

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

3SHAPE A/S AND 3SHAPE INC.,
Petitioner,

v.

ALIGN TECHNOLOGY, INC.,
Patent Owner.

IPR2021-01120
Patent 10,750,151 B2

Before HYUN J. JUNG, NEIL T. POWELL, and
JAMES J. MAYBERRY, *Administrative Patent Judges*.

POWELL, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. BACKGROUND

3Shape A/S and 3Shape Inc. (collectively, “Petitioner”) filed a Petition for *inter partes* review of claims 1, 4, 10, 11, 13, 18, 19, 25 and 30 of U.S. Patent No. 10,750,151 B2 (Ex. 1001, “the ’151 patent”). Paper 3 (“Pet.”). Align Technology, Inc. (“Patent Owner”) filed a Preliminary Response. Paper 10 (“Prelim. Resp.”).

An *inter partes* review may not be instituted “unless . . . the information presented in the petition . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a) (2018). Having considered the arguments and the associated evidence presented in the Petition and the Preliminary Response, we deny institution of *inter partes* review for the reasons provided below.

B. RELATED MATTERS

The Petition states that that “[t]he following judicial or administrative proceedings would affect, or be affected, by a decision in this proceeding”:

- *Align Technology, Inc. v. 3Shape A/S et al.*, 6:20-cv-00979-ADA (W.D. Tex.) (complaint filed October 19, 2020) (“WDTX Action”);
- *3Shape A/S et al. v. Align Technology, Inc.*, 1:20-cv-01492-LPS (DDE) (complaint filed November 2, 2020);
- *Align Technology, Inc. v. 3Shape A/S et al.*, 1:18-cv-01950-LPS (DDE) (complaint filed December 11, 2018);
- *Align Technology, Inc. v. 3Shape A/S et al.*, 1:17-cv-01649-LPS (DDE) (complaint filed November 14, 2017);
- ITC Investigation No. 337-TA-1144 (complaint filed December 10, 2018);
- ITC Investigation No. 337-TA-1091 (complaint filed November 14, 2017);

- IPR2019-00154 (US8363228), IPR2019-00155 (US8451456), and IPR2019-00156 (US8675207) (petitions filed November 10, 2018);
- IPR2019-00157 (US8363228), IPR2019-00159 (US8451456), IPR2019-00160 (US8675207), and IPR2019-00163 (US9101433) (petitions filed November 8, 2018);
- IPR2020-00173 (US8102538) and IPR2020-00174 (US8102538) (petitions filed December 9, 2019);
- SN 15/175,267 filed June 7, 2016 now U.S. Patent No. 10,924,720;
- SN 14/755,171 filed June 30, 2015 now U.S. Patent No. 9,404,740;
- SN 14/511,091 filed October 9, 2014 now U.S. Patent No. 9,101,433;
- SN 14/150,505 filed January 8, 2014 now U.S. Patent No. 8,885,175;
- SN 13/868,926 filed April 23, 2013 now U.S. Patent No. 8,675,207;
- SN 13/620,159 filed September 14, 2012 now U.S. Patent No. 8,451,456;
- SN 13/333,351 filed December 21, 2011 now U.S. Patent No. 8,363,228;
- SN 12/770,379 filed April 29, 2010 now U.S. Patent No. 8,102,538;
- SN 12/379,343 filed February 19, 2009 now U.S. Patent No. 7,724,378;
- SN 11/889,112 filed August 9, 2007 now U.S. Patent No. 7,511,829;
- SN 11/154,520 filed June 17, 2005 now U.S. Patent No. 7,319,529;
- U.S. Provisional Application No. 60/580,109 filed June 17, 2004; and
- U.S. Provisional Application No. 60/580,108 filed June 17, 2004.

Pet. 2–4.

C. THE '151 PATENT

1. *Overview of Disclosure*

The '151 patent discloses a method and device for determining the surface topology and associated color of a three-dimensional (3D) structure, such as a teeth segment. Ex. 1001, code (57), 2:66–3:5. The resulting data can be used for design and manufacture of a dental prosthesis, such as a crown, bridge, restoration, or filling. *Id.* at 3:5–10.

Regarding the method, the '151 patent explains that “[t]he determination of the 3D surface topology of a portion of a three-dimensional structure is preferably carried out using a confocal focusing method.” *Id.* at 3:13–16. The '151 patent then explains the steps of the confocal focusing method (*id.* at 3:17–35), adding that “any suitable method may be employed to obtain the 3D entity” (*id.* at 4:14–15). In addition, the '151 patent explains that “[a]ccording to the present invention, a two dimensional (2D) color image of the 3D structure that is being scanned is also obtained, but typically within a short time interval with respect to the 3D scan.” *Id.* at 4:16–19. After certain other processing, the method includes mapping the color values of the color 2D image onto the 3D scan. *Id.* at 4:48–51.

The '151 patent discloses one example of its device in connection with Figure 1, which is reproduced below:

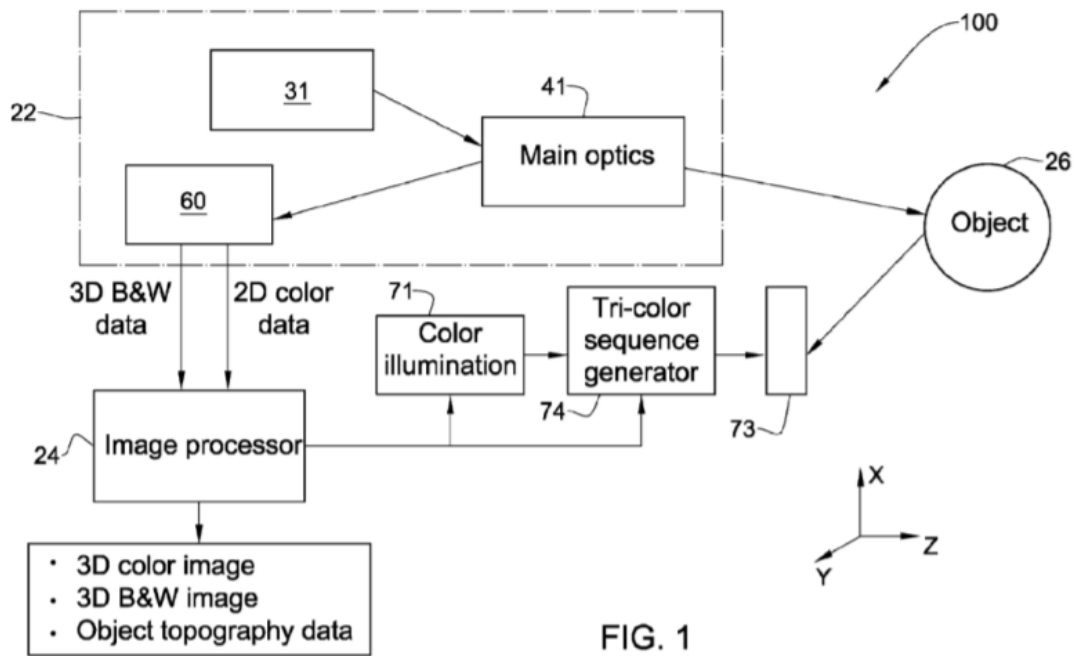


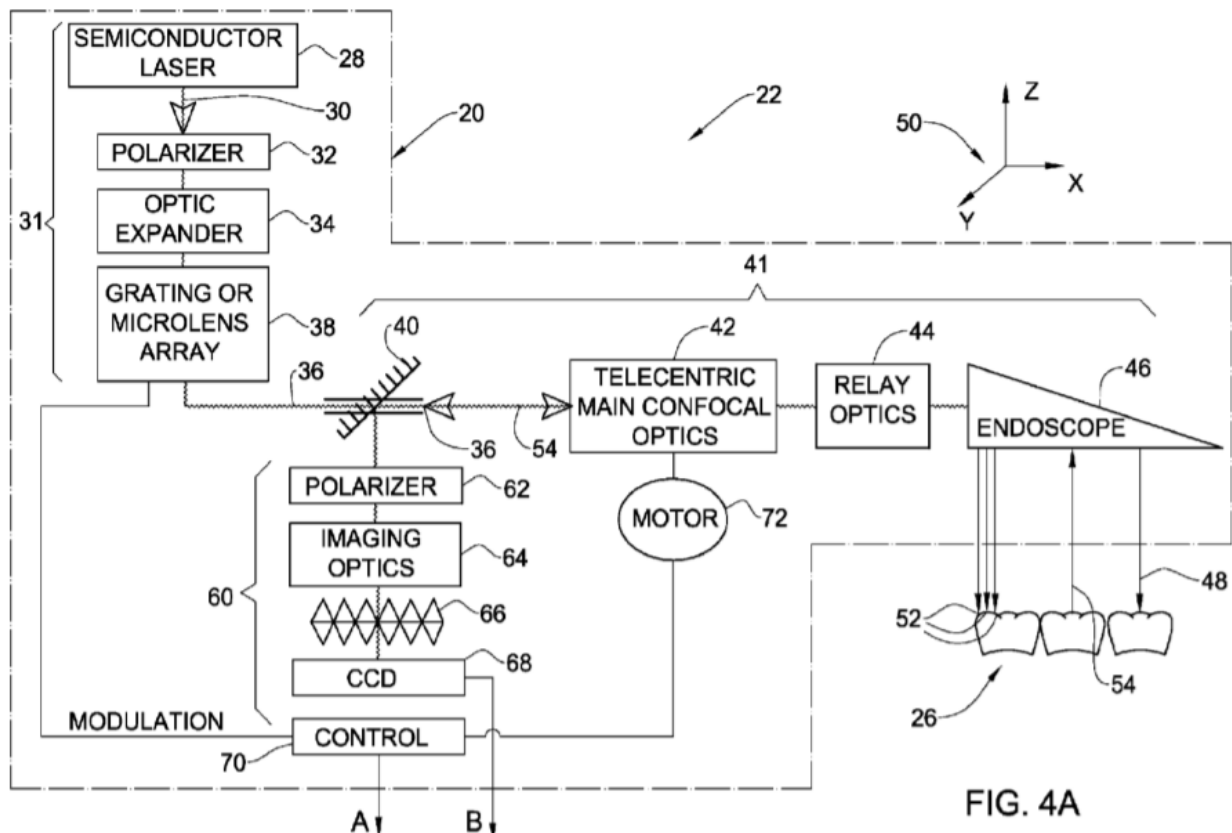
Figure 1 is a block diagram illustrating the relationship among various elements of the imaging device according to the '151 patent. *Id.* at 12:52–53, 13:31–35. As shown in Figure 1, device 100 includes optical device 22, which in turn includes main illumination source 31, main optics 41, and detection optics 60, which together provide a three-dimensional (“3D”) numerical entity comprising the surface coordinates of object 26. *Id.* at 13:36–51, Fig. 1. Device 100 also includes tri-color light sources 71, tri-color sequence generator 74, and delivery optics 73, which together illuminate object 26 with suitable colors, typically green, red and blue, allowing a two-dimensional (“2D”) color image of object 26 to be captured by detection optics 60. *Id.* at 13:52–57, 17:20–26. Device 100 further includes processor 24, which aligns the 2D color image with the 3D entity and maps color values to the 3D entity at aligned X-Y points. *Id.* at 13:64–67, 15:4–13, Fig. 1.

The '151 patent discloses that both the 3D entity and the 2D color entity are obtained “[a]most concurrently” using the same detection optics

60 at substantially the same relative spatial disposition between detection optics 60 and object 26. *Id.* at 14:10–15; *see also id.* at 4:19–22 (3D scan and 2D color image are taken “at substantially the same angle and orientation”).

The '151 patent explains that the optical information for creating both of these entities is obtained almost simultaneously so there is insufficient time for significant relative movement between the image plane of detection optics 60 and object 26 to occur between the two scans. *Id.* at 14:26–33; *see also id.* at 4:16–19 (3D scan and 2D color image are obtained “within a short time interval”).

Figures 4A and 4B of the '151 patent are reproduced below:



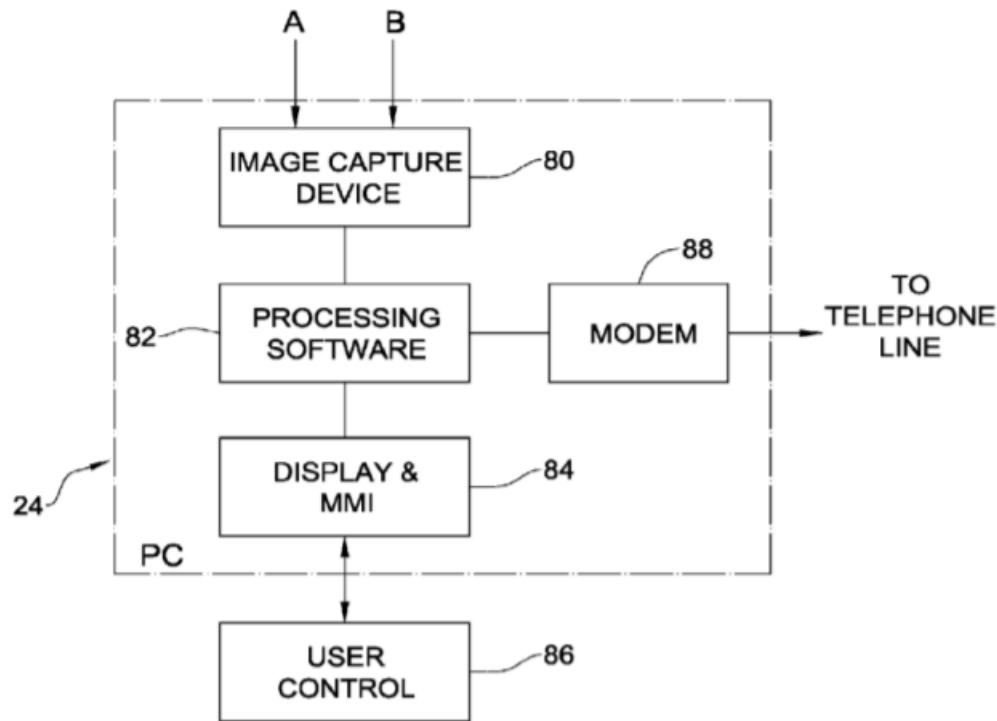


FIG. 4B

Figures 4A and 4B are block diagrams illustrating system 20 for confocal imaging of a 3D structure. *Id.* at 12:61–63, 15:16–18.

As shown in Figures 4A and 4B, system 20 comprises optical device 22 coupled to processor 24. *Id.* at 15:23–24. Optical device 22 comprises main illumination source 31, main optics 41, detection optics 60, control module 70, and motor 72. *Id.* at 15:14–16, 16:49–51, Fig. 4A. Main illumination source 31 includes semiconductor laser unit 28, polarizer 32, optic expander 34, and module 38, e.g., a grating or micro lens array. *Id.* at 15:24–32, Fig. 4A. Main optics 41 includes punctured mirror 40, confocal optics 42, relay optics 44, and endoscope 46. *Id.* at 15:37–38, 15:55–57, 16:23–28, Fig. 4A. Detection optics 60 comprises polarizer 62, imaging optic 64, array of pinholes 66, and charge coupled device (“CCD”) 68. *Id.* at 16:35–43, 17:16–20, Fig. 4A. Processor 24 includes image capturing module 80, a central processing unit (“CPU”) with processing software 82,

and display 84. *Id.* at 16:44–45, 16:64, 17:7–9, 17:31–32, Fig. 4B.

Processor 24 is connected to user control module 86, typically a computer keyboard. *Id.* at 17:7–11, Fig. 4B.

According to the '151 patent,

[t]he main optics 41, main illumination source 31, detection optics 60 and image processor 24 are . . . described with reference to [Figures] 4A and 4B which illustrate, by way of a block diagram an embodiment of a system 20 for confocal imaging of a three dimensional structure according to WO/008415 assigned to the present assignee, the contents of which are incorporated herein. Alternatively, any suitable confocal imaging arrangement may be used in the present invention.

Id. at 15:14–22.¹

The '151 patent explains that light from main illumination source 31 travels as light beam 30, incident light beams 36, and incident light beams 48 and impinges on teeth segment 26 as light spots 52 on the surface of the teeth. *Id.* at 15:24–34, 16:2–13, Fig. 4A. Light scattered from the light spots includes returned light beams 54 travelling in the opposite direction from incident light beams 36. *Id.* at 16:29–33. Returned light beams 54 are received by detection optics 60 where CCD 68 measures the light intensity at each pixel. *Id.* at 16:33–43. Light intensity data from CCD 68 is grabbed by image capturing module 80 and analyzed by CPU 82 to determine the relative intensity at each pixel over a range of focal planes of optics 42, 44. *Id.* at 16:44–48, 16:58–66. Before each light pulse from main illumination unit 31, the focal plane is changed by displacing optical element 42 along the Z-axis by the action of motor 72 under the control of module 70. *Id.* at

¹ Hereafter, we refer to WO/008415 as “Babayoff.”

16:49–58. The relative position of each light spot along the Z-axis is determined from the maximal light intensity or maximum displacement derivative of the light intensity for each pixel. *Id.* at 16:14–28, 16:64–17:5; *see also id.* at 3:13–4:13 (describing confocal focusing method). In this manner, data representative of the three-dimensional structure of the surface of the teeth segment is obtained and displayed on display 84. *Id.* at 17:5–8.

The '151 patent discloses multiple techniques for obtaining a 2D color image of object 26. *Id.* at 17:12–20, 25:37–41, 25:16–43. These techniques involve illuminating object 26 either sequentially with red, green, and blue light or with white light and using either a monochromatic CCD or a color CCD to capture the light reflected from the object. *Id.*; *see also id.* at 14:12–20 (describing method for obtaining 2D color image of object 26).

According to one technique, processing software 82 combines the red, green, and blue images to provide a 2D color image comprising an array of data points having location (X, Y) and color (C) information for each pixel of the 2D color image. *Id.* at 17:31–35. Similarly, the '151 patent discloses other examples that use colored light sources for generating a 2D color image. *Id.* at 17:36–58, 18:24–32, 19:21–27, 20:16–18, Fig. 9. Also, the '151 patent discloses examples using a white light source. For instance,

[a]ccording to a fourth technique for providing the color image, the main illumination source 31 of device 100 comprises suitable means for providing the three different colored illuminations. In one embodiment, the illumination source 31 comprises three different lasers, each one providing an illumination radiation at a different desired color, red green or blue. In another embodiment, a suitable white light illumination means is provided, coupled to a suitable rotating tri-color filter, similar to the filters described above, *mutatis mutandis*. In each case, suitable control means are provided, adapted to illuminate the object 26 with each colored radiation in turn, and the 2D colored

image is obtained in a similar fashion to that described above, mutatis mutandis. The object is also illuminated with one of the colored illuminations in order to provide the 3D surface topology data.

Id. at 25:26–43.

2. *Related Applications*

The '151 patent issued from application number 16/791,994 (“the '994 application”). Ex. 1001, code (21). The '994 is a continuation application that claims priority to a series of prior non-provisional continuation applications, including application number 15/175,267, application number 14/755,171, application number 14/511,091, application number 14/150,505, application number 13/868,926, application number 13/620,159, application number 13/333,351, application number 12/770,379, application number 12/379,343, application number 11/889,112, and application number 11/154,520 (collectively, the “Non-Provisional Ancestral Applications”). *Id.* at code (63). The '151 patent also claims priority to two provisional applications: provisional application number 60/580,109 and provisional application number 60/580,108 (collectively, the “Provisional Ancestral Applications”). We refer to the Non-Provisional Ancestral Applications and the Provisional Ancestral Applications, collectively, as the “Ancestral Applications.” We refer to the earliest Non-Provisional Ancestral Application, application no. 11/154,520, as “the '520 application.” The '520 application issued as U.S. Patent No. 7,319,529 (“Babayoff '529”).

Petitioner takes the position that, aside from claims, the '151 patent and Non-Provisional Ancestral Applications contain a nearly identical disclosure, which Petitioner refers to as the “Common Specification.” Pet.

20. Petitioner also takes the position that Provisional Ancestral Applications contain a nearly identical disclosure to the Common Specification. *Id.* at 23. With Patent Owner not disputing these positions, for purposes of this decision, we adopt Petitioner’s position that, aside from claims, the ’151 patent and the Ancestral Applications have materially identical disclosures. And, like Petitioner, we refer to those disclosures as the “Common Specification.” Consistent with this, the following discussion summarizes and cites to the content of both the ’151 patent and ’520 application, providing an overview of the Common Specification.

D. ILLUSTRATIVE CLAIM

Of the challenged claims, claims 1, 10, 18, and 25 are independent. Each of claims 4, 11, 13, 19, and 30 depends from one of independent claims 1, 10, 18, and 25. Claim 1 is illustrative and is reproduced below with certain reformatting:²

1. [Preamble] A method for determining surface topology and associated color of an intraoral structure, the method comprising:

[1.1] illuminating the intraoral structure using white light passing through focusing optics;

[1.2] capturing depth image data and color image data of the intraoral structure from the white light illuminating the intraoral structure using an image sensor of an imaging device,

[1.2a] wherein the capturing includes scanning a focal plane of the imaging device over a range of depths and wherein the returned lights beams from the intraoral structure pass through the focusing optics;

² We have labeled the claim limitations with the same labels used by the Petition to identify claim 1’s limitations.

- [1.3] generating, using the imaging device and the depth image data, depth data of the intraoral structure;
- [1.4] generating, using the imaging device and the color image data, color data for the intraoral structure; and
- [1.5] providing, using one or more processors, a color three-dimensional numerical entity based on the depth data and the color data.

Ex. 1001, 26:59–27:9.

E. ASSERTED GROUND OF UNPATENTABILITY

Petitioner challenges the patentability of claims 1, 4, 10, 11, 13, 18, 19, 25, and 30 of the '151 patent on the following ground (Pet. 7):

Claims Challenged	35 U.S.C. §	References
1, 4, 10, 11, 13, 18, 19, 25, 30	103	Babayoff '529 ³ , Atiya ⁴

In support of its unpatentability contentions, Petitioner also relies on the Declaration of David Schaafsma, Ph.D. Ex. 1002.

II. ANALYSIS

A. LEVEL OF ORDINARY SKILL IN THE ART

Petitioner contends that

[a] person of ordinary skill in the art (“POSITA”) as of the Effective Filing Date of the '151 Patent would have been a person having at least a bachelor's degree in electrical engineering, optical engineering, or physics (or equivalent course work) and two to three years of work experience in the areas of optical imaging systems and image processing. EX1002, ¶¶43-47. Alternatively, a POSITA could have a master's degree in electrical engineering or physics (or

³ U.S. Patent No. 7,319,529 B2, issued January 15, 2008 to Noam Babayoff (Ex. 1005).

⁴ Published U.S. Patent Application No. 2018/0192877 A1, published July 12, 2018 to Yossef Atiya et al. (Ex. 1006).

equivalent course work) with a focus in the area of optical imaging systems and image processing. *Id.* Additional education might compensate for less experience, and vice-versa. *Id.*

Pet. 15 (citing Ex. 1002 ¶¶ 43–47). Patent Owner does not comment explicitly on the level of ordinary skill in the art.

The level of ordinary skill in the art usually is evidenced by the references themselves. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995); *In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978). As Petitioner’s description of a person of ordinary skill is supported by expert testimony and appears consistent with the technology at issue, for purposes of this Decision, we apply Petitioner’s definition of a person of ordinary skill in the art.

B. CLAIM CONSTRUCTION

In an *inter partes* review proceeding, a claim of a patent is construed using the same standard used in federal district court, including construing the claim in accordance with the ordinary and customary meaning of the 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) (2020). According to the applicable standard, claim terms “are generally given their ordinary and customary meaning” as understood by a person of ordinary skill in the art in question at the time of the invention. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc) (citations omitted). “In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006)

(citing *Phillips*, 415 F.3d at 1312–17). Extrinsic evidence is “less significant than the intrinsic record in determining ‘the legally operative meaning of claim language.’” *Phillips*, 415 F.3d at 1317. Only those terms that are in controversy need be construed, and only to the extent necessary to resolve the controversy. See *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (citing *Vivid Techs., Inc. v. America Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

In the section of the Petition devoted to claim construction, Petitioner states “[f]or purposes of the arguments presented in this Petition, Petitioner does not believe any express claim constructions are necessary.” Pet. 16. In the next section, the Petition states that “independent claims 1, 10, 18, and 25 require capturing depth data of an intraoral structure from white light illuminating the intraoral structure.” *Id.* at 18. Petitioner bases this position on limitations 1.2, 10.2, 18.1d, and 25.1d. *Id.* at 16–17.

A later section of the Petition notes that dependent claims 5, 14, 20, and 26 narrow the scope of independent claims 1, 10, 18, and 25 by reciting the use of colored filters. Based on this, the Petition argues that

dependent claims 5 and 14, which depend from claims 1 and 10, respectively, each recite that “illuminating the intraoral structure using the white light passing through the focusing optics further comprises **passing the white light through a plurality of color filters**.” EX1001, 27:23-26, 28:6-9 (emphasis added); EX1002, ¶97. Accordingly claims 1 and 10 must be broader in scope and employ unfiltered white light. EX1002, ¶97. Similarly, claims 20 and 26, which depend from claims 18 and 25, respectively, recite that the system further includes “a plurality of color filters [positioned] between the white light [source/illuminator] and the intraoral structure.” EX1001, 28:40-42, 29:12-14; EX1002, ¶¶102-103. Accordingly, claims 18 and 25 must employ unfiltered white light. EX1002, ¶¶102-103.

Id. at 22–23.

In response, Patent Owner objects that “Petitioners’ interpretation of the claims as requiring the use of unfiltered white light to determine depth data is plainly at odds with the claims themselves.” Prelim. Resp. 4. Patent Owner argues that “[t]his interpretation leads to a contradiction between the independent and dependent claims: the same light illuminating the intraoral structure would have to be simultaneously filtered (as recited in the dependent claims) and unfiltered (as Petitioners presume to be required by the independent claims).” *Id.* Patent Owner also suggests the possibility that the Petition’s arguments mean “the independent claims *encompass* using unfiltered white light to obtain depth data.” *Id.* at 7.

We do understand the Petition’s arguments to mean that the independent claims encompass using unfiltered white light to illuminate an intraoral structure, not that the independent claims require using white light to illuminate an intraoral structure. And we agree with that understanding of the independent claims’ scope. Consistent with Patent Owner’s explanation, if we construed the independent claims to require using unfiltered white light to illuminate an intraoral structure, that would conflict directly with the dependent claims’ express requirement to use colored filters.

C. ALLEGED OBVIOUSNESS OVER BABAYOFF ’529 AND ATIYA

Petitioner argues that the challenged claims “are obvious based on Babayoff ’529 in view of Atiya.” Pet. 26. Petitioner contends that Babayoff ’529 and Atiya are prior art because they predate the February 14, 2020 filing date of the ’994 application. *Id.* at 1, 5–6. Petitioner argues that “the Challenged Claims are not entitled to a priority date earlier than February 14, 2020.” *Id.* at 24. Petitioner asserts that the challenged claims “lack

written description support in the '994 Application and the [Ancestral Applications].” *Id.* at 1.

Patent Owner argues that Petitioner does not meet its burden of demonstrating that Babayoff '529 is prior art. Prelim. Resp. 10. In support of this, Patent Owner disputes Petitioner’s assertion that the Ancestral Applications do not provide written description support for the challenged claims. *Id.* at 10–32.

The assertion that Babayoff '529 and Atiya are prior art to the '151 patent is critical to Petitioner’s challenge. *See* 35 U.S.C. § 312 (“A petitioner in an inter partes review may request to cancel as unpatentable 1 or more claims . . . only on the basis of *prior art* consisting of patents or printed publications.” (emphasis added)). And the issue of whether the Ancestral Applications provide written description support for the challenged claims is pivotal to the assertion that Babayoff '529 and Atiya are prior art. Accordingly, we now turn to a detailed discussion of that issue.

1. *The Dispute Regarding Written Description in the Ancestral Applications*

Asserting that “[t]he fact-finder must determine whether the earlier disclosure conveyed that the inventor had possession of full scope of the later-claimed subject matter,” Petitioner argues that “[t]he Common Specification does not provide any written description support for capturing ‘depth image data’ from white light illuminating an intraoral structure, as required by the Challenged Claims.” Pet. 19 (citing *Wang Labs., Inc. v. Toshiba Corp.*, 993 F.2d 858, 865 (Fed. Cir. 1993)); *id.* at 22. Petitioner contends that

the Common Specification teaches that the main illumination source 31 is coupled to the main optics 41 and used to obtain the

depth data. EX1002, ¶¶92-94. For all but one embodiment in the Common Specification, the main illumination source for depth data is a monochromatic laser that illuminates the intraoral structure with a narrowband colored illumination (*e.g.*, red, blue, green laser, or a combination thereof).

Id. at 21.

Petitioner adds that “[t]he Common Specification discloses only a single embodiment in which white light is employed as the main illumination source, but that white light is passed through a color filter prior to illuminating any intraoral structure, to provide three different ‘colored illuminations.’” *Id.* Citing the recitations in dependent claims 5, 14, 20, and 26 of colored filters, Petitioner argues that the independent claims “employ unfiltered white light.” *Id.* at 23.

Additionally, Petitioner argues that neither the claims of the Ancestral Non-Provisionals nor the Ancestral Provisionals provide the allegedly missing written description support. *Id.* at 23–24. According to Petitioner the claims in the Ancestral Non-Provisionals did not include “the requirement of capturing depth image data from white light illuminating an intraoral structure.” *Id.* at 23. And Petitioner asserts that the Ancestral Provisionals “do not expressly or implicitly disclose capturing ‘depth image data’ from white light illuminating an intraoral structure.” *Id.*

Patent Owner alleges a number of flaws in Petitioner’s arguments. Patent Owner argues that Petitioner applies an erroneous test for written description. Prelim. Rep. 10–15. Additionally, Patent Owner argues that Petitioner does not acknowledge many of the Ancestral Applications’ pertinent disclosures. *Id.* at 16–28. Patent Owner also argues that Petitioner

presents an obviousness case that contradicts its priority challenge. *Id.* at 29–32.

Regarding the law, Patent Owner argues Petitioner misunderstands the authority it cites, as well as applicable aspects of the written description test. *Id.* at 10–15. Patent Owner contends that

[a]t most, Petitioners’ criticism of the independent claims is that they are not limited to a single embodiment. Specifically, whereas certain dependent claims recite a plurality of colored filters, the independent claims do not expressly limit this limitation.

Id. at 11. Patent Owner suggests Petitioner bases this position on a misinterpretation of *Wang*. *Id.* at 11–12. Patent Owner argues that, contrary to Petitioner’s assertion, *Wang* does not say the “fact-finder must determine whether the earlier disclosure conveyed that the inventor had possession of full scope of the later-claimed subject matter.” *Id.* at 12. Patent Owner asserts that the written description test does not require disclosing every embodiment within the scope of the claims, particularly in the predictable arts. *Id.* at 12–13 (citing *Falkner v. Inglis*, 448 F.3d 1357, 1366 (Fed. Cir. 2006)); *PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1306 (Fed. Cir. 2008); *Hologic, Inc. v. Smith & Nephew, Inc.*, 884 F.3d 1357, 1361–63 (Fed. Cir. 2018)). Patent Owner also argues that “[b]roadening a claim beyond a particular embodiment by omitting a limitation is generally acceptable, unless a POSA would understand the omitted limitation to be ‘not only important, but essential’ to the invention.” *Id.* at 13 (citing *Gentry Gallery, Inc. v. Berkline Corp.*, 134 F.3d 1473, 1479 (Fed. Cir. 1998)).

Turning to the facts of this proceeding, Patent Owner argues that Petitioner overlooks pertinent disclosure from the Ancestral Applications that provides the allegedly missing written description support. Patent

Owner argues that “the parent applications include broad language describing the use of focused, illuminated spots to derive depth data, without any limitation as to the color of light used.” Prelim. Resp. 16–17. Patent Owner also argues that a number of specific embodiments provide written description support for the challenged claims. *Id.* at 18. For instance, Patent Owner argues “[o]ne example acknowledged by the petition (the ‘fourth technique’) includes colored filters located between the intraoral structure and a white light illuminator, which is used to obtain both depth and color data.” *Id.* Citing this embodiment and embodiments that omit colored filters, Patent Owner argues that “far from demonstrating that pre-illumination filtering was essential, the specification as a whole indicates that such an arrangement was optional.” *Id.* at 21. Patent Owner also argues Petitioner does not address the Ancestral Applications’ incorporation of Babayoff’s disclosure, which describes using light composed of multiple wavelengths for obtaining depth data. *Id.* at 25–27. Additionally, Patent Owner argues that certain claims of the Ancestral Applications conflict with Petitioner’s arguments. *Id.* at 27–29.

Patent Owner further argues that Petitioner’s obviousness arguments undercut its priority arguments. *Id.* at 29–32. Patent Owner notes that Petitioner alleges that Atiya discloses using white light to obtain depth data. *Id.* at 29–30. With respect to using white light to obtain depth data, Patent Owner argues that Atiya “provides no materially greater detail” than the Ancestral Applications. *Id.*

Weighing the parties’ arguments and evidence, Patent Owner’s arguments and evidence persuasively rebut Petitioner’s argument that the Ancestral Applications do not provide written description support for the

challenged claims. *See* Pet. 19. As explained above in Section II.B, using unfiltered white light to illuminate an intraoral structure for capturing depth data is not a *limitation* of the challenged claims. Rather, the challenged claims *encompass, without requiring*, using unfiltered white light to illuminate an intraoral structure for capturing depth. Accordingly, the Ancestral Applications can provide written description support for the challenged claims without specifically disclosing an embodiment illuminating an intraoral structure with white light for obtaining depth data. To satisfy the written description requirement, “all *limitations* must appear in the specification.” *PowerOasis*, 522 F.3d at 1306 (emphasis added). But written description is not lacking “simply because the embodiments of the specification do not contain examples explicitly covering the full scope of the claim language.” *Falkner*, 448 F.3d at 1366 (Fed. Cir. 2006) (quoting *LizardTech, Inc. v. Earth Resource Mapping, Inc.*, 424 F.3d 1336, 1345 (Fed. Cir. 2005)).

Moreover, Patent Owner’s arguments and evidence persuasively rebut Petitioner’s suggestion that the Ancestral Applications do not demonstrate possession of the full scope of the challenged claims. *See* Pet. 8 (“The fact-finder must determine whether the earlier disclosure conveyed that the inventor had possession of full scope of the later-claimed subject matter.” (citing *Wang Labs., Inc. v. Toshiba Corp.*, 993 F.2d 858, 865 (Fed. Cir. 1993))).⁵ As Patent Owner notes, Petitioner overlooks multiple of the

⁵ As noted above, Patent Owner argues that *Wang* does not support Petitioner’s argument that written description requires “the inventor had possession of full scope of the later-claimed subject matter.” Prelim. Resp. 12. Because Patent Owner’s arguments and evidence persuasively rebut Petitioner’s suggestion that the Ancestral Applications do not demonstrate

Common Specification's relevant disclosures regarding confocal methods, which involve using light to gather data related to depth and shape. Prelim Resp. 16–29. For example, Petitioner does not address the Common Specification's disclosure that

[t]he determination of the 3D surface topology of a portion of a three-dimensional structure is preferably carried out using a confocal focusing method, comprising:

(a) providing an array of incident light beams propagating in an optical path leading through a focusing optics and a probing face; the focusing optics defining one or more focal planes forward said probing face in a position changeable by said optics, each light beam having its focus on one of said one or more focal plane; the beams generating a plurality of illuminated spots on the structure;

(b) detecting intensity of returned light beams propagating from each of these spots along an optical path opposite to that of the incident light;

(c) repeating steps (a) and (b) a plurality of times, each time changing position of the focal plane relative to the structure; and

(d) for each of the illuminated spots, determining a spot-specific position, being the position of the respective focal plane, yielding a maximum measured intensity of a respective returned light beam; and

based on the determined spot-specific positions, generating data representative of the topology of said portion.

Ex. 1036, 200; Ex. 1001, 3:14–35. This passage describes performing the confocal method with any “incident light beams” and any “returned light beams,” which would include unfiltered white light beams. Thus, the

possession of the full scope of the challenged claims, the dispute regarding the correct interpretation of *Wang* is moot.

passage conflicts with Petitioner's suggestion that the Common Specification describes gathering depth data using only certain types of light.

Petitioner also fails to discuss any details of the Babayoff disclosure incorporated into the Common Specification, despite recognizing that “the confocal imaging technique described in the ’151 Patent relies specifically on the technique described in [Babayoff].” Pet. 8. Babayoff provides additional written description that conflicts with Petitioner's position. For example, Babayoff describes a method that uses “an array of incident light beams” and “returned light beams” for determining surface topology. Ex. 1007, 3:3–22. Babayoff also describes an apparatus for determining surface topology using, among other things, “an illumination unit for providing an array of incident light beams” and “sensing elements for measuring intensity of each of a plurality of light beams.” *Id.* 3:23–4:14. These disclosures further evince possession of techniques that use any light beams for obtaining depth data to determine object shape.

Although Petitioner cites portions of the Common Specification that disclose determining depth data by illuminating an object with monochromatic or filtered white light (Pet. 20–23), Patent Owner's arguments and evidence persuade us that the written description is not limited to these examples. In addition to citing disclosures that broadly describe techniques using any light, Patent Owner cites disclosure of specifically using light other than monochromatic or filtered white light to illuminate the object and obtain depth data. Prelim. Resp. 24–29. For example, Patent Owner cites Babayoff's discussion of Figure 4, which is reproduced below.

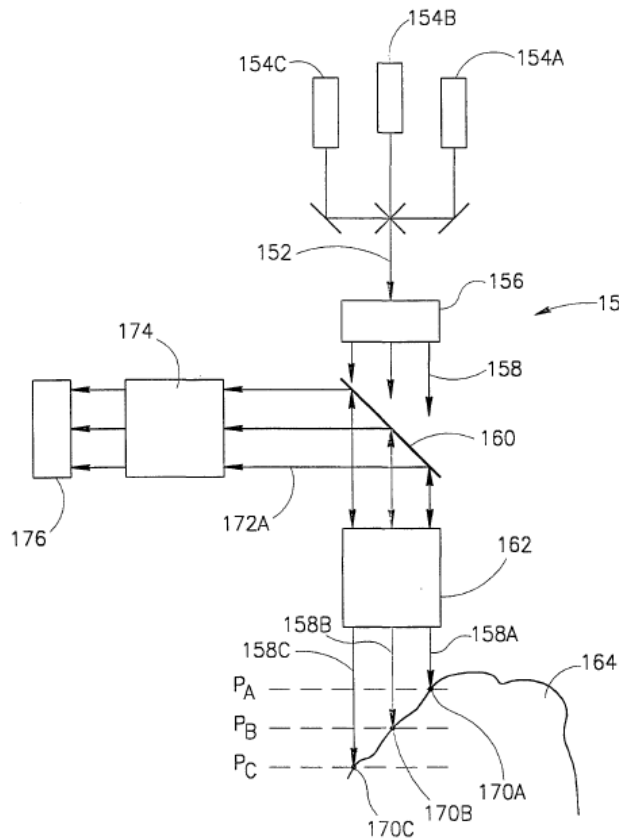


FIG.4

Figure 4 shows “an embodiment where the parent light beam, and thus each of the incident light beams, is composed of several light components, each originating from a different light emitter.” Ex. 1007, 8:5–7. Babayoff further explains that

[i]n this apparatus a parent light beam 152 is a combination of light emitted by a number of laser light emitters 154A, 154B and 154C. Optic expander unit 156 then expands the single parent beam into an array of incident light beams 158. Incident light beams pass through unidirectional mirror 160, then through optic unit 162 towards object 164.

The different light components composing parent beam 152 may for example be different wavelengths, a different one transmitted from each of laser emitters 154A-C. Thus, parent light beam 152 and each of incident light beams 158 will be composed of three different light components. The image of the optics, or an optical arrangement associated with each of light

emitters may be arranged such that each light component focuses on a different plane, P_A , P_B and P_C , respectively. Thus in the position shown in Fig. 3, incident light beam 158A bounces on the surface at spot 170A which in the specific optical arrangement of optics 162 is in the focal point for light component A (emitted by light emitter 154A). Thus, the returned light beam 172A, passing through detection optics 174 yield maximum measured intensity of light component A measured by two-dimensional array of spectrophotometers 176, e.g. a 3 CHIP CCD camera. Similarly, different maximal intensity will be reached for spots 170B and 170C for light components B and C, respectively.

Id. at 13:25–14:17. Patent Owner argues that this describes using incident light beams that are each formed of three different light components of different wavelengths. Prelim. Resp. 26. Despite recognizing that the Common Specification relies on the confocal imaging methods of Babayoff (Pet. 8), the Petition does not discuss Babayoff's Figure 4 disclosure.

Weighing the parties' arguments and evidence on this point, Patent Owner persuades us that Babayoff's discussion of Figure 4 discloses obtaining depth data by illuminating an object with light beams composed of multiple wavelengths of light. This also evinces that the Ancestral Applications provide broad written description support that is not limited to the specific examples the Petition cites and discusses. Indeed, further demonstrating that the written description support of the Ancestral Applications is not limited to the examples Petitioner cites, Patent Owner cites the Common Specification's disclosure that

[w]hile the present invention has been described in the context of a particular embodiment of an optical scanner that uses confocal focusing techniques for obtaining the 3D entity, the device may comprise any other confocal focusing arrangement, for example as described in WO 00/08415. In fact, any suitable means for providing 3D scanning can be used so long as the 3D

scan and the color 2D scan correspond substantially to the same object or portion thereof being scanned, and the same frames of references are maintained.

Ex. 1036, 240; Ex. 1001, 26:4–13; Prelim. Resp. 6–7, 21.

If Petitioner presented persuasive evidence that the Common Specification described it as essential or critical for the confocal imaging technique to use only a certain kind or certain kinds of light, that would support Petitioner's position that the Ancestral Applications do not provide written description support for the challenged claims. *See Gentry Gallery, Inc. v. Berkline Corp.*, 134 F.3d 1473, 1480 (Fed. Cir. 1998). Petitioner does not present such evidence. Petitioner cites the last sentence of the following passage from the Common Specification:

Many methods have been developed for obtaining the three dimensional location of surface points of an object, for a host of applications including, inter alia, the intraoral cavity. Techniques for direct non-contact optical measurement, in particular for direct optical measurement of teeth and the subsequent automatic manufacture of dentures, are known. The term "direct optical measurement" signifies surveying of teeth in the oral cavity of a patient. This facilitates the obtainment of digital constructional data necessary for the computer-assisted design (CAD) or computer-assisted manufacture (CAM) of tooth replacements without having to make any cast impressions of the teeth. Such systems typically include an optical probe coupled to an optical pick-up or receiver such as charge coupled device (CCD) and a processor implementing a suitable image processing technique to design and fabricate virtually the desired product. Such methods include, for example, confocal imaging techniques as described in [Babayoff] assigned to the present assignee. These methods provide a digital three-dimensional surface model that is inherently monochromatic, i.e., no color information is obtained in the imaging process.

Ex. 1036, 197; Ex. 1001, 1:50–2:4. Based on this, Petitioner asserts that “[t]he ’151 Patent acknowledged that known methods for obtaining the 3D location of surface points of an object were inherently monochromatic, *i.e.*, no color information is obtained in the imaging process.” Pet. 12.

The cited passage is not persuasive evidence that the Common Specification described it as essential or critical for a confocal imaging process to use any particular type of light. The passage explains that exemplary confocal processes do not capture color information, such that the three-dimensional model produced by the exemplary processes is monochromatic. It does not say that exemplary confocal processes must use monochromatic light. To the contrary, the passage discloses that exemplary confocal processes are disclosed in Babayoff, which describes using light composed of multiple wavelengths, not just monochromatic light.

2. *Summary Regarding Obviousness Challenge*

Because Patent Owner’s arguments and evidence persuasively rebut Petitioner’s assertion that the Ancestral Applications do not provide written description support for the challenged claims, Petitioner has not shown adequately that Babayoff ’529 is prior art to the challenged claims. Accordingly, Petitioner has not demonstrated a reasonable likelihood of prevailing on its assertion that claims 1, 4, 10, 11, 13, 18, 19, 25, and 30 would have been obvious over Babayoff ’529 and Atiya.

III. CONCLUSION

For the foregoing reasons, we determine that the information presented in the record does not establish there is a reasonable likelihood that Petitioner would prevail with respect to at least one challenged claim of

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the patent '151 patent. Accordingly, we do not institute an *inter partes* review.

IV. ORDER

For the reasons given, it is:

ORDERED that the Petition is denied; and

FURTHER ORDERED that no *inter partes* review is instituted.

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