests that the Director deny institution because Petitioner has not shown that any remaining challenged claim of the '304 Patent is unpatentable in relation to any ground raised in the Petition.

Petitioner fails to show obviousness of the "arc" limitations that are recited in multiple challenged claims, as Petitioner fails to establish specifically why or how a person of skill in the art ("POSITA") would have implemented the relied-upon teachings of Soller in Lisogurski for these limitations. A POSITA would not have been motivated to make the alleged combinations.

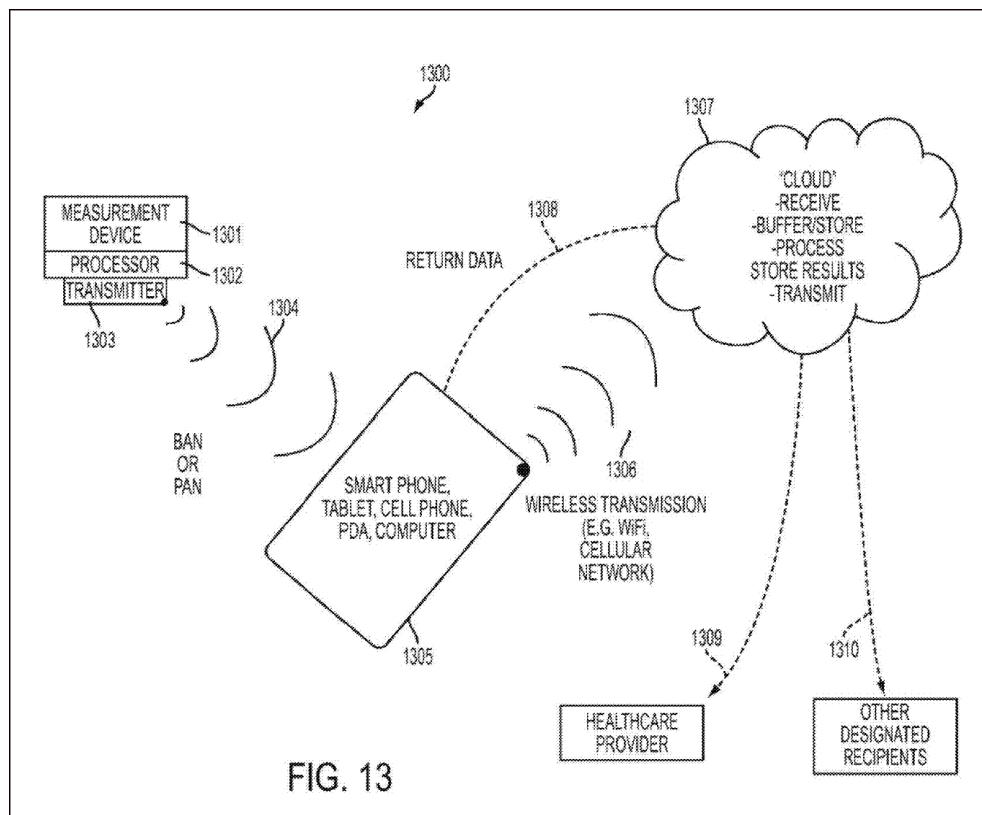
Petitioner also fails to show that Lisogurski and/or Tran discloses the "selection or identification of an object" limitation recited in other challenged claims. Lisogurski and Tran's pulse oximeter performs parameter measurement, not object identification or selection.

II. OVERVIEW OF THE '304 PATENT

The '304 Patent discloses a comprehensive system for optical measurement and data management that integrates optical signal acquisition, processing, wireless

transmission, and cloud-based storage and computation to enable non-invasive physiological monitoring and data analytics. EX1001, Abstract; EX2046, ¶55.

An exemplary physiological measurement or blood constituent monitoring system including a measurement device 1301, a personal device 1305 such as a smartphone or tablet, and a cloud server 1307 is illustrated in FIG. 13:



EX1001, FIG. 13, 33:45-50; 34:58-61; EX2046, ¶56.

The '304 Patent extends beyond physiological monitoring by incorporating identification capabilities that use algorithmic analysis of spectral data from multiple wavelengths. EX1001, 35:17-23; EX2046, ¶57. The '304 Patent discloses that “pattern matching algorithms and other software and mathematical methods” can

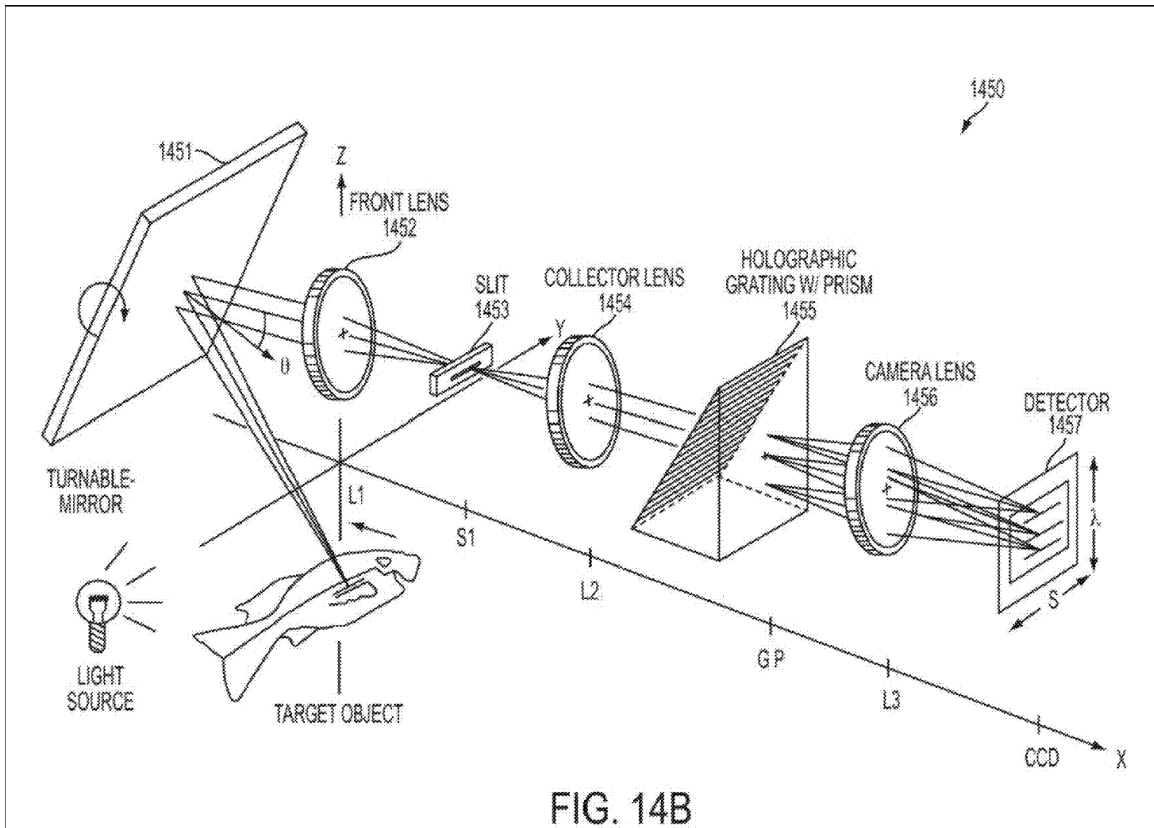
identify specific blood constituents. EX1001, 35:17-19; EX2046, ¶57. It further explains that spectral data may be compared with a “library of known spectra” to calculate overlap integrals and apply threshold functions to quantify constituent concentrations. EX1001, 35:19-23; EX2046, ¶57.

The '304 Patent further states that various blood constituents exhibit distinct near-infrared signatures, requiring spectroscopy and spectral fingerprinting to accurately identify glucose. EX1001, 4:58-62; EX2046, ¶58. The '304 Patent explains that constituent selection and analysis can be enhanced using advanced mathematical and signal processing methods, including multiple linear regression, partial least squares, and principal component regression (PCR). EX1001, 20:7-17; EX2046, ¶58.

The '304 Patent additionally describes identifying materials and biological constituents using optical techniques in the short-wave infrared (SWIR) range. EX1001, 20:41-49; EX2046, ¶59. The SWIR region captures characteristic molecular vibrations, allowing substances such as glucose, ketones, and many solids to exhibit unique spectral signatures, which can be used for identification through “stand-off detection or remote sensing.” EX1001, 20:41-49; EX2046, ¶59.

The '304 Patent also describes a reflective surface. EX1001, 31:6-9; 36:60-67; EX2046, ¶60. The claims recite that “the measurement system further comprises a reflective surface to receive and redirect at least some of the at least a portion of

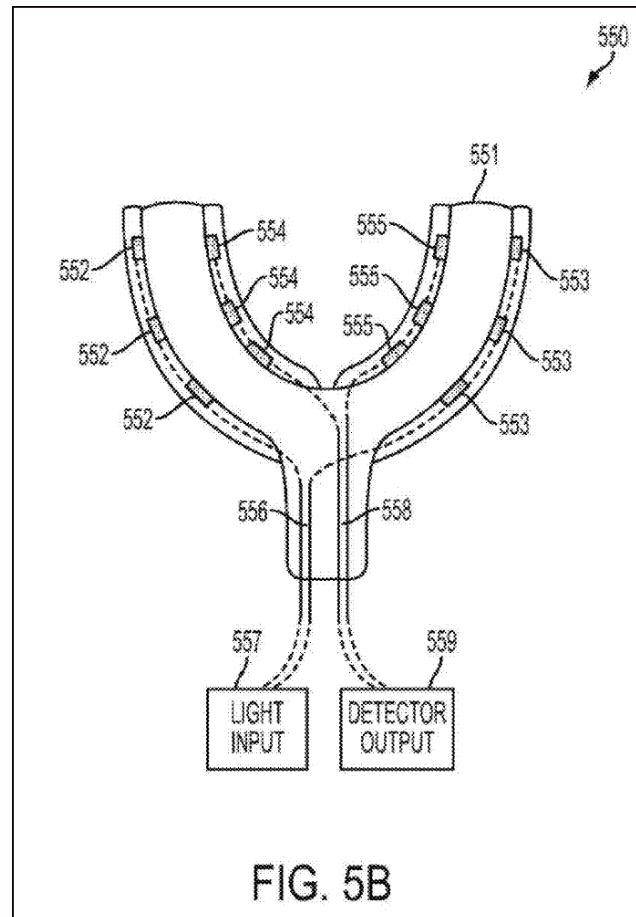
the analysis output beam reflected or transmitted from the sample.” EX1001, 36:60-67; EX2046, ¶60. For example, the '304 Patent discloses that, as illustrated in FIG. 14B (reproduced below), “the input light may be directed first by a tunable mirror 1451.” EX1001, 31:6-9; EX2046, ¶60.



EX1001, FIG. 14B.

The '304 Patent further specifies a distinct spatial arrangement of light sources and detectors along arcs. EX1001, 17:56-59; 37:6-13; EX2046, ¶61. Certain claims recite that “the receiver comprises a plurality of detectors arranged along a first arc, and wherein the plurality of semiconductor sources are arranged along a second arc” EX1001, 37:6-13; EX2046, ¶61. As illustrated in FIG. 5B (reproduced below), as an

example, “the mouth guard may have one or more light source input ports 552, 553 and one or more detector output ports 554, 555.” EX1001, 17:56-59; EX2046, ¶61.



EX1001, FIG. 5B.

III. PATENT OWNER'S STATUTORY DISCLAIMER

Patent Owner has statutorily disclaimed 1-3, 11, 14, 19, 20, 25 and 27 of the '304 Patent. EX2048; EX2054. The Board has held that such disclaimers are not a request for adverse judgment and do not give rise to estoppel as to the remaining challenged claims. *Daikin Industries, Ltd. v. Chemours Co. FC, LLC*, IPR2018-00993, Paper 12 at 2-7 (PTAB Nov. 13, 2018); *see also* 37 C.F.R. § 42.107(e).

IV. LEVEL OF SKILL IN THE ART

Petitioner proposes the following definition for a POSITA in relation to the '304 Patent:

A person of ordinary skill in the art ("POSITA") at the time of the alleged invention (December 2012) would have had good working knowledge of optical sensing techniques and their applications, and familiarity with optical system design and signal processing techniques. [] The POSITA would have an undergraduate degree in engineering (electrical, mechanical, biomedical, or optical) or a related field of study, along with relevant experience studying or developing physiological monitoring devices (e.g., non-invasive optical biosensors) in industry or academia. [] Lack of professional experience can be remedied by additional education, and vice versa.

Petition, 14. For purposes of this Preliminary Response, Patent Owner adopts Petitioner's proposed definition. EX2046, ¶¶51-54.

V. SUMMARY OF REFERENCES IN THE PETITION

Petitioner challenges claims 1-27 of the '304 Patent as being allegedly obvious in Grounds 1-6, which involve various combinations of the following references: Lisogurski, Carlson, Debreczeny, Valencell-093, Soller, and Tran. Petition, 9-12.

A. Lisogurski (EX1027) (Grounds 1-6)

Lisogurski describes a non-invasive system for measuring parameters related to a subject's blood. EX1027, 3:61-4:5; EX2046, ¶89. The system is illustrated in Figures 3 and 1:

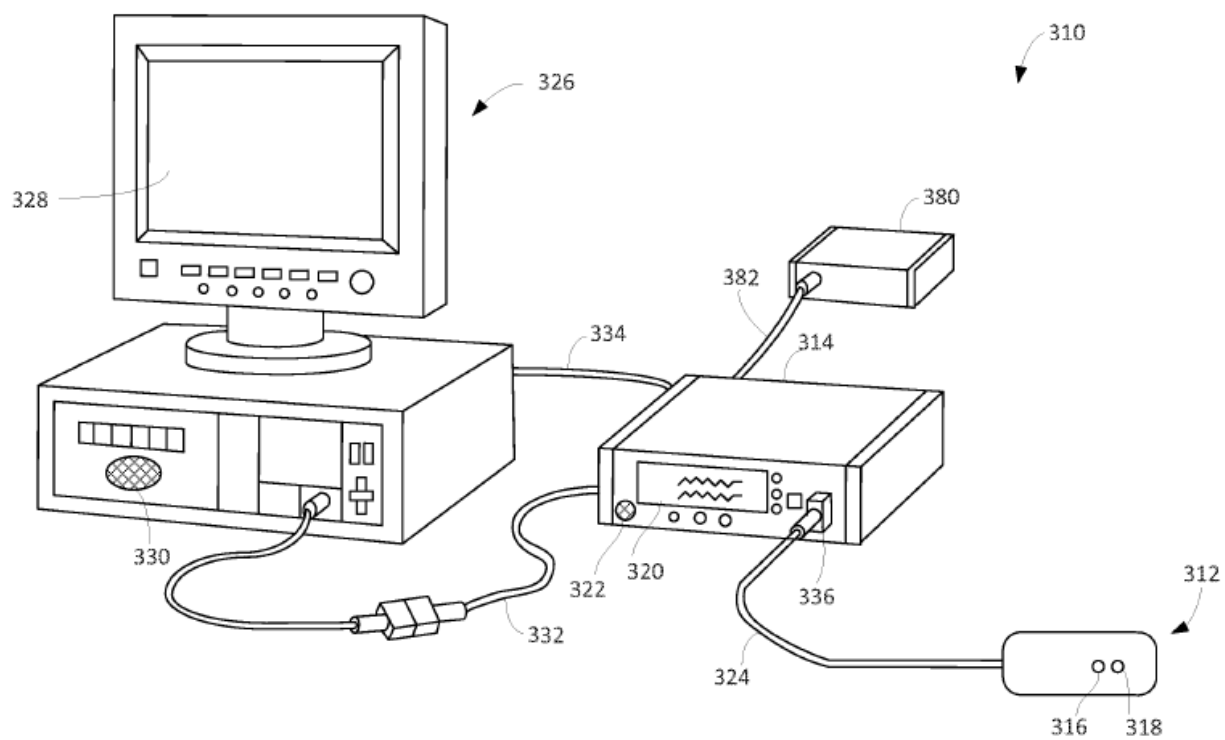


FIG. 3

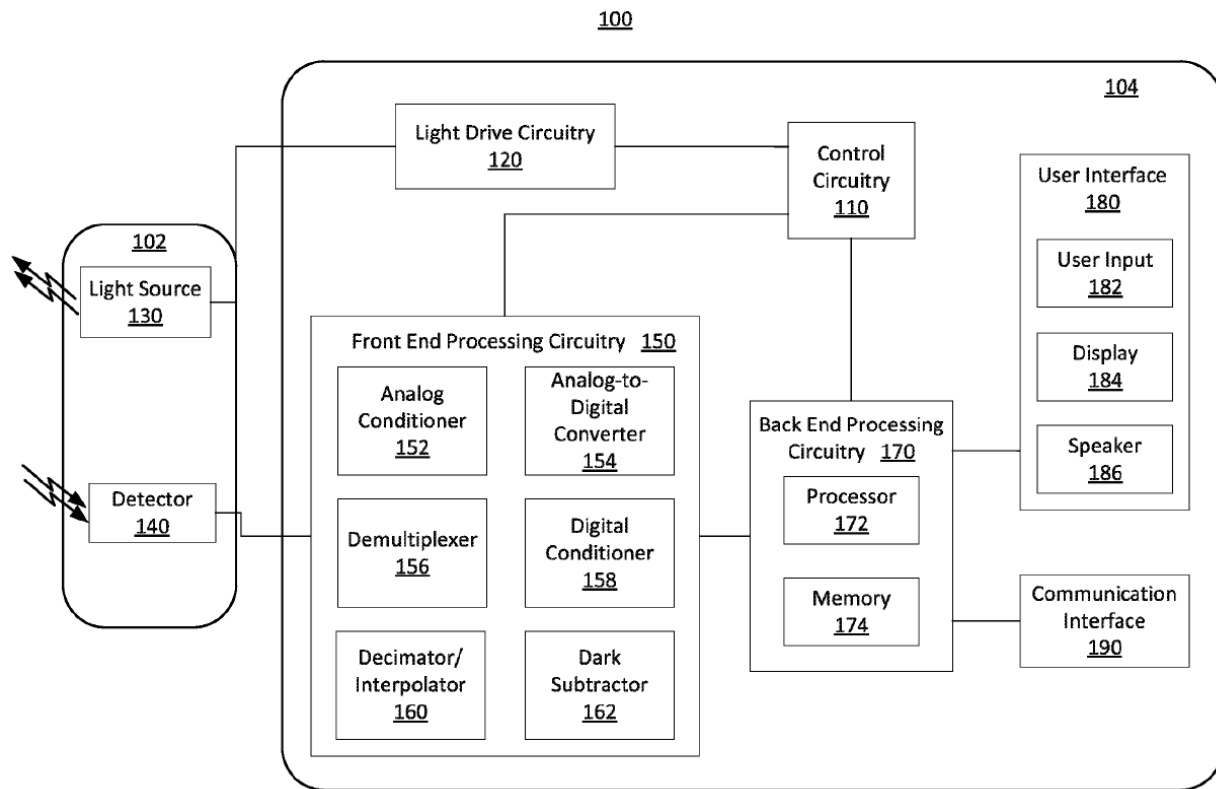


FIG. 1

EX1027, FIGS. 3, 1; EX2046, ¶89.

A subject wears sensor unit 312, while the other components in the system are included for system calibration, data processing, and displaying information. EX1027, 17:54-18:15, 18:32-67; EX2046, ¶89. The sensor unit 312 includes light emitting diodes for directing light of different wavelengths to the subject's tissue and a detector that detects the light reflected from the tissue and converts it into an electrical signal. EX1027, 4:42-62, 10:48-64; EX2046, ¶90. Front end processing circuitry 150 processes that signal. EX1027, 12:42-49; EX2046, ¶90. Then, “[p]rocessor 172 may receive and process physiological signals received from front

end processing circuitry 150. For example, processor 172 may determine one or more physiological parameters based on the received physiological signals.” EX1027, 14:60-64; EX2046, ¶¶90. The system compares the signals to determine parameters such as blood oxygen saturation. EX1027, 24:58-25:5; EX2046, ¶¶90.

B. Carlson (EX1028) (Grounds 1-6)

Carlson describes a non-invasive optical pulse oximeter. EX1028, ¶¶[0002]; EX2046, ¶¶91. The oximeter is designed to be clipped onto a user's ear. EX1028, ¶¶[0048]-[0049]; EX2046, ¶¶91. This is illustrated in Figures 1 and 2:

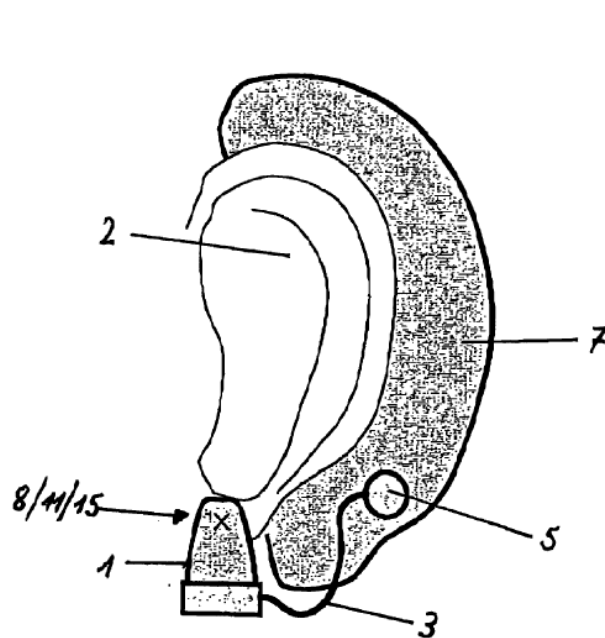


Figure 1

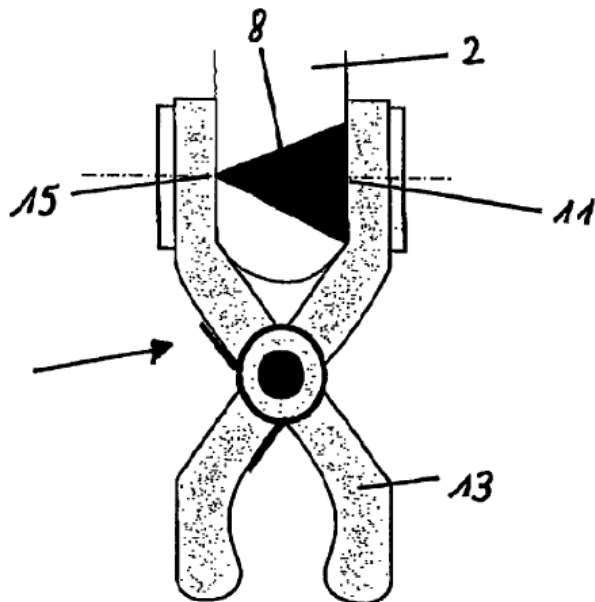


Figure 2

EX1028, FIGS. 1-2; EX2046, ¶¶91. The oximeter relies on various techniques, including beam shaping optical elements, for improving the signal-to-noise ratio and signal-to-background ratio of the signal generated by its photo detecting element

when it detects light that has been reflected from bodily tissue. EX1028, ¶¶[0010], [0013]-[0014], [0062]; EX2046, ¶92. Carlson also relies on “optical wavelength filters” which filter the light detected by the photo detecting element to a particular range of wavelengths before it is detected by the photo detecting element. EX1028, ¶¶[0026], [0062]; EX2046, ¶92.

C. Debreczeny (EX1029) (Ground 2)

Debreczeny discloses a pulse oximeter sensor that includes “a first, second and third source of electromagnetic radiation,” where “the first and third sources of electromagnetic radiation are symmetrically oriented about an axis” relative to a photodetector. EX1029, Abstract; 2:51-3:6; EX2046, ¶93. Debreczeny further describes that the first and third sources have emission spectra that “overlap at their half power level or greater” and “correspond to a center wavelength in the range of 650 to 670 nm.” EX1029, 2:57–60, 5:45–67; EX2046, ¶93.

D. Valencell-093 (EX1032) (Ground 3)

Valencell-093 discloses “apparatus and methods for attenuating environmental interference.” EX1032, Abstract; EX2046, ¶94. Valencell-093 explains that “a medium (e.g., physiological material of a subject), having a region of interest, is monitored via a sensor module having at least one energy emitter for interrogating the medium with energy to generate an energy response associated with the medium.” EX1032, ¶[0005]; EX2046, ¶94.

Valencell-093 further discloses that “[t]he sensor module includes an optical emitter, a detector, a motion/position sensor, a filter, and at least one processor that controls operations of the optical emitter, detector, and/or filter.” EX1032, ¶[0012]; EX2046, ¶95. Valencell-093 additionally states that “[o]utput from the motion/position sensor is associated with the motion or position between the housing and ear of the subject.” EX1032, ¶[0012]; EX2046, ¶95.

E. Soller (EX1030) (Grounds 4 and 6)

Soller describes a “measurement of blood hematocrit (Hct)” – “the volume percent of red blood cells in a blood sample.” EX1030, 1:17–20; EX2046, ¶96. Soller explains that hematocrit is measured using a “non-invasive optical and mathematical method... with an accuracy of approximately 99%,” and that this “accuracy results from the complete analysis provided by the new optical method, which measures blood hematocrit by quantifying a plurality of red blood cell constituents.” EX1030, 1:49–52; EX2046, ¶96. According to Soller, hematocrit is determined by “processing the optical spectrum with a mathematical model” that relates “optical properties of the plurality of red blood cell constituents to known blood hematocrit.” EX1030, 1:58–62; EX2046, ¶96. In one aspect, Soller “features a fiber optic device for determining blood hematocrit including an array of light sources...attached to a mount and a fiber optic cable ...for delivering radiation to the sample.” EX1030, 3:16–22; EX2046, ¶96. Additionally, Soller is directed to

using both reflectance detectors and reference detectors, with the reference detectors used to measure and account for variations in LED intensity. EX1030, 2:27-33, 2:58-63, 17:42-48; EX2046, ¶96.

F. Tran (EX1031) (Grounds 5 and 6)

Tran describes a patient heart monitoring system with wireless nodes forming a wireless mesh network. EX1031, Abstract, 3:3-13, 8:29-33; EX2046, ¶97. Tran's system also includes a wearable appliance adapted to communicate with the wireless nodes and a statistical analyzer to determine a heart attack or stroke attack. EX1031, Abstract, 3:3-13; EX2046, ¶97. The wearable appliance may include sensors and may non-invasively measure, for example, blood pressure. EX1031, 4:62-65, 9:23-30; EX2046, ¶97.

VI. CLAIM CONSTRUCTION

Petitioner applies the Board's prior construction of the term "identification of an object" to mean "to recognize or establish an object as being a particular thing," in the '304 Patent. Petition, 12-13. Petitioner contends that the remaining terms or phrases in the challenged claims of the '304 Patent do not require construction. Petition, 12-13.

Pursuant to the Scheduling Order in the Delaware Case, Invalidity Contentions are due on January 21, 2026, the parties will exchange their proposed claim constructions by February 4, 2026, and opening claim construction briefs are

due on April 13, 2026. EX2034, 2, 6. Thus, as of the date of this Preliminary Response, the parties have not yet formally proposed claim constructions in the Delaware Case.

Patent Owner agrees that claim construction is not necessary at this time for the Board to find that Petitioner did not meet its burden for institution. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017). Patent Owner reserves the right to seek constructions in litigation or if institution is granted, and to further respond to any constructions that Petitioner proposes.

A. The Petition Does Not Comply with the Board's Claim Construction Rules

The Board's rules require that the petition sets forth "[h]ow the challenged claim is to be construed." 37 C.F.R. § 42.104(b)(3). "[W]hen a petitioner takes alternative positions before the Board and a district court, that petitioner should, at a minimum, explain why alternative position are warranted." *Revvo Techs., Inc. v. Cerebrum Sensor Techs., Inc.*, IPR2025-00632, Paper 20 at 3-4 (PTAB Nov. 3, 2025) (precedential). This rule "ensure[s] that the Board correctly construes claim terms and to minimize inconsistency in claim construction between forums." *Id.* at 4. In this case, Petitioner's position that the meaning of "identification of an object" in this IPR is inconsistent with its indefiniteness position for the same phrase in a

related PGR.

Specifically, in challenging claim 7 of related U.S. Patent No. 12,193,790¹ (the “’790 Patent”) in PGR2026-00003, Petitioner alleges that “Omni’s position as to the scope of ‘identify an object’ in its appeal of the ’484 IPR, if accepted, would render the Challenged Claim unpatentable as indefinite.” EX2051, 90. Claim 7 of the ’790 patent recites “wherein the wearable device is at least in part configured to ***identify an object.***” EX2058, 87:31-33 (emphasis added). Dependent claims 9, 12, and 26 of the ’304 Patent recite “wherein the measurement system is at least in part configured for ***selection or identification of an object.***” EX1001, 37:29-34, 38:27-32, 40:33-38 (emphasis added). Despite this, Petitioner construes the term “identification of an object” in this IPR to mean “to recognize or establish an object as being a particular thing.” Petition, 12-13.

Petitioner does not provide any explanation for its inconsistent positions. Petition, 12-13. Dr. Mercier similarly fails to explain the inconsistency and merely applies the same construction from this Petition. EX1003, ¶¶298-301. The Board should deny institution given Petitioner’s failure to justify its inconsistent positions. *Tesla, Inc. v. Intellectual Ventures II LLC*, IPR2025-00340, Paper 18 at 3-5 (PTAB Nov. 5, 2025) (informative) (denying institution where petitioner argued that claim

¹ The ’304 Patent is the parent to the ’790 Patent. EX2051, 4; EX2058.

term was indefinite in district court but adopted patent owner's plain and ordinary meaning construction in its petition).

B. "Selection or Identification of an Object"

Dependent claims 9, 12, and 26 of the '304 Patent recite "wherein the measurement system is at least in part configured for *selection or identification of an object*, and wherein the measurement system is configured to improve a signal-to-noise ratio of the selection or identification by applying regression signal processing methodologies or multivariate techniques." EX1001, 37:29-34, 38:27-32, 40:33-38 (emphasis added).

As noted in the Petition, the Board construed the term "to identify an object" to mean "to recognize or establish an object as being a particular thing" in a prior IPR concerning a related patent. EX1011, 8-10; EX1013, 3; Petition, 12. Patent Owner agrees with Petitioner that the "identify an object" term in the '484 IPR is similar to the "identification of an object" term in claims 9, 12, and 26 of the '304 Patent. *See* Petition, 12-13. Patent Owner applies these constructions in its analysis below. EX2046, ¶¶70-73.

With respect to identifying an object, the '304 Patent specification discloses:

In addition, it may be advantageous to use pattern matching algorithms and other software and mathematical methods to *identify the blood constituents of interest*. In one embodiment, the spectrum may be correlated with a library of known spectra to determine the overlap integrals, and a threshold function may be used to quantify the

concentration of different constituents. ...

EX1001, 35:17-26 (emphasis added); EX2046, ¶84. With respect to selecting an object, the specification discloses:

One of the issues in measuring a particular blood constituent is the interfering and overlapping signal from other blood constituents. The *selection of the constituent of interest* may be improved using a number of techniques. For example, a higher light level or intensity may improve the signal-to-noise ratio for the measurement. Second, mathematical modeling and signal processing methodologies may help to reduce the interference, such as multivariate techniques, multiple linear regression, and factor-based algorithms.

EX1001, 35:17-44 (emphasis added); EX2046, ¶84. Thus, the '304 Patent describes "selection of the constituent of interest" (e.g., as opposed to other blood constituents) after "identif[ying] the blood constituents of interest." EX2046, ¶85. Thus, the claimed "selection" of an object first requires an identification of the object and a selection of that identified object. EX2046, ¶85.

VII. PETITIONER FAILED TO MEET ITS BURDEN

The Director should deny institution because Petitioner has not met its burden of showing a reasonable likelihood that any claim of the '304 Patent is unpatentable for any of the grounds in the Petition.

A. Petitioner Failed to Show Collateral Estoppel Applies

Petitioner argues that "[t]he Challenged Claims are materially similar (or identical) to those found unpatentable by the Board in the prior '533 and '484 IPRs"

and “for the limitations/claims below that overlap with those previously found unpatentable, Omni is collaterally estopped from challenging unpatentability.” Petition, 21; *see also id.* at 1-2. Petitioner also argues that Patent Owner “is collaterally estopped from challenging motivation to combine” Carlson and Lisogurski. Petition, 25. Both assertions are incorrect.

Collateral estoppel does not apply because “there are differences between the claim limitation[s] at issue ... and the adjudicated claim limitations at issue in the prior IPRs.” *Palo Alto Networks, Inc. v. Centripetal Networks, Inc.*, IPR2021-01153, Paper 10 at 18 (PTAB Jan. 24, 2022); *see also MaxLinear, Inc. v. CF CRESPE LLC*, 880 F.3d 1373, 1377-78 (Fed. Cir. 2018) (collateral estoppel does not apply to claims that “present materially different issues that alter the question of patentability”); *Dr. Reddy's Lab'ys., Ltd. v. Monosol RX, LLC*, IPR2016-01111, Paper 14 at 16-17 (PTAB Dec. 5, 2016).

For example, the arc limitations, i.e., “a plurality of detectors arranged along a first arc, and [] the plurality of semiconductor sources are arranged along a second arc” recited in claims 4-8, 9, 10, 15-18, and 21-24 of the '304 Patent are not recited in the claims of either the '533 Patent or '484 Patent. EX1001, 36:15-40-42; EX1004, 28:52-32:23; EX1005, 36:46-40:56; EX1003, ¶¶ 255-287. Notably, Petitioner does not rely on the '533-Final Written Decision (“FWD”) or '484-FWD in its analysis of those claims (e.g., claim 4) or argue that collateral estoppel applies

to those claims. *See* Petition, 64-74. Therefore, collateral estoppel does not apply to claims 4-8, 9, 10, 15-18, and 21-24 of the '304 Patent.

The Petition relies on the Board's remand decision concerning the related '484 Patent ("the '484-RFWD") for claims 9, 12, 13, and 26 of the '304 Patent. Petition, 80-81, 84. Claims 9, 12, 13, and 26 recite "selection or identification of an object." Ex. 1001 at 37:30, 38:20-32, 40:26-38. As Petitioner acknowledges, "the question of whether the prior art teaches the 'identifying an object' limitation in the '484 patent (and in claims 9, 12, 26 here) remains a live limitation on appeal." Pet. 21. The FWD in the Apple '484 IPR has no collateral estoppel effect because there is no final judgment. EX1013; EX1010. Patent Owner has appealed that FWD. EX1010. "[A]n IPR decision does not have collateral estoppel effect until that decision is affirmed or the parties waive their appeal rights." *United Therapeutics Corp. v. Liquidia Techs., Inc.*, 74 F.4th 1360, 1372 (Fed. Cir. 2023). Accordingly, collateral estoppel cannot apply to the "identification of an object" limitations in the '304 Patent..

Petitioner cites no authority for its argument that Patent Owner is collaterally estopped from arguing against any possible combination of Lisogurski and Carlson. Petition, 25. The fact that the Board found that a POSITA would combine Lisogurski and Carlson to arrive at the inventions in different claims in different patents does not mean that a POSITA would combine them to meet the requirements of the

challenged claims of the '304 Patent, which have material differences relative to the prior claims. For example, the challenged claims include limitations not present in the prior '533 and '484 IPRs—such as the arc limitations—and Petitioner offers no argument, let alone evidence, that these limitations are materially the same as any limitation previously adjudicated. *See* Petition, 1, 2, 21, 25, 64-74.

Thus, Petitioner has not shown that collateral estoppel applies to any of the remaining grounds.

B. Ground 1: Obviousness Based on Lisogurski and Carlson (Claims 1, 11, 19, 20, 25)

In Ground 1, Petitioner argues that claims 1, 11, 19, 20, and 25 of the '304 Patent are obvious over Lisogurski in view of Carlson. Petition, 22-55. Patent Owner has statutorily disclaimed claims 1, 11, 19, 20, and 25 of the '304 Patent, rendering Ground 1 of the Petition moot. EX2048; EX2054.

C. Ground 2: Obviousness Based on Lisogurski, Carlson and Debreczeny (Claim 3)

In Ground 2, Petitioner argues that claim 3 of the '304 Patent is obvious over Lisogurski in view of Carlson and Debreczeny. Petition, 55–59. Patent Owner has statutorily disclaimed claim 3 of the '304 Patent, rendering Ground 2 of the Petition moot. EX2048.

D. Ground 3: Obviousness Based on Lisogurski, Carlson and Valencell-093 (Claims 2, 14, 27)

In Ground 3, Petitioner argues that claims 2, 14, and 27 of the '304 Patent are

obvious over Lisogurski in view of Carlson and Valencell-093. Petition, 59–64. Patent Owner has statutorily disclaimed claims 2, 14, 27 of the '304 Patent, rendering Ground 3 of the Petition moot. EX2048; EX2054.

E. Ground 4: Obviousness Based on Lisogurski, Carlson and Soller (Claims 4–8, 10, 15–18, 21–24)

In Ground 4, Petitioner argues that claims 4–8, 10, 15–18, and 21–24 of the '304 Patent are obvious over Lisogurski, Carlson and Soller. Petition, 64–74. For at least the reasons discussed below, Petitioner fails to meet its burden. *See* EX2046, ¶¶103–218.

1. Claims 4-6, 15-16, and 21-22: Lisogurski, Carlson and Soller Do Not Render Obvious the Arc Limitation

Claims 4-6, 15-16, and 21-22 of the '304 Patent each recite an “arc” limitation. Claim 4 recites: “the receiver comprises a plurality of detectors arranged along a first arc, and wherein the plurality of semiconductor sources are arranged along a second arc.” EX1001, 37:6-9. Claims 15 and 21 similarly recite: “the receiver comprises a plurality of detectors arranged along a first arc, and wherein the plurality of semiconductor sources are arranged along a second arc that is offset from the first arc.” EX1001, 38:47-51 (claim 15), 40:3-6 (claim 21). Claims 5-6, 16 and 22 depend from one of the foregoing claims. EX1001, 37:10-13; 38:52-53; 40:7-8.

Lisogurski, Carlson, and Soller do not render obvious the arc limitations. Petition, 64–74; *see* EX2046, ¶¶103–218. Notably, Petitioner does not argue that

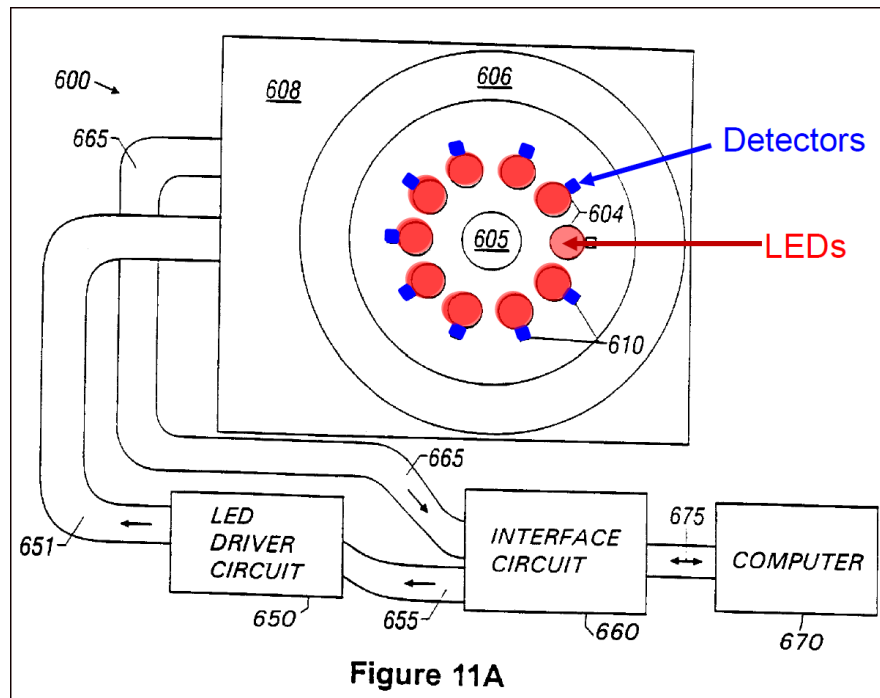
collateral estoppel applies to these limitations. Petition, 21-22, 64-74. Because Lisogurski does not disclose any arrangement of its LEDs or detectors, much less “a first arc” and “a second arc” as claimed, Petitioner relies on Soller’s arrangement of LEDs and optical detectors in Figures 9 and 11A (referenced herein as Soller’s “alleged arc arrangement”) and proposes a two-step modification to arrive at the claimed invention. EX2046, ¶¶107-13.

Specifically, Petitioner argues that as the first step, POSITA would modify Soller to change the *reference* detectors 610 (depicted in Soller’s embodiment in Figures 11A-11C) into *reflectance* detectors like the reflectance detectors recited in the ’304 claims (including the arc limitation) and those in Lisogurski. Then, as the second step, Petitioner alleges a POSITA would have “implement[ed] Soller’s two ... [modified] arcs [from the first step] into Lisogurski’s system.”² Petition, 66-74; EX2046, ¶¶107-112; *see also* EX1001, 36:26-40, 37:52-57, 39:9-17, 37:6-9, 38:49-52, 40:3-5 (reciting claim elements including reflectance “detectors”); EX1027, 17:39-42 (teaching reflectance detectors); Petition, 20, 23, 36, 38, 39, 43, 66, 68 (recognizing that the claimed “detectors” and Lisogurski’s relied-upon detectors include reflectance detectors). EX2046, ¶¶108-12.

In proposing this two-step obviousness modification, Petitioner relies on the

² Petitioner does not rely on Carlson for the arc limitation.

following annotated Figure 11A of Soller:



Petition, 67-68 (annotating EX1030, FIG. 11A). Petitioner, however, fails to establish (1) that a POSITA would have modified Soller's reference detectors 610 to be reflectance detectors, (2) that a POSITA would have modified Lisogurski's reflectance detectors without that first modification to Soller, or (3) that a POSITA would have implemented Soller's alleged arc arrangement in the Lisogurski/Carlson combination. EX2046, ¶¶103-218.

a) Soller Does Not Disclose the Arc Limitation

Claims 1, 11, 19 require a receiver configured to: “capture... beam reflected [or transmitted] from the sample [/tissue]” and dependent claims 4, 15, 21 further require that “a[/the] receiver comprises a plurality of detectors arranged along a first

arc.” EX1001, 36:26-40, 37:52-57, 39:9-17, 37:6-9, 38:49-52, 40:3-5. In other words, the claimed “detectors” receive reflected or transmitted light from the sample. EX2046, ¶¶112, 117-18. Petitioner recognizes this and relies on *reflectance* detectors in Lisogurski, i.e., detects that receive reflected light from the sample. Petition, 23, 36, 38, 39, 43; EX1027, 17:39-42.

As discussed above, Petitioner relies on Soller's embodiment in Figure 11A for the arc limitation, but as depicted in the annotated version of Figure 11A below, the relied-upon embodiment teaches only a single, central *reflectance* detector 605 (annotated in green). Petition, 67-74.

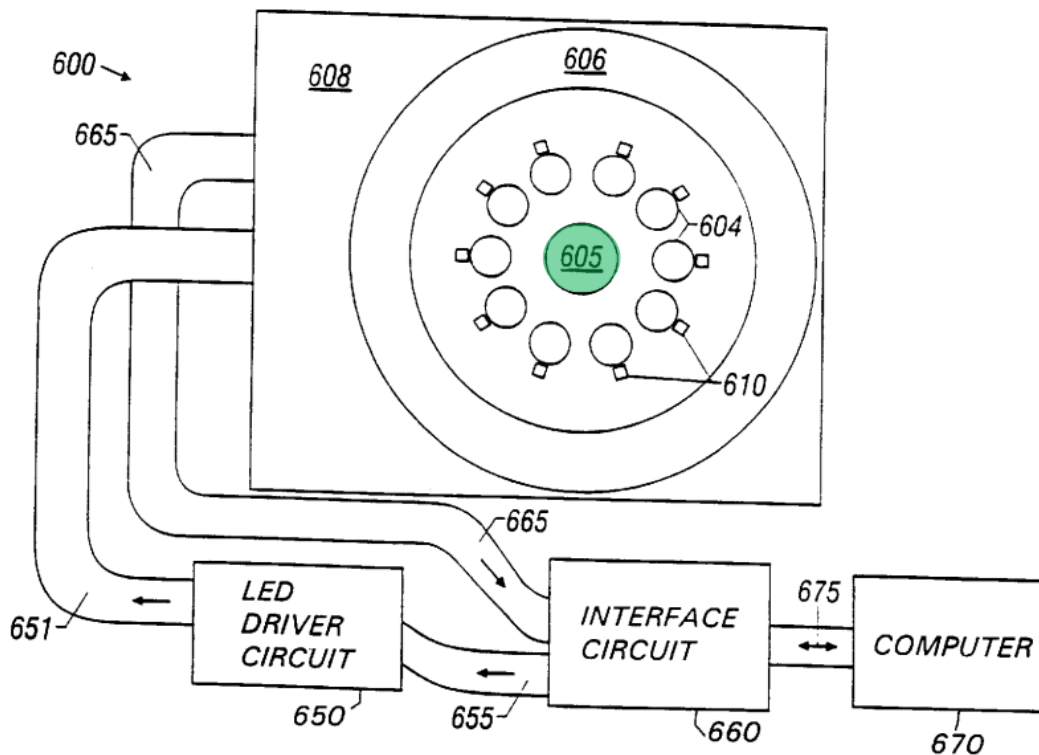


Figure 11A

EX1030, FIG. 11A (annotated), 17:36-60; EX1046, ¶¶119-127 (explaining how other embodiments of Soller also teach only a single reflectance detector). Soller does not disclose an arc arrangement of reflectance detectors as required by the arc limitation in the challenged claims. EX1046, ¶¶117-126, 128. Petitioner instead relies on Soller's arrangement of *reference* detectors 610 in Figure 11A in an attempt to show that Soller disclose an arc. Petition, 67-69. But these *reference* detectors measure light directly from LEDs 604 rather than reflected light from a sample. EX1030, 17:36-60, 2:27-33, 3:27-39; EX1046, ¶127-28.

Recognizing this shortcoming in Soller, Petitioner argues as a first step of its obviousness modification that a POSTIA would have substituted Soller's *reference* detectors 610 that are allegedly arranged in an arc with *reflectance* detectors. Petition, 68-69. As set forth below, Petitioner failed to show that a POSITA would make such a modification to Soller.

b) Petitioner Does Not Establish Motivation to Modify Soller's *Reference* Detectors 610 to Be *Reflectance* Detectors

Petitioner fails to establish that a POSITA would have modified Soller's *reference* detectors 610 to be *reflectance* detectors. EX2046, ¶¶129-44. With respect to the alleged motivation for such a modification, the Petition asserts:

The detectors 604 above [in Fig. 11A] are reference detectors “to measure and correct for variations in the LED intensity,” []. EX1030, 17:36-49; EX1003 ¶259. Both types of detectors are conventional

“photodiodes.” EX1003 ¶259; EX1030, 13:50-62. As Dr. Mercier explains, it would have been obvious to modify 11A of Soller to position the reflectance detectors in the position of the reference detectors, since both are conventional photodiodes performing their routine functions. EX1003 ¶¶260-61.

Petition, 68-69.

Petitioner's conclusory assertion that “it would have been obvious to modify 11A of Soller to position the reflectance detectors in the position of the reference detector” is insufficient. *PersonalWeb*, 848 F.3d at 993-94 (“[O]bviousness concerns whether a [POSA] not only *could have made* but *would have been motivated to make* the ... modifications” (emphasis in original) (citation omitted)). Petitioner fails to explain *why* a POSITA would have been motivated to change Soller's reference detectors 610 into reflectance detectors, especially since Soller's Figure 11A embodiment already includes reflectance detector 605. Petition, 67-69; EX1030, FIG. 11A, 17:42-60; EX2046, ¶¶132-34. Moreover, the portion of Soller cited by Petitioner does not indicate that reference detectors 610 can instead serve as reflectance detectors, much less provide any motivation for such modification. EX1030, 17:36-50; EX2046, ¶132-34. Dr. Mercier's testimony is substantially similar and thus deficient for at least the same reasons. *See* EX1003, ¶¶259-61 (asserting merely that “the ‘reference detectors’ ... *could* serve as ‘reflectance detector(s),’” without identifying *why* a POSITA would have made this modification). EX2046, ¶132-34.

Petitioner next argues that changing Soller's reference detectors 610 to be reflectance detectors would have been a "straightforward substitution":

This modification to Soller would have been a straightforward substitution for a POSITA involving routine substitution of known elements. EX1003 ¶¶260-65.

Petition, 69. But this too is conclusory and unsupported. Petitioner cites only Dr. Mercier's declaration, in which the only potentially-relevant paragraphs discuss merely a few changes that "could" or "can" be made and do not explain specifically what changes a POSITA *would have* made or address the full extent of changes needed to implement the proposed modification. EX1003, ¶¶259-62; EX2046, ¶135.

Regardless, the alleged modification to Soller would not have been a mere "straightforward substitution" as Petitioner argues because modifying Soller's reference detectors 610 to be reflectance detectors would result in different structure and function within device 600 in Figure 11A. EX2046, ¶¶136-37. For example, Soller's reference detectors 610 are "mounted on the side of each LED [604]" to directly light from LEDs 604 "and correct for variations in the LED intensity," but Petitioner's modification would change the function of detectors 610 to instead measure light reflected from sample 505 and also require changing the mounting/location of detectors 610 such that they no longer receive light directly from LEDs 604. Ex. 1030 at 17:36-48, FIGS. 11A-B; EX2046, ¶¶136-37. As another example, Soller teaches that LEDs 604 are mounted "at an angle" around an existing

“centrally located” reflectance detector 605, but Petitioner’s modification would necessitate changes regarding the mounting angle of LEDs 604 and subsequent change to existing reflectance detector 605 (e.g., relocation or removal). EX1030, 17:36-60, FIGS. 11A-B; EX2046, ¶¶136-37. The alleged modification would leave device 600 with no remaining reference detectors and thus necessitate the addition of new reference detectors, with appropriate location/mounting relative to LEDs 604. EX1030, 17:36-50, FIGS. 11A-C; EX2046, ¶137.

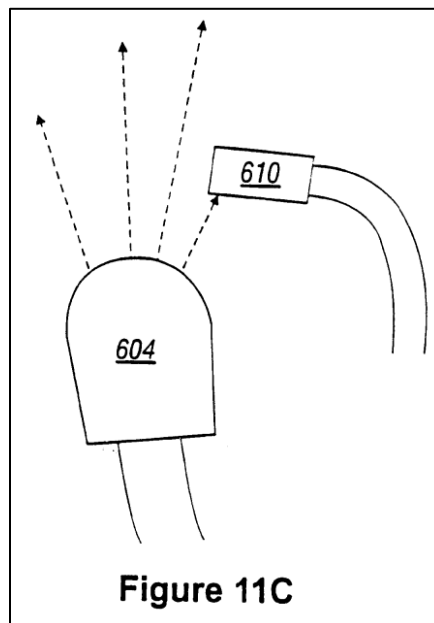
The Federal Circuit has held that proposed modifications where structure and function differed are not simply obvious design choices. *See In re Gal*, 980 F.2d 717, 719-720 (Fed. Cir. 1992) (finding of “obvious design choice” was precluded because the claimed structure and the function it performed were different from the prior art); *Ex parte Maeda*, Appeal No. 2010-009814, Decision on Appeal, at 6-7 (PTAB Oct. 23, 2012) (informative) (finding that the “proposed modification of Meserole is not an obvious design choice” because it “would result in a different function than that shown by Meserole”); *Cutsforth, Inc. v. MotivePower, Inc.*, 636 Fed. App’x 575, 578 (Fed. Cir. 2016) (“Merely stating that a particular placement of an element is a design choice does not make it obvious.”).

Petitioner next argues that “Soller ... teaches modifying the arrangement of detectors”:

Soller itself directly teaches modifying the arrangement of detectors.
EX1030, 17:42-49, Fig. 11C.

Petition, 69. Even if true, however, this modification of the “*arrangement* of detectors” does not mean modifying the *type* of detector like Petitioner's proposed modification of changing *reference* detectors 610 to be *reflectance* detectors. Petition, 68-69; EX2046, ¶138. Petitioner does not argue that Soller teaches modifying the *type* of detector. Petition, 68-69; EX1030, 17:42-43. Indeed, neither of the two portions of Soller cited by Petition teach or support changing detectors 610 type from reference to reflectance. Petition, 68-69 (citing EX1030, 17:42-49, Fig. 11C); EX2046, ¶¶139-40.

Petitioner's expert Dr. Mercier first cites Soller's teaching that “FIG. 11C shows an alternate mounting position for reference detectors 610 which allows more light to reach reference detectors 610,” but this does not teach or suggest that reference detectors 610 can be modified to be reflectance detectors. EX1030, 17:42-49; Petition, 69; EX1003, ¶260. In fact, this disclosure relates to positing detectors 610 to receive more light directly from LEDs 604 (as shown in Figure 11C below) to improve the performance of detectors 610 *in their capacity as reference detectors*. EX1030, 17:42-50, FIG. 11C



EX1030, FIG. 11C, 17:42-50; EX2046, ¶139. Additionally, a POSITA would have understood that reference detector 610 shown in Figure 11C above **cannot** serve as a reflectance detector, since it receives light directly from LED 604. EX1030, FIG. 11C; EX2046, ¶139.

Petitioner's expert Dr. Mercier also cites Soller's teaching that "Hematocrit measuring device 700 can be modified." EX1030, 18:47-58; Petition, 68-69; EX1003, ¶260. But this teaching does not relate to the relied-upon embodiment of device 600 in Figure 11A or mention any detector or modification, much less teach or support a proposed modification of reference detectors 610 in device 600. Compare EX1030, 18:18-19, 18:47-58, FIGS. 12A-B with EX1030, 17:36-43, FIGS. 11A-B; see EX2046, ¶140.

As discussed above, Petitioner fails to establish **why** a POSITA would have

modified Soller's reference detectors 610 to be reflectance detectors. Petitioner fails to explain *how* this change would be implemented in device 600 as required for motivation for obviousness. Petition, 67-69; EX2046, ¶¶141-42; *In re Anova Hearing Labs, Inc.*, 809 Fed. App'x 840, 843 (Fed. Cir. 2020) (finding the Board "d[id] not explain why a [POSA] would be motivated to modify Brown, which already includes vents"); *PersonalWeb Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 993-94 (Fed. Cir. 2017) (finding the Board failed to explain "*how* the combination of the two references was supposed to work" (emphasis in original)). Petitioner merely suggests modifying Soller's reference detectors [610] to be reflectance detectors without also explaining how a POSITA would have changed other relevant aspects of device 600 to account for such modification. Petition, 67-69; EX1003, ¶260.

For example, a POSITA would have understood that Petitioner's proposed modification to detectors 610 would have affected, and necessitated changes regarding, several other relevant aspects of device 600, such as: the relative location, mounting, and angling of detectors 610 (as modified), LEDs 604, and reflectance detector 605; the redundancy of detectors 610 (as modified) and existing reflectance detector 605 resulting from Petitioner's proposed modification; and the lack of any remaining reference detectors as a result of Petitioner's proposed modification. EX1030, 17:36-60, FIGS. 11A-B; EX2046, ¶¶141-42. Petitioner fails to address

these issues. Pet., 67-69; EX2046, ¶¶141-42

c) A POSITA Would Not Have Been Motivated to Modify Soller's *Reference* Detectors 610 to Be *Reflectance* Detectors

Regardless of the deficiencies in the Petition, a POSITA would not have been motivated to modify Soller's *reference* detectors 610 to be *reflectance* detectors as Petitioner proposes. EX2046, ¶¶145-159.

First, a POSITA would not have modified Soller's reference detectors 610 in device 600 to be *reflectance* detectors because device 600 already includes an existing *reflectance* detector 605, and the modified detectors 610 would perform the same function as existing reflectance detector 605. EX1030, 17:42-60, FIGS. 11A-B, 2:30-31; *see* Petition, 68-69 (arguing that detectors 610 would be modified to serve as “‘reflectance detectors’ to measure light received from the sample”); EX1003, ¶ 259 (recognizing that Soller already teaches “‘reflectance detector [605]’ for receiving light ... from the sample”). EX2046, ¶¶145-47. Thus, modifying detectors 610 to be reflectance detectors would be redundant and unnecessary given Soller's existing reflectance detector 605. EX2046, ¶¶145-47. Accordingly, there is no motivation. *South-Tek Systems, LLC v. Engineered Corrosion Solutions, LLC*, 748 Fed. App'x 1003, 1006 (Fed. Cir. 2018) (finding no motivation “[g]iven the redundant functions” of primary and secondary reference elements); *In re Anova Hearing Labs, Inc.*, 809 Fed. App'x 840, 843 (Fed. Cir. 2020) (finding the Board

“d[id] not explain why a [POSA] would be motivated to modify Brown, which already includes vents”); *see also Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1369 (Fed. Cir. 2012). Neither Petitioner nor Dr. Mercier discuss Soller's existing reflectance detector 605, much less address that the modified detectors 610 would have been redundant of reflectance detector 605. *See* Petition, 68-69; EX1003, ¶¶259-62; EX2046, ¶147.

Second, Petitioner's proposed modification is inconsistent with Soller's alleged invention and its goals. Soller is directed to hematocrit measuring devices that contain ***both*** (1) reflectance detectors to measure light reflected from a sample ***and*** (2) reference detectors to measure light from the LEDs. EX1030, 2:27-33, 3:27-32, 13:50-14:13, FIGS. 5-6, 16:8-32, FIG. 7, 16:61-17:5, 17:42-48, FIGS. 11A-B, 18:24-25, FIGS. 12A-B, 18:66-67, 19:17-27, FIGS. 13A-B, 23:14-36; EX2046, ¶148. Soller's alleged invention includes reference detectors for the goal of measuring and accounting for variations in LED intensity when calculating reflected light. EX1030, 2:58-63, 7:26-29, 14:7-13, 17:1-5, 17:45-48, 19:4-7; EX2046, ¶149. For example, in Soller's Figure 11A embodiment (which Petitioner relies on), device 600 includes reference detectors 610 in addition to reflectance detector 605, with reference detectors 610 intended to “measure and correct for variations in the LED intensity due to temperature, gaining, or electrical power source drifts.” EX1030, 17:42-48; EX2046, ¶149.

Petitioner's proposed modification of Soller is also flawed because it would change reference detectors 610 (which are the only reference detectors in device 600) into reflectance detectors, thus leaving device 600 with ***no remaining reference detectors***. Petition, 67-69; *see* EX1030, 17:36-18:17 (disclosing no reference detectors other than detectors 610 for device 600); EX2046, ¶150. This is contrary to Soller's teaching of including both reflectance and reference detectors, and also this detracts from Soller's goal of using the reference detectors to account for variation in LED intensity to more accurately calculate reflected light from a sample. EX2046, ¶¶148-153. A POSITA would not have been motivated to make such a modification to Soller. Petitioner does not acknowledge or address the fact that its proposed modification would result in the device 600 containing no reference detectors, much less provide reasoning or support to square this result with Soller's contrary teachings and objective. *See* Petition, 68-69; EX2046, ¶¶151-52.

Third, Petitioner's proposed modification would result in incompatibilities and inoperability in Soller's device 600. Soller teaches that reference detectors 610 are positioned relative to LEDs 604 to receive light directly from LEDs 604. EX1030, FIGS. 11A-C, 17:42-50; EX2046, ¶153. With this positioning, a POSITA would have understood that detectors 610 ***cannot*** serve as ***reflectance*** detectors for measuring light reflected from sample 505 because such measurement of reflected light would be contaminated by light that detectors 610 receive directly from LEDs

604. EX2046, ¶¶153-54. Thus, if reference detectors 610 were modified to be reflectance detectors as Petitioner proposes, then those modified detectors 610 would be incompatible with their positioning in device 600. And because of this incompatibility, there is no motivation for the proposed modification. *See Grit Energy Sols., LLC v. Oren Techs., LLC*, 957 F.3d 1309, 1323 (Fed. Cir. 2020) (finding technological incompatibility telling of non-obviousness); *3Shape Medical A/S v. Sirona Dental Sys. GMBH*, IPR2016-00481, Paper 40 at 30 (PTAB June 21, 2017) (finding no motivation because of “incompatibilities”).

Because the positioning of detectors 610 precludes them from functioning as reflectance detectors, Petitioner's proposed modification of those detectors 610 to be reflectance detectors would thus render device 600 inoperable for its intended purpose of measuring reflected light from sample 505. And because of this inoperability, there is no motivation for the proposed modification. EX2046, ¶¶153-55. *In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984) (reversing obviousness rejection where the proposed modification would result in the reference being “rendered inoperable for its intended purpose”).

Additionally, Petitioner and Dr. Mercier's proposed modification of Soller's reference detectors 604 does not address these issues of incompatibility and inoperability nor argue that a POSITA would have modified the positioning of detectors 610. *See* Petition, 68-69; EX1003, ¶¶259-62; EX2046, ¶156. Dr. Mercier's

declaration contains an assertion (not included in the Petition) that “the reflectance detector(s) could also be arranged in a different position, including to be further away from the LEDs,” but this assertion lacks any cited support or explanation, is unclear as to what “reflectance detector(s)” it is referring to, and merely asserts what “could” be done, not that a POSITA *would have* made any such change. EX1003, ¶261; EX2046, ¶157; *see PersonalWeb*, 848 F.3d at 993-94 (“[O]bviousness concerns whether a [POSA] not only *could have made* but *would have been motivated to make* the ... modifications”) (emphasis in original) (citation omitted)).

d) Without Modification of Soller's *Reference* Detectors 610, There Is No Motivation to Modify Lisogurski's *Reflectance* Detectors Based on Soller's Arrangement

Because there is no motivation to modify Soller's *reference* detectors 610 to be *reflectance* detectors like Lisogurski's relied-upon *reflectance* detectors, there is thus no motivation to arrange Lisogurski's reflectance detectors based on Soller's arrangement of those detectors 610. EX2046, ¶¶153-54, 158-59.

As discussed above, Petitioner makes a two-part argument for modifying Lisogurski's *reflectance* detectors to be arranged according to Soller's alleged arc arrangement of *reference* detectors 610 in Figure 11A: that (1) Soller would have been modified to change *reference* detectors 610 into *reflectance* detectors and (2) then Lisogurski would have been modified to arrange its *reflectance* detectors based

on Soller's alleged arc arrangement of then-modified detectors 610. Petition, 67-69. But as explained in §VII.E.1.b-c above, part (1) fails because there is no motivation to modify Soller's *reference* detectors 610 to be *reflectance* detectors. Part (2) thus fails for two reasons.

First, Petitioner fails to show that a POSITA would have made the modification in part (2) without first making the modification in part (1). EX2046, ¶¶143-44. Petitioner's two-part argument recognizes that the proposed modification of Lisogurski's arrangement of *reflectance* detectors based on Soller's alleged arc arrangement of detectors 610 in part (2) is predicated on first modifying Soller's *reference* detectors 610 to be *reflectance* detectors in part (1). Petition, 67-69. Indeed, Petitioner does not argue part (2) without part (1)—i.e., does not argue that Lisogurski's *reflectance* detectors would have been arranged based on Soller's arrangement of unmodified *reference* detectors 610. Petition, 67-69.

Second, regardless of Petitioner's showing, a POSITA would not have been motivated to make the modification in part (2) without first making the modification in part (1)—i.e., would not have arranged Lisogurski's *reflectance* detectors based on Soller's arrangement of (unmodified) *reference* detectors 610. EX2046, ¶159.

e) Petitioner Does Not Establish Motivation to Implement Soller's Alleged Arc Arrangement in Lisogurski

As explained below, Petitioner's motivation-to-combine argument fails to

specifically explain, with supporting evidence, either why or how Soller's alleged arc arrangement of LEDs and detectors would have been implemented in Lisogurski's sensor's LEDs and detectors. *PersonalWeb Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 993-94 (Fed. Cir. 2017) (finding the Board failed to explain "how the combination of the two references was supposed to work" (emphasis in original)).

Petitioner asserts that a POSITA "would have understood the disclosures below teach or render obvious a "first arc" (comprising the plurality of detectors) and a "second arc" (comprising the plurality of semiconductor sources)" to satisfy the arc limitations of claims 4-6, 15-16, and 21-22. Petition, 66-71; EX1003 ¶¶256-63. Petitioner's discussion largely restates Soller and then asserts that the same arrangement could be applied to Lisogurski, without identifying any teaching in Lisogurski suggesting a need for such an arrangement or any recognized design problem in Lisogurski that Soller uniquely solves. Petition, 66-71; EX1003 ¶¶256-63; EX2046, ¶158; *See Braintree Labs., Inc. v. Novel Labs., Inc.*, 749 F.3d 1349, 1359 (Fed. Cir. 2014) (patent challenger "failed to prove ... why the ... references would have worked together") (cleaned up); *see also In re NuVasive, Inc.*, 842 F.3d 1376, 1381-82 (Fed. Cir. 2016) (emphasizing "need for specificity" in "findings on motivation" to combine).

(1) Soller and Lisogurski Are Directed to Fundamentally Different Measurement Problems and Systems

Soller is directed to hematocrit measurement, not oximetry: “[h]ematocrit is the volume percent of red blood cells in a blood sample.” EX1030, Abstract, 1:19-20; EX2046, ¶163. Soller teaches that “[t]he invention provides an optical and mathematical method to measure hematocrit with increased accuracy relative to other methods, e.g., impedance and oximetric methods.” EX1030, 5:42-45. It distinguishes its invention from conventional oximetry methods: “[a]ll of the reported optical techniques are variations on oximetric methods where hematocrit is measured using only the concentrations of oxygenated and deoxygenated hemoglobin,” typically “using 2 to 4 wavelengths of light in the near-infrared region of the hemoglobin Spectrum.” EX1030, 1:36-44; EX2046, ¶165.

Soller emphasizes “a new optical method, which measures blood hematocrit by quantifying a plurality of red blood cell constituents.” EX1030, 1:49–51. It relies on “irradiating blood with optical radiation having a selected range of optical wavelengths to produce an optical spectrum” and “processing the optical spectrum with a mathematical model” that explicitly accounts for multiple hemoglobin species and other cellular components. EX1030, 1:52-62, 5:33-42; EX2046, ¶165. Soller teaches “using a larger set of wavelengths for analysis,” e.g., “7 or more wavelengths, to record optical spectra of blood,” with LEDs that “uniformly span the 500-1100 nm range.” EX1030, 5:48-63, 17:31-33; *see also id.* 6:33–41; EX2046, ¶¶165, 168-169. Soller’s mathematical model likewise departs from oximetry’s

ratio-of-ratios and uses multivariate calibration (e.g., PLS) to relate spectral data across many wavelengths to hematocrit as a single scalar output. EX1030, 6:42-59; 7:18-25; 11:5-8; EX2046, ¶¶167, 170.

Lisogurski, in contrast, describes a conventional pulse oximeter that estimates oxygen saturation by exploiting the absorption differences between oxyhemoglobin and deoxyhemoglobin at two wavelengths: “[r]ed and infrared (IR) wavelengths may be used because it has been observed that highly oxygenated blood will absorb relatively less red light and more IR light than blood with a lower oxygen saturation.” EX1027, 4:42-48, 24:58-25:5. Lisogurski further explains that “[b]y comparing the intensities of two wavelengths at different points in the pulse cycle, it is possible to estimate the blood oxygen saturation of hemoglobin in arterial blood,” using “two wavelengths of light and a ratio-of-ratios calculation,” a conventional, dual-channel approach. EX1027, 4:48-56; 45:6-21; EX2046, ¶¶166-67.

A POSITA would recognize that Soller's multi-wavelength, spectral-modeling hematocrit system is not a modular enhancement to Lisogurski's two-wavelength, ratio-of-ratios oximetry architecture. Rather, the two systems embody different measurement objectives and processing paradigms that are not interchangeable. EX1027, 4:42–56, 45:6-21; EX1030, 5:33-63; EX2046, ¶¶168-171.

Petitioner does not identify any design problem in Lisogurski that would

motivate adopting Soller's alleged arc arrangement of LEDs and detectors. Nor do they show that Soller's alleged geometry solves any limitation or deficiency in the two-wavelength ratio-of-ratios oximetry model. Petition, 66-71; EX1003 ¶¶256-263. Because Lisogurski is purpose-built to compute oxygen saturation from two channels, importing Soller's broader spectral framework and detector layout would require a substantial redesign, including reengineering Lisogurski's light source array with optic cables, significantly increasing the count of the light sources and detectors, and replacing its two-channel ratio-of-ratios processing with a multi-wavelength spectral calibration model to acquire and analyze a much larger dataset. EX2046, ¶¶171-172. The resulting system would no longer measure blood oxygen saturation using Lisogurski's two-channel ratio-of-ratios approach and would therefore undermine the very principle Lisogurski implements. EX2046, ¶¶171-72; *see Application of Ratti*, 270 F.2d 810, 813 (C.C.P.A. 1959) (holding the suggested combination of references was not obvious because it "would require a substantial reconstruction and redesign of the elements shown in [a prior art reference] as well as a change in the basic principles under which [that prior art reference's] construction was designed to operate").

Contrary to Petitioner's suggestion, "combining" Soller with Lisogurski would not "improve" Lisogurski's dual-wavelength oximetry; it would shift Lisogurski toward an entirely different multi-wavelength spectral-modeling

paradigm and would fail to deliver the intended outputs of either system. EX1027, 4:42–56, 45:6-21; EX1030, 5:33-63, 11:5-8; EX2046, ¶¶163-72; *see In re Fritch*, 972 F.2d 1260, 1265 n.12 (“A proposed modification [is] inappropriate for an obviousness inquiry when the modification render[s] the prior art reference inoperable for its intended purpose.”). Applying Soller’s mathematical model and system would not produce the oxygen-saturation output Lisogurski is designed to generate because Soller is calibrated to estimate hematocrit from a broad, multi-wavelength spectrum reflecting multiple blood constituents, not to compute blood oxygen level from the red/IR pulsatile absorption relationship captured by two channels. EX1027, 4:42-56, 45:6-21; EX1030, 5:33-63, 11:5-8; EX2046, ¶¶163-72. Conversely, applying Lisogurski’s ratio-of-ratios calculation would not produce Soller’s predicted hematocrit result because the ratio-of-ratios algorithm assumes only two wavelengths selected for oxy- and deoxyhemoglobin discrimination, whereas Soller’s hematocrit prediction requires multi-wavelength spectral data calibration across multiple constituents. EX1027, 4:42-56, 45:6-21; EX1030, 5:33--63, 11:5-8; EX2046, ¶¶163-72.

(2) Petitioner Fails to Show That Soller’s Alleged Arc Arrangement Applies to Lisogurski Because Soller’s Alleged Arc Arrangement Is Specifically Tied to Soller’s Hematocrit Measurement Configuration Absent from Lisogurski

Petitioner asserts that “[a] POSITA would have been motivated to implement Soller’s [] arcs (one of the LEDs and the second of the detectors) into Lisogurski’s system, because this would have been a straightforward design choice that would have achieved the benefits described by Lisogurski/Soller.” Petition, 65-66, 70-71. EX1003, ¶264. However, Petitioner’s showing is deficient because it does not connect its generalized motivation to the *specific* Soller configuration it seeks to combine, nor does it explain how that configuration would operate in Lisogurski’s wearable oximetry system with a reasonable expectation of success. Petition, 65-66, 70-71.

Petitioner’s “straightforward design choice” assertion is conclusory and untethered to Soller’s actual disclosure. Petition, 65-66; EX2046, ¶¶173-94. Petitioner and Dr. Mercier rely on descriptions of Sollar that disclose a fiber-optic or porthole coupling architecture for the alleged semiconductor arc (citing EX1030, 13:47–49, 16:39–48, 17:36–41, FIG. 9; EX1003, ¶¶258, 266–68, 280, 284), and detector arc (citing EX1030, 16:6–39, 18:36–46; EX1003 ¶¶256–57, 266–68, 280, 284). Petition, 66-67; EX2046, ¶¶174-75.

As an initial matter, Petitioner relies on multiple embodiments from Soller but does not explain how those embodiments were allegedly interchangeable or why the skilled person in the art would have found it obvious to combine the teachings of those embodiments. Petition, 66-67; *Abiomed, Inc. v. Maquet Cardiovascular, LLC*,

IPR2017-01204, Paper 9 at 8-12 (PTAB Oct. 23, 2017) (The Board denied the IPR institution because “Petitioner [] fail[ed] to provide a sufficient rationale to combine the teachings of [a single reference’s] different embodiments [and] fail[ed] to explain sufficiently why one skilled in the art would have found it obvious to combine those teachings.”)

Soller’s alleged “ring-like” arrangement solves a fiber optic, or porthole coupling problem that Lisogurski does not have and is incompatible with Lisogurski’s direct-illumination wearable architecture. EX2046, ¶¶176-189. Petitioner thus fails to show a specific connection between its asserted motivation and the particular arrangement it seeks to import. *See Innogenetics, N.V. v. Abbott Labs.*, 512 F.3d 1363, 1373 (Fed. Cir. 2008) (“knowledge of a problem and motivation to solve it are entirely different from motivation to combine particular references to reach the particular claimed method”).

Soller discloses a fiber optic, or porthole delivery system in which the LEDs do not illuminate the sample directly. EX2046, ¶176. “A fiber optic cable is attached to each light source” and includes “a delivery fiber for delivering radiation [from the light source] to the sample.” EX1030, 3:19-22; *see also id.* 12:30-31 (“radiation is delivered via an optical delivery cable 80 to a probe 82 positioned in close proximity to the skin 73”), Fig. 9, Fig. 11A; EX2046, ¶176. In an integrated embodiment, “radiation 122, 122' from the LEDs 104, 104' is focus[ed] by a lens 150 into a fiber

optic cable 152,” with “an annular fiber housing 156 disposed radially around the fiber optic cable 152.” EX1030, 15:57-63, 16:39-48. Soller also explains that “[t]he mounting plate 108 includes a series of portholes 109, 109’ positioned above each LED so that radiation 122, 122” can pass through the mounting plate 108 and onto the sample.” EX1030, 13:35-49. Thus, the alleged “ring-like” LED arrangement is expressly disclosed as part of a fiber optic or porthole coupling architecture in a hematocrit analysis system. EX1030, 15:57-63, 16:39-48, 13:35-49; EX2046, ¶¶176-81.

Soller confirms that this geometry maximizes coupling into the fiber: “[t]he component of the light from each LED that is collimated will be focused by the lens into a small spot at the entrance end of cable [152], thereby maximizing the amount of radiation coupled into the fiber optic cable.” EX1030, 16:44-48; *see also id.* 15:60-63 (“annular fiber housing...disposed radially around the fiber”). EX2046, ¶178. A POSITA would understand that Soller’s LED geometry is inseparable from its fiber delivery scheme and is not a general-purpose illumination geometry for a compact wearable sensor. EX1030, 15:57-63, 16:39-48; EX2046, ¶178. *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561,1568 (Fed. Cir. 1987) (reference “must be considered in its entirety, ... including portions that would lead away” from the claimed invention).

Soller’s fiber optic or porthole pathway likewise defines the illumination

“dimension” and angular distribution at the sample through the fiber geometry, rather than through the LED package itself. EX2046, ¶179. As Soller explains, “radiation ... from the LEDs ... is focus[ed] by the lens ... into a fiber optic cable,” making the fiber the effective optical output aperture. EX1030, 15:57-63, 16:39-48. Consistent with this configuration, Soller discloses fiber diameters and spacing that determine the resulting illumination geometry. See EX1030, 13:10-12 (“optical delivery and signal fibers have diameters of between about 0.1 and 2 mm, and 10 to 500 microns, respectively”). EX2046, ¶¶179, 186.

The fiber optic cable or porthole is integral to Soller's measurement and calibration architecture, including reference detector measurement paths. EX2046, ¶180. In Fig. 7, “the fiber optic cable 152 is bifurcated at a first point 158a to deliver a portion of the incident radiation through a first fiber optic cable section 160 to a reference detector 155 [] to determine the reference spectrum.” EX1030, 16:8-12. “A cross-sectional slice of the fiber optic cable 152 ... features a delivery fiber 166 surrounded by radially and symmetrically disposed reference fibers 168,” with the lens focusing into both sets of fibers. EX1030, 16:12-21. Soller's annular/radial LED arrangement is therefore motivated by fiber based optical routing to support reflectance and reference measurements. EX1030, 15:57-63, 16:8-21, 16:39-48, Fig. 11A; EX2046, ¶¶180-81.

Lisogurski, by contrast, discloses a compact wearable pulse oximeter that uses

direct illumination and local detection, not collimated optic delivery. EX2046, ¶182. As Lisogurski explains, “[a]n oximeter may include a light sensor ... [that] may use a light source to pass light through blood perfused tissue and photoelectrically sense the absorption of the light in the tissue.” EX1027, 4:6-11. Lisogurski further teaches that “sensors ... may include sensors for sensing absorbed light based on detecting reflected light.” EX1027, 4:21-22; *see also id.*, FIG. 1, 10:42-11:20. Thus, when the “red and IR light emitters” are driven, “they emit pulses of light at their respective wavelengths into the tissue of a subject,” and the detector senses the intensity “after passing through the subject’s tissue.” EX1027, 12:11-16; 11:9-14; EX2046, ¶183. The only “cable” disclosed in Lisogurski is a communication cable to the monitor, not an optical fiber. EX1027, 18:58-62, 18:16-23; EX2046, ¶184.

Because fiber or porthole delivery reduces the illumination aperture to the output and imposes specific angular and spatial distributions, Soller’s coupling physics and geometry are fundamentally different from—and incompatible with—Lisogurski’s direct-illumination architecture. EX2046, ¶183. Soller requires focusing into the fiber entrance and mechanical structures “disposed radially around the fiber optic cable.” EX1030, 15:57-63, 16:8-21, 16:39-48, Fig. 11A. Lisogurski, on the other hand, is designed around LEDs that directly “emit pulses of light ... into the tissue” with a local detector, and contains no suggestion of fiber routing or bifurcation. EX1027, Fig. 1, 4:6-11, 10:42-11:20, 12:11-16. A POSITA would

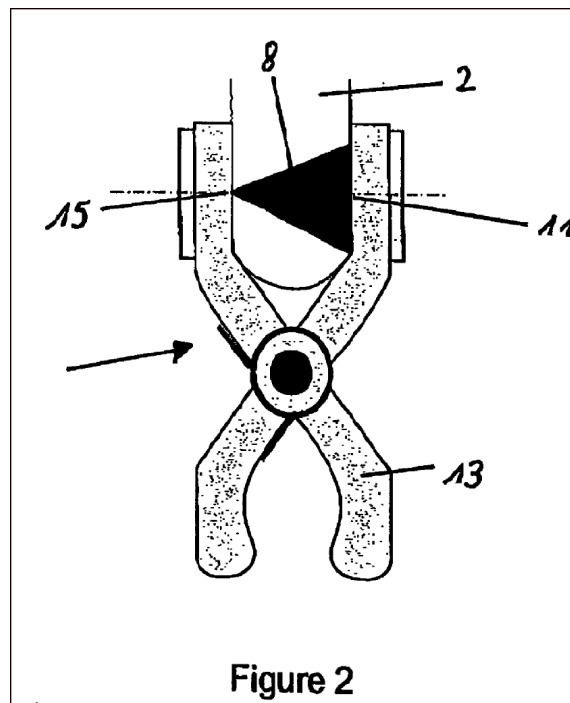
recognize that these different illumination paradigms are not interchangeable because they define different optical footprints, coupling efficiencies, and spatial distributions at the tissue. EX1027, 4:6-11, 4:21-22, 12:11-16; EX1030, 15:57-63, 16:39-48; EX2046, ¶185.

Soller's disclosed dimensions underscore its fiber-centric design. Soller explains that "[p]robe fibers ... are combined into a single fiber bundle ... [and] [l]ight from [the] fiber bundle ... illuminates sample," and further specifies that "[t]he spacing between the ... illuminating fiber bundle and the outer fiber ring ... is preferably 2–4 mm" for a 5 mm probe tip. EX1030, 18:43-46; EX2046, ¶186. Soller also teaches that this fiber spacing is selected to ensure sampling of blood-rich tissue and to manage noise: a "separation of 1–5 mm ... facilitates obtaining adequate depth penetration," while spacing that "is too small" causes most reflected light to originate at the "air/tissue interface," such that "the geometry of the fiber optic probe is likely to be a limiting factor in the noise level." EX1030, 21:20-34 (referring to Figs. 14A–B); EX2046, ¶187.

Pulse oximetry, by contrast, isolates the pulsatile arterial component mathematically using a conventional dual-wavelength ratio-of-ratios approach and does not depend on fiber or porthole defined sampling geometry. EX1027, 4:42-56, 45:6-21; EX2052, 5; EX2046, ¶188.

Petitioner fails to explain why a POSITA would have chosen an arc

arrangement from amongst the wide array of non-arc arrangement options (e.g., a single element or linear designs), let alone the alleged arc arrangement in Soller's FIG. 11A. Pet., 66-74; EX2046, ¶190; *Virtek Vision Int'l ULC v. Assembly Guidance Sys., Inc.*, 97 F.4th 882, 886-87 (Fed. Cir. 2024) (the “mere ... exist[ence]” of “possible arrangements” does not mean that a POSITA would have been motivated to use them). For example, Carlson discloses a single-detector configuration in which “[t]he sensor or ear clip 13 ... includes a light source 15 which emits a light beam 8 to a light receiver 11,” as shown in FIG. 2. EX1028, ¶[0049], FIG. 2; EX2046, ¶190.



EX1028, FIG. 2

Carlson also discloses “optical radiation 8 emitted from the two LEDs 15” in

FIG. 4 as a linear configuration of the LEDs. EX1028, ¶[0054], FIG. 4; EX2046, ¶191.

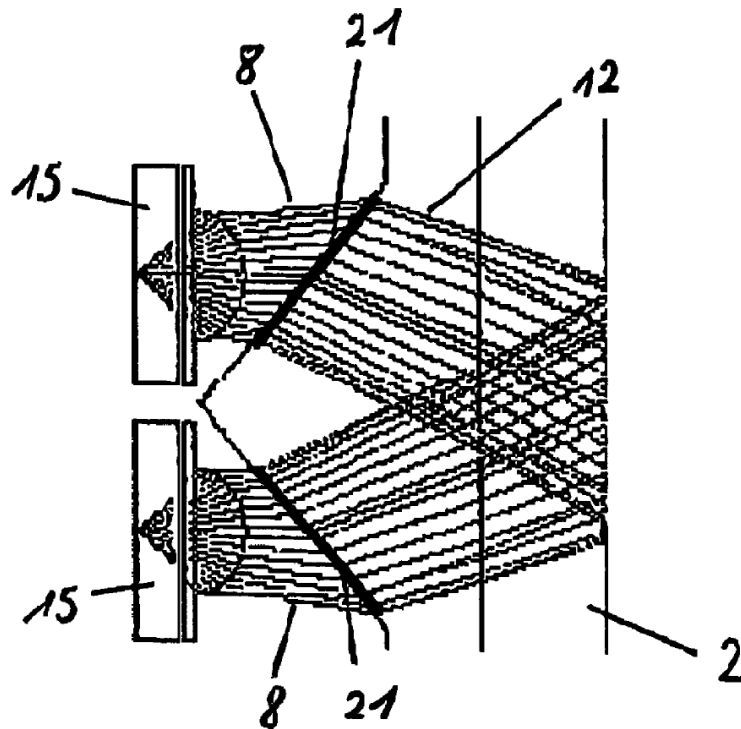


Figure 4

EX1028, FIG. 4

Indeed, Petitioner acknowledges that Lisogurski “does not require the LEDs and detectors to be arranged in a particular configuration” Petition, 70.

Second, Petitioner argues at a high level that all three references involve optical measurement systems and that Lisogurski’s goal of improving SNR would have motivated a POSITA to look to Soller for accuracy improvements, including arranging LEDs “in a ring.” Petition, 65-66. But Petition does not provide any basis

for adopting Soller's *particular* arc/ring-like configuration (and multi-LED/multi-detector structure) in Lisogurski's specific wearable oximetry sensor. Pet., 65-66, 70-71; EX2046, ¶193. Petitioner does not identify any deficiency in Lisogurski that would be solved specifically by adopting Soller's arc geometry (as opposed to any number of LEDs/detector layouts), and it never explains why Soller's solution—developed for multi-wavelength hematocrit spectral analysis—would be expected to improve a dual-wavelength ratio-of-ratios oximeter. Petition, 70-71; EX1003, ¶¶111-13; EX2046, ¶193. In other words, Petitioner asserts a POSITA would use Soller's ring in Lisogurski, without explaining why that specific selection would have been made or why it would yield predictable results in Lisogurski's system. EX2046, ¶193.

Third, Petitioner never explains the implementation details necessary to support “predictable results” or a reasonable expectation of success. Pet., 65-66, 70-71; EX2046, ¶194. The Petition asserts that applying Soller's modifications to the “arrangement and number” of LEDs and detectors in Lisogurski “would have been straightforward” and would yield “predictable results.” Pet., 66; EX1003, ¶264. But Petitioner does not address what redesign would be required to (i) add Soller's many-wavelength LED array to Lisogurski's two-wavelength oximetry sensor, (ii) incorporate Soller's multiple detector scheme (including reference detectors), or (iii) reconcile Soller's correction and calibration framework with Lisogurski's time-

varying, two-channel oximetry processing. Pet., 65-74; EX2046, ¶194. Without those details, Petitioner has not shown that the modification is truly routine or that the outcome would be predictable.

Accordingly, combining Soller's fiber driven LED geometry into Lisogurski would be unnecessary and incompatible with Lisogurski's compact direct illumination oximetry design. Petitioner and Dr. Mercier do not explain how a POSITA could implement Soller's fiber optic or porthole delivery configuration in Lisogurski without the requisite optical cables or porthole and associated components, or how adding those elements would avoid increasing size and complexity contrary to Lisogurski's wearable objective. EX1027, 4:6-11, 4:21-22, 12:11-16; EX1030, 15:57-63, 16:39-48, 13:35-49; Petition, 65-71; EX2046, ¶189.

(3) Petitioner Fails to Show That Soller's Alleged Detectors Would Be Used in Lisogurski Because They Serve a Reference-Calibration Function Absent from Lisogurski

Petitioner and Dr. Mercier rely on Soller—not Lisogurski—to supply the “first arc” and “second arc” arrangements required by claims 4–6, 15–16, and 21–22, pointing primarily to the “interior” or “reference” detector 610 arrangements in Figures 11A–11B. EX1003 ¶¶256-263; Petition, 66-71. Those detectors, however, serve a reference calibration function rather than capture light reflected or transmitted from the sample as required by the challenged claims, as discussed in

§VII.E.1.a. EX2046, ¶¶195-97.

Soller explains that its interior/reference detectors do not perform reflectance detection. EX2046, ¶¶196-97. Instead, “the interior detector 350 monitors the optical output emitted from the LEDs,” and “[r]adiation detected by the interior detector is used to determine a reference spectrum which allows intensity variations from the various LEDs to be accounted for.” EX1030, 17:1-5. Likewise, “reference detectors 610 ... measure and correct for variations in the LED intensity due to temperature, aging, or electrical power source drifts.” EX1030, 17:45-48. By contrast, the '304 Patent's independent claims require a receiver configured to receive a “beam reflected or transmitted from the sample.” EX1001, 36:26-40; EX2046, ¶¶196-97.

Lisogurski contains no separate reference detector and no disclosure of using a spatially arranged reference detector to correct LED intensity variation. EX1027, 10:48-11:27; EX2046, ¶198. Instead, the same detector receives light “after passing through the subject's tissue,” with intensity tied to tissue absorbance/reflectance at the measurement wavelengths. EX1027, 11:9-20; EX2046, ¶198. Petitioner and Dr. Mercier do not explain how or why a POSITA would use Soller's reference detector architecture—designed to generate a reference spectrum for hematocrit spectral calibration—in Lisogurski's two wavelength pulse oximetry system, which neither requires nor contemplates such detectors. EX2046, ¶¶198-99.

As discussed above, Soller and Lisogurski address different physiological

parameters using incompatible optical architectures and signal-processing models—Soller's multi-wavelength spectral modeling for hematocrit versus Lisogurski's dual-wavelength ratio-of-ratios calculation for oxygen saturation. Soller's LED/detector geometry is fundamentally tied to fiber-optic coupling and reference-spectrum calibration, features that are absent from—and would not function in—Lisogurski's compact wearable oximetry device. EX1030, 5:33-63, 15:57-63, 16:8-21, 16:39-48; EX1027, 4:42-56, 10:48-11:27, 45:6-21; EX2046, ¶¶163-201.

Therefore, the combination of Lisogurski and Soller does not render obvious the arc limitation, at least because a POSITA would not have been motivated to apply Soller's alleged arc arrangement of reference detectors in Lisogurski's oximetry device. EX1003, ¶¶256-63; Pet., 66-71; EX2046, ¶¶163-201.

f) Petitioner Similarly Does Not Show that a POSITA Would Have Been Motivated to Implement's Soller's Alleged Arc Arrangement in Carlson to Meet the Arc Limitation

Petitioner argues that “[a] POSITA would have considered Lisogurski, Carlson, and Soller together; they are analogous optical measurement systems with common applications and utility,” and that “[a]ll three describe techniques for improving the performance of wearable, optical devices used to remotely monitor physiological parameters, including blood oxygen.” Pet., 65-66; EX1003 ¶111. For the same reasons discussed with respect to Lisogurski, Petitioner and Dr. Mercier do

not show that a POSITA would have been motivated to combine Soller's alleged arc arrangement into Carlson. Pet., 65-66; EX1003, ¶¶111-13, 255-65; EX2046, ¶¶202-09.

Carlson is directed to optical pulse oximetry—measurement of pulsation and oxygen saturation using conventional dual wavelength principles that distinguish oxygenated from deoxygenated hemoglobin. EX1028, ¶¶[0002]-[0003]. Soller, by contrast, addresses hematocrit using multi wavelength spectral acquisition and mathematical modeling of red blood cell constituents. EX1030, Abstract, 1:49-62. A POSITA would recognize that Soller's multi-wavelength spectral-modeling framework is fundamentally different from—and incompatible with—Carlson's dual-wavelength, time-varying oximetry architecture, which mirrors the system implemented in Lisogurski. EX2046, ¶204. As explained above in §VII.E.1.e.1-2, the two systems address different measurement objectives and rely on different input data and processing paradigms.

Moreover, Soller's physical LED arrangement is driven by a fiber optic delivery constraint—focusing collimated LED light into a fiber entrance and organizing components around annular fiber housings—which Carlson does not disclose or require. EX1030, 3:19-22, 12:30-31, 16:44-48; EX2046, ¶205. Carlson teaches compact sensors in which LEDs directly illuminate tissue, with detector placement optimized for ambient light rejection, not fiber coupling. EX1028,

¶¶[0048]-[0052], [0073], Figs. 1, 2, 10a, 10b. Because Carlson lacks the fiber optic coupling problem that motivates Soller's geometry, a POSITA would have no reason to import Soller's geometry into Carlson's sensor. EX2046, ¶205.

Finally, Petitioner's reliance on Soller's "interior" or "reference" detectors to supply an alleged detector arc is misplaced. Those detectors serve a calibration function—monitoring LED output to generate a reference spectrum and correct for LED intensity variation—that Carlson neither discloses nor needs. EX1030, 17:1-5, 17:45-48; EX1028, ¶[0025]; EX2046, ¶206. Petitioner offers no reasoned explanation for including Soller's reference detector architecture in Carlson's pulse oximetry design. Petition, 65-66; EX2046, ¶206.

Accordingly, the combination of Lisogurski, Carlson, and Soller does not render obvious the arc limitation, and claims 4–6, 15–16, and 21–22 are not rendered obvious by Lisogurski in view of Carlson and Soller.

2. Dependent Claims

Claim 7 depends from claim 6 and includes the same limitation as claim 6. EX1001, 37:14-17. Claim 10 depends from claim 8, which in turn depends from claim 7. EX1001, 37:35-37, 37:18-21. Claim 17 depends from claim 16 and includes the same limitation as claim 16. EX1001, 38:54-57. Claim 18 depends from claim 17 and includes the same limitation as claim 17. EX1001, 38:58-61. Claim 23 depends from claim 22 and includes the same limitation as claim 22. EX1001, 40:9-

11. Claim 24 depends from claim 23 and includes the same limitation as claim 23. EX1001, 40:12-15.

Petitioner's analysis for Claims 7-8, 10, 17-18, and 23-24 does not address any of the aforementioned deficiencies discussed above for Ground 4. *Supra*, §VII.E.1; Petition, 66-74; EX2046, ¶¶210-218.

Therefore, Petitioner has failed to meet its burden because Lisogurski, Carlson and Soller do not render obvious claims 7-8, 10, 17-18 and 23-24 for at least the same reasons explained above with respect to Ground 4 and claims 4-6, 15-16, and 21-22 of the '304 Patent. *Supra*, §VII.E.1.

F. Ground 5: Obviousness Based on Lisogurski, Carlson, and Tran (Claims 12–13, 26)

In Ground 5, Petitioner argues that claims 12-13 and 26 of the '304 Patent are obvious over Lisogurski, Carlson, and Tran. Petition, 75-82. For the reasons discussed below, Petitioner fails to meet its burden for claims 12-13 and 26. *See* EX2046, ¶¶219-237.

Claim 12 recites “wherein the measurement system is at least in part configured for selection or identification of an object.” EX1001, 38:20-32. Claim 26 similarly recites “wherein the wearable device is at least in part configured for selection or identification of an object.” EX1001, 40:26-38. As discussed, the phrase “to identify an object” means “to recognize or establish an object as being a

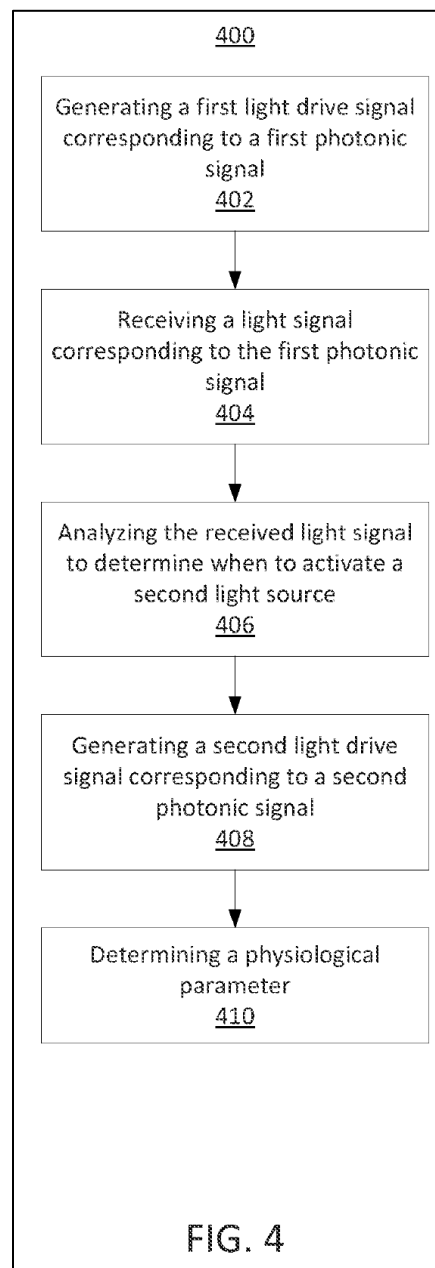
particular thing.” *Supra*, §VI.B; EX1011, 8-10; EX1013, 3. There is a difference between identifying an object and detecting an object, the latter of which means “to discover or notice the existence or presence of something.” *Id.* To illustrate by way of example, a scale measures weight without identifying the object on the scale. As another example, a pH meter measures acidity without identifying which acids or bases are present.

The '304 Patent exemplifies identification or selection through discrimination among multiple unknown constituents. To distinguish between blood constituents such as glucose, which has spectral features that may overlap with other blood constituents, the '304 Patent describes using “pattern matching algorithms and other software and mathematical methods to identify the blood constituents of interest.” EX1001, 4:58-62, 18:50-54, 35:17-44; EX2046, ¶228. It also describes “using a wider wavelength range and using more sampling wavelengths [to] improve the ability to discriminate one signal from another.” EX1001, 35:41-44; EX2046, ¶228. The identification is achieved via various signal processing techniques. EX1001, 35:23-26; EX2046, ¶229. “Various mathematical derivatives, including the first and second derivatives, may help to accentuate differences between spectra.” EX1001, 20:17-19; EX2046, ¶229. In addition, “the spectrum may be correlated with a library of known spectra to determine the overlap integrals.” EX1001, 35:20-21; EX2046, ¶229.

The '304 Patent specification describes that “it may be advantageous to use pattern matching algorithms and other software and mathematical methods to ***identify the blood constituents of interest.***” EX1001, 35:17-26 (emphases added); EX2046, ¶230. The specification further recognizes that when “identifying the blood constituents of interest,” “[o]ne of the issues in measuring a particular blood constituent is the interfering and overlapping signal from other blood constituents.” Ex. 1001 a 35:27-44; EX2046, ¶230. The specification explains that “[t]he ***selection of the constituent of interest*** may be improved using a number of techniques.” *Id.* (emphases added). The specification also explains the number of techniques, stating “a higher light level or intensity may improve the signal-to-noise ratio for the measurement.... [and,] using a wider wavelength range and using more sampling wavelengths may improve the ability to discriminate one signal from another.” *Id.*

Based on the foregoing disclosures in the '304 Patent, a POSITA would understand that selection or identification requires determining what the object is, not measuring an assumed object's parameters. EX2046, ¶¶226-27. This is what distinguishes selecting or identifying an object from merely detecting something or measuring a parameter of a presumed object. EX1011, 10; EX2046, ¶¶191-92. To select or identify an object, the system must determine what the object is, recognizing it as a particular thing. EX2046, ¶¶226-27. This is distinct from assuming an object and simply quantifying one of its attributes.

Lisogurski does not disclose selecting or identifying an object as claimed because measuring a known parameter does not meet the claim construction. EX2046, ¶¶231-32. Lisogurski's pulse oximeter measures oxygen saturation of hemoglobin—a known, presumed constituent—without identifying what blood constituents are present. *Id.* Lisogurski describes a pulse oximetry system that measures blood oxygen saturation. EX1027, 3:61-4:41; EX2046, ¶¶231-32. The Lisogurski system emits light at two wavelengths, detects the transmitted or reflected light, and calculates oxygen saturation based on the ratio of absorbed light with a detector. EX1027, 4:42-62, FIG. 4; EX2046, ¶231.



EX1027, FIG. 4

Lisogurski operates on the presupposition that hemoglobin is present. EX1027, 4:35-41; EX2046, ¶¶231-33. It uses known characteristics of that single constituent to estimate oxygen saturation. EX1027, 4:35-41; EX2046, ¶233.

Lisogurski does not disclose or suggest any step where the system attempts to determine the identity of a substance or object—it, at most, assumes the identity of the object from the outset. EX1027, 4:35-41; EX2046, ¶¶231-33.

The oximetry technique described in Lisogurski is not a blood identification or selection technique. EX2046, ¶233. Oximetry exclusively focuses on one blood constituent, hemoglobin, and measuring the ratio of oxygenated and deoxygenated hemoglobin, without discriminating hemoglobin from other blood constituents. EX1027, 3:61-4:3; EX2046, ¶¶232-33. This technique applies pre-established assumptions that oxygenated and deoxygenated hemoglobin are inherently present in blood and that the absorbance of specific wavelengths has a mathematical correlation to blood oxygen saturation. EX2046, ¶¶231-33. An oximeter is configured to know what blood constituent it is measuring; it does not recognize or establish the identity of what it is measuring. *Id.*

The Petition relies on the Board's remand decision concerning the related '484 Patent ("the '484-RFWD"). Petition, 80-81. Petitioner's reliance on the '484-RFWD is flawed because the '484-RFWD is not final and does not have any preclusive effect because it is currently on appeal. EX1010; *United Therapeutics*, 74 F.4th at 1372. The '484-RFWD does not obviate Petitioner's burden to prove that Lisogurski discloses this limitation under the proper claim construction in this proceeding.

Petitioner and Dr. Mercier argue that “Lisogurski and Tran both teach techniques for selecting or identifying blood oxygen saturation and other blood constituents.” Petition, 81; EX1003, ¶¶298-99. Petitioner further states that “[m]easuring blood oxygen saturation requires selecting oxygenated and deoxygenated hemoglobin from among other blood constituents, and then identifying and quantifying both components, which Lisogurski and Tran do by measuring reflected light at particular wavelengths known to be associated with each substance.” Petition, 81; EX1003, ¶¶298-300. Petitioner’s arguments are incorrect for the following reasons.

A POSITA would understand that Lisogurski’s pulse oximeter performs parameter measurement, not object identification or selection. EX1027, 3:61-4:3; EX2046, ¶233. As explained in *Supra*, §VII.E.1.e.1, pulse oximetry assumes hemoglobin is the relevant absorber and estimates oxygen saturation by applying a ratio-based calculation to differential absorption at selected wavelengths; it does not select or identify hemoglobin as an object from among other blood constituents. EX2046, ¶233. Lisogurski operates on the express assumption that the object of interest—hemoglobin—is present and known. EX1027, 3:61-4:3, 4:35-41; EX2046, ¶233. Using known characteristics of hemoglobin, Lisogurski estimates oxygen saturation. EX1027, 4:35-41; EX2046, ¶233. At no point does Lisogurski attempt to determine what substance or object is being analyzed; rather, the system presupposes

the object and merely measures physiological parameters associated with it. EX1027, 4:35-41; EX2046, ¶233. A POSITA would therefore understand that Lisogurski does not select or identify an object as properly construed. EX2046, ¶233.

Tran likewise performs parameter measurement rather than object identification or selection. EX2046, ¶234. Tran explains that its system analyzes blood pressure, heart rate, and pulse oximetry values to characterize a user's cardiac condition. EX1031, 74:29-67; EX2046, ¶234. Tran teaches that blood cells absorb and transmit red and infrared radiation based on the amount of oxygen bound to hemoglobin. EX1031, 36:62-37:13; EX2046, ¶234. Thus, any alleged "object identification" in Tran is achieved only by applying ratio comparison of presumed tissue parameters to estimate physiological condition—not by identifying an unknown substance or object. EX1031, 15:9-12; EX2046, ¶234. Tran includes no step in which the system determines what the substance is; instead, it presupposes the tissue and computes parameters. EX2046, ¶234. A POSITA would therefore understand that Tran, like Lisogurski, fails to select or identify an object as required under the claim construction. EX2046, ¶234.

In contrast, identifying or selecting an object as required by claims 12, 13, and 26 requires discernment of the object's identity. EX2046, ¶236. The '304 Patent describes using spectral data and algorithms to classify unknown samples, including through spectral analysis and library matching, rather than merely measuring signal

parameters. EX1001, 29:9-16, 35:19-44; EX2046, ¶236. The '304 Patent further discloses methods “of improving the ability to discriminate between different constituents,” underscoring that the claimed invention is directed to object identification—not simple parameter measurement. EX1001, 20:51-23; EX2046, ¶236. While the claim recites “identification” or “selection,” Petitioner does not take address “selection” separately from “identification,” which is consistent with the specification's description of “selection” after “identification.” Petition, 81. In any event, the ratio-based oximetry methods in both Lisogurski and Tran do not select any constituent from among multiple constituents; they merely compute a ratio from detected signals at two wavelengths. EX2046, ¶235.

For at least these reasons, Petitioner fails to meet its burden for Ground 5. Lisogurski and Tran perform parameter measurement, not object identification or selection. EX2046, ¶¶219-37.

G. Ground 6: Obviousness Based on Lisogurski, Carlson, Soller, and Tran (Claim 9)

In Ground 6, Petitioner argues that claim 9 of the '304 Patent is obvious over Lisogurski, Carlson, Soller, and Tran. Petition, 83-84. Claim 9 depends from claim 8. EX1001, 37:22-34. Petitioner's analysis for claim 9 does not address any of the aforementioned deficiencies regarding Lisogurski, Carlson and Soller explained above for Ground 4 and claim 8. *Supra*, §VII.E.2; EX2046, ¶¶239-40.

Claim 9 recites “wherein the measurement system is at least in part configured for selection or identification of an object.” EX1001, 37:29-30. Petitioner’s analysis for Claim 9 does not address any of the aforementioned deficiencies with respect to the “selection or identification of an object” limitation discussed above for Ground 5. *Supra*, §VII.F; EX2046, ¶241.

VIII. CONCLUSION

For at least the foregoing reasons, the Petition should be denied as to each of the requested grounds. For brevity, Patent Owner may not have addressed all characterizations of the applied references and the challenged claims and reserves the right to do so should institution be granted. The absence of a response by Patent Owner to any of the positions presented in the Petition or the associated expert declaration is not a concession to those positions. The fact that Patent Owner’s Preliminary Response has focused on particular arguments is not a concession that there are no other arguments for patentability of the challenged claims.

Respectfully submitted,

Dated: January 5, 2026

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CERTIFICATION OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(d), the undersigned hereby certifies that the foregoing Patent Owner's Preliminary Response is produced using a 14-point Times New Roman font and contains approximately 12,362 words, which is less than the 14,000 total words permitted by the U.S. Patent Trial and Appeal Board rules. Counsel relies on the word count of the computer program used to prepare the response on January 5, 2026.

By: /s/ Jennifer Hayes

Lead Counsel for Patent Owner

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing **Patent Owner's Preliminary Response** was served on January 5, 2026, by email:

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