

Filed on behalf of Patent Owner

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MEDIT CORPORATION
Petitioner

v.

3SHAPE A/S
Patent Owner

Case No. IPR2023-01316
Patent 11,076,146

PATENT OWNER'S PRELIMINARY RESPONSE

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I. INTRODUCTION

Patent Owner, 3Shape A/S (“3Shape” or “Patent Owner”), submits this Patent Owner’s Preliminary Response to the Petition for *Inter Partes* Review (“Petition” or “Pet.”) filed by MEDIT CORPORATION (“Medit” or “Petitioner”) against U.S. Patent No. 11,076,146 (EX1001, “the ’146 Patent”). This paper is timely filed pursuant to 37 C.F.R. §42.207(b) and the Notice of Filing Date Accorded to Petition and Time for Filing Patent Owner Preliminary Response (Paper 4).

Petitioner fails to establish a reasonable likelihood that it would prevail with respect to any challenged claim of the ’146 Patent. The first purported ground for unpatentability is that Orametrix, Faul, and Breton renders obvious Claims 1, 3-6, 8-13, 15, 21-27, and 29. This ground is deficient for at least three reasons. First, Petitioner fails to demonstrate that any of the cited references disclose or suggest a “a tip configured to be inserted into the oral cavity” or “a hardware processor configured to: selectively switch a color of the probe light, thereby illuminating the object with different colors at different times.” Second, Petitioner bears the burden of providing a reason with rational underpinnings as to why it would have been obvious to modify Orametrix or Faul to arrive at the claimed invention. Petitioner’s rationale for modifying Orametrix and Faul is negated by the Breton disclosure. Further, a POSITA would not have had a reasonable expectation of

combining Orametrix, Faul, and Breton to successfully arrive at the claimed invention. Thus, the Board should deny institution of Ground 1.

The second purported ground for unpatentability is that Orametrix, Faul, Breton, and Durbin render obvious Claim 16. For the reasons presented above, with respect to the first ground, the Board should also deny institution of Ground 2.

Patent Owner respectfully requests that the Board denies institution of this Petition.

II. STATEMENT OF THE PRECISE RELIEF REQUESTED

Patent Owner requests that the Board deny institution of the Petition with respect to all challenged claims and all asserted grounds. A full statement of the reasons for the relief requested is set forth in Sections III-VI below.

III. THE '146 PATENT

The '146 Patent contains thirty (30) claims. EX1001 at 37:24-40:27. Claims 1 and 21 are the sole independent claims. *Id.* Claims 2-20 and 22-30 depend either directly or indirectly from Claims 1 or 21. *Id.* Independent Claims 1 and 21 recite:

1. An intraoral scanner for determining the 3D geometry and color of at least a part of the surface of an object in an oral cavity, the intraoral scanner comprising:
 - at least one camera accommodating an array of sensor elements;

a pattern generator configured to generate, using a light source, a probe light with a plurality of configurations in the form of a time-varying illumination pattern;

an optical system for transmitting the probe light towards the object along an optical path thereby illuminating at least a part of the object with the time-varying illumination pattern, and for transmitting at least a part of the light returned from the object to the at least one camera to form a plurality of 2D images, wherein the 3D geometry is determined based on the plurality of 2D images and the time-varying illumination pattern;

a tip configured to be inserted into the oral cavity; and

a hardware processor configured to:

- selectively switch a color of the probe light, thereby
- illuminating the object with different colors at different times;
- record different images by the at least one camera at the different times, thereby recording images of the object with the different colors; and
- combine the different colors from the different images, thereby obtaining the color of the surface of the object,

wherein the intraoral scanner is wireless, and
wherein the at least one camera is a high-speed
camera.

21. A method for determining the 3D geometry and color
of at least a part of the surface of an object in an oral
cavity,

said method comprising the steps of:

using a light source and a pattern generator to generate
a

probe light with a plurality of configurations in the
form of a time-varying illumination pattern;

transmitting the probe light, through a tip of intraoral
scanner inserted into the oral cavity, towards the
object along an optical path, thereby illuminating
at least a part of the object with the time-varying
illumination pattern;

transmitting at least a part of the light returned from the
object to at least one camera accommodating an
array of sensor elements to form a plurality of 2D
images,

wherein the 3D geometry is determined based on the
plurality of 2D images and the time-varying
illumination pattern;

selectively switching a color of the probe light, thereby
illuminating the object with different colors at
different times;

recording different images by the at least one camera at the different times, thereby recording images of the object with the different colors;
combining the different colors from the different images to obtain the color of the surface of the object; and wirelessly transmitting the data for the 3D geometry.

Id., at 37:24-52; 38:60-39:18.

IV. CLAIM CONSTRUCTION

The standard for claim construction in *inter partes* review is the “ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R. §42.100(b). Patent Owner here maintains the claim construction positions it has taken in the parallel district court proceeding. *Compare* below with EX2005.

A. “time-varying illumination pattern” (Claims 1, 21)

The specification of the ’146 Patent defines “time varying illumination pattern” as “a pattern that varies in time, i.e. the embedded spatial structure varies in time.” EX1001, 4:62-64. Further, “illumination pattern” is defined as a “light signal comprising an embedded spatial structure in the lateral plane.” *Id.*, 4:59-61. Thus, the meaning of this claim term is a light signal comprising an embedded spatial structure in the lateral plane, wherein the embedded spatial structure of the light signal varies in time.

This construction of the claim term is consistent with statements made by 3Shape during prosecution of ancestral U.S. Patent No. 10,326,982, wherein the term was first introduced into the patent family prosecution history. *See In re Rambus Inc.*, 694 F.3d 42, 48 (Fed. Cir. 2012) (“unless otherwise compelled ... the same claim term in the same patent or related patents carries the same construed meaning,” quoting *Omega Eng’g Inc. v. Raytek Corp.*, 334 F.3d 1314, 1334 (Fed. Cir. 2003)).

Here, the Office had asserted that U.S. Publ. No. 2007/0041729 (“Heinz”) “explicitly [taught] wherein the plurality of configurations is in the form of a time-varying illumination pattern, such that the 3D geometry is determined based on the time-varying illumination pattern” as recited in the then-pending claims. EX2001, at 5. In response, 3Shape filed a Proposed Amendment and an Interview Summary stating that

the radiation incident on the object 804 [in Heinz] is constant, and the light reflected back to the sensor may vary with time based on the movement of the object itself. This is in contrast to claim 2, which states that the probe light *illuminating the object* includes a plurality of configurations in the form of a time-varying illumination pattern. In Heinz, the radiation incident on the object 804 does not include a plurality of configurations in the form of a time-varying illumination pattern.

EX2002, at 2. The Office then accepted 3Shape’s proposed claim amendments and arguments in an Examiner’s amendment. EX2003, at 6-7.

Thus, 3Shape successfully distinguished its claimed invention as providing an illumination pattern (*i.e.*, an embedded spatial structure of the light signal) that varies over time, over Heinz which purportedly discloses (i) moving an illuminating fiber **802** providing a multimode interference pattern over a surface **804** and/or (ii) moving the surface **804**. EX2004, at 7, ¶[0069]. Additionally, based on 3Shape’s prosecution statements, “time-varying illumination pattern” as recited in the patented claims does not encompass Heinz’s moving an illumination pattern across an object being scanned. *See General Electric Company v. Rolls-Royce PLC*, IPR2016-00528, Paper 29 (PTAB July 26, 2017) (panel adopted patent owner’s claim construction based on the prosecution history and narrowing amendments made by the applicant during prosecution); *see also The Scotts Company LLC v. Encap LLC*, IPR2013-00110, Paper 79 at 13-16 (PTAB June 24, 2014) (panel reviewed prosecution history to inform claim construction); *Microsoft Corp. v. Proxycom, Inc.*, 789 F.3d 1292, 1298 (Fed. Cir. 2015) (“The PTO should also consult the patent’s prosecution history in proceedings in which the patent has been brought back to the agency for a second review.”); *In re NTP, Inc.*, 654 F.3d 1279, 1288 (Fed. Cir. 2011) (the Board’s construction “cannot be divorced from

the specification and the record evidence”); *In re Man Machine Interface Tech. LLC*, 822 F.3d 1282, 1286 (Fed. Cir. 2016).

Finally, 3Shape’s construction of this claim term is consistent with their parallel district court proceeding construction. EX2005.

B. “the object” is “an object in an oral cavity” (Claims 1, 21)

The term “the object” as recited in Claims 1 and 21 finds antecedent basis in the recitation of “an object in an oral cavity” in Claims 1 and 21, respectively. Additionally, the recitation of “the object” in Claim 8 refers to “an object in an oral cavity” as recited in Claim 1. Accordingly, the term “the object” in Claims 1 and 21 should be construed to be “the object in an oral cavity” because the use of antecedent-basis language like “the” narrows the term “the object” to encompass only objects in an oral cavity. *Evolusion Concepts, Inc. v. HOC Events, Inc.*, 22 F.4th 1361, 1366 (Fed. Cir. 2022).

V. ARGUMENT

Institution should be denied because Petitioner has failed to establish a reasonable likelihood that the Petitioner would prevail with respect to any ground or any challenged claim. There are at least three reasons to deny institution. First, there is at least one limitation missing in the combination of references. Second, Petitioner has not established a motivation with reasonable underpinnings to combine the asserted art to arrive at the claimed invention. Third, Petitioner has

failed to provide evidence that a POSITA would have had a reasonable expectation of success in combining the art to arrive at the claimed invention.

The Director may not authorize an *inter partes* review to be instituted unless the Director determines that the information presented in the petition filed under 35 U.S.C. §311 and any response filed under 35 U.S.C. §313 shows that there is a reasonable likelihood that the Petitioner would prevail with respect to at least one of the claims challenged in the petition. 35 U.S.C. §314(a); 37 C.F.R. §42.108(c).

The Petition sets forth two grounds of alleged unpatentability. In “Ground 1,” Petitioner alleges that Claims 1, 3-6, 8-13, 15, 21-27, and 29 are unpatentable under pre-AIA 35 U.S.C. §103(a) as obvious based on Orametrix, Faul, and Breton. *Id.* In “Ground 2,” Petitioner alleges that Claim 16 is unpatentable under pre-AIA 35 U.S.C. §103(a) as obvious based on Orametrix, Faul, Breton, and Durbin. *Id.*

To establish obviousness of a claimed invention under 35 U.S.C. §103(a), Petitioner must establish that “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person of ordinary skill in the art to which the subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007) (citing *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1 (1966)). A patent claim composed of several elements is not proved obvious

merely by demonstrating that each of its elements was known, independently, in the prior art. *See KSR*, 550 U.S. at 418.

Further, the appropriate inquiry into obviousness requires that “one must have a motivation to combine accompanied by a reasonable expectation of achieving what is claimed in the patent-at-issue.” *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir. 2016). Thus, the requirement for a motivation to combine references is separate from the requirement for a person of ordinary skill in the art to have a reasonable expectation of success in combining the cited references to meet the limitations of the claimed invention. *Id*; *see also In re Merck & Co., Inc.*, 800 F.2d 1091 (Fed. Cir. 1986)

“[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006); *see also KSR*, 550 U.S. at 418. The Petition does not provide articulated reasoning based on rational underpinnings for why one of ordinary skill in the art would have modified the asserted art to arrive at the claimed invention.

Petitioner fails to demonstrate a reasonable likelihood of success with respect to all challenged claims and all grounds presented in the Petition. The deficiencies of the Petition are discussed below.

A. Petitioner fails to demonstrate a reasonable likelihood of success that Petitioner would prevail with respect to at least one of the claims challenged in Ground 1

Petitioner fails to establish a reasonable likelihood that Petitioner would prevail with respect to at least one of the claims challenged in Ground 1 based on Orametrix, Faul, and Breton for at least the following reasons.

1. None of the asserted references, either alone or in combination, disclose or suggest each and every limitation of the challenged claims.

As discussed in further detail below, Petitioner fails to demonstrate that the cited references, either alone or in combination, disclose or suggest each and every limitation of the challenged claims.

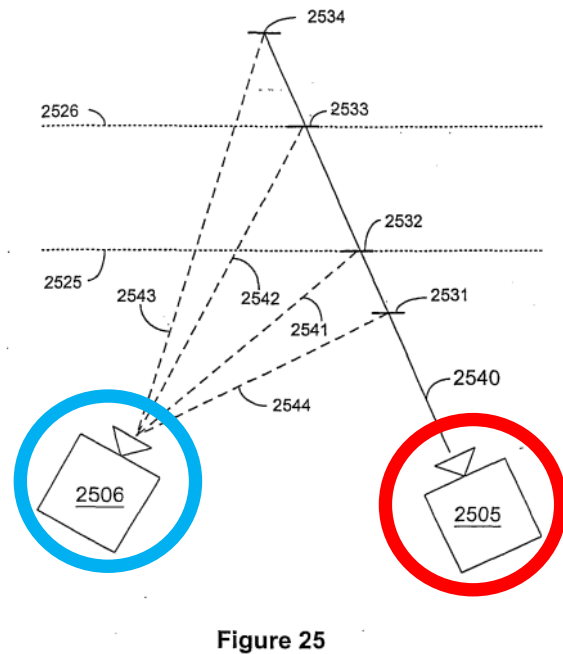
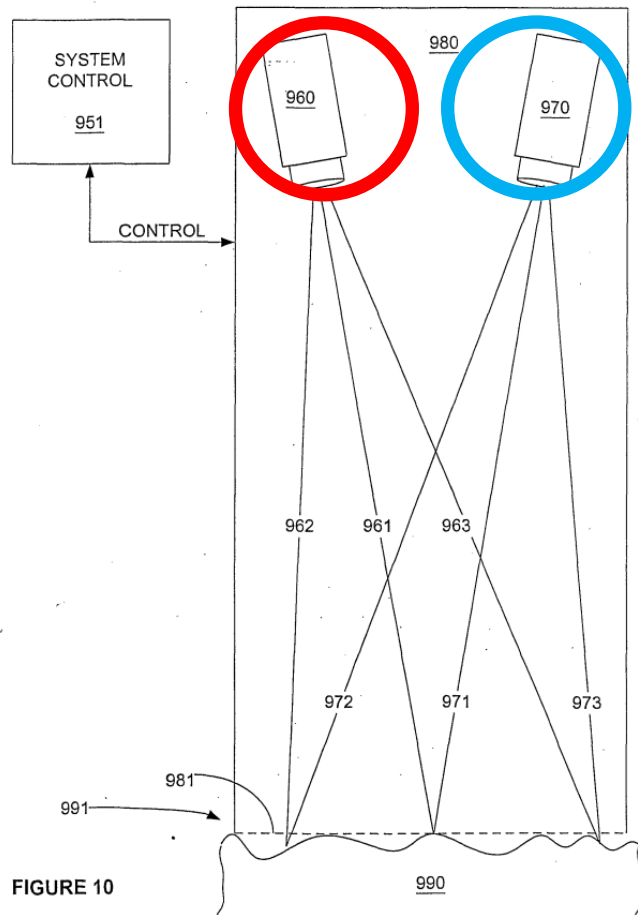
a. None of the asserted references disclose “a tip configured to be inserted into the oral cavity” [Claim 1a] or “transmitting the probe light, through a tip of intraoral scanner inserted into the oral cavity” [Claim 21b]

Petitioner provides no evidence or arguments to infer that Orametrix discloses that its scanner comprises “a tip configured to be inserted into the oral cavity” or “transmitting the probe light, through a tip of intraoral scanner inserted into the oral cavity.” Petitioner relies on Figure 44, the text associated with Figure 44 at 56:11-20, and 31:11-19, and Figure 27. While Figure 44 depicts what the

Petitioner correctly refers to as “scanner 4401,” Figure 44 does not illustrate “a tip configured to be inserted into the oral cavity” connected to scanner 4401. Scanner 4401 is of the same thickness throughout the illustration, and does not show any narrowing of the scanner body such that a portion of it can be “inserted into the oral cavity.” None of the text listed at 56:11-20 or 31:11-19 discusses a scanner tip, much less one that is “configured to be inserted into the oral cavity.” Likewise, Figure 27 does not depict “a tip configured to be inserted into the oral cavity.”

A word search of Orametrix reveals that the term “tip” as it relates to a scanner, the term “insert,” and the term “oral cavity” simply do not appear in the reference. And, while there is discussion of using the scanner of Orametrix to scan teeth (*e.g.*, EX1005, Fig.27), any discussion of “inserting” any portion of such scanner “into [an] oral cavity” is wholly absent from the reference. Further, Figure 27 does not explicitly or inherently disclose whether the illustration is of patient teeth or of a model of teeth. Furthermore, a POSITA would understand that Figure 27 illustrates a tooth model because the device disclosed in Orametrix is not suitable for “inserting into the oral cavity” as discussed below.

Figures 10 and 25 of Orametrix illustrate a triangulation system that only involves a camera/viewer (blue circles) and a projector (red circles):



In Figure 10, the illustrated triangulation system is scanning an occlusal surface of a molar. A triangulation system for intraoral use would also need a mirror that reflects the emitted light downwards (orthogonal to the optical axis of the projector) to scan other tooth surfaces (*e.g.*, buccal, distal, mesial, lingual, labial). *See, e.g.*, EX2008, Abstract (“a mirror system compensate[es] for the fact that there is no possibility of watching an object directly in the mouth under a certain angle except from a facial position during intraoral scanning [when employing a laser triangulation system]”) and EX2009, p.210 (“In active triangulation, a light beam generated by a laser is deflected by a mirror and

scanned on the target object.”), p.213 (folding mirror reflects sheet of laser light in IOS FastScan™ system), and p.214 (deflection mirror deflects light beam to a first mirror which subsequently directs the light to the object in Bluescan®-I). However, such a mirror is not disclosed or suggested by Orametrix. Thus, from at least Figure 10, a POSITA would understand that Orametrix only discloses a desktop scanner, not a scanner suitable for intraoral use. As such, a POSITA would also understand that the teeth illustrated in Figures 10 and 27 of Orametrix are from a gypsum model or another type of tooth model and **not** a molar from an oral cavity of a patient. Accordingly, the device disclosed in Orametrix is not suitable for “inserting into the oral cavity.”

Petitioner asserts without evidence that “a POSITA would understand that in order to facilitate direct scanning of an anatomical structure, such as a tooth in a mouth, a housing that includes a tip would be needed to protect the scanning optics from damage or debris.” Pet., 25, 42. Certainly a housing would be required to protect the scanning optics from damage or debris. But, neither the Petitioner nor its expert explain with rational underpinnings as to why such a housing would necessarily include a “tip configured to be inserted into the oral cavity.” Indeed, paragraphs 86-87 and 141-142 of Petitioner’s expert declaration simply parrot the Petition without adding anything more. *Compare* Pet., §IX.A.1.g. and IX.A.21.c. with EX1012, ¶¶86-88 and 141-142.

The Petitioner does not assert that Faul or Breton cures this deficiency of Orametrix. Accordingly, the combination of Orametrix, Faul, and Breton does not teach or suggest all of the claimed limitations of independent Claims 1 or 21. For at least the same reasons, the combination of Orametrix, Faul, and Breton does not teach or suggest all of the claimed limitations of Claims 3-6, 8-13, 15, 22-27, and 29, which directly or indirectly depend from Claims 1 and 21.

b. None of the asserted references disclose “a hardware processor configured to: selectively switch a color of the probe light, thereby illuminating the object with different colors at different times” [Claim 1g]

Petitioner provides no evidence or arguments to infer that the processor of Orametrix or the microprocessor of Faul is “configured to selectively switch a color of the probe light, thereby illuminating the object with different colors at different times.” While Petitioner does reference “computation time” in connection with Breton (Pet., 27), Petitioner does not cite to any portion of Breton that expressly or implicitly discusses “a hardware processor configured to: selectively switch a color of the probe light, thereby illuminating the object with different colors at different times.”

i. Orametrix does not disclose Claim 1g

Petitioner relies on the text at 14:13-17, 25:11-26:5, 64:6-15, 16:19-22, 69:15-70:10, and Figures 16 and 46 in Orametrix. None of these citations refers to “a hardware processor configured to selectively switch a color of the probe light,

thereby illuminating the object with different colors at different times.” The citations discuss *processing data obtained* from the viewer/camera, *i.e.*, a process that occurs after the object has been illuminated. *See, e.g.*, Pet., 26 and EX1005, 14:13-17, 54:8-13, 64:6-15, and 69:15-70:10.

The text at 16:19-22 states that “[t]he system controller 951 further includes data processor 952.” However, the following text at 17:1-19 indicates that “data processor 952” is provided “reflected image data [] received from the view 970 at the viewer controller 955.” Further, “the projection image is a digital image (electrically generated), [and] the representation can be stored in memory by data processor 952, thereby allowing the data processor 952 to modify the projection image representation.”

Any discussion of a specific “hardware processor configured to selectively switch a color of the probe light, thereby illuminating the object with different colors at different times” is wholly absent from Orametrix. Paragraph 89 of Petitioner’s expert declaration likewise simply parrots the Petition without adding anything more. *Compare* Pet., §IX.A.1.h. with EX1012, ¶89.

In any event, Petitioner and its expert have also misconstrued the Orametrix disclosure and how it relates to the claimed invention. For example, Orametrix describes “encoding features” and “measuring features” as follows:

In accordance with a specific embodiment of the present invention, *an image is projected upon a surface. The image can include a pattern having a plurality of individual shapes used to measure and map the surface.*

The plurality of individual shapes include features that are detectable in a direction parallel to the plane formed by a projection axis of the projected shapes and a point associated with a view axis. The *image further comprises a feature containing encoding information for identifying the plurality of shapes individually.*

[Emphasis added.]

EX1005, 14. Here, “an image is projected upon a surface” is, at best, analogous to illumination of an object in an oral cavity by a probe light in the ’146 Patent. “The “image can include a pattern having a plurality of individual shapes used to measure and map the surface” is, at best, analogous to an illumination pattern that is one of the configurations of the probe light in the ’146 Patent. The illumination pattern of Orametrix is illustrated in Figure 23 as measuring features 1011, 1012, and 1013. *See also id.*, 29. Thus, at best, *it is the measuring features of Orametrix that relate to the illumination pattern of the probe light in the ’146 Patent.*

The encoding features discussed in Orametrix include information that is in addition to the measuring features—“[t]he image further comprises a feature containing encoding information for identifying the plurality of shapes

individually.” *Id.*, 14. As Figure 23 of Orametrix illustrates, it is the encoding features that vary over time, not the measuring features. *See also id.*, 29 (“During time T1, no encoding feature is projected. During time T2, an image containing encoding features 1021-1023 is projected. The patterns of times T1 and T2 are repeated during times T3 and T4 respectively. The result of alternating the projection of encoding and measuring features is that denser patterns can be used, allowing for more information to be obtained.”). The encoding features which do vary over time do not contribute to 3D geometry determination, rather they are only used to distinguish the measuring features. *Id.*, 14.

Because it is the encoding features that are varied in time and **not** the measuring features, Orametrix fails to disclose a time-varying illumination pattern of the probe light which is used for determining 3D geometry in the ’146 Patent. And, because color features are described as encoding features by Orametrix (*id.*, 25) and **not** as measuring features, Orametrix fails to disclose “switch[ing] a color of the probe light, thereby illuminating the object with different colors at different times.”

ii. Faul does not disclose Claim 1g

Petitioner relies on the text at 4:25-53, 6:60-67, 10:64-11:4, and 7:49-8:8 in Faul. While the citations discuss “dynamically alter[ing] the size, shape, color or intensity of the structured light,” none of these citations refers to “a hardware

processor configured to selectively switch a color of the probe light, thereby illuminating the object with different colors at different times.”

A word search of the Faul specification reveals that the term “processor” is only associated with “an image processor” that can (1) “generate[] surface point data which characterize the locations of points on the intersection relative to the scanner position indicator,” (2) “discard all video information after determining the 2D numerical coordinates for one or more points in the image of the intersection,” (3) perform “computations” such as transformations, (4) make available and store “calibration data, identification data, and other descriptive information characterizing the scanner” as well as “details about the pattern of structure light **42**, the position indicator or indicators **20, 22, 24**, the number of sensors **16, 18**, the serial number, and so forth.” EX1004, 2:67, 3:5-8, 4:64-66, 5:12-15, 5:41-43, 5:65-6:2, 6:38-42, 7:21-24, 7:51-63, 7:64-8:8, and 12:28-32. None of these *storage and image processing* activities amounts to “selectively switch[ing] a color of the probe light, thereby illuminating the object with different colors at different times.”

While the Abstract of Faul vaguely references “a processor configured for projecting a pattern of structured light on the object,” no further details as to whether this processor is or can be “configured to selectively switch a color of the probe light, thereby illuminating the object with different colors at different times” are provided. EX1004, Abstract. Petitioner asserts without evidence that “a

POSITA would understand that this microprocessor would be utilized to implement the measurement process, including light source and camera control, as well as image processing.” Pet., 26-27. However, neither the Petitioner nor its expert explain with rational underpinnings as to why the microprocessor of Faul would necessarily be “configured to selectively switch a color of the probe light, thereby illuminating the object with different colors at different times.” Indeed, paragraph 90 of Petitioner’s expert declaration simply parrot the Petition without adding anything more. *Compare* Pet., §IX.A.1.h. with EX1012, ¶90.

In any event, Petitioner and its expert have misconstrued the Faul disclosure. At pages 12 and 26, Petitioner asserts that “Faul also describes measuring the color of the scanned surface by dynamically altering the color of the projected structured light” and refers to 6:60-67 of Faul. The cited section of Faul is reproduced below:

The geometric data sent by data transmitter 26 may be augmented by brightness or color data from the image of each sensor 16, 18, so that the surface model 80 of the object 38 can include color or texture data in addition to geometrical shape data. To capture color data most accurately, an embodiment may utilize a color camera and a structured pattern of white light or a pattern which includes a variety of wavelengths.

EX1004, 6:60-67. Here, Faul suggests capturing color data using a color camera and (i) a structured pattern of white light, or (ii) a pattern which includes a variety

of wavelengths. However, the pattern with a variety of wavelengths is projected all at once. Faul does not disclose or suggest that the wavelengths of the pattern vary over time. As such, Faul fails to disclose or suggest “switch[ing] a color of the probe light, thereby illuminating the object with different colors at different times.”

iii. Breton does not disclose Claim 1g

Presumably, Breton was introduced by the Petitioner to cure the deficiencies of Orametrix and Faul.¹ However, Breton too suffers from the same deficiency because none of the citations to Breton discuss “a hardware processor configured to: selectively switch a color of the probe light, thereby illuminating the object with different colors at different times.” *See, e.g.,* EX1003, 6:62-7:20 (discussing

¹The Petition fails to state what claim limitations are missing from the Orametrix and Faul disclosures, and would necessarily be found in Breton. Petitioner’s repeated and ubiquitous attempts to fill gaps in the disclosures of the prior art, by reference to the extrinsic opinions of its expert fall short of meeting the evidentiary threshold necessary to support institution of a trial. *See, e.g.,* EX1012, ¶¶66, 195. Our reviewing court has “repeatedly recognized that conclusory expert testimony is inadequate to support an obviousness determination on substantial evidence review.” *TQ Delta, LLC v. Cisco Sys., Inc.*, 942 F.3d 1352, 1359 (Fed. Cir. 2019).

wavelength scanning methods generally), 8:24-36 (discussing tristimulus value measurement), and Figure 2 (illustrating “a schematic view of the illuminator assembly and of the CCD camera of the apparatus of Fig. 1”).

Without any evidence, the Petitioner and its expert incorrectly opine that “[t]he processor of Orametrix is already configured to change the color of projected encoding features” and that “the processors described by Orametrix and Faul would be configured to implement the color changing scheme as taught by Breton in the structured light projection in order to obtain sufficient spectral resolution to achieve an accurate color measurement of the scanned object surface Pet., 27-28 and EX1012, ¶92. Neither Petitioner’s nor its expert’s conclusory statements explain with rational underpinnings as to why the *data storage and image processing* processors of Orametrix and Faul when modified to accommodate the wavelength scanning data acquisition method of Breton would result in “a hardware processor configured to: selectively switch a color of the probe light, thereby illuminating the object with different colors at different times”—a processing activity that would take place *prior* to image processing.

Accordingly, the combination of Orametrix, Faul, and Breton does not teach or suggest all of the claimed limitations of independent Claim 1. For at least the same reasons, the combination of Orametrix, Faul, and Breton does not teach or

suggest all of the claimed limitations of Claims 3-6, 8-13, and 15, which directly or indirectly depend from Claim 1.

2. A POSITA would not have been motivated to modify Orametrix or Faul to incorporate the wavelength scanning method of Breton.

There is no reason with rational underpinnings for incorporating the wavelength scanning method of Breton. Petitioner's reasons for modifying either of Orametrix or Faul with Breton are undercut by Petitioner's mischaracterization of Breton.

In particular, Petitioner suggests "combin[ing] the wavelength scanning of the monochromatic light source of Breton with time-varying pattern projection of Orametrix or Faul in order to measure the color of the scanned surface at an adequate spectral resolution, and therefore achieve an accurate color measurement." Pet., 27. Petitioner's stated reasons for why a POSITA would have been motivated to combine Orametrix, Faul, and Breton is because (i) "all describe measuring systems requiring the color and shape of scanned objects" and (ii) all "belong to the same technical field, provide similar scanning systems, and have the same purpose to increase objectivity and accuracy in three-dimensional modeling of real-world objects." *Id.*, 15-16.

a. Breton does not disclose three-dimensional data acquisition or modeling

Contrary to the Petitioner's assertion, Breton does not disclose a "measuring system[] requiring the ... shape of scanned objects," let alone three-dimensional data acquisition and modeling. At best, Breton discusses two-dimensional mapping and measurement of tooth color for the purposes of ensuring the accurate color shade of replacement teeth. *See, e.g.*, EX1003, Title, Abstract ("appearance mapping of the object"), 1:7-18, 2:43-47 ("A general drawback of the prior art lies in that the notion of comparison between the measured tooth and a duplicate is limited to a single [one-dimensional] point to point comparison. Thus, [two-dimensional] area defects cannot be detected where no measurement has been taken."), 2:50-52, 2:60-64 ("collecting with a camera, color shade data corresponding to light rays reflected from a predetermined plurality of points on the illuminated surface of the object; and processing the color shade data to create at least one appearance map of the object"), FIG. 3.

Both Orametrix and Faul disclose triangulation and other methodologies to obtain three-dimensional object data; Breton is silent on any three-dimensional data acquisition methodology. *See, e.g.*, EX1005, 9:11-13, 46:7-10, Claim 35 and EX1004, 1:61-2:15, Claim 5. Both Orametrix and Faul disclose methodologies to process the obtained data and construct three-dimensional representations of the scanned object; Breton is silent on this aspect also. *See, e.g.*, EX1005, 30:7-34:11,

and EX1004, 13:28-16:6. As such, Breton does not have “the same purpose [as purportedly Orametrix and Faul] to increase objectivity and accuracy in three-dimensional modeling of real-world objects.”

b. Breton does not disclose a scanning system similar to those of Orametrix and Faul

Contrary to the Petitioner’s assertion, Breton also does not disclose a scanning system similar to those of Orametrix or Faul. Both Orametrix and Faul disclose “patterns” of illumination; Breton is silent on this aspect. *See, e.g.*, EX1005, FIG. 16, and EX1004, Abstract. In fact, Breton does disclose a “time-varying illumination pattern” as properly construed, *i.e.*, a light signal comprising an embedded spatial structure in the lateral plane, wherein the embedded spatial structure of the light signal varies in time. §IV.A. As such, Breton’s scanning system does not comprise many of the optical elements required to produce an “illumination pattern,” much less a “time-varying illumination pattern.”

For example, Orametrix makes use of “a projector projecting a SHAPE along a path 2540” in Figure 25 to project both measuring and encoding features. EX1005, FIG. 25 and 22:12-13. Likewise, Faul employs “a pattern [that] may be generated by rapidly sweeping a ray of light within a plane or through a more complex volumetric pattern.” EX1004, 4:30-33, 4:36-58 (discussing use of holograms, diffraction gratings, and optical projectors). At most, Breton employs the use square glass integrator rods, integrating spheres, optic fibers, and custom-

made lenses. EX1003, 42-45, FIG. 2 (square glass integrator rods **20, 20'**), 11:35-38, FIG. 4 (integrating sphere **152**), 11:40-41, 11:47-49. None of these light sources result in an “illumination pattern,” much less a “time-varying illumination pattern.” Thus, a POSITA would not have been motivated to combine Breton with Orametrix or Faul, because Breton does not share a scanning system similar to those of Orametrix or Faul.

Petitioner’s expert does not provide any more evidence for why a POSITA would have been motivated to combine Breton with Orametrix and Faul than what is present in the Petition. *Compare* EX1012, ¶¶62-64 and Pet., 15-16. As a result, the Petition fails to provide rational underpinnings for modifying either of Orametrix or Faul with Breton.

3. Petitioner’s combination would not have provided a POSITA with a reasonable expectation of successfully arriving at the claimed invention.

Without citing any evidence, Petitioner and its expert conclusory state that “a POSITA would have had a reasonable expectation of success in combining the features and teachings of Orametrix, Faul, and Breton, because these optical systems all rely on similar scanning arrangements, and the substitution and combination of features would be simple and yield the expected results of more accurate and objective optical measurements to make three-dimensional models of real-world objects.” Pet., 16 and EX1012, ¶¶62, 65-66.

First, Petitioner is mistaken in characterizing Breton as having a similar scanning arrangement as those of Orametrix and Faul. *See* §A.2.b.

Second, the only modification the Petitioner offers is suggesting “combin[ing] the wavelength scanning of the monochromatic light source of Breton with time-varying pattern projection of Orametrix and Faul.” Pet. 27, EX1012, ¶92. However, the Petitioner does not explain *which components* of Breton’s monochromatic light source should be *combined* with the scanners of Orametrix or Faul. Which of the square glass integrator rods, integrating spheres, optic fibers, and/or the custom-made lenses of Breton is to be included in Petitioner’s combination? *See* §V.A.2.b. and EX1003, 42-45, FIG. 2, 11:35-38, FIG. 4, , 11:40-41, 11:47-49.

Likewise, neither Petitioner nor its expert describe *how* the monochromatic light source of Breton can be integrated into the scanners of Orametrix or Faul. As discussed above, Orametrix and Faul disclose the use of holograms, diffraction gratings, and optical projectors to generate illumination patterns. *See* §V.A.2.b., EX1005, FIG. 25, 22:12-13, and EX1004, 4:30-33, 4:36-58. How are the square glass integrator rods, integrating spheres, optic fibers, and/or the custom-made lenses of Breton situated in connection with the holograms, diffraction gratings, and optical projectors used in the scanners of Orametrix and Faul? Neither the Petitioner nor its expert discuss any of these engineering details. Rather, Petitioner

and its expert simply rely on “the knowledge, creativity and common sense of a POSITA and the nature of the problem to be solved.” EX1012, ¶66. No evidence, mere opinion.

Third, the Petitioner does not discuss ***substitution*** of any of the scanning elements of Orametrix or Faul with the scanning elements of Breton in any particularity. That is, neither Petitioner nor its expert discuss ***which components*** of the scanning systems of Orametrix or Faul should be removed in the proposed combination device.

As discussed above, the requirement for a motivation to combine references is separate from the requirement for a POSITA to have a reasonable expectation of success in combining the cited references to meet the limitations of the claimed invention. *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367 (Fed. Cir. 2016); *see also In re Merck & Co., Inc.*, 800 F.2d 1091 (Fed. Cir. 1986). Accordingly, the Petition fails to provide rational underpinnings for modifying either of Orametrix or Faul with Breton so as to provide a POSITA with a reasonable expectation of success in combining the cited references to meet the limitations of the claimed invention.

B. Petitioner fails to demonstrate a reasonable likelihood of success that Petitioner would prevail with respect to at least one of the claims challenged in Ground 2

For the same reasons provided above with respect to Ground 1, Petitioner fails to demonstrate a reasonable likelihood of prevailing with respect to Ground 2.

1. None of the asserted references, either alone or in combination, disclose or suggest each and every limitation of the challenged claims.

As discussed in further detail below, Petitioner fails to demonstrate that the cited references, either alone or in combination, disclose or suggest each and every limitation of the challenged claims. In particular, Petitioner has failed to demonstrate that the cited references, either alone or in combination, disclose or suggest the following claim limitations: (i) “a tip configured to be inserted into the oral cavity,” and (ii) “a hardware processor configured to: selectively switch a color of the probe light, thereby illuminating the object with different colors at different times.”

a. Orametrix does not teach or suggest “a tip configured to be inserted into the oral cavity”

As discussed above in §V.A.1.a., Petitioner provides no evidence or arguments to infer that Orametrix discloses that its scanner comprises “a tip configured to be inserted into the oral cavity.” None of the citations to Orametrix teach or suggest the claimed limitation. EX1005, FIG. 44, 56:11-20, 31:11-19, and FIG. 27. Indeed, a review of Orametrix reveals that any discussion of “inserting”

any portion of such scanner “into [an] oral cavity” is wholly absent from the reference.

And, as discussed above §V.A.1.a., neither the Petitioner nor its expert explain with rational underpinnings as to why such a scanner housing would necessarily include a “tip configured to be inserted into the oral cavity.”

The Petitioner does not assert that Faul, Breton, or Durbin cures this deficiency of Orametrix. Accordingly, the combination of Orametrix, Faul, Breton, and Durbin does not teach or suggest all of the claimed limitations of independent Claim 1. For at least the same reasons, the combination of Orametrix, Faul, Breton, and Durbin does not teach or suggest all of the claimed limitations of Claim 16, which directly depends from Claim 1.

b. None of the asserted references disclose “a hardware processor configured to: selectively switch a color of the probe light, thereby illuminating the object with different colors at different times” [Claim 1g]

As discussed above in §V.A.1.b., Petitioner provides no evidence or arguments to infer that the processor of Orametrix or the microprocessor of Faul is “configured to selectively switch a color of the probe light, thereby illuminating the object with different colors at different times.” While Petitioner does reference “computation time” in connection with Breton (Pet., 27), Petitioner does not cite to any portion of Breton that expressly or implicitly discusses “a hardware processor

configured to: selectively switch a color of the probe light, thereby illuminating the object with different colors at different times.”

i. Orametrix does not disclose Claim 1g

Petitioner relies on the text at 14:13-17, 25:11-26:5, 64:6-15, 16:19-22, 69:15-70:10, and Figures 16 and 46 in Orametrix. None of these citations refers to “a hardware processor configured to selectively switch a color of the probe light, thereby illuminating the object with different colors at different times.” The citations discuss *processing data obtained* from the viewer/camera, *i.e.*, a process that occurs after the object has been illuminated. *See, e.g.*, Pet., 26 and EX1005, 14:13-17, 54:8-13, 64:6-15, and 69:15-70:10.

ii. Faul does not disclose Claim 1g

Petitioner relies on the text at 4:25-53, 6:60-67, 10:64-11:4, and 7:49-8:8 in Faul. While the citations discuss “dynamically alter[ing] the size, shape, color or intensity of the structured light,” none of these citations refers to “a hardware processor configured to selectively switch a color of the probe light, thereby illuminating the object with different colors at different times.”

A word search of the Faul specification reveals that the term “processor” is only associated with “an image processor” that can (1) “generate[] surface point data which characterize the locations of points on the intersection relative to the scanner position indicator,” (2) “discard all video information after determining the

2D numerical coordinates for one or more points in the image of the intersection,” (3) perform “computations” such as transformations, (4) make available and store “calibration data, identification data, and other descriptive information characterizing the scanner” as well as “details about the pattern of structure light **42**, the position indicator or indicators **20, 22, 24**, the number of sensors **16, 18**, the serial number, and so forth.” EX1004, 2:67, 3:5-8, 4:64-66, 5:12-15, 5:41-43, 5:65-6:2, 6:38-42, 7:21-24, 7:51-63, 7:64-8:8, and 12:28-32. None of these *storage and image processing* activities amounts to “selectively switch[ing] a color of the probe light, thereby illuminating the object with different colors at different times.”

While the Abstract of Faul vaguely references “a processor configured for projecting a pattern of structured light on the object,” no further details as to whether this processor is or can be “configured to selectively switch a color of the probe light, thereby illuminating the object with different colors at different times” are provided. EX1004, Abstract.

iii. Breton does not disclose Claim 1g

The Petitioner does not assert that Breton or Durbin cures this deficiency of Orametrix and Faul. Accordingly, the combination of Orametrix, Faul, Breton, and Durbin does not teach or suggest all of the claimed limitations of independent Claim 1. For at least the same reasons, the combination of Orametrix, Faul, Breton,

and Durbin does not teach or suggest all of the claimed limitations of Claim 16, which directly depends from Claim 1.

2. A POSITA would not have been motivated to modify Orametrix or Faul to incorporate the wavelength scanning method of Breton.

As discussed above in §V.A.2., there is no reason with rational underpinnings for incorporating the wavelength scanning method of Breton. Petitioner's reasons for modifying either of Orametrix or Faul with Breton and Durbin are undercut by Petitioner's mischaracterization of Breton.

Petitioner's stated reasons for why a POSITA would have been motivated to combine Orametrix, Faul, and Breton is because "[t]hese four references belong to the same technical field, provide similar scanning systems, and have the same purpose to increase objectivity and accuracy in three-dimensional modeling of real-world objects." Pet., 18.

a. Breton does not disclose three-dimensional data acquisition or modeling

As discussed above in §V.A.2.a., Breton does not disclose a "measuring system[] requiring the ... shape of scanned objects," let alone three-dimensional data acquisition and modeling. At best, Breton discusses two-dimensional mapping and measurement of tooth color for the purposes of ensuring the accurate color shade of replacement teeth. *See, e.g.*, EX1003, Title, Abstract, 1:7-18, 2:43-47, 2:50-52, 2:60-64, FIG. 3.

Both Orametrix and Faul disclose triangulation and other methodologies to obtain three-dimensional object data; Breton is silent on any three-dimensional data acquisition methodology. *See, e.g.*, EX1005, 9:11-13, 46:7-10, Claim 35 and EX1004, 1:61-2:15, Claim 5. Both Orametrix and Faul disclose methodologies to process the obtained data and construct three-dimensional representations of the scanned object; Breton is silent on this aspect also. *See, e.g.*, EX1005, 30:7-34:11, and EX1004, 13:28-16:6. As such, Breton does not have “the same purpose [as purportedly Orametrix, Faul, and Durbin] to increase objectivity and accuracy in three-dimensional modeling of real-world objects.”

b. Breton does not disclose a scanning system similar to those of Orametrix and Faul

As discussed above in §V.A.2.b., Breton also does not disclose a scanning system similar to those of Orametrix, Faul, or Durbin. Orametrix, Faul, and Durbin disclose “patterns” of illumination; Breton is silent on this aspect. *See, e.g.*, EX1005, FIG. 16, EX1004, Abstract, and EX1008, 2:64-3:2. In fact, Breton does disclose a “time-varying illumination pattern” as properly construed, *i.e.*, a light signal comprising an embedded spatial structure in the lateral plane, wherein the embedded spatial structure of the light signal varies in time. §IV.A. As such, Breton’s scanning system does not comprise many of the optical elements required to produce an “illumination pattern,” much less a “time-varying illumination pattern.”

For example, Orametrix makes use of “a projector projecting a SHAPE along a path 2540” in Figure 25 to project both measuring and encoding features. EX1005, FIG. 25 and 22:12-13. Likewise, Faul employs “a pattern [that] may be generated by rapidly sweeping a ray of light within a plane or through a more complex volumetric pattern.” EX1004, 4:30-33, 4:36-58. Similarly, Durbin discusses the use of “light-emitting diode[s] in conjunction with a plurality of slits.” EX1008, 2:63-3:2. At most, Breton employs the use square glass integrator rods, integrating spheres, optic fibers, and custom-made lenses. EX1003, 42-45, FIG. 2 (square glass integrator rods **20**, **20'**), 11:35-38, FIG. 4 (integrating sphere **152**), 11:40-41, 11:47-49. None of these light sources result in an “illumination pattern,” much less a “time-varying illumination pattern.” Thus, a POSITA would not have been motivated to combine Breton with Orametrix, Faul, or Durbin, because Breton does not share a scanning system similar to those of Orametrix or Faul.

As a result, the Petition fails to provide rational underpinnings for modifying either of Orametrix or Faul with Breton and Durbin.

3. Petitioner’s combination would not have provided a POSITA with a reasonable expectation of successfully arriving at the claimed invention.

Without citing any evidence, Petitioner and its expert conclusory state that “a POSITA would have had a reasonable expectation of success in combining the features and teachings of Orametrix, Faul, Durbin, and Breton, because these

optical systems all rely on similar scanning arrangements, and the substitution and combination of features would be simple and yield the expected results of more accurate and objective optical measurements to make three-dimensional models of real-world objects.” Pet., 18 and EX1012, ¶¶190, 194-195.

First, Petitioner is mistaken in characterizing Breton as having a similar scanning arrangement as those of Orametrix, Faul, and Durbin. *See* §B.2.b.

Second, the modifications the Petitioner offers is suggesting “combin[ing] the wavelength scanning of the monochromatic light source of Breton with time-varying pattern projection of Orametrix and Faul” and “a CMOS imager in the combination of Orametrix, Faul, and Breton.” Pet. 16, 57-60. However, the Petitioner does not explain *which components* of Breton’s monochromatic light source should be *combined* with the scanners of Orametrix or Faul. Which of the square glass integrator rods, integrating spheres, optic fibers, and/or the custom-made lenses of Breton is to be included in Petitioner’s combination? *See* §V.A.2.b. and EX1003, 42-45, FIG. 2, 11:35-38, FIG. 4, , 11:40-41, 11:47-49.

Likewise, neither Petitioner nor its expert describe *how* the monochromatic light source of Breton can be integrated into the scanners of Orametrix or Faul. As discussed above, Orametrix and Faul disclose the use of holograms, diffraction gratings, and optical projectors to generate illumination patterns. *See* §V.A.2.b., EX1005, FIG. 25, 22:12-13, and EX1004, 4:30-33, 4:36-58. How are the square

glass integrator rods, integrating spheres, optic fibers, and/or the custom-made lenses of Breton situated in connection with the holograms, diffraction gratings, and optical projectors used in the scanners of Orametrix and Faul? Neither the Petitioner nor its expert discuss any of these engineering details. Rather, Petitioner and its expert simply rely on “the knowledge, creativity and common sense of a POSITA and the nature of the problem to be solved.” EX1012, ¶195. No evidence, mere opinion.

Third, the Petitioner does not discuss *substitution* of any of the scanning elements of Orametrix or Faul with the scanning elements of Breton in any particularity. That is, neither Petitioner nor its expert discuss *which components* of the scanning systems of Orametrix or Faul should be removed in the proposed combination device.

Fourth, each of Faul and Breton requires certain system components without which the systems of Faul and Breton would be rendered inoperable. For example, Faul requires an external tracker to facilitate continuous “3D position (location and orientation) [determination] of the scanner position indicator, over time and with respect to the object.” EX1004, 3:11-14. Faul explains that this external tracker feature is essential to its “wireless three dimensional shape sensing and mensuration” system because “[t]o date, such non-contact scanners are tethered at least by an electronic cable, if not by further mechanical linkage.” *Id.*, 2:36-44.

None of the other cited references discuss an external tracker. Accordingly, neither the cited references nor the Petitioner and its expert discuss how to incorporate the external tracker into the proposed combination device.

Likewise, Breton requires a wavelength sweeper to “tak[e] images of the tooth 34 using different wavelength illuminations” so as to provide a “method for determining the appearance of an object to be replicated.” EX1003, Abstract, 6:58:61, 7:1-4, 7:39-45. None of the other cited references discuss a wavelength sweeper. Accordingly, neither the cited references nor the Petitioner and its expert discuss how to incorporate the wavelength sweeper into the proposed combination device.

Accordingly, the Petition fails to provide rational underpinnings for modifying either of Orametrix or Faul with Breton and Durbin so as to provide a POSITA with a reasonable expectation of success in combining the cited references to meet the limitations of the claimed invention.

C. The Petition Should be Denied Under §314(a)

Petitioner waited until August 18, 2023 to file this Petition, one day before the bar date arising from service of the Complaint in the Related Litigation. EX2006; *see also* EX2007. Petitioner’s only argument in response to the *Fintiv* issue is that it has made a stipulation pursuant to *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 (PTAB Dec. 1, 2020). Pet, 74. However,

Petitioner’s stipulation substantially differs from the language expressly provided in the Director’s Interim Procedure and *Sotera*. Petitioner states:

Petitioner hereby stipulates that, should the Petition be granted, Petitioner will not pursue in the district court the same grounds that are raised or could have reasonably been raised in this Petition pursuant to *Sotera*.... [Pet., 74.]

Unlike the Director’s Interim Procedure and *Sotera*, Petitioner’s stipulation does not include the “any grounds”/“any other ground” language. *See* Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation, June 21, 2022 at 3 (“the PTAB will not discretionarily deny institution in view of parallel district court litigation where a petitioner presents a stipulation not to pursue in a parallel proceeding the same grounds ***or any grounds*** that could have reasonably been raised before the PTAB.”); *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 (PTAB Dec. 1, 2020) (“The stipulation states that if the PTAB institutes inter partes review, Petitioner ‘will not pursue in [the District Court] the specific grounds [asserted in the inter partes review], ***or on any other ground*** . . . that was raised or could have been reasonably raised in an IPR....’”) (emphases added). Confusingly, Petitioner in its stipulation omits the “any grounds”/“any other ground” language but maintains the “could have reasonably been raised” language, resulting in the statement that Petitioner will not

pursue “the same grounds that ... could have reasonably been raised”. The Director’s Interim Procedure and *Sotera* decision are clear as to what is needed for a *Sotera* stipulation, and Petitioner’s stipulation falls short of this. Petitioner in the Related Litigation advances additional invalidity grounds under Sections 102 and 103 based on patents and printed publications beyond the grounds presented in the Petition, and Petitioner’s stipulation does not state that Petitioner will not pursue in a parallel proceeding the same grounds *or any grounds* that could have reasonably been raised before the PTAB. Given Petitioner’s equivocating stipulation, Petitioner might attempt to pursue grounds that would otherwise be foreclosed by a proper *Sotera* stipulation. This is precisely the type of judicial inefficiency that the PTAB seeks to avoid in *Fintiv* and *Sotera*. The Petition should be denied under Section 314(a).

VI. CONCLUSION

Petitioner fails to demonstrate that any of the challenged claims of the ’146 Patent are unpatentable. Thus, the Petition should be denied.

Respectfully submitted,

Date: January 2, 2024

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APPENDIX A - LIST OF EXHIBITS

Exhibit No.	Description
1001	U.S. Patent No. 11,076,146
1003	U.S. Patent No. 6,008,905 (“Breton”)
1004	U.S. Patent No. 7,336,375 (“Faul”)
1005	WIPO Publication No. 01/84479 A1 (“Orametrix”)
1008	U.S. Patent No. 7,494,338 (“Durbin”)
1012	Declaration of Dr. Rongguang Liang
2001	Office Action in U.S. Patent Application No. 16/217,943 dated February 7, 2019
2002	Interview Summary and Proposed Amendment filed in U.S. Patent Application No. 16/217,943 on March 12, 2019
2003	Notice of Allowance in U.S. Patent Application No. 16/217,943 dated March 20, 2019
2004	U.S. Patent Application Publication No. 2007/0041729 published on February 22, 2007 (“Heinz”)
2005	Joint Claim Construction Chart filed on December 2, 2022, 3Shape’s Opening Brief on Claim Construction filed on January 30, 2023, and 3Shape’s Responsive Brief on Claim Construction filed on February 16, 2023 in <i>3Shape A/S v. Carestream Dental, LLC et al.</i> , Civ. Action No. 22-cv-01829 (NDGA)
2006	Complaint filed on May 2, 2022 in <i>3Shape A/S v. Medit Corp.</i> , Civ. Action No. 22-cv-00443 (WDTX)
2007	Joint Notice of Unopposed Extension of Time for Defendant to Answer or Otherwise Respond to Plaintiff’s Complaint filed on September 8, 2022 in <i>3Shape A/S v. Medit Corp.</i> , Civ. Action No. 22-cv-00443 (WDTX)

2008	Commer <i>et al.</i> , “Construction and testing of a computer-based intraoral laser scanner for determining tooth positions,” 22 MEDICAL ENGINEERING & PHYSICS 625-635 (2000)
2009	Logozzo <i>et al.</i> , “Recent advances in dental optics – Part 1: 3D intraoral scanners for restorative dentistry,” 54 OPTICS AND LASERS IN ENGINEERING 203-221 (2014)

CERTIFICATE OF COMPLIANCE WITH 37 C.F.R. §42.24

I hereby certify that the word count for the foregoing Patent Owner's Preliminary Response totals 8,722 words, excluding the parts which are exempted by 37 C.F.R. §42.24(a).

Respectfully submitted,

Date: January 2, 2024

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CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing **PATENT OWNER'S PRELIMINARY RESPONSE and EXHIBITS 2001-2009** are being served on counsel for Petitioner by electronic mail this 2nd day of January, 2024 as follows:

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