

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

MASIMO CORPORATION,
Patent Owner.

IPR2022-01299 (Patent 7,761,127 B2)

Before JOSIAH C. COCKS, JAMES A. TARTAL, and
ROBERT A. POLLOCK, *Administrative Patent Judges*.

POLLOCK, *Administrative Patent Judge*.

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

I. INTRODUCTION

Petitioner, Apple Inc., filed a Petition for *inter partes* review of claims 1–30 of U.S. Patent No. 7,761,127 B2 (Ex. 1001, “the ’127 patent”). Paper 2 (“Pet.”). Patent Owner, Masimo Corporation, timely filed a Preliminary Response to the Petition. Paper 9 (“Prelim. Resp.”).

For the reasons provided below, we determine Petitioner has satisfied the threshold requirement set forth in 35 U.S.C. § 314(a). Because Petitioner has demonstrated a reasonable likelihood that at least one claim of the ’127 patent is unpatentable, we institute an *inter partes* review of all challenged claims on each of the Grounds raised in the Petition. *See SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018); *PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (interpreting the statute to require “a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition”); *see also* Guidance on the Impact of SAS on AIA Trial Proceedings (April 26, 2018).¹

A. Real Parties-in-Interest

Petitioner identifies itself, Apple Inc. as the real party-in-interest. Pet. 70. Patent Owner identifies itself as the real party-in-interest. Paper 5, 1.

B. Related Matters

In addition to the current matter, Petitioner challenges claims 1–30 of the ’127 patent in IPR2022-01300.²

¹ Available at <https://www.uspto.gov/patents-application-process/patent-trial-and-appeal-board/trials/guidance-impact-sas-aia-trial> (“Guidance”).

² In light of its concurrent challenges to claims 1–30 of the ’127 patent, Petitioner filed a Notice of Ranking Petitions (Paper 3), to which Patent Owner responded (Paper 11). We address Petitioner’s Notice of Ranking arguments and Patent Owner’s response in copending IPR2022-01300.

According to the parties, the '127 patent is among the patents at issue *In the Matter of Certain Light-Based Physiological Measurement Devices and Components Thereof*, Inv. No. 337-TA-1276, pending in the U.S. International Trade Commission. Pet. 70; Paper 5, 1.

C. The '127 Patent and Relevant Background

The '127 patent, titled “Multiple Wavelength Sensor Substrate,” is directed to sensors comprising optical emitters (e.g., LEDs) and corresponding detectors to non-invasively measure physiological parameters in a subject’s blood. Ex. 1001, code (54), 2:14–28, 2:49–65. These components are commonly used in pulse oximeters, which measure oxygen saturation and pulse rate. *Id.* at 2:14–16.

In general, the sensor has light emitting diodes (LEDs) that transmit optical radiation of red and infrared wavelengths into a tissue site and a detector that responds to the intensity of the optical radiation after absorption (e.g. by transmission or transreflectance) by pulsatile arterial blood flowing within the tissue site.

Id. at 2:16–21. According to the Specification,

[o]ne aspect of a physiological sensor is emitters configured to transmit optical radiation having multiple wavelengths in response to corresponding drive currents. A thermal mass is disposed proximate the emitters so as to stabilize a bulk temperature for the emitters. A temperature sensor is thermally coupled to the thermal mass. The temperature sensor provides a temperature sensor output responsive to the bulk temperature so that the wavelengths are determinable as a function of the drive currents and the bulk temperature.

Id. 2:57–65; Abstract.

Figure 6 of the '127 patent is reproduced below.

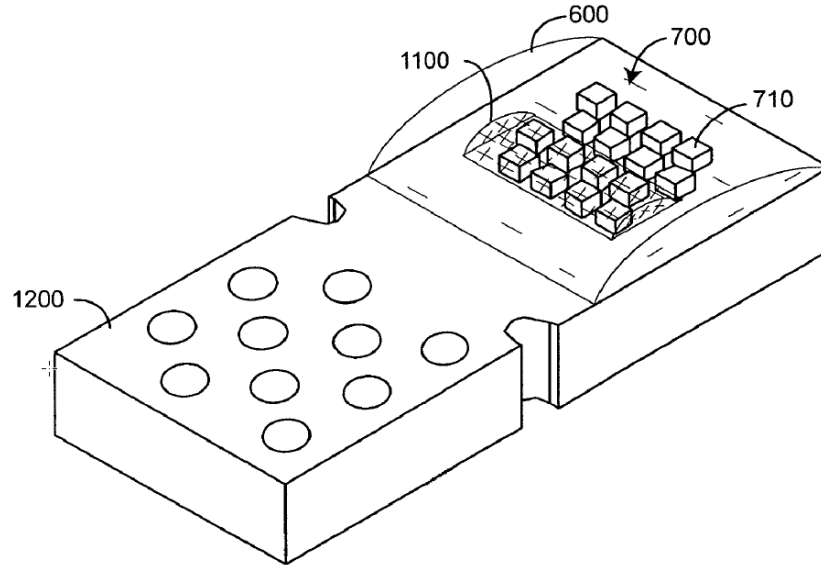


Figure 6 shows an exemplary emitter assembly comprising LEDs 710 arranged in emitter array 700 on a substrate 1200. *Id.* at 3:43–44, 6:48–52. The LEDs of emitter array 700 “are physically arranged and electrically connected in an electrical grid to facilitate drive control, equalization, and minimization of optical pathlength differences at particular wavelengths.” *Id.* at 6:54–58. “[S]ubstrate 1200 is configured to provide a bulk temperature of the emitter array 700 so as to better determine LED operating wavelengths.” *Id.* at 6:60–63. In some embodiments, “substrate 1200 is also configured with a relatively significant thermal mass, which stabilizes and normalizes the bulk temperature so that the thermistor measurement of bulk temperature is meaningful.” *Id.* at 10:62–11:4.

Figure 12 of the '127 patent is reproduced below.

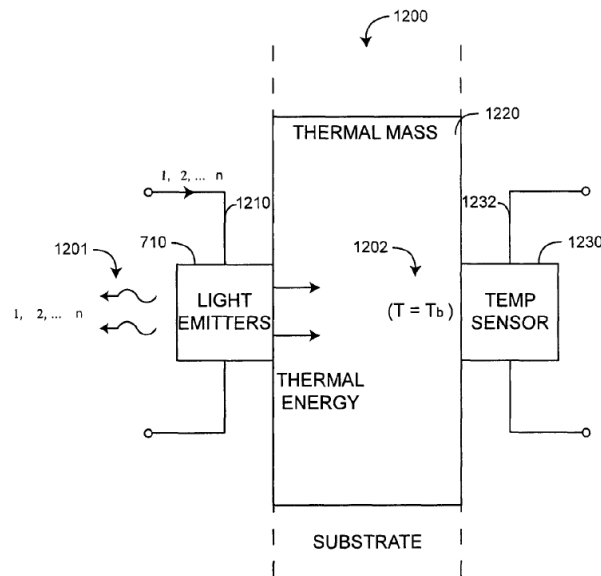


FIG. 12

Figure 12 shows a generalized block diagram of an emitter substrate. *Id.*

3:52. According to the '127 patent, Figure 12

illustrates light emitters 710 configured to transmit optical radiation 1201 having multiple wavelengths in response to corresponding drive currents 1210. A thermal mass 1220 is disposed proximate the emitters 710 so as to stabilize a bulk temperature 1202 for the emitters. A temperature sensor 1230 is thermally coupled to the thermal mass 1220, wherein the temperature sensor 1230 provides a temperature sensor output 1232 responsive to the bulk temperature 1202 so that the wavelengths are determinable as a function of the drive currents 1210 and the bulk temperature 1202.

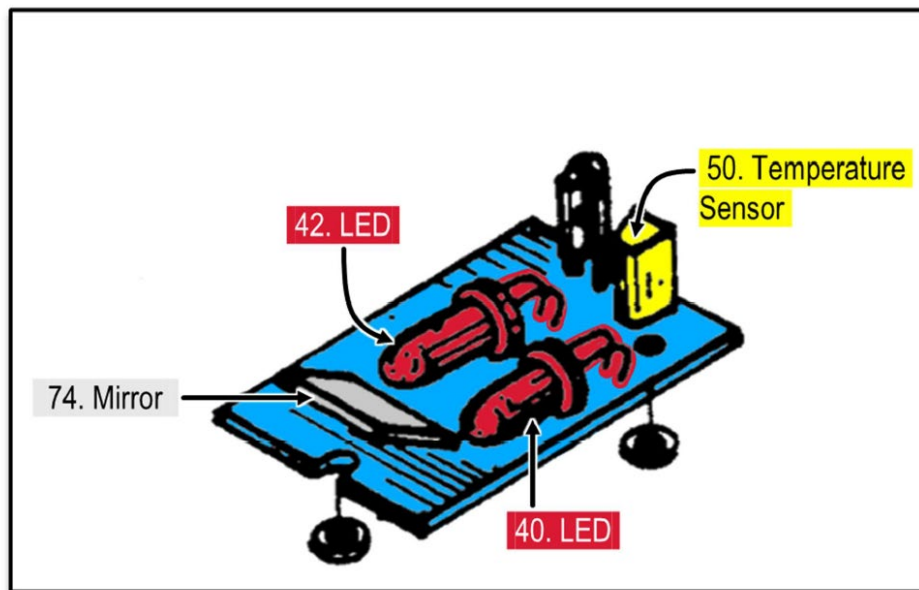
Id. at 10:22–31.

The Specification describes two embodiments involving the use of temperature measurements to determine the operating wavelength of emitters. *Id.* at 10:32–48. One embodiment involves the measurement of temperature of each individual emitter. *Id.* at 10:39–48. The other embodiment involves the determination of bulk temperature of the substrate

to which the emitters are thermally coupled. *Id.* at 10:32–39. With respect to this embodiment, the Specification provides an equation (“EQ.4” or “Equation 4”) for determining the operating wavelength of each light emitter based on bulk temperature and drive current as determined by the sensor controller. *Id.*

D. Relevant Prosecution History

In a first Office Action, the Examiner rejected certain claims in view of Cheung (Ex. 1007) and other references. Ex. 1002, 68–75. An excerpt of Cheung’s Figure 11, annotated and colorized by Patent Owner, is reproduced below.



See PO Resp. 23; Ex. 1007, Fig. 11. The above representation of Cheung’s Figure 11, shows temperature sensor 50 and LEDs 42/45 mounted on a substrate or board. PO Resp. 22–23; Ex. 2051 ¶ 43; Ex. 1002, 70 (Examiner’s statement that Cheung’s Figure 11 “compris[es] a plurality of LED emitters 40,42 and a temperature sensor 50, the emitters mounted on a first left side of a substrate and the temperature sensor mounted on a second right side of the substrate”).

According to the Examiner, Cheung disclosed all elements of certain rejected claims except for “the method comprising utilizing a thermistor thermally coupled to the light emitting sources to measure the bulk temperature,” “details of [its] temperature sensor,” or a “sensor comprising a thermal mass disposed proximate the emitters, wherein the thermal mass stabilizes a bulk temperature of the emitters.” Ex. 1002, 71. The Examiner also determined that certain dependent claims encompassed allowable subject matter, stating that:

None of the prior art teaches or suggests, either alone or in combination a physiological sensor wherein either a thermal mass is a plurality of layers of a substrate or wherein a thermal mass is disposed within a substrate proximate light emitting sources and a temperature sensor, in combination with the other claimed elements.

Id. at 73. Consistent with the Examiner’s description of allowable subject matter, Applicants amended then pending claims 1 and 5 to clarify that the “thermal mass” is disposed “within the substrate”; claim 9 to recite “providing a thermal mass disposed within a substrate proximate the light emitting sources”; and claim 13 to recite “providing a thermal mass disposed within a substrate of the light emitting sources.” *Id.* at 50–57.

The Examiner subsequently issued a Notice of Allowance. *Id.* at 32–38.

E. Challenged Claims

Petitioner challenges claims 1–30 of the ’127 Patent. Pet. 2. The challenged claims variously depend from independent claims 1, 7, 13, 20, and 26. *See, e.g., id.* at iv–vii (claim listing). Claims 1 and 7, reproduced below, are illustrative of the subject matter challenged (paragraphing and labeling as added in Petitioner’s claim listing).

[1.P] A physiological sensor comprising:

[1.1] a plurality of emitters configured to transmit optical radiation having a plurality of wavelengths in response to a corresponding plurality of drive currents, the plurality of emitters including a substrate;

[1.2] a thermal mass disposed proximate the emitters and within the substrate so as to stabilize a bulk temperature for the emitters; and

[1.3] a temperature sensor thermally coupled to the thermal mass,

[1.4] wherein the temperature sensor provides a temperature sensor output responsive to the bulk temperature so that the wavelengths are determinable as a function of the drive currents and the bulk temperature.

Ex. 1001, 19:4–17; *see* Pet. iv

[7.P] A physiological sensor capable of emitting light into tissue and producing an output signal usable to determine one or more physiological parameters of a patient, the physiological sensor comprising:

[7.1] a thermal mass;

[7.2] a plurality of light emitting sources, including a substrate of the plurality of light emitting sources, thermally coupled to the thermal mass, the sources having a corresponding plurality of operating wavelengths, the thermal mass disposed within the substrate;

[7.3] a temperature sensor thermally coupled to the thermal mass and capable of determining a bulk temperature for the thermal mass, the operating wavelengths dependent on the bulk temperature; and

[7.4] a detector capable of detecting light emitted by the light emitting sources after tissue attenuation, wherein the detector is capable of outputting a signal usable to determine one or more physiological parameters of a patient based upon the operating wavelengths.

Ex. 1001, 19:35–54; *see* Pet. iv–v.

F. Asserted Grounds of Unpatentability

Petitioner challenges the patentability of claims 1–30 of the
’127 Patent on the following grounds (Pet. 2):

Ground	Claims Challenged	35 U.S.C §	Reference(s)/Basis
1A	7–10	103	Yamada, ³ Chadwick ⁴
1B	11–12	103	Yamada, Chadwick, Leibowitz ⁵
1C	13–17, 20–23	103	Yamada, Chadwick, Cheung ⁶
1D	18–19, 24–25	103	Yamada, Chadwick, Cheung, Leibowitz
1E	1–3, 6–10, 26–27, 30	103	Yamada, Chadwick, Noguchi ⁷
1F	4–5, 11–12, 28–29	103	Yamada, Chadwick, Noguchi, Leibowitz
2A	7–10	103	Yamada
2B	11–12	103	Yamada, Leibowitz
2C	13–17, 20–23	103	Yamada, Cheung
2D	18–19, 24–25	103	Yamada, Cheung, Leibowitz
2E	1–3, 6–10, 26–27, 30	103	Yamada, Noguchi
2F	4–5, 11–12, 28–29	103	Yamada, Noguchi, Leibowitz

Petitioner further relies, *inter alia*, on the Declaration of Brian W. Anthony, Ph.D. (Ex. 1007), Thomas L. Yearwood, M.D. (Ex. 1024), and Michael Henry Verdolin, M.D. (Ex. 1003). Patent Owner relies on the

³ Yamada et al., Certified English Translation of Japanese Patent Publication No. JP 2004-337605 A to (Ex. 1004).

⁴ Chadwick et al., US 3,514,538, issued May 26, 1970. (Ex. 1005).

⁵ Leibowitz, US 4,591,659, issued May 27, 1986. (Ex. 1006).

⁶ Cheung et al., US 5,259,381, issued Nov. 9, 1993. (Ex. 1007).

⁷ Noguchi, US 5,334,916, issued Aug. 2, 1994. (Ex. 1008).

testimony of Jack Goldberg (Ex. 2051), and named inventor, Mohamed Diab (Ex. 2002).

II. ANALYSIS

A. Legal Standards

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (2012) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden of persuasion never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

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

In analyzing the obviousness of a combination of prior art elements, it can be important to identify a reason that would have prompted one of skill

in the art “to combine . . . known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418. A precise teaching directed to the specific subject matter of a challenged claim is not necessary to establish obviousness. *Id.* Rather, “any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.” *Id.* at 420. Accordingly, a party that petitions the Board for a determination of unpatentability based on obviousness must show that “a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1381 (Fed. Cir. 2016) (internal quotations omitted).

We address Petitioner’s challenges with these standards in mind, and in view of the definition of the skilled artisan and the claim constructions discussed below.

B. Person of Ordinary Skill in the Art

Factual indicators of the level of ordinary skill in the art include “the various prior art approaches employed, the types of problems encountered in the art, the rapidity with which innovations are made, the sophistication of the technology involved, and the educational background of those actively working in the field.” *Jacobson Bros., Inc. v. U.S.*, 512 F.2d 1065, 1071 (Ct. Cl. 1975); *see also Orthopedic Equip. Co. v. U.S.*, 702 F.2d 1005, 1011 (Fed. Cir. 1983) (quoting with approval *Jacobson Bros.*).

Petitioner proposes two versions of a person of ordinary skill in the art. In the first, a person of ordinary skill in the art “would have had a Bachelor of Science degree in an academic discipline emphasizing the

design of electrical and thermal technologies, in combination with training or at least one to two years of related work experience with capture and processing of data or information, including physiological monitoring technologies.” Pet. 7 (citing Ex. 1003 ¶ 20). In the alternative, Petitioner asserts that the ordinarily skilled artisan “could have had a Master of Science degree in a relevant academic discipline with less than a year of related work experience in the same discipline.” *Id.*

Patent Owner does not address the above definitions in its Preliminary Response but its expert, Mr. Goldberg, disagrees with Petitioner’s first definition insofar as it requires an academic discipline emphasizing both electrical and thermal technologies. Ex. 2051 ¶ 16. In this respect, Mr. Goldberg states that “he is unaware of such an academic discipline being available, whereas, Petitioner’s expert, Dr. Anthony, appears to assert that he has worked with “many such persons.” *Cf.* Ex. 2051 ¶ 16 *with* Ex. 1003 ¶ 21.

Mr. Goldberg states that one of ordinary skill in the art would have had

a Bachelor of Science degree in an academic discipline emphasizing the design of electrical systems, in combination with training or at least one to two years of related work experience with thermal management of electrical systems and capture and processing of data or information, including physiological monitoring technologies. Alternatively, the person could have had a Master of Science degree in a relevant academic discipline with less than a year of related work experience in the same discipline.

Ex. 2051 ¶ 16. Despite providing an alternative definition of one of ordinary skill in the art, Mr. Goldberg indicates that his opinions with respect to the

challenged claims do not depend on which of the proposed definitions is applied. *Id.*

On the current record, we accept Petitioner’s proposed definitions, as they appear consistent with the level of skill in the art reflected in the prior art of record and the disclosure of the ’127 Patent. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (“the prior art itself [may] reflect[] an appropriate level” as evidence of the ordinary level of skill in the art) (quoting *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 163 (Fed. Cir. 1985)). The parties are welcome to further address this definition at trial.

C. Claim Construction

We construe claims “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b).” 37 C.F.R. § 42.100 (2021). Therefore, we construe the challenged claims under the framework set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–19 (Fed. Cir. 2005) (en banc). Under this framework, claim terms are given their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art, at the time of the invention, in light of the language of the claims, the specification, and the prosecution history of record. *Id.*

Petitioner bears the burden of stating “[h]ow the challenged claim is to be construed.” 37 C.F.R. § 42.104(b)(3). But only those terms that are in controversy need be construed, and only to the extent necessary to resolve the controversy. *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999); *see also Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (applying *Vivid Techs.* in the context of an AIA trial proceeding).

Patent Owner proposes definitions for “thermal mass” as used in claims 1, 7, 13, 20, and 26, and “bulk temperature” as used in claims 1, 7, 13, 21, and 26 but argues that it is prejudiced by having to “go first on claim construction.” PO Resp. 19–30. In this respect, Patent Owner argues that the Petition violates 37 C.F.R. § 42.104(b)(3), and is out of compliance with our rules because it lacks “a statement identifying a proposed construction if a claim term requires an express construction.” PO Resp. 16 (citing Trial Practice Guide 44).

We do not find Petitioner in violation of our rules or practice. Under the heading “Claim Construction Under 37 C.F.R. §§ 42.104(b)(3),” Petitioner contends “all claims terms should be construed according to the standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005),” and that “no formal claim constructions are presently necessary.” Pet. 8. Petitioner, moreover, addresses the meaning of terms “thermal mass” and “bulk temperature” elsewhere in the Petition. *See e.g.*, Pet. 22–25; PO Resp. 49–50 (referencing “Apple’s ‘back-door’ attempt at construction of ‘bulk temperature’”). Moreover, and as noted by Patent Owner, Petitioner addressed the meaning of these terms in the parties’ dispute before the ITC, which we take into account below. *See* PO Resp. 17 (citing Ex. 1012, 213–215).

1. “thermal mass” and “bulk temperature”

Relying on the testimony of Mr. Goldberg, Patent Owner proposes intertwined constructions of “thermal mass” and “bulk temperature” relating to how thermal mass and bulk temperature are employed in certain embodiments of the ’127 patent. As such, Patent Owner proposes that we construe “thermal mass” as “a mass that provides a bulk temperature that can be used to reliably estimate LED wavelengths” (PO Resp. 19–25;

Ex. 2051 ¶¶ 38–45), and “bulk temperature” as “a temperature of the thermal mass that is used to estimate wavelengths of multiple LEDs” (PO Resp. 25–30; Ex. 2051 ¶¶ 46–60.

In support of its proposed constructions, Patent Owner points to the Specification as evidence that the thermal mass may be:

- (1) within the substrate (EX1001, Fig. 12);
- (2) disposed proximate the emitters so as to stabilize a bulk temperature for the emitters (*id.*, 10:24–26);
- (3) thermally coupled to a temperature sensor that provides a bulk temperature so that the wavelengths are determinable as a function of the drive currents and the bulk temperature (*Id.*, 10:26–31); and
- (4) relatively significant so as to stabilize and normalize the bulk temperature so that the thermistor measurement of bulk temperature is meaningful (*id.*, 10:67–11:4).

PO Resp. 20 (paragraphing added); *see* Ex. 2051 ¶ 40. In further support of these positions, Patent Owner and its expert further cite to embodiments depicted in Figures 14, 15, 16, and 18 of the ’127 patent. PO Resp. 20–22; Ex. 2051 ¶¶ 41–42.

Patent Owner also argues that the prosecution history supports its construction of thermal mass. PO Resp. 22–24. As noted in section I.D., above, the Examiner found that Cheung fails to disclose a “sensor comprising a thermal mass disposed proximate the emitters, wherein the thermal mass stabilizes a bulk temperature of the emitters,” and found allowable subject matter where the prior art failed to teach “a thermal mass is disposed within a substrate proximate light emitting sources and a temperature sensor.” Ex. 1002, 71, 73. According to Patent Owner, the intrinsic record, thus, shows that a “‘thermal mass’ must be more than just any object with some amount of mass,” and “ha[ve] the additional *thermal*

characteristic that it provides a bulk temperature that can be used to reliably estimate LED wavelengths.” PO Resp. 23 (citing Ex. 1002, 73; Ex. 2051 ¶ 43).

With respect to the related concept of “bulk temperature,” Patent Owner contends that the overall structure of the challenged claims indicates that the term means “a temperature used to estimate wavelengths for multiple LEDs.” *Id.* at 25. Patent Owner also argues that claim references to bulk temperature relate to measurements of the thermal mass such that, for example, claim 21’s recitation of “bulk temperature *for the emitters*,” indicates a temperature measurement of the thermal mass, and not the temperature measurement of the LED emitters, per se. *Id.* at 27–28; Ex. 2051 ¶ 54. In a related point, Mr. Goldberg points to the Specification’s teaching that “substrate 1200 is configured to provide a bulk temperature of the emitter array 700 so as to **better determine** LED operating wavelengths.” *See* Ex. 2051 ¶ 51 (citing 6:61–63). Considering this language, Mr. Goldberg opines that one of ordinary skill in the art would understand that “bulk temperature” is used to estimate, rather than calculate, LED wavelengths of multiple emitters. *See id.*

Further with respect to the meaning of “bulk temperature,” we note Mr. Goldberg’s reliance on Equation 4 and statements from the ’127 Patent Specification that

Advantageously, the substrate 1200 also provides a **bulk temperature** measurement so as to **calculate** the operating wavelengths for the light emitting sources.

Ex. 2051 ¶ 48 (citing Ex. 1001, 6:39–42)

A thermal mass 1220 is disposed proximate the emitters 710 so as to stabilize a **bulk temperature** 1202 for the emitters. A temperature sensor 1230 is thermally coupled to the thermal

mass 1220, wherein the temperature sensor 1230 provides a temperature sensor output 1232 responsive to the **bulk temperature** 1202 so that the wavelengths are **determinable as a function** of the drive currents 1210 and the bulk temperature 1202.

Id. (citing Ex. 1001, 10:26–31).

Petitioner equates “thermal mass” to a thermal core as represented by Chadwick’s metallic printed circuit board. *See* Pet. 12–13, 20, 23–24. In discussing how the combination of Yamada and Chadwick applies to the challenged claims, Petitioner stated that “the thermally conductive material (e.g., metal) and relatively large mass of the thermal core enables the core to ‘sink’ heat from the surface components (e.g., LEDs 111, 112) and produce a reasonably distributed/uniform temperature gradient reflective of an average, bulk temperature of the thermal core.” Pet. 24 (citing Ex. 1003 ¶ 61). Consistent with this position, Petitioner argued before the ITC that “‘thermal mass’ is a component that stabilizes a bulk temperature.” Ex. 1012, 235 (citing e.g., Ex. 1001, 2:59–61, 10:67–11:4). Petitioner there elaborated that “‘thermal mass’ does not refer to the physical property of ‘thermal mass’ that is possessed by all objects with mass, because that would render the limitation meaningless.” *Id.* (citations omitted); *see also* PO Resp. 23 (Patent Owner’s assertion that “‘thermal mass’ must be more than just any object with some amount of mass”).

Petitioner further argues that one of ordinary skill in the art “would have understood a ‘bulk’ temperature to be akin to an ‘average’ temperature or a temperature of a ‘vast majority’ of the measurement target, and in any event clearly different from a local temperature measurement.” Pet. 24 (citing Ex. 1003 ¶ 60); *see also id* at 23–24 (indicating that the bulk temperature of a thermal mass would be “reflective of an average or

approximate temperature” of thermally linked LEDs). Consistent with its present position, Petitioner argued before the ITC that bulk temperature differed from a local temperature measurement in that it referred to the temperature of the thermal mass, i.e., “*a representative temperature of the whole bulk.*” Ex. 1012, 236–237 (citations omitted).

At this stage of the proceeding, we find the language “to reliably estimate LED wavelengths” and “used to estimate wavelengths of multiple LEDs” descriptive of intended use of the underlying terms rather than descriptive of what they are. Although Patent Owner points to evidence that certain embodiments of the ’127 patent use “thermal mass” and “bulk temperature” in the manner described in Patent Owner’s proposed constructions, we decline to import these use limitations into the claim terms. *See In re Prater*, 415 F.2d 1393, 1404–05 (CCPA 1969)

Reading a claim in light of the specification, to thereby interpret limitations explicitly recited in the claim, is a quite different thing from reading limitations of the specification into a claim, to thereby narrow the scope of the claim by implicitly adding disclosed limitations which have no express basis in the claim.

We further note that Patent Owner fails to evidence the meets and bounds of “*reliably* estimate[ing] LED wavelengths,” such that the construction appears indefinite. In this respect, we note the Specification’s teaching that some embodiments include “a relatively significant thermal mass, which stabilizes and normalizes the bulk temperature so that the thermistor measurement of bulk temperature is meaningful.” Ex. 1001, 10:62–11:4. Considering the intrinsic evidence, we understand a “meaningful” temperature reading in the context of the ’127 patent to be one on a scale relevant to estimating LED wavelengths.

Considering the present arguments and evidence, including those aspects of construction upon which the parties appear to agree (*see e.g.*, Prelim. Resp. 24 (citing Ex. 1012, 213)), we provisionally construe “thermal mass” as a mass having resistance to temperature change on a scale relevant to estimating LED wavelengths, and “bulk temperature” as a temperature representative of all or substantially all of a thermal mass.

2. Claimed Relationship between Bulk Temperature of a Thermal Mass and LED Operating Wavelength

Patent Owner, relying on the testimony of Mr. Goldberg, infers a mathematical relationship for controlling LED operating wavelengths based on operating temperature for all of the independent claims. Prelim. Resp. 25–26; Ex. 2051 ¶¶ 46–47. In this respect, claim 1, element [1.4] and claim 26, element [26.4] recite that a “temperature sensor provides a temperature sensor output responsive to the bulk temperature so that the wavelengths are determinable as a function of the drive currents and the bulk temperature.” On the record before us, we agree with Patent Owner that the recitation of “so that the wavelengths are determinable as a function of the drive currents and the bulk temperature,” reasonably infers a mathematical relationship between bulk temperature, drive current, and LED operating wavelengths for claims 1 and 26.

We do not presently view either of claims 7 or 21 as evidencing such a relationship. Claim 7 recites “a temperature sensor thermally coupled to the thermal mass, the operating wavelengths dependent on the bulk temperature.” Contrary to the testimony of Mr. Goldberg, we do not read claim 7 as written to indicate “that the bulk temperature is used to estimate the operating wavelength that is indicated.” *See* Ex. 2051 ¶ 47. Rather, we agree with Petitioner and its expert, “the operating wavelengths dependent

on the bulk temperature,” merely reflects the well-known property of LEDs that their operating wavelengths vary as a function of temperature. *See* Pet. 25 (citing Ex. 1003 ¶ 62). *See Chef Am., Inc. v. Lamb-Weston, Inc.*, 358 F.3d 1371, 1374 (Fed. Cir. 2004) (stating that “courts may not redraft claims, whether to make them operable or to sustain their validity”).

Claim 20 presents the same lack of linkage between control of operating wavelengths and bulk temperature. Claim 20 recites the steps of

[20.1] providing a thermal mass disposed within a substrate of the light emitting sources and **a temperature sensor thermally coupled to the thermal mass;**

[20.2] transmitting optical radiation from the plurality of light emitting sources into body tissue;

[20.3] detecting the optical radiation after tissue attenuation;
and

[20.4] **indicating an operating wavelength for each of the plurality of light emitting sources.**

Ex. 1001, 20:37–49; Pet. vii (bolding added; labeling as added in Petitioner’s claim listing). Despite its recitation of “indicating an operating wavelength for each of the plurality of light emitting sources,” the plain language of claim 20 does not explain how this is accomplished. Nor does the claim recite any functional linkage between the “temperature sensor thermally coupled to the thermal mass” and control of the LED operating wavelength. To the contrary, claim 20 does not even make clear that the temperature sensor necessarily *detects* a bulk temperature.

For the reasons discussed above, we provisionally refer to claims 1 and 26 (and claims dependent therefrom) as “linked claims,” because they reasonably infer an actionable relationship between bulk temperature, drive currents, and LED operating wavelengths. Conversely, we refer to claims 7

and 20 (and claims dependent therefrom) as “unlinked claims,” indicating our present understanding that they do not require this relationship.⁸

D. Merits Analysis

Petitioner asserts twelve grounds involving five references. Pet. 2. Patent Owner does not presently challenge the prior art status of any asserted reference. *See* Prelim. Resp. Grounds 1A–1F are based on Yamada and Chadwick. Grounds 2A–2F are similar, but do not rely on Chadwick. For the purpose of institution, we address unlinked claim 7 under Ground 1A, and linked claim 1 under Ground IE.

1. Ground 1A: Obviousness over Yamada and Chadwick

As Ground 1A, Petitioner challenges independent claim 7 and its dependent claims 8–10 as obvious in view of Yamada and Chadwick. Pet. 2, 8–28. Petitioner’s challenge includes discussion of why it would have been obvious to combine Yamada and Chadwick with a reasonable expectation of success (*id.* at 13–18), and an element-by-element comparison of the claims to the cited art (*id.* at 18–28). Patent Owner opposes. Prelim. Resp. 33–47. We begin with an overview of the asserted references and focus our analysis on independent claim 7.

a) Overview of Yamada (Ex. 1004)

Yamada is a certified translation of a Japanese Patent Publication for an “Optical Probe, Measurement System Using the Same, and Reflected Light Detecting Method Using the Same.” Ex. 1004, code (54). Yamada is directed to “an optical sensor that is less susceptible to heat generated by the light emitting unit,” and discloses an optical sensor (e.g., a pulse oximeter)

⁸ Information regarding our Motion to Amend Pilot Program is available in Section A.6 of the concurrently filed Scheduling Order.

that “detects light (reflected light) that has been directed toward the surface of the human body, scattered inside the human body, and returned toward the exposed surface.” *Id.* at code (57), ¶¶ 1–2, 106.

According to Yamada, a problem with prior optical sensors is “that the LED used to emit light also generates heat, and the patient is exposed to this heat because the optical sensor is attached to the surface of a fingernail.” *Id.* ¶ 5. “As a result, the exposure time and power consumption (that is, the amount of light generated) have to be limited in order to suppress the amount of heat that is generated.” *Id.* Yamada, therefore, proposes a design for an optical sensor that was intended to reduce the amount of heat to which the subject wearing the device is exposed. *Id.* ¶¶ 1–6.

Figure 5, reproduced below, illustrates one embodiment of Yamada’s design.

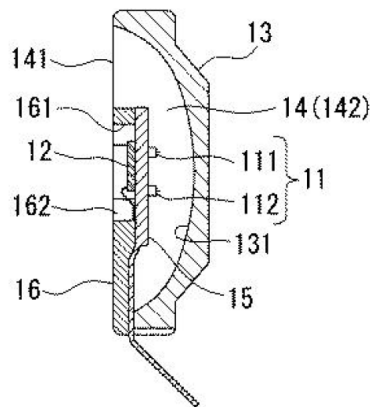


Figure 5 shows a cross-sectional view of one aspect of Yamada’s design, which includes “a light emitting unit 11 (including LEDs 111, 112), a light receiving unit 12, a main body 13, an optical passage 14,” and a “reflecting unit 131.” *Id.* ¶¶ 42–43, 68, 113, Fig. 5. In this embodiment, LEDs 111, 112 are disposed on a first surface of substrate 15 (also referred to as “board 15”), while the light receiving unit 12 is disposed on an opposite surface of the same substrate 15. *Id.*

According to Figure 5, light emitted from the LEDs 111, 112 is reflected by the reflecting unit 131 and guided through optical passage 14 to the measurement site (e.g., the surface of a finger) via end portion 141. *Id.* ¶¶ 59–62. A portion of the light emitted to the measurement site is scattered and reflected back toward the light receiving unit 12. *Id.*

Yamada further describes how the board/substrate 15 “may have heat transferring properties that guide heat generated by the light emitting unit toward the outside.” *Id.* ¶ 20. In some embodiments, a “heat conductor 132” is “connected to the board 15 near the light emitting unit 11” to allow heat to be transmitted away from the light emitting unit. *Id.*, ¶¶ 102–103.

Yamada’s Figure 19 is reproduced below.

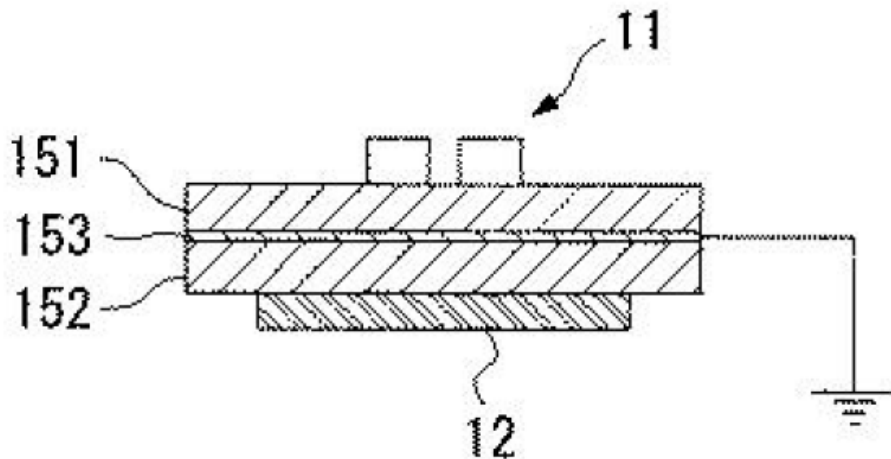


Figure 19 depicts a horizontal cross-sectional view of a board 15 according to one embodiment of the invention. *See id.* ¶ 113. In this embodiment, “board 15 is composed of a first substrate 151, a second substrate 152, and an intermediate layer 153.” *Id.* ¶¶ 80–84, FIG. 19. Intermediate layer 153 can be “made of a conductive material” such as “copper, aluminum, gold, [or] conductive resins.” *Id.* ¶ 83.

Yamada further teaches that a “temperature sensor,” e.g., a thermistor, can be attached to the optical probe in each embodiment. This temperature sensor can be positioned, for example, on the lower surface of the board 15 facing the user, or attached to the upper surface of the board 15 facing away from the user. *Id.* ¶¶ 109–110. “When the temperature of the optical probe 1 is monitored using a temperature sensor, a warning can be issued when the temperature becomes too high or emission of light from the light emitting unit 11 can be stopped.” *Id.* ¶ 111.

b) Overview of Chadwick (Ex. 1005)

Chadwick is a U.S. patent for a “Thermal Dissipating Metal Core Printed Circuit Board.” According to Chadwick, presently available circuit boards, “lack the desirable property of being capable of quickly and effectively dissipating heat which is generated by components in the circuit when the apparatus in which they are used is operated.” Ex. 1005, 1:35–44. Chadwick states that, one

obstacle to the design of a metal core printed circuit board has been the difficulty of having components in close enough contact with the circuit board so that heat generated in the components can pass readily to the metal core, serving in such instances as a heat sink, and at the same time have the components adequately insulated electrically from the electrically conducting metal core.

Id. at 2:3–10. To address these issues, Chadwick proposes “[a] metal core printed circuit board which includes multiple layers of synthetic plastic resin material on a sheet of metal.” *Id.* at 1:14–16.

Chadwick's Figure 11 is reproduced below.

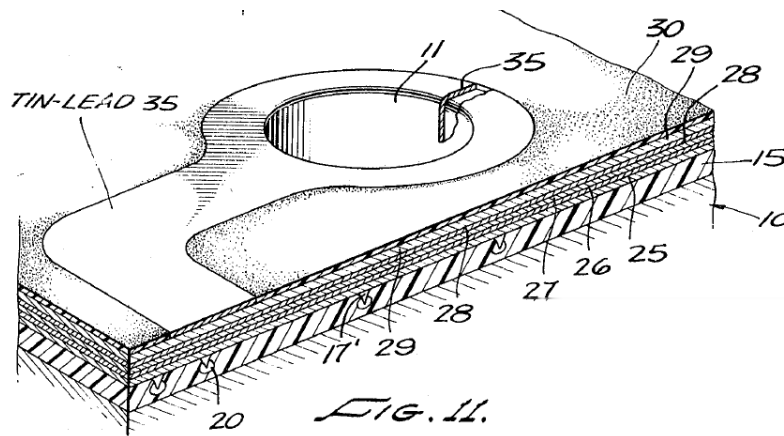


Figure 11 is a perspective view of one embodiment of Chadwick's printed circuit board. *See id.* at 2:67–69. Figure 11 shows metal sheet 10, preferably of aluminum, on which layers of material have been applied to form a substrate for the mounting of electronic components. *See id.* at 3:50–64. To encourage heat transfer between surface components and the metal core 10, the intermediate layers include electrically non-conductive but thermally conductive material. *Id.* at 4:11–38; *generally id.* at 2:2–29, 4:39–8:17 (describing detailed process for the formation of layers on metal core 10).

c) Analysis

Petitioner, in short, argues that Yamada discloses an optical sensor designed to reduce the amount of heat directed toward the patient and the amount of heat maintained by its LEDs. Pet. 14 (citing Ex. 1004 ¶¶ 1–5). In this respect, Petitioner points to Yamada's LED-supporting board/substrate 15 as providing “heat transferring properties that guide heat generated by the light emitting unit toward the outside.” *Id.* (citing Ex. 1004 ¶ 20).

With respect to element [7.3], Petitioner argues that the combination of Yamada's board/substrate 15 and Chadwick's thermal core would provide “a thermally conductive material (e.g., metal),” wherein the

relatively large mass of the thermal core enables the core to “sink” heat from the surface components (e.g., LEDs 111, 112) and produce a reasonably distributed/uniform temperature gradient reflective of an average, bulk temperature of the thermal core, as well as the LEDs 111, 112 due to their thermal coupling with the thermal core.

Pet. 24 (citing Ex. 1003 ¶ 61). According to Petitioner, the temperature sensor in the Yamada/Chadwick combination would be mounted on a surface board/substrate 15, and in thermal contact with Chadwick’s thermal core in substantially the same manner as the temperature sensor disclosed in the ’127 patent is disposed on substrate 1200. *Id.* at 24–25 (citing Ex. 1003 ¶ 61–62; Ex. 1001, 10:63–11:45, Figs 12, 15–16). As such, the combined apparatus would be “capable of determining a bulk temperature for the thermal mass,” as required by element [7.3]. *Id.*

Patent Owner responds that Yamada and Chadwick do not disclose or make obvious claimed “thermal mass” as defined as “a mass that provides a bulk temperature that can be used to reliably estimate LED wavelengths.” PO Resp. 35. As explained in Section II.C.2, above, however, we provisionally construe “thermal mass” as a mass having resistance to temperature change on a scale relevant to estimating LED wavelengths. Although Patent Owner argues that dissipating heat using a thermal core as taught by Chadwick relates to “controlling the maximum temperature of electronic components to prevent damage by overheating,” we do not find this inconsistent with “resistance to temperature change on a scale relevant to estimating LED wavelengths” under our preliminary construction. *See* Section II.C.1, above; Prelim. Resp. 37–38. Considering Dr. Anthony’s

testimony that the “relatively large mass of the thermal core enables the core to ‘sink’ heat from the surface components (e.g., LEDs 111, 112) and produce a reasonably distributed/uniform temperature gradient reflective of an average or ‘bulk’ temperature of the LEDs 111, 112 (which are the primary heat generators) and the thermal core,” Petitioner has established sufficiently that the combined references suggest a “thermal mass,” as presently defined.

Patent Owner also raises two arguments for why the Yamada/Chadwick combination does not disclose or make obvious a “temperature sensor . . . capable of determining a bulk temperature for the thermal mass, the operating wavelengths dependent on the bulk temperature,” as recited in element [7.3]. Prelim. Resp. 38–40. As we understand the first argument, Patent Owner contends that “Yamada never suggests measuring the temperature of the intermediate layer, which [Petitioner] alleges is the thermal mass” and, thus, lacks any disclosure of measuring a “bulk temperature for the thermal mass,” as required by element [7.3]. *Id.* at 39. Chadwick, however, teaches that components mounted to a circuit board are thermally coupled to the metal core “so that heat generated in the components can pass readily to the metal core, serving in such instances as a heat sink.” Ex. 1005, 2:3–10; *see also id.* at 4:12–16 (disclosing electrically non-conductive coating between components and metal core “of such character as to be capable of offering relatively a minimum amount of resistance to the transfer of heat”).

As noted in Section II.C.2, on the current record we interpret the language of claim 7, “the operating wavelengths dependent on the bulk temperature,” as expressing no actionable linkage between bulk

temperature and LED operating wavelength. Consistent with our present understanding of this claim language, Petitioner argues that this claim language merely reflects the “well-known physical property of LEDs like those in Yamada that their operating wavelengths are dependent on temperature.” Pet. 25 (citing Ex. 1003 ¶ 62).

Patent Owner, however, argues that “[c]laim 7 requires the operating wavelengths to be “dependent on the *bulk* temperature,” not merely “temperature,” whereas “bulk temperature is not the actual temperature of any of the LEDs.” Prelim. Resp. 40 (citing Ex. 2002 ¶ 43; Ex. 2051 ¶ 51). While these assertions may be correct, we do not read claim 7 to require that bulk temperature is the same as the actual temperature of any LED, but merely that the LEDs are thermally coupled to the core such that their operating wavelengths are dependent on (i.e., responsive to) its bulk temperature. On the record before us, Petitioner has sufficiently established that LEDs of the Yamada/Chadwick combination would be thermally coupled to the thermal core, and thus dependent on the bulk temperature of the thermal core. *See* Pet. 25; Ex. 1003 ¶ 62.

With respect to motivation to combine, Petitioner posits that one of ordinary skill in the art would have been motivated “to implement a thermal core as suggested by Chadwick in Yamada’s board/substrate 15” to achieve various benefits, such as to “reduc[e] the amount of heat transmitted to the patient and increasing the ‘exposure time’ by which the patient can don the sensor without discomfort or heat-related safety concerns,” and/or “mitigate heat-induced spectral shifts in the wavelengths of light emitted by LEDs” Pet. 15–18; Ex. 1003 ¶¶ 42–48. With respect to the first of these, Patent Owner argues that motivation is lacking because Chadwick’s metal core heat

sink is redundant to Yamada's board/substrate 15. Prelim. Resp. 41–42 (citing *Ex. Parte Burns*, Appeal No. 2016-00351, 2017 WL 2132361, *2 (PTAB Apr. 28, 2017)). This would appear contrary to Patent Owner's assertions that "Yamada provides no discussion regarding the purpose, function, or use of substrate 15," whereas the purpose of Chadwick's metal core is to dissipate heat and act "as a heat sink to cool the electronics." Prelim. Resp. 35, 37 (citations omitted). As such, we do not find Patent Owner's argument availing.

With respect to Petitioner's argument that one of ordinary skill in the art would have been motivated to combine Chadwick and Yamada to "mitigate heat-induced spectral shifts in the wavelengths of light emitted by LEDs," Patent Owner argues that "the claimed invention does not *reduce* wavelength shift; in fact, the '127 patent accepts wavelength shift and provides a solution to compensate for it." Prelim. Resp. 42. Accordingly, Patent Owner asserts, motivation is lacking because "[r]educing wavelength shift points in a different direction from the invention." *Id.* at 43 (citing Ex. 2051 ¶ 80. This argument is also unavailing because, on the current record, claim 7 does require a solution to compensate for wavelength shift. *See* Section II.C.2, above. Accordingly, Petitioner's proposed motivation does not "point[] in a different direction," as Patent Owner contends.

Patent Owner similarly argues that Petitioner has not shown a reasonable expectation of success because "[t]here is no evidence anyone before the inventors would have expected that a thermal mass could be designed to provide a bulk temperature to reliably estimate multiple LED wavelengths." Again, Patent Owner's argument is predicated on Patent Owner's interpretation of claim 7, which we disagree with on the current record for the reasons provided above. *See* Section II.C.1–2. We do not read

claim 7 as requiring a reliable estimate of multiple LED wavelengths. Moreover, as explained more fully above, LED wavelength has a known relationship to temperature and Petitioner has reasonably shown that LEDs of the Yamada/Chadwick combination would be thermally coupled to the thermal core, and thus dependent on the bulk temperature of the thermal core.

d) Conclusion as to Ground 1A, Claims 7–10

Considering the record presently before us, and in light of our constructions based on the current record, Petitioner has the better position with respect to arguments discussed above. Patent Owner does not presently contest any other limitation of the claims challenged under Ground 1A. With respect to the remaining elements of claim 7, and its challenged dependent claims 8–10, Petitioner presents reasoned arguments for unpatentability under Ground 1A supported by the testimony of Dr. Anthony, which Patent Owner does not presently contest. *See generally* Pet. 13–30; Prelim. Resp. Having further considered the arguments and evidence with respect to these limitations, we determine that Petitioner has demonstrated a reasonable likelihood that claims 7–10 are unpatentable in view of Yamada and Chadwick.

2. Ground 1E: Obviousness over Yamada, Chadwick, and Noguchi

As Ground 1E, Petitioner challenges claims 1–3, 6–10, 26–27, 30 as obvious in view of Yamada and Chadwick. Pet. 2, 50–62. Petitioner’s challenge includes discussion of why it would have been obvious to combine Yamada and Chadwick with a reasonable expectation of success (*id.* at 53–56), and an element-by-element comparison of the claims to the cited art (*id.* at 56–62). Patent Owner opposes. Prelim. Resp. 51–56. For the purpose of institution, we focus our analysis on (linked) claim 1. Yamada and Chadwick are discussed in Section II.D.1.a–b, above. We begin with an overview of Noguchi

a) *Overview of Noguchi (Ex. 1008)*

Noguchi is a U.S. patent directed to “Apparatus and Method for LED Emission Spectrum Control.” Ex. 1008, code (54). Noguchi discloses techniques for “controlling the emission spectrum of an LED with high precision,” including determining the wavelength of light emitted by the LED based on (1) a measured temperature and (2) a measured level of current or voltage driving the LED. *Id.* at 1:7–12, 2:50–3:14, 1:33–50. With respect to the relationship between temperature and emission wavelength, Noguchi discloses that

[t]he temperature of the LED itself or the surrounding ambient temperature and the driving power of the LED are detected. Then, the emission wavelength energy can be calculated by subtracting the value of an applied power multiple by a specified coefficient and the difference from the standard temperature multiple by a specified coefficient from the optical band gap at the standard temperature.

Id. at 2:2–10. Noguchi teaches that for some embodiments, “[t]he temperature of the LED is measured by a temperature sensor,” however, “the

temperature to be measured is not limited to the temperature of the LED itself, but the temperature in the environment surrounding the LED can also be measured.” *Id.* at 2:20–29. Noguchi further discloses that “[t]he number of LEDs or sensors used in the present invention can be more than one each.” *Id.* at 2:30–41.

Noguchi describes an equation (1) for determining LED emission wavelength taking into account temperature and applied LED voltage (power). *Id.* at 2:51–3:14. Noguchi teaches the use equation (1) in the context of Figure 1, reproduced below.

Noguchi’s Figure 1 is reproduced below.

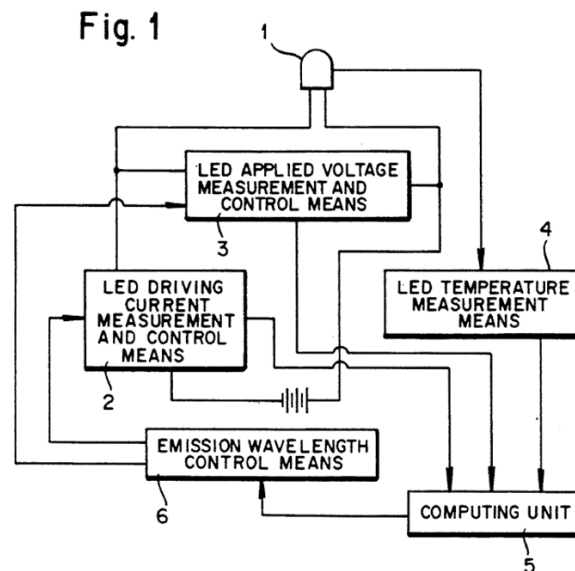


Figure 1 is a block diagram of an example system for “LED emission spectrum control.” *Id.* at 1:55–56. Figure 1 identifies elements 1 through 6, where

1 is an LED with a sensor for measuring temperature, 2 is a measurement and control means for an LED driving current, 3 is a measurement and control means for an LED applied voltage, 4 is a measurement means for an LED temperature, 5 is a computing unit, and 6 is a control means for an emission wavelength.

Id. at 2:14–19. Computing unit 5 receives inputs indicating the measured temperature of LED 1, the driving voltage of LED 1, and driving current of LED 1, and processes these inputs according to equation (1) to calculate the present wavelength of light emitted from LED 1. *Id.* at 3:15–38, FIG. 3. Control means 6 then uses the calculation of the present wavelength to adjust the driving current of LED 1 to correspondingly adjust the wavelength of emitted light toward a desired/target value. *Id.* at 3:39–47, FIG. 4.

b) Analysis

Referencing its arguments with respect to Ground 1A, Petitioner contends that

Yamada describes how ‘[a] temperature sensor can [] be attached to the optical probe 1 in each of the embodiments,’ and a signal from the temperature sensor is used to monitor for over-heating conditions so that a ‘warning’ can be issued or the LEDs 111, 112 can be turned off ‘when the temperature becomes too high.’

Pet. 53 (citing Ex. 1004 ¶¶ 109–111). According to Petitioner, “Noguchi describes another beneficial use for temperature sensors . . . namely to enable the device to compensate for temperature-induced shifts in the wavelengths of light emitted by an LED.” *Id.* Accordingly, Petitioner contends that one of ordinary skill in the art would have found it obvious to combine the teachings of Noguchi with the previously-discussed Yamada-Chadwick combination “to compensate for the effect of temperature variation on the wavelengths of light emitted from LEDs 111, 112.” *Id.* (citing Ex. 1003 ¶ 132). In particular, the skilled artisan would have been motivated to “employ Noguchi’s technique for calculating the emission wavelengths of LEDs 111, 112 based on measurements indicative of the temperature, driving voltages, and driving currents of the LEDs” in order “to

improve the accuracy of measurements obtained by the oximetry system” and with “a high likelihood of success in implementing the combination.” *Id.* at 55 (citing, e.g., Ex. 1003 ¶¶ 133–134).

Patent Owner responds that none of the cited references satisfies the requirement for a “plurality of LEDs,” “bulk temperature” or a “thermal mass disposed . . . within the substrate,” as required by claim 1. Prelim. Resp. 51–52, 55; *see* Pet. iv. But as discussed in Section II.D.1.c, above, Petitioner has sufficiently established that these elements are suggested by the combination of Yamada and Chadwick, wherein electronic components, including LEDs 111, 112, and a thermistor, are in thermal contact with the multi-layered heat sink taught by Chadwick. Noguchi’s teaching to monitor “the temperature in the environment surrounding the LED,” further supports Petitioner’s contention that it would have been obvious to monitor the temperature of Chadwick’s heat sink because it is thermally linked to the LEDs and disposed within the substrate to which the LEDs are mounted (i.e., in the surrounding environment). *Id.* at 2:20–29.

Element [1.4] of claim 1 recites that “the temperature sensor provides a temperature sensor output responsive to the bulk temperature so that the wavelengths are determinable as a function of the drive currents and the bulk temperature.” With respect to this element, Petitioner contends that Noguchi discloses that “the wavelengths of LEDs are determinable as a function of drive currents” and, thus, could have been used “to compensate for the effect of temperature variation on the wavelengths of light emitted from LEDs” Pet. 53, 58–59 (citing Ex. 1008, 2:2–10, 3:26–38, 2:54–58, Fig. 3; Ex. 1003 ¶¶ 132, 145–146). Patent Owner argues, however, that Noguchi’s teaching to “‘**control**[] the emission spectrum of an LED with high precision’ to maintain a desired wavelength” is different from “the ’127 patent’s

wavelength-shift compensation technique of estimating multiple LED wavelengths to improve physiological measurement accuracy.” Prelim. Resp. 53–54 (citing Ex. 1008, 1:8–9, 3:39–47, Fig 4; Pet. 53; Ex. 2051 ¶ 106). To the extent Patent Owner is correct, such differences are not reflected in the claims as written, to the extent we currently understand them. As we understand the argument, the ’127 patent teaches a method of determining LED wavelength based on drive current and bulk temperature, whereupon the wavelength determination is used in further calculations. In the context of the Yamada/Chadwick/Noguchi combination, a controller adjusts drive current in response to bulk temperature such that the LEDs produce light of predetermined wavelengths. Although the *purpose* of determining LED wavelength in Noguchi differs substantially from that Patent Owner describes for the ’127 patent, LED wavelengths according to Noguchi are, nonetheless, “determinable as a function of the drive current and bulk temperature,” as element [1.4] requires.⁹

⁹ Patent Owner argues that it “presented extensive evidence of secondary consideration on non-obvious in the ITC Investigation,” which we decline to consider here as it is not sufficiently developed on the present record and in light of our understanding of the claim terms. *See* Prelim. Resp. 61–62, 70 (addressing revenue but not market share), 71 (addressing industry praise), 62–72 (addressing nexus). For objective indicia evidence to be accorded substantial weight, a nexus must exist between the proffered evidence and the merits of the invention as claimed. *See Wyers v. Master Lock Co.*, 616 F.3d 1231 (Fed. Cir. 2010). “Where the offered secondary consideration actually results from something other than what is both claimed and *novel* in the claim, there is no nexus to the merits of the claimed invention.” *In re Kao*, 639 F.3d 1057 (Fed. Cir. 2011). Although Patent Owner expresses that there is a nexus between the identified objective indicia of non-obviousness and the claimed invention (Prelim. Resp. 72), the preliminary record before us does not appear complete on the matter. The parties may further address this matter during trial.

Patent Owner's further argues that the art teaches away from the claimed invention. PO Resp. 57–60. Patent Owner argues that Cheung teaches away from using a temperature sensor to measure bulk temperature because Cheung measures the ambient temperature of a sensor assembly. PO Resp. 58. This argument is not availing in view of Chadwick's teaching to mount electronic components in thermal contact with a metal core printed circuit board that acts as a heat sink. *See* Section II.D.b, above. Patent Owner argues that "Webster would discourage a POSITA from even attempting to use a temperature sensor to compensate for wavelength shift." PO Resp. 58–59 (citing Ex. 1051 ¶ 180). This argument, however, is undercut by Noguchi, which teaches the use of temperature sensor to compensate for wavelength shift by adjusting LED drive current. *See* Section II.D.a, above. Patent Owner further cites Huiki as evidence that "a POSITA would not have been motivated to measure a single temperature of a thermal mass in the substrate to which multiple LEDs are mounted." PO Resp. 59–60. But as Yamada's thermistor and multiple LEDs are thermally coupled to Chadwick's heat sink in the above-discussed combinations, we do not find this argument availing.

c) Conclusion as to Ground 1E, Claim 1

Considering the record presently before us, and in light of our constructions based on the current record, Petitioner has the better argument with respect to arguments discussed above. Patent Owner does not presently contest any other limitation of the claims challenged under Ground 1E. With respect to the remaining elements of claim 1 and its challenged dependent claims 2–6, Petitioner presents reasoned arguments for unpatentability under Ground 1E supported by the testimony of Dr. Anthony, which Patent Owner does not presently contest. *See generally* Pet. 53–58; Prelim. Resp. Having

further considered Petitioner’s arguments and evidence with respect to these limitations, we determine that Petitioner has demonstrated a reasonable likelihood that claims 1–6 are unpatentable in view of Yamada, Chadwick, and Noguchi.

E. Other Grounds

In addition to the Grounds discussed above, Petitioner asserts Grounds 1B–1D and 2B–2D, further relying on Leibowitz and/or Cheung. *See* Pet. 2. Petitioner relies on Leibowitz as disclosing “a multilayered printed circuit board structure in which multiple layers of graphite are employed . . . to provide enhanced thermal conductivity.” *See id.* at 29 (citing Ex. 1006, 2:30–34). As such, Leibowitz is duplicative of Chadwick and, therefore, does not substantially alter our analysis.

With respect to Cheung, Petitioner points to its “teaching of temperature compensation . . . to improve the accuracy of measurements that could be obtained by the sensor.” *Id.* at 38 (citing Ex. 1003 ¶ 90). Patent Owner responds that, “while Cheung recognizes wavelength shift, it discloses a different solution. Specifically, Cheung measures the ambient temperature of the sensor. It does not suggest measuring a bulk temperature of a thermal mass within the substrate.” PO Resp. 47. Considering that during prosecution, the Examiner determined that Cheung failed to disclose a “sensor comprising a thermal mass disposed proximate the emitters, wherein the thermal mass stabilizes a bulk temperature of the emitters,” Patent Owner may have the better argument. *See* Ex. 1002, 71. The parties’ arguments with respect to grounds involving Cheung, however, would benefit from further development. Our decision to institute does not depend on these grounds, and we invite the parties to further address them at trial.

F. Discretionary Denial of Institution under 35 U.S.C. § 325(d)

Finally, Patent Owner urges us to exercise our discretion to deny institution under 35 U.S.C. § 325(d). Prelim. Resp. 30–32. Petitioner takes a contrary position, arguing that the Board should not deny institution under 35 U.S.C. § 325(d). Pet. 68–70. We address these arguments below.

1. Legal standard

Under § 325(d), we have discretion to deny a petition that presents the same or substantially the same prior art or arguments as previously presented to the Office. *See* 35 U.S.C. § 325(d). In evaluating whether the factual predicate under § 325(d) is met, we consider a number of non-exclusive factors, as set forth in our decision in *Becton, Dickinson and Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 17–18 (PTAB Dec. 15, 2017) (precedential) (“the *Becton, Dickinson* factors”):

- (a) the similarities and material differences between the asserted art and the prior art involved during examination;
- (b) the cumulative nature of the asserted art and the prior art evaluated during examination;
- (c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection;
- (d) the extent of the overlap between the arguments made during examination and the manner in which Petitioner relies on the prior art or Patent Owner distinguishes the prior art;
- (e) whether Petitioner has pointed out sufficiently how the Examiner erred in its evaluation of the asserted prior art; and
- (f) the extent to which additional evidence and facts presented in the Petition warrant reconsideration of the prior art or arguments.

Becton, Dickinson, IPR2017-01586, Paper 8 at 17–18.

In performing an analysis under § 325(d):

[T]he Board uses the following two-part framework: (1) whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office; and (2) if either condition of first part of the framework is satisfied, whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims.... If, after review of [*Becton, Dickinson*] factors (a), (b), and (d), it is determined that the same or substantially the same art or arguments previously were presented to the Office, then factors (c), (e), and (f) relate to whether the petitioner has demonstrated a material error by the Office.

Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH, IPR2019-01469, Paper 6 at 8 (PTAB Feb. 13, 2020) (precedential).

Consequently, we first turn to an analysis of *Becton, Dickinson* factors (a), (b), and (d) under this framework to determine whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office.

2. Part one of the *Advanced Bionics* analysis

Patent Owner does not contest Petitioner’s assertion that the references discussed above, Yamada, Chadwick, and Noguchi, were not cited in prosecution, but argues that they are “merely cumulative of the art before the Examiner.” Prelim. Resp. 30–32; Pet. 69. Patent Owner’s sole argument with respect to Chadwick—which Petitioner relies on in Grounds 1A and 1E with respect to “thermal mass” and “bulk temperature”—is that Petitioner describes its teachings as “commonly known.” Prelim. Resp. 32. Considering the particular facts of this case, we are not persuaded that being

“commonly known” sufficiently satisfies part one of the *Advanced Bionics* analysis.

Patent Owner’s argument is also unavailing with respect to part two of the *Advanced Bionics* framework. As we understand the prosecution history, the Examiner interpreted Cheung’s mounting board as having insufficient thermal mass to stabilize a bulk temperature. *See* Ex. 1002, 71 (Examiner stating that Cheung failed to disclose a “sensor comprising a thermal mass disposed proximate the emitters, wherein the thermal mass stabilizes a bulk temperature of the emitters,” or “a thermistor thermally coupled to the light emitting sources to measure the bulk temperature.” As discussed in Section II.D.1.c, above, Petitioner relies on Chadwick—which was not before the Examiner—with respect to stabilizing thermal mass sufficient to determine a bulk temperature. And to the extent we were to accept Patent Owner’s argument that “Yamada adds nothing not disclosed in Cheung,” we agree with Petitioner that the Examiner erred in not considering Cheung in light of the “commonly known” disclosure of Chadwick. *See* Prelim. Resp. 32; Pet. 70.

For the above reasons, we decline to exercise our discretion under § 325(d) to deny institution of trial.

III. CONCLUSION

Having considered the record before us, we conclude that the information presented in the Petition establishes that Petitioner has shown a reasonable likelihood of prevailing in showing that at least one claim of the ’127 patent is unpatentable.

IV. ORDER

In consideration of the foregoing, it is hereby:
ORDERED that the Petition is granted; and
FURTHER ORDERED that the requested *inter partes* review is instituted
with respect to claims 1–30 of the '127 Patent on all asserted grounds.

IPR2022-01299
Patent 7,761,127 B2

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