Apple Inc. (Petitioner)
v.
Masimo Corporation (Patent Owner)

Petitioner Demonstratives

Case No. IPR2020-01722
U.S. Patent No. 10,470,695

Before Hon. Josiah C. Cocks, Robert L. Kinder, Amanda F. Wieker
Administrative Patent Judges

FISH.

DEMONSTRATIVE EXHIBIT – NOT EVIDENCE

APPLE 1023
Apple v. Masimo
IPR2020-01722

Instituted Grounds

Ground	Claims	§103 Basis
1A	1, 4, 5, 8, 9, 13, 15-19, 24-30	Sarantos
1B	1, 2, 4, 5, 8, 9, 11, 13, 15-19, 22, 24-30	Sarantos in view of Mendelson-1991
1C	3, 12, 23	Sarantos in view of Mendelson-1991 and Venkatraman
1D	6, 14, 21	Sarantos in view of Mendelson-1991 and Chin
2A	1, 4, 5, 8, 9, 13, 15-17, 19, 24-26, 28, 29	Ackermans
2B	2, 3, 11, 12, 18, 22, 23, 27, 30	Ackermans in view of Venkatraman
2C	6, 14, 21	Ackermans in view of Chin

Petition, 2-3; *see* Institution Decision (Paper 8), 9-10, 25; Ex. 2004

Issues Narrowed to Claims 6, 14, and 21

[1] The Petition originally challenged claims 1-6, 8, 9, 11-19, and 21-30 of the '695 patent. Patent Owner subsequently disclaimed claims 1-5, 8, 9, 11-13, 15-19 and 22-30, leaving claims 6, 14, and 21 as the only remaining challenged claims. *See* Ex. 2004.

Reply, 1 note 1 (citing Exhibit 2004)

6. The physiological monitoring device of claim **1**, further comprising a diffuser which receives, spreads, and emits the spread light, wherein the emitted spread light is directed at the tissue measurement site.

'695 patent, claim 6

Grounds Remaining After Masimo's Disclaimer

Ground	Claims	§103 Basis
1D	6, 14, 21	Sarantos in view of Mendelson-1991 and Chin
2C	6, 14, 21	Ackermans in view of Chin

Petition, 2-3; *see* Institution Decision (Paper 8), 9-10, 25; Ex. 2004

Table of Contents

Overview of the ’695 Patent

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’695 Patent Overview

(57) **ABSTRACT**

A non-invasive, optical-based physiological monitoring system is disclosed. One embodiment includes an emitter configured to emit light. A diffuser is configured to receive and spread the emitted light, and to emit the spread light at a tissue measurement site. The system further includes a

APPLE-1001, Abstract

Advantageously, the diffuser **304** can receive emitted light in the form of a point optical source and spread the light to fit a desired surface area on a plane defined by the surface of the tissue measurement site **102**. In an embodiment, the

APPLE-1001, 8:9-19

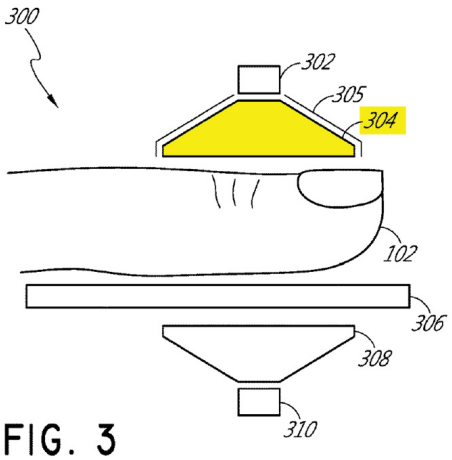


FIG. 3

’695 Patent Overview

6. The physiological monitoring device of claim **1**, further comprising a diffuser which receives, spreads, and emits the spread light, wherein the emitted spread light is directed at the tissue measurement site.

14. The method of claim **9**, further comprising spreading, with a diffuser, the emitted light and emitting the spread light from the diffuser to the tissue measurement site.

21. The physiological monitoring sensor of claim **19**, further comprising a diffuser which receives, spreads, and emits the spread light, wherein the emitted spread light is directed at the tissue measurement site.

APPLE-1001, claims 6, 14, 21

Overview of the Prior Art

FISH.

Chin Overview

Also shown is an optional optical diffuser **180** for diffusing the light from emitter **176**, which causes a further spreading or mixing of light and may enhance the amount of tissue penetrated in some instances.

APPLE-1006, 8:25-29 (cited at Petition, 61)

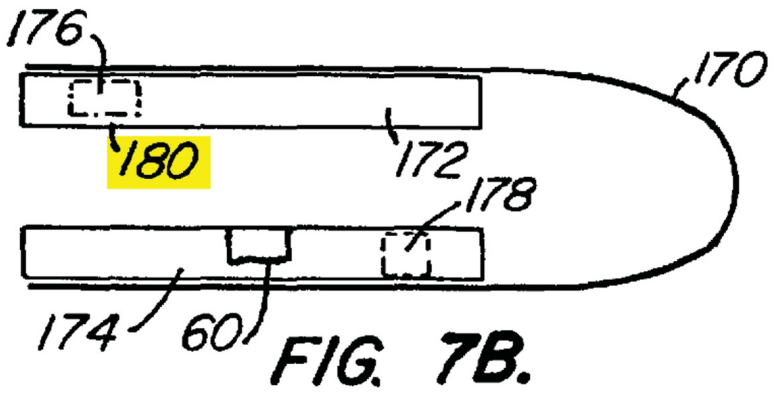


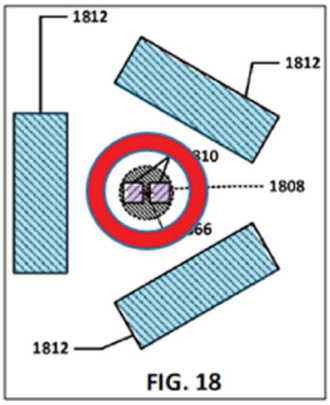
FIG. 7B.

APPLE-1006, FIG. 7B (from POR, 19)

Sarantos / Mendeslon 1991 Overview

To the extent one would dispute that Sarantos' light blocking/enclosing wall 2274, 2374, 2474 is not circular, a POSITA would have implemented a circular light blocking/enclosing wall 2274, 2374, 2474 in Sarantos based on the teachings of Mendelson. APPLE-1003, [65]; APPLE-1015, 2, FIGS. 1(A), 1(B). Implementing

Petition, 37



Photodetectors Light source Light blocking wall

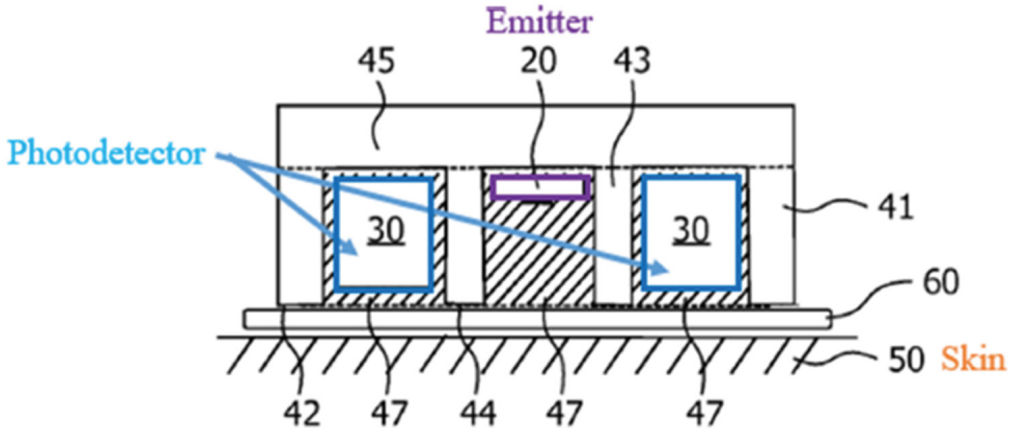
APPLE-1014, FIG. 18 (modified to show light blocking wall)

Petition, 41

Ackermans Overview

(57) Abstract: The medical optical sensor (10) comprises at least one light emitter (20) for emitting light (21) directed to a part of the skin (50) of a patient and at least one photo- detector (30) for detecting light (31) reflected from the skin (50). A housing (40) for carrying the at least one light emitter (20) and the at least one photo-detector (30) is provided, where the housing (40) has a contact area with the skin (50). The at least

APPLE-1015, Abstract (cited at Petition, 64)

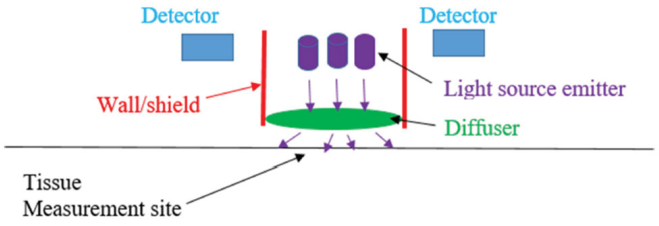


APPLE-1016, FIG. 2 (from Petition, 65)

Chin in Combination with Sarantos / Ackermans

In the combination, the combined pulse oximetry monitor of Sarantos and Mendelson-1991 is further modified to include Chin's diffuser between the emitters and the tissue measurement site. APPLE-1006, 2:4-7, 8:25-29; APPLE-1003, [97]. The diffuser would be placed at the bottom edge of the wall/optical shield so that light emitted from the light source emitters would be shielded from the detectors. APPLE-1003, [97]. By placing the diffuser at the bottom edge of the wall/optical shield, the light would travel within the area defined by the wall/optical shield, be received by the diffuser, and subsequently spread by the diffuser onto the tissue measurement site. APPLE-1003, [97].

Petition, 62; *see also* 103



Issue 1

Masimo's Tissue Thickness Arguments are Ineffectual

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Masimo's tissue thickness arguments are ineffectual

Patent Owner Response

Chin describes sensors worn at thin tissue measurement sites. EX1006 at 1:14-21, 8:21-29.

POR, 17

Thus, all of Apple's applied references, outside of Chin, already have thick tissue measurement sites to backscatter light and do not suffer the problems Chin attempts to solve. EX2001 ¶ 56.

POR, 20

Masimo's tissue thickness arguments are ineffectual

Petitioner's Reply

Chin specifically states that its sensor "could attach to ***any body part***," thereby contradicting Patent Owner's classification of Chin as directed only to "thin tissue" devices. APPLE-1006, 5:55-56.

Reply, 5

Chin

The sensor could be any type of sensor, such as a durable sensor or a disposable sensor. It could attach to any body part, such as the earlobe, finger, etc. The sensor could be a reflectance or a transmittance sensor.

APPLE-1006, 5:55-56 (cited at Reply, 5)

Masimo's tissue thickness arguments are ineffectual

Webster

7.2.2 Sensor placement

[. . . .]

Reflectance probes can be used to measure arterial oxygen saturation at virtually any place on the human body where the probe can be placed.

APPLE-1021, 88 (cited at Reply, 6)

Reflectance probes can be placed on virtually any place on the body where we can expect light reflection due to tissue.

APPLE-1021, 91 (cited at Reply, 6)

Masimo's tissue thickness arguments are ineffectual

Petitioner's Reply

Although the POR includes a handful of citations to Chin, Sarantos, and Ackermans in its "thick tissue" / "thin tissue" argument, the cited disclosure does not support Patent Owner's alleged distinction between "thin tissue" and "thick tissue" devices. *See* POR, 16-20 (citing APPLE-1006, 1:14-21, 2:39-62, 7:13-41, 8:21-29, FIGS. 5C-5E, 7B; APPLE-1014, 7:12-16; APPLE-1015, 15:43-45). In fact, neither Sarantos, nor Ackermans, nor Chin describes its pulse oximeter as applicable to only "thick" or "thin" tissue, and none of these references use the terms "thick" or "thin" when describing tissue measurement sites. *See* APPLE-1006, APPLE-1014, APPLE-1016.

Reply, 5

Masimo's tissue thickness arguments are ineffectual

Petitioner's Reply

Patent Owner provides no evidentiary support—besides uncorroborated testimony from its expert—for this alleged dichotomy between "thin tissue" and "thick tissue" pulse oximeters. *See* POR, 16-20 (citing EX2001, [52]-[56]).

Reply, 4

Dr. Anthony's Declaration

99. In addition, a POSITA would have been motivated to incorporate Chin's diffuser into the pulse oximeter of Sarantos and Mendelson because the diffuser will cause the light "to pass through more tissue, and thus more blood," resulting in a stronger reflected signal, with less relative noise, at the detectors, which "allows it to be more easily processed by the oximeter electronics and software" to determine the measured physiological parameters. APPLE-1006, 2:4-7, 8:25-29, 9:64-10:7.

APPLE-1003, [99] (cited at Petition, 63)

Masimo's tissue thickness arguments are ineffectual

Petitioner's Reply

Patent Owner provides no evidentiary support—besides uncorroborated testimony from its expert—for this alleged dichotomy between "thin tissue" and "thick tissue" pulse oximeters. *See* POR, 16-20 (citing EX2001, [52]-[56]).

Reply, 4

Chin

The sensor could be any type of sensor, such as a durable sensor or a disposable sensor. It could attach to any body part, such as the earlobe, finger, etc. The sensor could be a reflectance or a transmittance sensor.

APPLE-1006, 5:55-56 (cited at Reply, 5)

Masimo's tissue thickness arguments are ineffectual

Patent Owner's Response

Sarantos discloses a wrist-worn sensor applied to ***thick tissue***, which does not suffer the same thin tissue problem that Chin attempts to solve. EX2001 ¶ 62.

POR, 22

Masimo's tissue thickness arguments are ineffectual

Petitioner's Reply

Patent Owner's distinction between "thick tissue" and "thin tissue" devices has no basis in Chin or Sarantos—neither reference describes such a distinction—or indeed in any of the evidence of record. In fact, Chin specifically states that its sensor "could attach to any body part," thereby contradicting Patent Owner's classification of Chin as only being concerned with a "thin tissue problem." APPLE-1006, 5:55-56.

Reply, 10

Chin

The sensor could be any type of sensor, such as a durable sensor or a disposable sensor. It could attach to any body part, such as the earlobe, finger, etc. The sensor could be a reflectance or a transmittance sensor.

APPLE-1006, 5:55-56 (cited at Reply, 5)

Masimo's tissue thickness arguments are ineffectual

Patent Owner's Response

However, Ackermans and Chin apply their sensors to very different measurement sites. Ackermans discloses a wrist-worn sensor applied to ***thick tissue***, and thick tissue provides ample backscattering of light (despite having other characteristics that make the wrist a poor measurement site). EX2001 ¶ 77. In contrast, Chin is a nostril sensor applied to ***thin tissue*** with problematic backscattering. *Id.*

POR, 34

Masimo's tissue thickness arguments are ineffectual

Petitioner's Reply

supra), Patent Owner's distinction between "thick tissue" and "thin tissue" devices has no basis in Chin or Ackermans—neither reference describes such a distinction—or indeed in any of the evidence of record. In fact, Chin specifically states that its sensor "could attach to any body part," thereby contradicting Patent Owner's classification of Chin as only being concerned with a "thin tissue problem." APPLE-1006, 5:55-56.

Reply, 14

Chin

The sensor could be any type of sensor, such as a durable sensor or a disposable sensor. It could attach to any body part, such as the earlobe, finger, etc. The sensor could be a reflectance or a transmittance sensor.

APPLE-1006, 5:55-56 (cited at Reply, 5)

Issue 2

Masimo's "Experiment" is Unavailing

FISH.

Masimo's "experiment" is unavailing

Patent Owner's Response

To confirm that a diffuser reduces light that reaches the detector, Masimo's expert, Dr. Madisetti, conducted experiments applying different diffuser materials to reflectance-type sensors. *Id.* ¶¶ 58-59. Dr. Madisetti showed that a mostly transparent diffuser reduced the amount of light that reached the detector by about 14% to 17%. *Id.* ¶ 59. Dr. Madisetti also showed that a less-transparent diffuser reduced the amount of light that reached the detector by up to about 40% for infrared light and about 50% for red light. *Id.*

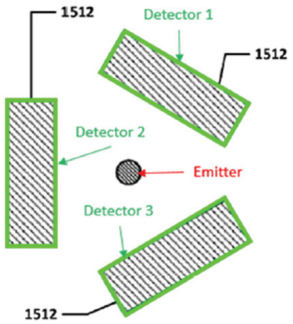
POR, 20

Masimo's "experiment" is unavailing

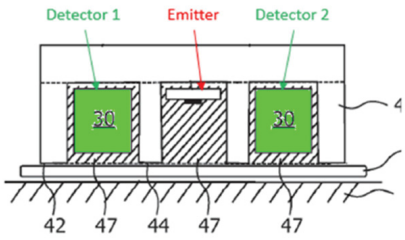
Petitioner's Reply

the devices described in Sarantos and Ackermans, which form the basis of the two proposed combinations, both include ***a plurality of photodetectors***, as required by the claims of the '695 patent. *See* Petition, 11-17, 71-75; APPLE-1001, claim 1 (reciting "a plurality of detectors").

Reply, 7



APPLE-1014 (Sarantos), Detail of FIG. 15 (annotated)



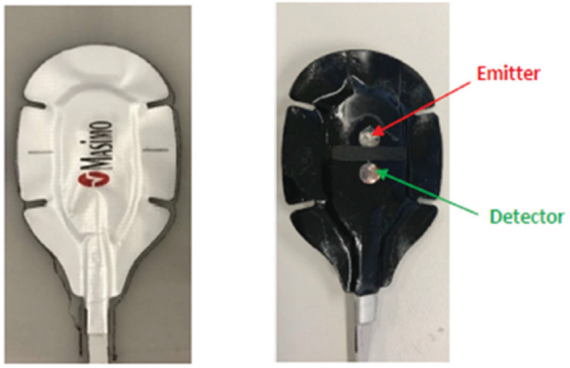
APPLE-1016 (Ackermans), Detail of FIG. 2 (annotated)

Masimo's "experiment" is unavailing

Petitioner's Reply

Dr. Madisetti's experiment is irrelevant to the present proceeding, because the Masimo pulse oximeter used in these experiments includes ***a single photodetector***, as shown in the following excerpt from Dr. Madisetti's declaration:

Reply, 7



Single-detector device used in Dr. Madisetti's experiment.
EX2001, Appendix p 1 (annotations in original)

Masimo's "experiment" is unavailing

Petitioner's Reply

Devices with multiple detectors will detect additional reflected light that will not be detected by a single detector (*i.e.*, light that strikes the area of the device covered by the additional detector). *See, e.g.*, APPLE-1014, 14:46-55 (explaining that using multiple photodetectors arrange around the light source can lead to more light being detected and thus "increase the signal to ambient noise ratio" of the device); APPLE-1015, 2 ("The major feature of the optical layout design is the multiple photodiode array, which…maximizes the amount of backscattered light that is detected by the sensor").

Reply, 8 (quoting Sarantos, Mendelson 1991)

Masimo's "experiment" is unavailing

Petitioner's Reply

Thus, the single-detector device used in Dr. Madisetti's experiment is fundamentally different from the devices described in the Sarantos and Ackermans combinations, and therefore the results of the experiment are not indicative of the performance of the combined prior art devices of Sarantos and Ackermans. Accordingly, the many arguments in the POR that rely on this theory must fail.

Reply, 8-9

Issue 3

A POSITA would have had a Reasonable Expectation of Success when Performing the Proposed Modifications

FISH.

A POSITA would have had a reasonable expectation of success in combining Sarantos-Mendelson and Chin

Patent Owner's Response

Moreover, even if a POSITA could combine the teachings of Sarantos-Mendelson with Chin, Apple provides no evidence of a reasonable expectation of success. Sarantos emphasizes use of its rectangular detectors arranged in close proximity to its emitters to ***maximize*** the amount of light reaching the detectors. EX1014 at 18:61-66. In contrast, combining a reflectance-type sensor with a diffuser on sufficiently thick tissue with ample light backscattering properties, ***reduces*** the amount of light reaching the detector, in some instances by half or more, without the benefit explained by Chin and relied on by Apple. *See supra* § VI.C.2.

POR, 25

A POSITA would have had a reasonable expectation of success in combining Sarantos-Mendelson and Chin

Petitioner's Reply

Patent Owner argues that a POSITA would have had no reasonable expectation of success in adding Chin's diffuser to the combined device of Sarantos-Mendelson-1991 because it alleges, again relying on the results of Dr. Madisetti's single-detector experiment, that the amount of light reaching the detectors would be reduced by the addition of the diffuser. POR, 24-25. But, as explained above (*see* Section II.B, *supra*), the results of Dr. Madisetti's single-detector experiment are not indicative of the performance of devices with multiple photodetectors, and therefore fail to support Patent Owner's argument.

Reply, 10

A POSITA would have had a reasonable expectation of success in combining Sarantos-Mendelson and Chin

Dr. Anthony's Declaration

98. As can be appreciated from the foregoing, a POSITA would have combined the teachings of Sarantos-Mendelson-1991 and Chin because doing so would have amounted to nothing more than the use of a known technique to improve similar devices in the same way and combining prior art elements according to known methods to yield predictable results. *See KSR v. Teleflex*, 550 U.S. 398, 417 (2007). And because a POSITA would be implementing the diffuser in a known way (specifically the way described in Chin), a POSITA would have had a reasonable expectation of success in integrating the diffuser of Chin into the pulse oximetry sensor of the Sarantos-Mendelson-1991 combination. *See, e.g.*, APPLE-1006, 8:20-28.

APPLE-1003, [98] (cited at Petition, 62)

A POSITA would have had a reasonable expectation of success in combining Ackermans and Chin

Patent Owner's Response

Moreover, even if a POSITA could combine the teachings of Ackermans and Chin, Apple provides no evidence of a reasonable expectation of success. Combining a reflectance-type sensor with a diffuser on tissue already sufficiently thick to provide ample backscattering, ***reduces*** the amount of light reaching the detector, in some instances by half or more. *See supra* § VI.C.2.

POR, 37

A POSITA would have had a reasonable expectation of success in combining Ackermans and Chin

Petitioner's Reply

Patent Owner argues that a POSITA would have had no reasonable expectation of success in adding Chin's diffuser to Ackerman's device because it alleges, again relying on the results of Dr. Madisetti's single-detector experiment, that the amount of light reaching the detectors would be reduced by the addition of the diffuser. POR, 36-37. But, as explained above (*see* Section II.B, *supra*), the results of Dr. Madisetti's single-detector experiment are not indicative of the performance of devices with multiple photodetectors, and therefore fail to support Patent Owner's argument.

Reply, 14

A POSITA would have had a reasonable expectation of success in combining Ackermans and Chin

Dr. Anthony's Declaration

162. As can be appreciated from the foregoing, a POSITA would have combined the teachings of Ackermans and Chin because doing so would have amounted to nothing more than the use of a known technique to improve similar devices in the same way and combining prior art elements according to known methods to yield predictable results. *See KSR v. Teleflex*, 550 U.S. 398, 417 (2007). And because a POSITA would be implementing the diffuser in a known way (specifically the way described in Chin), a POSITA would have had a reasonable expectation of success in integrating the diffuser of Chin into the pulse oximetry sensor of Ackermans. *See, e.g.,* APPLE-1006, 8:20-28.

APPLE-1003, [162] (cited at Petition, 104)

Issue 4

Masimo's Arguments Rely on Mischaracterizations of the Prior Art

FISH.

Masimo mischaracterizes Sarantos

Petitioner's Reply

In addition, Patent Owner characterizes Sarantos as limited to configurations where the photodetectors are spaced "1 mm to 4 mm" from the central emitter. *See, e.g.*, POR, 28, 30. But Sarantos specifically states that "implementations discussed herein may be used in products that achieve closer or farther spacing from the light source center, such as spacing closer than 1 mm or farther than 4 mm." APPLE-1014, 18:66-19:2.

Reply, 12

Masimo mischaracterizes Chin

Patent Owner's Response

Chin describes a transmittance-type nostril sensor for measuring oxygen saturation and pulse rate. EX1006 at 1:14-21, 8:21-29.

Chin is a nostril sensor applied to ***thin tissue*** with problematic backscattering. *Id.*

above, Chin's nostril sensor modifications are directed specifically to solve Chin's thin tissue problem. *See supra* § VI.C.1. Sarantos-Mendelson's wrist worn

POR, 12, 23, 34

Chin

The sensor could be any type of sensor, such as a durable sensor or a disposable sensor. It could attach to any body part, such as the earlobe, finger, etc. The sensor could be a reflectance or a transmittance sensor.

APPLE-1006, 5:55-56 (cited at Reply, 5)

Masimo mischaracterizes the Sarantos/Chin combination

Petitioner's Reply

Further, Patent Owner's arguments regarding these dimensions assume, without support, that the addition of Chin's diffuser would spread the light from Sarantos' emitter to an extent that the pattern of light reaching the photodetectors would be vastly changed, thus disrupting the operation of the device. POR, 29-32. Nothing in the references or in the description of the combination in the Petition suggests that the effect of Chin's diffuser would be so drastic. In fact, even a slight spreading of the emitted light would still "cause [the light] to pass through more tissue, and thus more blood" thereby leading to improved performance, as taught by Chin. *See* APPLE-1006, 2:4-9, 8:25-29.

Reply, 12

Masimo mischaracterizes Ackermans

Petitioner's Reply

56. Further, Patent Owner's arguments assume, without support, that the addition of Chin's diffuser would spread the light from Ackermans' emitter to an extent that the pattern of light reaching the photodetectors would be vastly changed, thus disrupting the operation of the device. POR, 40-42. Nothing in the references or in the Petition's description of the combination suggests that the effect of Chin's diffuser would be so drastic. In fact, even a slight spreading of the emitted light would still "cause [the light] to pass through more tissue, and thus more blood" thereby leading to improved performance, as taught by Chin. *See* APPLE-1006, 2:4-9, 8:25-29.

Reply, 16

Appendix

Overview of the Instituted Grounds

☐ Grounds covering only disclaimed claims

Ground	Claims	§103 Basis
1A	1, 4, 5, 8, 9, 13, 15-19, 24-30	Sarantos
1B	1, 2, 4, 5, 8, 9, 11, 13, 15-19, 22, 24-30	Sarantos in view of Mendelson-1991
1C	3, 12, 23	Sarantos in view of Mendelson-1991 and Venkatraman
1D	6, 14, 21	Sarantos in view of Mendelson-1991 and Chin
2A	1, 4, 5, 8, 9, 13, 15-17, 19, 24-26, 28, 29	Ackermans
2B	2, 3, 11, 12, 18, 22, 23, 27, 30	Ackermans in view of Venkatraman
2C	6, 14, 21	Ackermans in view of Chin

Petition, 2-3; *see* Institution Decision (Paper 8), 9-10, 25; Ex. 2004