

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SIENNA BIOPHARMACEUTICALS, INC.,
Petitioner,

v.

WILLIAM MARSH RICE UNIVERSITY,
Patent Owner.

Case IPR2017-00046
Patent 6,685,730 B2

Before GEORGIANNA W. BRADEN, ZHENYU YANG, and
AMANDA F. WIEKER, *Administrative Patent Judges*.

BRADEN, *Administrative Patent Judge*.

FINAL WRITTEN DECISION

35 U.S.C. § 318 and 37 C.F.R. § 42.73

I. INTRODUCTION

We have jurisdiction to hear this *inter partes* review under 35 U.S.C. § 6, and this Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we determine that Petitioner has shown by a preponderance of the evidence that claims 57–59 (“the challenged claims”) of U.S. Patent No. 6,685,730 (Ex. 1001, “the ’730 patent”) are unpatentable.

A. Procedural History

Sienna Biopharmaceuticals, Inc. (“Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting an *inter partes* review of the challenged claims of the ’730 patent. William Marsh Rice University (“Patent Owner”) timely filed a Preliminary Response (Paper 6, “Prelim. Resp.”).

Pursuant to 35 U.S.C. § 314(a), we instituted an *inter partes* review of (1) claims 57–59 as unpatentable under 35 U.S.C. § 102(b)¹ in view of Tankovich III²; (2) claims 58 and 59 as unpatentable under 35 U.S.C. § 102(e) in view of Anderson I³; (3) claim 59 as unpatentable under 35 U.S.C. § 102(b) in view of Tankovich II⁴; (4) claims 58 and 59 as

¹ The Leahy-Smith America Invents Act (“AIA”) included revisions to 35 U.S.C. § 100 *et seq.* effective on March 16, 2013. The ’730 patent issued from an application filed before March 16, 2013; therefore, we apply the pre-AIA versions of the statutory bases for unpatentability.

² US Patent No. 6,050,990, filed Dec. 4, 1997, issued Apr. 18, 2000 (Ex. 1006, “Tankovich III”).

³ U.S. Patent No. 6,183,773, filed Jan. 4, 1999, issued Feb. 6, 2001 (Ex. 1002, “Anderson I”).

⁴ U.S. Patent No. 5,817,089, filed Jun. 12, 1995, issued Oct. 6, 1998 (Ex. 1005, “Tankovich II”).

unpatentable under 35 U.S.C. § 103(a) in view of Tankovich I and Anderson I; (5) claims 58 and 59 as unpatentable under 35 U.S.C. § 103(a) in view of Tankovich II and Anderson I; and (6) claim 57 as unpatentable under 35 U.S.C. § 103(a) in view of Tankovich III and Anderson II⁵. See Paper 8 (“Dec. to Inst.”), 36.

After institution of trial, Patent Owner filed a Patent Owner Response (Paper 25, “PO Resp.”), to which Petitioner filed a Reply (Paper 29, “Reply”). Patent Owner also filed Objections to Evidence (Papers 12, 30) and a Motion to Exclude Evidence (Paper 38). Petitioner opposed the Motion to Exclude (Paper 43) and Patent Owner submitted a Reply in support of its Motion to Exclude (Paper 45). In addition, and with our authorization, Patent Owner filed a list of alleged improper reply arguments (Paper 32) to which Petitioner filed a Response (Paper 33).

Petitioner also filed Objections to Evidence (Paper 26) and a Motion to Exclude Evidence (Paper 40). Patent Owner opposed the Motion to Exclude (Paper 44) and Petitioner submitted a Reply in support of its Motion to Exclude (Paper 46).

An oral argument was held on December 18, 2017, together with co-pending Case IPR2017-00045.⁶ A transcript of the oral argument is included in the record. Paper 51 (“Tr.”).

⁵ U.S. Patent No. 5,810,801, filed Feb. 5, 1997, issued Sept. 22, 1998 (Ex. 1003, “Anderson II”).

⁶ The parties each filed objections to demonstrative exhibits. Papers 48, 49. In this Final Written Decision, we rely directly on the arguments presented properly in the parties’ briefs and the evidence of record. The demonstrative exhibits were not considered, therefore, the objections are overruled.

B. Related Proceedings

Petitioner informed us that at the time the Petition was filed, it was unaware of any related matters that would affect or be affected by this proceeding. Pet. 3; *see also* Paper 4, 2 (Patent Owner's Mandatory Notice). Subsequently, Patent Owner informed us of co-pending *Ex Parte* Reexamination of the '730 patent with Control No. 90/013,883. *See* Paper 7, 2 (Patent Owner's Updated Mandatory Notice). We stayed the *Ex Parte* Reexamination pending the outcome of this Final Written Decision. Paper 10.

C. The '730 Patent

The application that led to the '730 patent was filed on September 25, 2002, and is titled "Optically-Absorbing Nanoparticles for Enhanced Tissue Repair." Ex. 1001, Title. It is directed to methods for localized delivery of heat and repair of tissue using nanoparticles. *Id.* at Abstract. According to the '730 patent, "[t]he method involves localized induction of hyperthermia in tissue or materials by delivering nanoparticles to the tissue or materials and exposing the nanoparticles to an excitation source under conditions wherein they emit heat." *Id.* The '730 patent discloses that "[s]uch repair envisions the joining of tissue with other tissue or tissue with non-tissue material. The technique involves the use of nanoparticles which effect a localized heating when exposed to an excitation source which is typically light and more typically laser light, the localized heating effects tissue repair." *Id.* at 6:28–33.

The '730 patent states that "'nanoparticle' is defined as a particle having dimensions of from 1 to 5000 nanometers," and specifies that "'nanoparticle' means one or more nanoparticles." *Id.* at 5:62–64, 6:6–7. It

further states, “[a]s used herein ‘delivering’ nanoparticles to a location is defined as effecting the placement of the nanoparticles attached to, next to, or sufficiently close to the location such that any heat generated by the nanoparticles is transferred to the location.” *Id.* at 5:54–58.

D. Reviewed Claims

As noted above, an *inter partes* review was instituted as to independent claims 57–59, which are reproduced below:

57. A method for reducing wrinkles in tissue comprising the steps of: delivering nanoparticles that absorb light at one or more wavelengths to the tissue; and exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles.

58. A method for resurfacing tissue comprising the steps of: delivering nanoparticles that absorb light at one or more wavelengths to the tissue; and exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles.

59. A method of ablating tissue comprising the steps of: delivering nanoparticles that absorb light at one or more wavelengths to the tissue; and, exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles.

Ex. 1001, 20:17–35.

II. DISCUSSION

A. Claim Construction

In an *inter partes* review, claim terms in an unexpired patent are interpreted according to their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *see Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (“We

conclude that the regulation represents a reasonable exercise of the rulemaking authority that Congress delegated to the Patent Office.”). Under that standard, and absent any special definitions, we give claim terms their ordinary and customary meaning, as would be understood by one of ordinary skill in the art at the time of the invention. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). An inventor, however, may provide a meaning for a term that is different from its ordinary meaning by defining the term in the specification with “reasonable clarity, deliberateness, and precision.” *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). Limitations, however, are not to be read from the specification into the claims. *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993). In addition, the Board may not “construe claims during [an *inter partes* review] so broadly that its constructions are unreasonable under general claim construction principles.” *Microsoft Corp. v. Proxyconn, Inc.*, 789 F.3d 1292, 1298 (Fed. Cir. 2015), *overruled on other grounds by Aqua Prods., Inc. v. Matal*, 872 F.3d 1290 (Fed. Cir. 2017).

The parties dispute the proper construction of the term “nanoparticles,” and whether the preamble phrases “of ablating tissue,” “for resurfacing tissue,” and “for wrinkle removal” should be construed and given patentable weight.

1. Nanoparticles

The challenged claims of the ’730 patent recite the term “nanoparticles.” Independent claims 57–59 each recite “delivering nanoparticles” and “exposing said nanoparticles to light.” Ex. 1001, 20:17–35.

Petitioner contends that the broadest reasonable interpretation of the claim term “nanoparticles” is “particles of any size, shape or morphology having dimensions of from 1 to 1000 nanometers” because (1) that is its plain and ordinary meaning and (2) this is consistent with the definition provided in the ’730 patent. Pet. 9–10 (citing Ex. 1001, 5:62–67 (defining term as a “particle having dimensions of from 1 to 5000 nanometers, having any size, shape or morphology”); Ex. 1007 ¶ 44).

Patent Owner contests Petitioner’s proposed construction as overly broad and encompassing non-plasmonic nanoparticles. PO Resp. 13–14. According to Patent Owner, the term “nanoparticles” is limited to only “plasmonic nanoparticles.” *Id.* at 2, 14. Patent Owner cites to the claims and to the written description to support its position. *Id.* at 14–16.

Patent Owner specifically contends that Petitioner’s proposed construction is too broad and ignores the ’730 patent specification. PO Resp. 14 (citing Ex. 2004 ¶¶ 51–54). Patent Owner argues that although “the ’730 patent includes a general definition of ‘nanoparticle’ . . . the specification of the ’730 patent expressly requires additional limitations to the general meaning of ‘nanoparticles’ not included in the general definition.” *Id.* According to Patent Owner, “the term ‘nanoparticles’ as used in Claims 57–59 of the ’730 Patent is a particle having any size, shape or morphology from 1 to 5000 nanometers that exhibits a plasmon resonance, namely the nanoparticle is plasmonic.” *Id.* at 14 (citing Ex. 2004 ¶ 51; Ex. 1001, 2:61–57, 5:62–67).

Patent Owner further argues that the ’730 patent specification states “‘nanoparticles that are the subject of the invention’ are described in co-pending applications: U.S. Application Serial No. 09/779,677 which later

issued as U.S. Patent No. 6,530,944. The particles described therein are plasmonic nanoparticles.” PO Resp. 15 (citing Ex. 2004 ¶ 52); *see also* IPR2017-00045 (IPR instituted on certain claims in related U.S. Patent No. 6,530,944). Patent Owner further argues that “the ’730 Patent provides examples to illustrate the preferred embodiments of the invention. Within these examples, the nanoparticles expressly described are plasmonic, e.g., gold nanoshells, gold-silica nanoshells.” *Id.* (citing Ex. 2004 ¶ 53; Ex. 1001, 11:23–67, 12:5–8). Patent Owner notes:

[T]he specification of the ’730 Patent expressly states that “[f]or any given particle, the maximum absorbance depends upon the ratio of thickness of the non-conducting layer to the conducting shell layer. The spectral location of the maximum of the plasmon resonance peak depends on ratio of the core radius to shell thickness, as well as the dielectric functions of the core and shell. The presence of a dielectric core shifts the plasmon resonance . . .

. . .
Id. (citing Ex. 1001, 11:47–52; Ex. 2004 ¶ 54). Patent Owner, therefore, argues that throughout the patent, only plasmonic nanoparticles are expressly described. *Id.* (citing Ex. 2004 ¶ 54).

We agree with Patent Owner that lexicographic definitions in a specification may be express, but they need not be. PO Resp. 14; *compare In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004) (“Absent claim language carrying a narrow meaning, the PTO should only limit the claim based on the specification or prosecution history *when those sources expressly disclaim* the broader definition.”) (emphasis added), *with Bell Atl. Network Servs., Inc. v. Covad Commc’ns Grp., Inc.*, 262 F.3d 1258, 1268 (Fed. Cir. 2001) (“[A] claim term may be clearly redefined without an explicit statement of redefinition. . . . In other words, the specification may define

claim terms by implication such that the meaning may be found in or ascertained by a reading of the patent documents.”) (citations and internal quotation marks omitted), and *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996) (“The specification acts as a dictionary when it expressly defines terms used in the claims or when it defines terms by implication.”). Yet, here the ’730 patent expressly discloses a definition for the term “nanoparticle.” See Ex. 1001, 5:62–67. And Patent Owner’s citations to certain preferred embodiments do not support a narrow construction that is at odds with the express definition. See PO Resp. 14–15 (citing Ex. 1001, 2:61–67, 5:62–67, 11:23–67, 12:5–8), 16 (citing Ex. 1001, 2:61–67).

Patent Owner’s citations to the background section of the ’730 patent discuss alleged attributes of prior art nanoparticles, but these statements are not clear and unequivocal evidence that the claimed invention excludes a particular embodiment, e.g., non-plasmonic particles, nor do they act as a narrowing lexicographic definition. See PO Resp. 15. Additionally, we do not agree that the ’730 patent specification’s citation to the ’944 patent and its discussion of prior art patents to Gordon distinguishes the nanoparticles disclosed in the Gordon patents based on plasmonic properties. See Ex. 3002, 2:59–65. Instead, the ’944 patent specification distinguishes the Gordon patents based on excitation source, because the ’944 patent uses infrared radiation (*id.* at 2:61–67), while the Gordon patents use high frequency alternating electro-magnetic energy (*see* Ex. 3003, Abst; Ex. 3004, Abst.).

Moreover, Patent Owner’s arguments appear to be an attempt to import limitations from specific embodiments into the claims. See PO Resp.

14–16. The challenged claims, however, are broader than the cited embodiments as indicated by both the express definition of “nanoparticles” and by the claim language itself. Therefore, in keeping with the guidance from our reviewing court, we decline to read limitations from embodiments into the claims. *See Ericsson, Inc. v. D-Link Systems, Inc.*, 773 F.3d 1201, 1218 (Fed. Cir. 2014) (stating that although patent claims must be read in light of the specification, it is important that a court avoids importing limitations from the specification into the claims); *3M Innovative Properties Co. v. Tredegar Corp.*, 725 F.3d 1315, 1321 (Fed. Cir. 2014) (“While we construe the patent’s claims in light of the specification, limitations discussed in the specification may not be read into the claims.”); *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993) (holding that limitations are not to be read from the specification into the claims).

Having reviewed the entirety of the ’730 patent specification and its prosecution history, we find that the ’730 patent provides an explicit definition of the term “nanoparticle” as a “particle having a diameter of from 1 to 1000 nanometers, having any size, shape or morphology.” Ex. 1001, 5:62–67. The language of the claims, the embodiments in the specification, and the prosecution history generally appear to apply this definition. *See e.g.*, Ex. 1001, 3:38–45, 5:62–66, 6:39–54, 10:46–50, 11:29–36; Ex. 1009, 75, 103–104. We, thus, see no reason to read limitations into the claims from certain embodiments or from the characterization of prior art in the specification. *See In re Van Geuns*, 988 F.2d at 1184. Therefore, based on our analysis of the entire record, we construe “nanoparticle” as a “particle having a diameter of from 1 to 1000 nanometers, having any size, shape or morphology.”

2. Preamble Terms

“Whether to treat a preamble term as a claim limitation is determined on the facts of each case in light of the claim as a whole and the invention described in the patent.” *Am. Med. Sys., Inc. v. Biolitec, Inc.*, 618 F.3d 1354, 1358 (Fed. Cir. 2010) (internal quotation marks omitted). “Absent clear reliance on the preamble in the prosecution history, or in situations where it is necessary to provide antecedent basis for the body of the claim, the preamble generally is not limiting.” *Symantec Corp. v. Computer Assoc. Int’l, Inc.*, 522 F.3d 1279, 1288 (Fed. Cir. 2008). Additionally, preamble language that merely states the purpose or intended use of an invention generally is not treated as limiting the scope of a claim. *See Boehringer Ingelheim Vetmedica, Inc. v. Schering-Plough Corp.*, 320 F.3d 1339, 1345 (Fed. Cir. 2003); *Rowe v. Dror*, 112 F.3d 473, 478 (Fed. Cir. 1997). Yet, when the limitations in the body of the claim rely upon or derive essential structure from the preamble, then the preamble acts as a necessary component of the claimed invention and is limiting. *See Eaton Corp. v. Rockwell Int’l Corp.*, 323 F.3d 1332, 1339 (Fed. Cir. 2003).

Moreover, if the preamble recites a specific characteristic for a component of an invention recited in the body of the claim, then the preamble must be given patentable weight. *See, e.g., Bell Commc’ns Research, Inc. v. Vitalink Commc’ns Corp.*, 55 F.3d 615, 620 (Fed. Cir. 1995) (noting that a claim drafter may choose to use both the preamble and the body of the claim to define the subject matter of the claimed invention). The issue can be “resolved only on review of the entire [] . . . patent to gain an understanding of what the inventors actually invented and intended to encompass by the claim.” *Poly-Am., L.P. v. GSE Lining Tech., Inc.*, 383

F.3d 1303, 1309 (Fed. Cir. 2004). When reciting additional structure or steps underscored as important by the specification, the preamble may operate as a claim limitation. *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1257 (Fed. Cir. 1989) (limiting claim scope to “optical waveguides” rather than all optical fibers in light of specification); *Gen. Elec. Co. v. Nintendo Co.*, 179 F.3d 1350, 1361–62 (Fed. Cir. 1999) (limiting claim scope to a “raster scanned display device” rather than all display systems in view of specification’s focus on the prior art problem of displaying binary data on a raster scan display device); *Rowe*, 112 F.3d at 479–80; *Applied Materials, Inc. v. Advanced Semiconductor Materials Am., Inc.*, 98 F.3d 1563, 1572–73 (Fed. Cir. 1996) (“Whether a preamble stating the purpose and context of the invention constitutes a limitation of the claimed process is determined on the facts of each case in light of the overall form of the claim, and the invention as described in the specification and illuminated in the prosecution history.”).

In the present case, Petitioner argues that the preamble recitations of “[a] method for reducing wrinkles in tissue” (claim 57), “[a] method for resurfacing tissue” (claim 58), and “[a] method of ablating tissue” (claim 59) merely state intended uses for the recited method. Pet. 13. Petitioner specifically argues the body of the claims recite structurally complete inventions, and there is no reliance upon the preambles to define the subject matter of the claimed inventions (i.e., a method of delivering nanoparticles to a cell or tissue and exposing the nanoparticles to infrared radiation), because it is expressed explicitly in the body of the claims. *Id.*; Reply 10–11.

We agree with Petitioner that initially the preambles to claims 57–59 appear to be statements of intended use; however, the only difference between all three claims is the language of the preamble itself. The differences in language between the preamble of claims 57, 58, and 59 suggest that the inventors intended the claim preambles to define the complete invention and, thus, to be limiting. *See, e.g., Poly-Am., L.P.*, 383 F.3d at 1309.

Moreover, the doctrine of claim differentiation creates a presumption that “two independent claims have different scope when different words or phrases are used in those claims.” *Seachange Int’l, Inc. v. C-COR, Inc.*, 413 F.3d 1361, 1368–69 (Fed. Cir. 2005). The doctrine “takes on relevance in the context of a claim construction that would render additional, or different, language in another independent claim superfluous.” *Arlington Indus., Inc. v. Bridgeport Fittings, Inc.*, 632 F.3d 1246, 1254 (Fed. Cir. 2011). Construing the preamble of these claims as not limiting would discount and render meaningless or superfluous the distinctions between the preamble language in the claims, which weighs against such a construction. Construing the claim preambles as limiting, however, properly gives effect to these differences in language between claims 57, 58, and 59. Therefore, we determine that the preambles of these claims do not merely “state a purpose or intended use” for the claimed methods. *See Poly-Am.*, 383 F.3d at 1310. Rather, we determine that the preamble language gives “life, meaning, and vitality” to the claims. *See id.* at 1309–10. Accordingly, we conclude that the preambles of claims 57, 58, and 59 in the ’730 patent are limiting and we give each preamble patentable weight.

a. “ablating tissue”

Challenged independent claim 59 recites “[a] method of ablating tissue.” Ex. 1001, 20:30.

Patent Owner argues that the term “tissue ablation” would have been understood by a person of ordinary skill in the art to mean “the targeted destruction of tissue.” PO Resp. 16 (citing Ex. 2004 ¶ 57). According to Patent Owner, “tissue ablation can be done by using nanoparticles that absorb light and release heat and thereby induce elevated tissue temperatures (hyperthermia) such that targeted localized heat can be emitted by the nanoparticles.” *Id.* at 17 (citing Ex. 2004 ¶ 59; Ex. 1001, 14:37–15:1). Patent Owner relies on the declaration of Ivan J. Dmochowski, Ph.D. (“Dr. Dmochowski”) to support its position. Dr. Dmochowski testifies that “[s]uch very elevated temperatures can affect tissue/cells in a variety of ways, but the primary means of tissue/cell death during ablation is acute coagulative necrosis.” Ex. 2004 ¶ 60 (citing Ex. 2072, 2–3).

Dr. Dmochowski further testifies that “[a]t 46 °C or so, irreversible cell damage begins to occur.” *Id.* According to Dr. Dmochowski,

[a]s temperature continues to increase above that the time needed to achieve cell death is reduced and microvascular thrombosis, ischemia, and hypoxia results. This cascade cuts off the cells’ nutrient supply and leads to necrosis. Temperatures in excess of 60°C cause rapid protein denaturation and melt the plasma membrane that otherwise allows the cells to survive.
Id.

Petitioner contests Patent Owner’s position, arguing that the broadest reasonable interpretation of the claim term “ablating tissue” is “removing or destroying tissue, especially by cutting, abrading or evaporating” because that is its plain and ordinary meaning. Pet. 11 (citing Ex. 1007 ¶ 44).

Although the '730 patent does not provide an explicit definition of “ablate,” the specification uses the term “tissue ablation” in connection with changing or removing tissue. *See* Ex. 1001, 4:48–50, 14:37–54. We must be careful, however, not to import improperly limitations into the claims or to read a particular embodiment appearing in the written description into the claim if the claim language is broader than the embodiment. *In re Van Geuns*, 988 F.2d at 1184. Accordingly, we look to the ordinary meaning of the term as would be understood by one of ordinary skill in the art. A dictionary published just prior to the filing date of the '730 patent defines “ablate” as “removing especially by cutting, abrading or evaporating.” MERRIAM-WEBSTER’S COLLEGIATE DICTIONARY, 10TH EDITION, 1998 (Ex. 3001, 4). In his Declaration, Dr. Suslick relies upon the eleventh edition of this dictionary, to support his opinion that a person of ordinary skill in the art would have understood “ablating tissue” to mean “removing or destroying tissue, especially by cutting, abrading or evaporating.” Ex. 1007 ¶ 44 (citing Ex. 1010, 3). Although the dictionary edition relied upon by Dr. Suslick was published after the filing date of the '730 patent, its definition of “ablate” is consistent with its earlier publication. *Compare* Ex. 1010, 3, *with* Ex. 3001, 4.

Thus, despite Patent Owner’s arguments and the testimony of Dr. Dmochowski, we are persuaded that the term “ablate” has a meaning to those in the biological art, and one of ordinary skill in the art would understand “ablate” to be associated with removing tissue by cutting, abrading, or evaporating the tissue. *See* Ex. 1001 ¶ 44. This ordinary meaning of “ablate” is consistent with the term’s use in the embodiments of the '730 patent. Neither the use of the term in the specification nor the

ordinary meaning give an indication that the “tissue ablation” must be targeted to anything more than the tissue to be removed.

Given the disclosure in the ’730 patent and the ordinary meaning of the term “ablate,” as would be understood by one of ordinary skill in the art, based on the entirety of record before us, we find the broadest reasonable construction of “ablate tissue,” to mean “remove tissue especially by cutting, abrading, or evaporating the tissue.”

b. “resurfacing tissue”

Challenged independent claim 58 recites “[a] method for resurfacing tissue.” Ex. 1001, 20:23.

Patent Owner argues that the term “resurfacing tissue,” as used in claim 58, would have been understood by a person of ordinary skill in the art to be “the targeted removal or minimization of wrinkles or other cosmetic defects.” PO Resp. 18 (citing Ex. 2004 ¶ 61). According to Patent Owner, “[p]lastic surgeons, dermatologists and their patients have used a variety of methods for treating the effects of an aging skin. For example, ablating only thin tissue layers of the epidermis and/or shrinking the collagen under the skin within the dermis.” *Id.* (citing Ex. 2004 ¶ 62; Ex. 1003, 2:57–64).

Patent Owner relies on the declaration of Dr. Dmochowski to support its position. Dr. Dmochowski testifies that “[s]uperficial resurfacing is defined as destruction of or removal of the superficial epidermis or a major portion of the epidermis. Ex. 2004 ¶ 63 (citing Ex. 1001, 13:1–16).

Dr. Dmochowski further testifies that “[m]edium depth resurfacing involves removal of or destruction of the epidermis entirely along with a portion of papillary dermis. Deep resurfacing involves removal of or destruction of

epidermis, papillary dermis and a portion of reticular dermis to the level of mid reticular dermis.” *Id.* (citing Ex. 2073, 4–6).

Petitioner contests Patent Owner’s position, arguing that the broadest reasonable interpretation of the claim term “resurfacing tissue” is “removal or minimization of wrinkles or other cosmetic defects” because that is its plain and ordinary meaning. Reply 12–13. According to Petitioner, Patent Owner improperly attempts to narrow the term with a “discussion on the relative differences of superficial, medium and deep resurfacing.” *Id.*

Although the ’730 patent does not provide an explicit definition of “resurface,” the specification uses the term “resurfacing” in connection with removing and/or minimizing wrinkle tissue. *See* Ex. 1001, 12:61–13:28. There is no indication in the specification, prosecution history, or in the language of claim 58 that the term “resurfacing tissue” is limited or “targeted” to anything other than removing and/or minimizing wrinkle tissue. Likewise, the specification does not support Petitioner’s additional proposal that “resurfacing tissue” also include removal or minimization of “other cosmetic defects.”

Accordingly, given the disclosure in the ’730 patent and based on the entirety of record before us, we find the broadest reasonable construction of “resurfacing tissue” to mean “removing and/or minimizing wrinkle tissue.”

c. “reducing wrinkles”

Challenged independent claim 57 recites “[a] method for reducing wrinkles in tissue.” Ex. 1001, 20:16.

Patent Owner argues that the term “reducing wrinkles in tissue,” as used in claim 57, would have been understood by a person of ordinary skill in the art to mean “the targeted matrix remodeling of dermis.” PO Resp. 20

(citing Ex. 2004 ¶ 64). Patent Owner cites to the specification's disclosure for support, specifically the following disclosure:

In wrinkle reduction, nanoparticles targeted to the dermis to initiate matrix remodeling while minimizing damage to the epidermis. The highly controlled heating of tissue is accomplished by targeting nanoparticles to a specific depth or region of tissue to more strictly localize heating and more effectively avoid damage to “non targeted” tissue.

Id. at 21 (citing Ex. 2004 ¶ 66; Ex. 1001, 13:17–29). According to Patent Owner, a person of ordinary skill in the art would have understood that the skin is composed of two basic elements, the epidermis and the underlying dermis. *Id.* (citing Ex. 2004 ¶ 67; Ex. 1003, Fig. 4). Patent Owner relies on the declaration of Dr. Dmochowski to support its position. Dr. Dmochowski testifies that:

[t]he underlying dermis provides the main structural support of the skin. The epidermis contains the epithelial cells and pigment forming cells called melanocytes. The dermis varies in thickness throughout the body. The dermis is composed mainly of an extracellular protein called collagen. Collagen exists as a triple helix with three polypeptide chains that are connected with heat labile and heat stable chemical bonds. When collagen is heated, alterations in the physical properties of this protein occur at a characteristic temperature. This structural transition occurs at a specific shrinkage temperature.

Ex. 2004 ¶ 67 (citing Ex. 2071, 7–9, 11–12, 15–16; Ex. 1001, 12:61–67).

Petitioner contests Patent Owner's position, arguing for the application of the plain and ordinary meaning to the claim term “reducing wrinkles in tissue.” Reply 13. According to Petitioner, Patent Owner improperly attempts to narrow the term's construction because “not all forms of ‘reducing wrinkles’ in fact require matrix remodeling of the dermis,

let alone targeted remodeling.” *Id.* at 13–14 (citing Ex. 1016 (Dmochowski Depo), 66:25-67:10 (“Q. Does reducing wrinkles always involve targeted matrix remodeling of the dermis. . . . A. No.”)). Petitioner contends “[r]educing wrinkles is a basic and commonly understood concept that does not require specialized definition, and for which no re-definition has been provided in the specification.” *Id.* at 14.

Although the ’730 patent does not provide an explicit definition of “reducing wrinkles,” the specification uses the term “reducing” in connection with minimizing wrinkle tissue. *See* Ex. 1001, 4:34–39, 12:61–13:28. There is no indication in the specification, prosecution history, or in the language of claim 58 that the term “reducing wrinkles” is limited to instances when the dermis is remodeled. The plain and ordinary meaning of “reducing” is “diminish in size, amount, extent, or number.” MERRIAM-WEBSTER’S COLLEGIATE DICTIONARY, 10TH EDITION, 1998 (Ex. 3005). The ordinary meaning of “reducing” is consistent with the term’s use in the embodiments of the ’730 patent.

Accordingly, given the disclosure in the ’730 patent and based on the entirety of record before us, we find the broadest reasonable construction of “reducing wrinkles” to encompass “minimizing or diminishing the size, amount, extent, or number of wrinkle tissue.”

B. Principles of Law

A claim is unpatentable under 35 U.S.C. § 102 if a prior art reference discloses every limitation of the claimed invention, either explicitly or inherently. *Glaxo Inc. v. Novopharm Ltd.*, 52 F.3d 1043, 1047 (Fed. Cir. 1995). If the prior art reference does not expressly set forth a particular element of the claim, that reference still may anticipate if that element is

“inherent” in its disclosure. *In re Robertson*, 169 F.3d 743 (Fed. Cir. 1999). To establish inherency, the extrinsic evidence “must make clear that the missing descriptive matter is necessarily present,” or inherent, in the single anticipating reference. *Continental Can Co. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991). “Inherency, however, may not be established by *probabilities* or *possibilities*. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.” *Id.* at 1269 (quoting *In re Oelrich*, 666 F.2d 578, 581 (CCPA 1981) (emphasis added)). Inherent anticipation, however, does not require recognition in the prior art. *Schering Corp. v. Geneva Pharms.*, 339 F.3d 1373, 1377 (Fed. Cir. 2003) (“*Continental Can* does not stand for the proposition that an inherent feature of a prior art reference must be perceived as such by a person of ordinary skill in the art before the critical date”).

A claim is unpatentable under 35 U.S.C. § 103(a) if “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 having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) objective evidence of nonobviousness, i.e., secondary considerations. *See Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17–18 (1966).

“A determination of whether a patent claim is invalid as obvious under § 103 requires consideration of all four *Graham* factors, and it is error

to reach a conclusion of obviousness until all those factors are considered.” *Apple v. Samsung Elecs. Co., Ltd.*, 839 F.3d 1034, 1048 (Fed. Cir. 2016) (en banc) (citations omitted). “This requirement is in recognition of the fact that each of the *Graham* factors helps inform the ultimate obviousness determination.” *Id.*

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1326–27 (Fed. Cir. 2008)) (discussing the burden of proof in *inter partes* review). Furthermore, Petitioner cannot satisfy its burden of proving obviousness by employing “mere conclusory statements.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016).

Thus, to prevail in an *inter partes* review, Petitioner must explain how the proposed combinations of prior art would have rendered the challenged claims unpatentable. At this final stage, we determine whether a preponderance of the evidence of record shows that the challenged claims would have been obvious over the proposed combinations of prior art.

We analyze the instituted grounds of unpatentability in accordance with the above-stated principles.

C. Level of Ordinary Skill in the Art

In determining whether an invention would have been obvious at the time it was made, we consider the level of ordinary skill in the pertinent art at the time of the invention. *Graham*, 383 U.S. at 17. “The importance of resolving the level of ordinary skill in the art lies in the necessity of maintaining objectivity in the obviousness inquiry.” *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991). The person of ordinary skill in the art is a hypothetical person who is presumed to have known the relevant art at the time of the invention. *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). The level of ordinary skill in the art may be reflected by the prior art of record. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). Factors that may be considered in determining the level of ordinary skill in the art include, but are not limited to, the types of problems encountered in the art, the sophistication of the technology, and educational level of active workers in the field. *GPAC*, 57 F.3d at 1579. In a given case, one or more factors may predominate. *Id.* Generally, it is easier to establish obviousness under a higher level of ordinary skill in the art. *Innovation Toys, LLC v. MGA Entm’t, Inc.*, 637 F.3d 1314, 1323 (Fed. Cir. 2011) (“A less sophisticated level of skill generally favors a determination of nonobviousness . . . while a higher level of skill favors the reverse.”).

Petitioner’s declarant, Kenneth S. Suslick, Ph.D. (“Dr. Suslick”), opines that a person of ordinary skill in the art relevant to the ’730 patent would have had “either (i) a Bachelor’s degree in chemical engineering, physics, chemistry, materials science, or a similar field, and two or three years of work experience in materials technology, chemical or biomedical research or related fields, or (ii) a Master’s degree in chemical engineering,

physics, chemistry, materials science, or a similar field and one or two years of work experience in materials technology, chemical or biomedical research or related fields.” Ex. 1007 ¶¶ 18–20.

Patent Owner disputes Dr. Suslick’s testimony, relying on the testimony of its declarant, Dr. Dmochowski. PO Resp. 7–9 (citing Ex. 2004). Dr. Dmochowski testifies that “[g]iven the level of skill of the inventors [listed on the ’730 patent] and the other factors involving laser medicine surgery art,” a person of ordinary skill in the art relevant to the ’730 patent at the time of the invention “would have been at least a final year Ph.D. or M.D./Ph.D. candidate in biomedical engineering, bio-medicine, chemistry, medicine, surgery nanomedicine, or a closely related field.” Ex. 2004 ¶ 34.

Based on our review of the ’730 patent, the types of problems and solutions described in the ’730 patent and cited prior art, and the testimony of Dr. Suslick and Dr. Dmochowski, we find that a person of ordinary skill in the art at the time of the claimed invention would have had at least three years of post-graduate education in material sciences, chemistry, physics, biomedical engineering, bio-medicine, medicine, or biomedical sciences with at least one year of work experience in nanotechnology, nanochemistry, materials technology, chemical or biomedical research or related fields.

D. Alleged Anticipation of Claims 57–59 in view of Tankovich III

Petitioner contends claims 57–59 of the ’730 patent are unpatentable under 35 U.S.C. § 102(b) in view of Tankovich III. Pet. 13–20. Patent Owner disputes Petitioner’s contentions. PO Resp. 26–28. For reasons that follow, we determine Petitioner has established by a preponderance of the

evidence that the challenged claims of the '730 patent are unpatentable under 35 U.S.C. § 102(b) as anticipated by Tankovich III.

1. Overview of Tankovich III

Tankovich III is a U.S. patent titled “Methods and Devices for Inhibiting Hair Growth and Related Skin Treatments.” Ex. 1006, Title. Tankovich III is directed to treating skin by infiltrating a light-absorbing contaminant into hair ducts or other openings in the skin and illuminating the contaminated skin section. *Id.* at [57]. Tankovich III specifically states that it was known in the art to inhibit hair growth by apply a light-absorbing contaminant onto a skin section prior to laser treatment. *Id.* at 1:40–41. Tankovich III also states that a contaminant applied topically can be used to facilitate laser skin resurfacing, while a contaminant that infiltrates beneath the surface layers of the stratum corneum can be used to remove surface layers of the stratum corneum. *Id.* at 1:41–45. Tankovich III contemplates building upon the prior art for the “long term prevention of hair growth and other beneficial skin treatments.” *Id.* at 1:47–50. Tankovich III indicates its invention produces death of the tissue immediately surrounding the base of a hair follicle by heating and by photochemical reaction. *Id.* at 3:46–49, 28:34–38, 31:52–55, 34:36–43.

One embodiment disclosed in Tankovich III, shown in Figures 20A, 20B, and 20C reproduced below, uses contaminant carbon particles with diameters in the 1.0 to 50 nanometer range. *Id.* at 5:52–55. According to Tankovich III, skin contaminated with the carbon particles is illuminated with pulses of light having a frequency highly absorbed by the contaminant particles. *Id.* at 10:20–26.

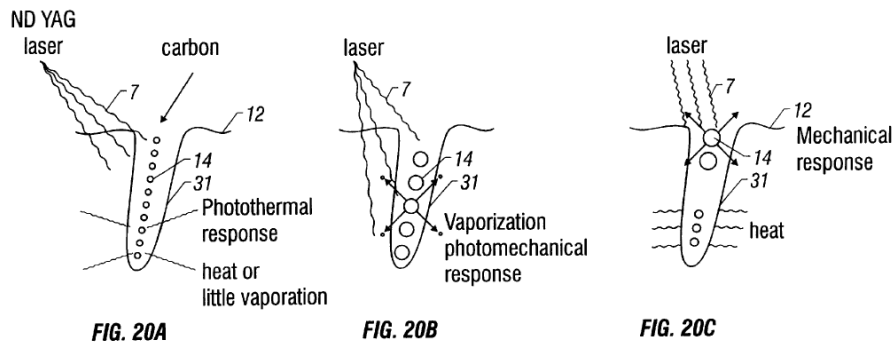


Figure 20A, above, shows transfer of photothermal energy from carbon particles to tissue surrounding a hair duct infiltrated by the carbon particles. *Id.* Figure 20B shows transfer of photomechanical energy to tissue surrounding a hair duct infiltrated with contaminant carbon particles with diameters of about 1.0 micron. *Id.* at 5:56–60. Figure 20C shows the combined transfer of photomechanical and photothermal energy to tissue surrounding a hair duct infiltrated with a combination of the contaminant carbon particles of Figures 20A and 20B. *Id.* at 5:61–64.

2. *Analysis of Cited Art as Applied to Independent Claims 57–59*
a. *Preamble to Claims 57–59*

The preamble of claim 57 recites a “method for reducing wrinkles in tissue,” the preamble of claim 58 recites a “method for resurfacing tissue,” and the preamble of claim 59 recites a “method of ablating tissue.”
Ex. 1001, 20:17–35.

We have determined that the preambles to claims 57–59 in the ’730 patent are limiting and we give each preamble patentable weight. *See supra* Section II.A.2.

(1) “ablating tissue” (claim 59)

We have construed “ablate tissue,” to mean “remove tissue especially by cutting, abrading, or evaporating the tissue.” *See supra* Section II.A.2.a.

Petitioner argues Tankovich III meets this claim preamble because it “describes how ‘the inventors of the present application have devised new methods and devices used in long term prevention of hair growth and other beneficial skin treatments.’” Pet. 16–17 (citing Ex. 1006, 1:48–50; Ex. 1007 ¶ 53).

Patent Owner argues that “ablating tissue” requires the “targeted destruction of tissue.” PO Resp. 16. According to Patent Owner, Tankovich III does not meet this claim preamble because the “plasmonic nanoparticles used in Claim[] []59” are different than that used in Tankovich III. *Id.* at 27–28. Patent Owner specifically argues that Tankovich III uses explosive carbon particles, whereas the “plasmonic nanoparticles” used in the ’730 patent “permit the specific targeting and localized heating of tissue to conduct the various medical skin procedures identified, namely, . . . tissue ablation.” *Id.* (citing Ex. 2004 ¶ 76; Ex. 1001, 1:5–10 (incorporating by reference the application that led to U.S. Patent No. 6,530,730); Ex. 2062, 13:1–14:3).

We agree with Petitioner for at least two reasons. First, Tankovich III specifically discloses using high temperatures to kill, evaporate, and/or destroy tissue, thereby meeting the limitation of “ablating tissue.” *See, e.g.*, Ex. 1006, 3:46–49 (“The duration of the pulse is sufficient that tissue immediately surrounding the base of a hair follicle in the section of skin is destroyed by heat transferred from the irradiated contaminant.”), 28:34–37 (“By raising the temperature of tissue surrounding the hair ducts and maintaining it at the elevated temperature for a sufficient period of time, the target tissue is destroyed . . .”), 31:51–55 (“The combination of mechanical and thermal energy transferred from the particles to the skin tissue sought to

be destroyed is a very effective technique for achieving long term inhibition of the growth of hairs in hair ducts.”), 34:36–42 (“The following examples model a zero-order estimation of the laser parameters suitable for administering any desired combination of photo mechanical and photothermal thermal damage to hair follicles without burning skin, coagulating blood vessels in the dermal matrix, or destroying the skin pigment (i.e. melanin) located at the interface of epidermis and dermis.”).

Second, we disagree with Patent Owner’s argument that Tankovich III’s use of an explosive photomechanical mechanism to damage hair follicles is a failing addressed by the ’730 patent, which distinguishes challenged claim 59. *See* PO Resp. 27–28. Specifically, there is nothing in the recited steps of the claim that prohibits or excludes the use of an explosive photomechanical mechanism in addition to delivering heat emitting nanoparticles. *See Invitrogen Corp. v. Biocrest Mfg., L.P.*, 327 F.3d 1364, 1368 (Fed. Cir. 2003) (“The transition ‘comprising’ in a method claim indicates that the claim is open-ended and allows for additional steps.”). Additionally, we find insufficient support in the specification for a negative claim limitation regarding use of an explosive photomechanical mechanism. *See Santarus, Inc. v Par Pharm., Inc.*, 694 F.3d 1344, 1351 (Fed. Cir. 2012) (“Negative claim limitations are adequately supported when the specification describes a reason to exclude the relevant limitation.”). Moreover, as discussed above in Section II.A.1, we do not construe the claims to require plasmonic nanoparticles. *See also infra* Section II.D.2.b.

Accordingly, based on the entirety of the record, we determine Tankovich III discloses “ablating tissue,” as recited by claim 59.

(2) “*resurfacing tissue*” (claim 58)

We have construed “resurfacing tissue” to mean “removing and/or minimizing wrinkle tissue.” *See supra* Section II.A.2.b.

Petitioner argues Tankovich III meets this claim preamble because it “describes how ‘the inventors of the present application have devised new methods and devices used in long term prevention of hair growth and other beneficial skin treatments.’” Pet. 16 (citing Ex. 1006, 1:48–50; Ex. 1007 ¶ 50).

Patent Owner argues that “resurfacing tissue” requires “targeted removal or minimization of wrinkles or other cosmetic defects.” PO Resp. 16. According to Patent Owner, Tankovich III does not meet this claim preamble because the “plasmonic nanoparticles used in Claim[] []58” are different than that used in Tankovich III. *Id.* at 28. Patent Owner specifically argues that Tankovich III uses explosive carbon particles, whereas the “plasmonic nanoparticles” used in the ’730 patent “permit the specific targeting and localized heating of tissue to conduct the various medical skin procedures identified, namely, . . . resurfacing tissue . . .” *Id.* (citing Ex. 2004 ¶ 76; Ex. 1001, 1:5–10 (incorporating by reference the application that led to U.S. Patent No. 6,530,730); Ex. 2062, 13:1–14:3).

We agree with Petitioner for at least two reasons. First, Tankovich III specifically discloses the removal and/or destruction of a hair duct and the surrounding skin tissue, thereby causing thermal damage to such tissue. Ex. 1006, 30:38–41. Tankovich III indicates that such destruction can be used as a beneficial skin treatment and indicates that “laser skin resurfacing” is known in the art and a contemplated application of its invention. *Id.* at 1:40–45 (“A contaminant applied topically can also be used to facilitate laser

skin resurfacing. The contaminant is infiltrated beneath the surface layers of the stratum corneum, and then the skin surface bearing the contaminant is illuminated so as to remove the surface layers of the stratum corneum.”); 1:48–50 (“[T]he inventors of the present application have devised new methods and devices used in long term prevention of hair growth and other beneficial skin treatments.”).

Second, for the same reasons discussed above, we disagree with Patent Owner’s argument that Tankovich III’s use of an explosive photomechanical mechanism to damage hair follicles is a failing addressed by the ’730 patent, which distinguishes challenged claim 58. *See* PO Resp. 27–28.

Accordingly, based on the entirety of the record, we determine Tankovich III discloses “resurfacing tissue,” as recited by claim 58.

(3) “*reducing wrinkles*” (claim 57)

We have construed “reducing wrinkles” to encompass “minimizing or decrease in size or number wrinkle tissue.” *See supra* Section II.A.2.c.

Petitioner argues Tankovich III meets this claim preamble because it “describes how ‘the inventors of the present application have devised new methods and devices used in long term prevention of hair growth and other beneficial skin treatments.’” Pet. 14 (citing Ex. 1006, 1:48–50; Ex. 1007 ¶ 47).

Patent Owner argues that “reducing wrinkles” requires “targeted matrix remodeling of the dermis.” PO Resp. 20. Additionally, Patent Owner argues Tankovich III does not meet this claim preamble because the “plasmonic nanoparticles used in Claim[] []57” are different than those used in Tankovich III. *Id.* at 28. Patent Owner specifically argues that Tankovich

III uses explosive carbon particles, whereas the “plasmonic nanoparticles” used in the ’730 patent “permit the specific targeting and localized heating of tissue to conduct the various medical skin procedures identified, namely, reducing wrinkles. . .” *Id.* (citing Ex. 2004 ¶ 76; Ex. 1001, 1:5–10 (incorporating by reference the application that led to U.S. Patent No. 6,530,730); Ex. 2062, 13:1–14:3).

We agree with Petitioner for at least two reasons. First, Tankovich III specifically discloses the removal and/or destruction of a hair duct and the surrounding skin tissue, thereby causing thermal damage to such tissue. Ex. 1006, 30:38–41. Although Tankovich III does not disclose reducing wrinkles, it indicates that such destruction can be used as a beneficial skin treatment. *Id.* at 1:48–50 (“[T]he inventors of the present application have devised new methods and devices used in long term prevention of hair growth and other beneficial skin treatments.”).

Second, for the same reasons discussed above, we disagree with Patent Owner’s argument that Tankovich III’s use of an explosive photomechanical mechanism to damage hair follicles is a failing addressed by the ’730 patent, which distinguishes challenged claim 58. *See* PO Resp. 27–28.

Accordingly, based on the entirety of the record, we determine Tankovich III discloses “reducing wrinkles,” as recited by claim 57.

b. “delivering nanoparticles that absorb light at one or more wavelengths to the tissue”

Petitioner contends Tankovich III discloses “delivering nanoparticles that absorb light at one or more wavelengths to the tissue,” as recited by claims 57–59. According to Petitioner, Tankovich III uses “an oil or water-

based suspension of carbon particles or other chromophore particles that absorb light in the near IR region of the spectrum,” wherein the “suspension of carbon particles [is] in the size range from about 0.2 to about 0.01 micron (carbon black) or in the size range up to about 1 micron.” Pet. 14 (citing Ex. 1006, 9:35–38, 9:66–10:2). Petitioner argues that Tankovich III’s disclosed particle size range, from 0.01 micron to 1 micron, is equivalent to a range of 10 nanometers to 1000 nanometers, and therefore overlaps the size range of “nanoparticles” of 1 to 5000 nanometers, as described in the ’730 patent. *Id.* Moreover, Petitioner notes that Tankovich III’s suspension is described as being “applied to the skin section prior to irradiation,” whereby “at least a portion of the contaminant must enter the upper region of the hair follicles.” *Id.* at 15 (citing Ex. 1006, 10:6–8; Ex. 1007 ¶ 48).

Patent Owner disputes Petitioner’s contentions, arguing that Tankovich III’s carbon particles do not anticipate the nanoparticles recited in the challenged claims. PO Resp. 26. Patent Owner specifically argues that Tankovich III does not disclose carbon nanoparticles that are plasmonic and they do not permit targeted heating and minimal damage to surrounding skin. *Id.* at 27 (citing Ex. 2004 ¶ 73). Patent Owner further argues that the particles disclosed in Tankovich III have explosive potential and do not interact with light the same way as plasmonic nanoparticles. *Id.* (citing Ex. 2004 ¶ 74; Ex. 1006, 10:29–32). According to Patent Owner, the use of an explosive mechanism produces significantly more damage than the minimal collateral damage resulting from the claims of the ’730 patent. *Id.* at 28 (citing Ex. 2004 ¶ 75; Ex. 1006, 10:29–32). Patent Owner argues that, by contrast, “the plasmonic nanoparticles used in Claims 57–59 of the ’730 Patent permit the specific targeting and localized heating of tissue to conduct

the various medical skin procedures identified” *Id.* (citing Ex. 2004 ¶ 76; Ex. 1001, 1:5–10). Therefore, Patent Owner contends that “[c]laims 57–59 of the ’730 Patent are not disclosed as Petitioner contends by a description in another patent simply because the other patent applies ‘light’ to cause ‘local heating’ to human tissue.” *Id.* (citing Ex. 2004 ¶ 77).

We agree with Petitioner’s contentions for multiple reasons. First, the ’730 patent defines “delivering” nanoparticles to a location “as effecting the placement of the nanoparticles attached to, next to, or sufficiently close to the location such that any heat generated by the nanoparticles is transferred to the location.” Ex. 1001, 5:54–58. Tankovich III discloses that the carbon particles in an oil or water-based suspension are gently applied to the targeted skin section so that at least a portion of the contaminant enters the upper region of the hair follicles. Ex. 1006, 9:31–38. Based on the definition of “delivering” nanoparticles provided in the ’730 patent, we find that Tankovich III “delivers” nanoparticles to the hair follicles.

Second, based on our construction of “nanoparticles” and the failure of the challenged claims to recite “plasmonic” nanoparticles, we do not agree with Patent Owner’s position that the carbon particles of Tankovich III must be plasmonic in order to anticipate the claim. *See supra* section II.A.1. Tankovich III’s disclosed particle size range, from 0.01 micron to 1 micron, falls within the size range of “nanoparticles” of 1 to 5000 nanometers, as specified in both the ’730 patent, and falls within the size range of “nanoparticles” recited in our claim construction, as described previously. *See id.*

Accordingly, based on the entirety of the record, we determine Tankovich III discloses “delivering nanoparticles that absorb light at one or more wavelengths to the tissue,” as recited by claims 57–59.

c. “exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles”

Petitioner contends Tankovich III discloses “exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles,” as recited by claims 57–59. Pet. 15. Tankovich III describes how, after delivering the nanoparticle suspension to the skin, “the contaminated skin section is illuminated with one or two short pulses of light having a frequency highly absorbed by the contaminant particles.” *Id.* (citing Ex. 1006, 10:20–23; Ex. 1007 ¶ 49). According to Petitioner, Tankovich III discloses that the parameters of the radiation “have been chosen to preferentially heat the suspension [of carbon nanoparticles] which in turns heats the hair follicles and the blood vessels feeding the follicles to temperatures high enough to kill the hair follicles[.]” *Id.* (citing Ex. 1004, 2:51–64).

Patent Owner does not dispute Petitioner’s contentions. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

We find that Tankovich III’s disclosure of a Nd:YAG laser using “a frequency” that “is well absorbed in carbon” (*see* Ex. 1006, 10:20–27) meets the required limitations recited in claims 57–59.

d. Summary

Accordingly, having analyzed the entirety of the record, we determine Petitioner has established by a preponderance of the evidence that claims

57–59 are unpatentable under 35 U.S.C. § 102(b) as anticipated by Tankovich III.

E. Alleged Anticipation of Claims 58 and 59 in view of Anderson I
Petitioner contends claims 58 and 59 of the '730 patent are unpatentable under 35 U.S.C. § 102(e) in view of Anderson I. Pet. 20–25. Patent Owner disputes Petitioner's contentions. PO Resp. 29–31. For reasons that follow, we determine Petitioner has established by a preponderance of the evidence that challenged claims 58 and 59 of the '730 patent are unpatentable under 35 U.S.C. § 102(e) as anticipated by Anderson I.

1. Overview of Anderson I

Anderson I is a U.S. patent titled "Targeting of Sebaceous Follicles as a Treatment of Sebaceous Gland Disorders." Ex. 1002, Title. Anderson I is directed to treatment of sebaceous glands by topically applying an "energy activatable material" to skin, followed by laser irradiation. *Id.* at [57]. Anderson I specifically discloses that its method can be used for skin resurfacing, selective photothermolysis, or controlled skin ablation with lasers or other intense light sources. *Id.* at 1:41–50.

According to the teachings of Anderson I, "energy activatable material" which, when stimulated by energy from an energy source, e.g., a laser source, becomes energetically stimulated, e.g., photothermally or photochemically. *Id.* at 5:36–40. Anderson I discloses that the introduction of an energy activatable material in sebaceous glands followed by exposure to energy (light) with a wavelength that corresponds to the absorption peak of the material, will increase the local absorption of light in tissue and lead to selective thermal damage of sebaceous glands. *Id.* at 10:33–38.

Anderson I specifically discloses the use of the Nd:YAG laser as an energy source. *Id.* at 9:15–30.

Anderson I indicates that suitable materials useful in its invention include metal oxides, such as aluminum oxide, iron oxides, carbon particles (graphite and amorphous carbon particles), and natural and synthetic chromophores. *Id.* at 5:46–50. Anderson I discloses that delivery of the energy activatable material to the hair follicle can be achieved by topical application, injection, liposome encapsulation technology, massage, iontophoresis or ultrasonic technology, or other means for delivery of compounds into the dermal region of the skin. *Id.* at 11:19–25. Anderson I explains that the liposomes are artificially created, microscopic spherical membrane-enclosed vesicles or sacks (0.5–500 μm in diameter) used to deliver energy activatable material into the follicle and immediately surrounding tissue. *Id.* at 12:66–13:5.

One embodiment disclosed in Anderson I is shown in Figure 3, reproduced below.

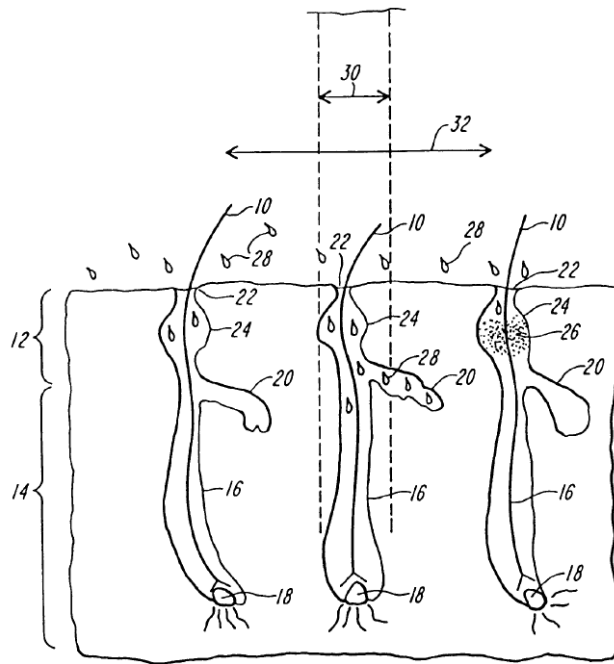


Figure 3, above, shows a cross-section view of hair shafts, which have absorbed energy activatable material, and are being irradiated with a laser.

Id. at 3:1–3, 13:38–51.

2. *Analysis of Cited Art as Applied to Independent Claims 58 and 59*

a. *Preamble to Claims 58 and 59*

As discussed previously, the preamble of claim 58 recites a “method for resurfacing tissue,” and the preamble of claim 59 recites a “method of ablating tissue.” Ex. 1001, 20:17–35. We have determined that the preambles to claims 58 and 59 in the ’730 patent are limiting and we give each preamble patentable weight. *See supra* Section II.A.2.

(1) *“ablating tissue” (claim 59)*

We have construed “ablate tissue,” to mean “remove tissue especially by cutting, abrading, or evaporating the tissue.” *See supra* Section II.A.2.a.

Petitioner argues Anderson I meets this claim preamble because it “describes the use of ‘laser dermatology treatments’ as ‘cures’ – producing a

permanent anatomic, microsurgical effect on the skin’ including ‘skin resurfacing.’” Pet. 22–23 (citing Ex. 1002, 1:42–45). Petitioner notes that Anderson I further “describes the curing of skin disorders by means of ‘[s]elective photothermolysis or controlled skin ablation.’” *Id.* at 23 (citing Ex. 1002, 1:46–47; Ex. 1007 ¶ 61).

Patent Owner argues that “ablating tissue” requires the “targeted destruction of tissue.” PO Resp. 16. According to Patent Owner, “[c]laim 59 [recites] a method of ablating tissue using plasmonic nanoparticles” while, in contrast, Anderson I, “cautions the artisan from vaporizing tissue, i.e., it teaches against ablation.” *Id.* at 30 (citing Ex. 2004 ¶ 81; Ex. 1002, 6:48–53). Therefore, Patent Owner argues that a person of ordinary skill in the art following the teachings and suggestions of Anderson I would not be ablating tissue. *Id.* (citing Ex. 2004 ¶ 81).

We agree with Petitioner for at least two reasons. First, Anderson I specifically discloses the use of “ablation,” as well as using intense light to kill, evaporate, and/or destroy tissue, thereby meeting the limitation of “ablating tissue.” *See, e.g.*, Ex. 1002, 1:46–49 (“Selective photothermolysis or controlled skin *ablation* with lasers or other extremely intense light sources, might therefore be capable of curing skin disorders.”) (emphasis added), 2:31–36 (“Application of the energy activatable material to the pilosebaceous unit, e.g., the sebaceous gland, followed by stimulation by an energy source can cause selective permanent physical alteration to the sebaceous gland and/or follicle such that surrounding tissue remains unaffected.”), 7:8–17 (“Photothermal alteration of the sebaceous gland, the follicle infundibulum, or both requires the deposition of sufficient energy to cause *local heating to temperatures capable of cell killing* (e.g., killing of

sebocytes, stem cells, or bacterial cells), protein denaturation (e.g., denaturation of basement membranes and/or perifollicular collagen), or *vaporization of tissue*. In general, these temperatures range from about 60—100°C for the first two effects, and somewhat over 100°C (e.g., about 120°C) for vaporization of tissue.”) (emphasis added).

Second, we disagree with Patent Owner’s argument that Anderson I teaches away from using ablation techniques such as vaporization. See PO Resp. 30. Rather, Anderson I cautions against vaporization to such a degree that there is violent explosion of material causing damage to surrounding tissue. See Ex. 1002, 6:58–58. Anderson I states:

The energy activatable materials of the present invention do not undergo fragmentation or vaporization such that the energy activatable material causes photo-mechanical destruction of the surrounding tissue, e.g., the energy activatable materials do not undergo violent decomposition, i.e., the energy activatable materials do not explode. Preferably, therefore, the energy activatable material is subjected to a sufficient energy which causes the energy activatable material to be photochemically or photothermally stimulated without violent decomposition and harm to surrounding tissue.

Id. Anderson I further states:

Not to be limited by theory, stimulation of the energy activatable material, e.g., a chromophoric agent, can cause oxidation and decomposition of the unwanted material(s), thereby degrading and removing unwanted material from the pore.

Id. at 6:63–67. Anderson I also discloses specifically that vaporization of tissue may be used in order to achieve alteration of the targeted tissue. *Id.* at 7:8–17 (“Photothermal alteration of the sebaceous gland, the follicle infundibulum, or both requires the deposition of sufficient energy to cause

local heating to temperatures capable of cell killing (e.g., killing of sebocytes, stem cells, or bacterial cells), protein denaturation (e.g., denaturation of basement membranes and/or perifollicular collagen), or *vaporization of tissue*. In general, these temperatures range from about 60—100°C for the first two effects, and somewhat over 100°C (e.g., about 120°C) for vaporization of tissue.”) (emphasis added).

Accordingly, based on the entirety of the record, we determine Anderson I discloses “ablating tissue,” as recited by claim 59.

(2) “*resurfacing tissue*” (claim 58)

Petitioner argues Anderson I meets this claim preamble because it “describes the use of ‘laser dermatology treatments’ as ‘cures’ – producing a permanent anatomic, microsurgical effect on the skin” including ‘skin resurfacing.’” Pet. 20–21 (citing Ex. 1002, 1:42–45). Petitioner notes that Anderson I further “describes the curing of skin disorders by means of ‘[s]elective photothermolysis or controlled skin ablation.’” *Id.* at 23 (citing Ex. 1002, 1:46–47; Ex. 1007 ¶ 61).

Patent Owner contends “resurfacing tissue” requires “targeted removal or minimization of wrinkles or other cosmetic defects. PO Resp. 19 (citing Ex. 2004 ¶ 61). As discussed previously, we do not agree with Patent Owner’s proposed construction. Rather, we have construed “resurfacing tissue” to mean “removing and/or minimizing wrinkle tissue.” *See supra* Section II.A.2.b. Additionally, we find that Anderson I specifically discloses “resurfacing tissue” as we have construed the term. *See, e.g.*, Ex. 1002, 1:46–49 (“Unlike medical dermatology, most laser dermatology treatments are actually ‘cures’—producing a permanent anatomic, microsurgical effect on the skin. This includes skin resurfacing”).

Accordingly, based on the entirety of the record, we determine Anderson I discloses “resurfacing tissue,” as recited by claim 58.

b. *“delivering nanoparticles to said cell or tissue that absorb light at one or more wavelengths to the tissue”*

Petitioner contends Anderson I discloses “delivering nanoparticles that absorb light at one or more wavelengths to the tissue,” as recited by claims 58 and 59. Pet. 21. Petitioner specifically argues that Anderson I discloses energy activatable material comprising any of a variety of candidate nanoparticle materials and compositions, including “metal oxides, such as aluminum oxide, iron oxides, carbon particles (graphite and amorphous carbon particles) and natural and synthetic chromophores.” *Id.* (citing Ex. 1002, 5:47–50). According to Petitioner, the energy activatable material would be understood as being in the size range of 1 to 5000 nanometers, because Anderson I describes using liposome encapsulation technology for delivery of the material to the skin, with liposomes being vesicles that are 0.5–500 μm in diameter, e.g., 500–500,000 nanometers. *Id.* at 21–22 (citing Ex. 1002, 11:19–25; Ex. 1007 ¶ 59). Petitioner, therefore, concludes that Anderson I meets the claimed limitation. *Id.*

Patent Owner argues that Anderson I’s conventional exogenous chromophores do not meet the requirement of claim 58, which requires resurfacing tissue using plasmonic nanoparticles and “subjecting such nanoparticles to light resulting in a targeted and controlled heating of tissue.” PO Resp. 29 (citing Ex. 2004 ¶ 80; Ex. 1001, 2:9–15, 2:61–67). According to Patent Owner, plasmonic nanoparticles and conventional exogenous chromophores, such as dyes, have different mechanisms of action. *Id.* (citing Ex. 2004 ¶ 80; Ex. 1002, 5:54–62, Ex. 1001, 8:65–67).

Patent Owner then argues that a person of ordinary skill in the art would have understood that by using plasmonic nanoparticles in resurfacing tissue, the unnecessary collateral damage to non-targeted tissue could be minimized. *Id.* at 30 (citing Ex. 2004 ¶ 80; Ex. 1001, 13:8–19).

We agree with Petitioner’s position. First, the ’730 patent defines “delivering” nanoparticles to a location “as effecting the placement of the nanoparticles attached to, next to, or sufficiently close to the location such that any heat generated by the nanoparticles is transferred to the location.” Ex. 1001, 6:54–59. Anderson I discloses

Delivery of the energy activatable material, preferably methylene blue or other FDA approved dyes, to the follicle matrix can be achieved by topical application, injection, liposome encapsulation technology, massage, iontophoresis or ultrasonic technology, or other means for delivery of compounds into the dermal region of the skin, e.g., pharmaceutically acceptable carriers.

Ex. 1002, 11:19–25. Anderson I further discloses that “[a] sufficient amount of the material infiltrates the pilosebaceous unit.” *Id.* at 4:25–29. Based on the definition of “delivering” nanoparticles provided in the ’730 patent, we find that Anderson I “delivers” nanoparticles to target follicle cells.

Second, based on our construction of “nanoparticles” and the failure of the challenged claims to recite “plasmonic” nanoparticles, we do not agree with Patent Owner’s position that the chromophores of Anderson I must be plasmonic in order to anticipate the claim. *See supra* section II.A.1. The disclosure of energy activatable material delivered to a tissue via a liposome satisfies the claim limitation. *See* Ex. 1002, 12:66–13:5.

Accordingly, based on the entirety of the record, we determine Anderson I discloses “delivering nanoparticles to said cell or tissue,” as recited by claims 58 and 59.

c. “exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles”

Petitioner contends Anderson I discloses “exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles,” as recited by claims 58 and 59. Pet. 22. According to Petitioner, Anderson I describes “exposure to energy (light)” of the nanoparticles “with a wavelength that corresponds to the absorption peak” in order to “increase the local absorption of light in tissue and lead to selective thermal damage of sebaceous glands.” *Id.* (citing Ex. 1002, 10:33–38; Ex. 1007 ¶ 60).

Patent Owner does not dispute Petitioner’s contentions. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

Anderson I specifically discloses “exposure to energy (light)” of the nanoparticles “with a wavelength that corresponds to the absorption peak” in order to “increase the local absorption of light in tissue and lead to selective thermal damage of sebaceous glands.” *See* Ex. 1002, 10:33–38.

Accordingly, based on the entirety of the record, we determine Anderson I discloses “exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles,” as recited by claims 58 and 59.

d. Summary

Accordingly, having analyzed the entirety of the record, we determine Petitioner has established by a preponderance of the evidence that claims 58

and 59 are unpatentable under 35 U.S.C. § 102(e) as anticipated by Anderson I.

F. Alleged Anticipation of Claim 59 in view of Tankovich II

Petitioner contends that claim 59 of the '730 patent is unpatentable under 35 U.S.C. § 102(b) in view of Tankovich II. Pet. 25–28. Patent Owner disputes Petitioner's contentions. PO Resp. 30–32. For reasons that follow, we determine Petitioner has established by a preponderance of the evidence that challenged claim 59 of the '730 patent is unpatentable under 35 U.S.C. § 102(b) as anticipated by Tankovich II.

1. Overview of Tankovich II

Tankovich II is a U.S. patent titled "Skin Treatment Process Using Laser." Ex. 1005, Title. Tankovich II is directed to (1) the removal of superficial epidermal skin cells in human skin, (2) the reduction or removal of unwanted hair, and (3) the mitigation of skin conditions such as acne and seborrhea. *Id.* at [57]. One embodiment disclosed in Tankovich II is shown in Figures 3A–3F, reproduced below.

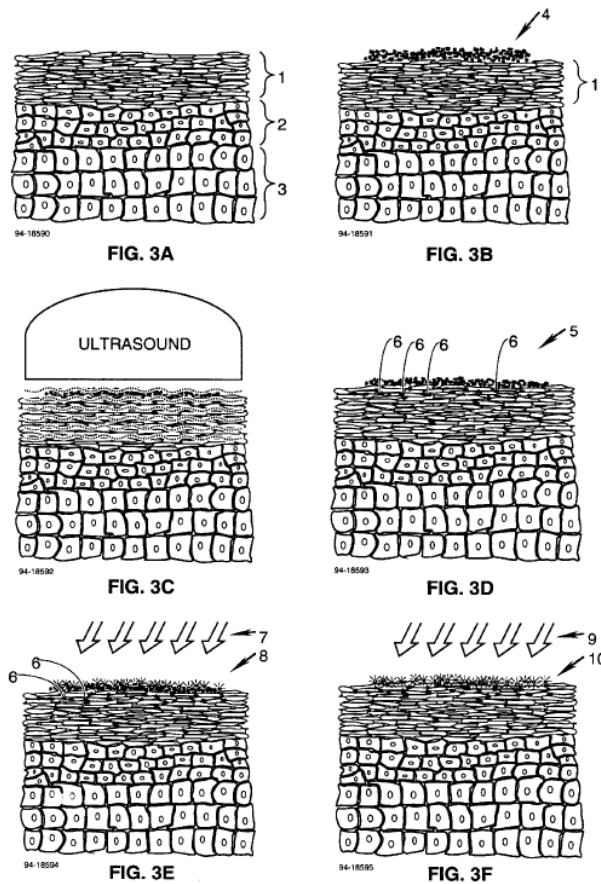


Figure 3A, above, shows a typical cross section of the outer portion (the top three strata) of human epidermis. *Id.* at 3:31–33. Tankovich II discloses topically applying a layer of carbon solution of 1 micron graphite powder to the skin surface. *Id.* at 3:47–50, Fig. 3B. Then, according to the teachings of Tankovich II, some of the carbon particles are forced down below the surface of the stratum corneum using an ultrasound unit. *Id.* at Fig. 3C, 3:51–53.

The result of the ultrasound treatment is shown in Figure 3D above, where two layers of graphite particles are left on the surface and a portion of particles 6 are distributed below the surface. *Id.* at 3:61–67. Tankovich II discloses that the next step is to irradiate the skin surface with Nd:YAG laser

pulses of about 3 J/cm^2 at a wavelength of $1.06 \text{ }\mu\text{m}$. *Id.* at 4:3–4. According to Tankovich II, pulse frequency is about 5 Hz but it scans the beam so that each location is subjected to pulses at a frequency of about 1 Hz. *Id.* at 4:5–7. Tankovich II indicates that graphite is very absorptive of laser energy at the $1.06 \text{ }\mu\text{m}$ wavelength, and that the latent heat of vaporization is about 105 J/cm^2 for cold solid graphite. *Id.* at 4:7–9.

Tankovich II then discloses that as a result of first pulse 7, the first layer of graphite particles is exploded, and the second layer and the skin surface is effectively shielded from first pulse 7 by the first layer. *Id.* at 4:22–25, Fig. 3E. According to the teachings of Tankovich II, some of the carbon particles above the skin have been pushed into the skin as a result of the shockwaves resulting from the explosion of the particles in the first layer. *Id.* at 4:25–28. Tankovich II lastly discloses that second pulse 9, coming one second later, vaporizes the second layer. *Id.* at 4:28–30, Fig. 3F.

2. Analysis of Cited Art as Applied to Independent Claim 59

a. Preamble

The preamble of claim 59 recites a “method of ablating tissue.” Ex. 1001, 20:30–35. We have construed “ablate tissue,” to mean “remove tissue especially by cutting, abrading, or evaporating the tissue.” *See supra* Section II.A.2.a.

Petitioner argues Tankovich II meets this claim preamble because it “discusses a pulse laser technique which, ‘in addition to vaporizing carbon [nanoparticles] below the skin surface will vaporize a thin surface of tissue,’ resulting in ‘vaporization of a surface layer of epidermal tissue about 2-3 microns thick.’” Pet. 26 (citing Ex. 1005, 7:7–13). According to Petitioner,

“[t]he vaporization of epidermal tissue corresponds to the claimed ‘ablating tissue.’” *Id.* (citing Ex. 1007 ¶ 66).

Patent Owner argues that “ablating tissue” requires the “targeted destruction of tissue.” PO Resp. 16. According to Patent Owner, Tankovich II does not meet the claim preamble, because the “plasmonic nanoparticles used in Claim[] []59” are different than that used in Tankovich II, which have explosive potential. *Id.* at 31. Patent Owner specifically argues that the “plasmonic nanoparticle” used in the ’730 patent “concentrates the energy of the absorbed infrared radiation.” *Id.* (citing Ex. 2004 ¶ 89; Ex. 1001, 1:5–10 (incorporating Ex. 2062, 8:38–46)).

We agree with Petitioner for at least two reasons. First, Tankovich II specifically discloses vaporizing tissue, thereby meeting the limitation of “ablating tissue,” as we have construed the term. *See, e.g.*, Ex. 1006, 1005, 7:7–13 (“The third pulse however will in addition to vaporizing carbon below the skin surface will vaporize a thin surface of tissue.”).

Second, we disagree with Patent Owner’s argument that the ’730 patent’s use of “plasmonic nanoparticles,” which “concentrate[] the energy of the absorbed infrared radiation,” distinguishes challenged claim 59 from Tankovich II. *See* PO Resp. 31. Specifically, there is nothing in the recited steps of the claim that requires concentration of absorbed energy. *See Invitrogen Corp. v. Biocrest Mfg., L.P.*, 327 F.3d 1364, 1368 (Fed. Cir. 2003) (“The transition ‘comprising’ in a method claim indicates that the claim is open-ended and allows for additional steps.”).

Accordingly, based on the entirety of the record, we determine Tankovich II discloses “ablating tissue,” as recited by claim 59.

- b. *“delivering nanoparticles to said cell or tissue that absorb light at one or more wavelengths to the tissue”*

Petitioner contends Tankovich II discloses “delivering nanoparticles that absorb light at one or more wavelengths to the tissue,” as recited by claim 59. Pet. 26. According to Petitioner, Tankovich II discloses a process where, “[t]he first step . . . is to topically apply a layer of carbon solution to the skin surface . . . comprised of 1 micron graphite powder in baby oil.” *Id.* at 27–28 (citing Ex. 1005, 3:47–50). Petitioner, therefore, concludes that the particles have a diameter in the range of 1 to 5000 nm and qualify as nanoparticles. *Id.* at 27 (citing Ex. 1007 ¶ 67).

Patent Owner disputes Petitioner’s contentions, arguing that Tankovich II does not meet the claimed limitation, because: (1) Tankovich II uses explosive carbon graphite particles (Ex. 1005, 4:33–39, 5:64–67; Ex. 2004 ¶ 87); (2) Tankovich II does not disclose that its particles are plasmonic (Ex. 2004 ¶ 89; Ex. 1005, 2:67–3:3); and (3) Tankovich II’s particles do not permit targeted heating and minimal damage to surrounding skin (Ex. 2004 ¶¶ 89–92; Ex. 1001, 13:19–21). PO Resp. 30–32.

We agree with Petitioner’s position for several reasons. First, the ’730 patent defines “delivering” nanoparticles to a location “as effecting the placement of the nanoparticles attached to, next to, or sufficiently close to the location such that any heat generated by the nanoparticles is transferred to the location.” Ex. 1001, 5:54–59. As Petitioner points out, Tankovich II discloses topically applying a carbon solution (of micron graphite power) to skin. Ex. 1005, 3:47–50. Based on the definition of “delivering” nanoparticles provided in the ’730 patent, we find that Tankovich II “delivers” nanoparticles to target epithelial cells.

Second, based on our construction of “nanoparticles” and the failure of the challenged claims to recite “plasmonic” nanoparticles, we do not agree with Patent Owner’s position that the particles of Tankovich II must be plasmonic in order to anticipate the claim. *See supra* Section II.A.1. Additionally, we find that Tankovich II delivers “nanoparticles” because it discloses the use of a solution “comprised of 1 micron graphite powder in baby oil,” which falls within the scope of the term “nanoparticle” as we have construed it for this Decision. *Id.*

Lastly, we disagree with Patent Owner’s argument that Tankovich II’s use of carbon particles with explosive potential that damages skin is distinguishable from the nanoparticles disclosed by the ’730 patent. *See* PO Resp. 27. Specifically, given the explicit steps recited in claim 59, there is nothing in the claims that prohibits or excludes the use of an explosive photomechanical mechanism in addition to the heat emitting nanoparticles. Additionally, we find insufficient support in the specification for a negative claim limitation regarding use of an explosive photomechanical mechanism. *See Santarus, Inc. v Par Pharm., Inc.*, 694 F.3d 1344, 1351 (Fed. Cir. 2012) (“Negative claim limitations are adequately supported when the specification describes a reason to exclude the relevant limitation.”)

Accordingly, based on the entirety of the record, we find Tankovich II discloses this limitation recited in claim 59.

c. “*exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles*”

Petitioner contends Tankovich II discloses “exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles,” as recited by claim 59. Pet. 27. Petitioner argues that

Tankovich II describes “irradiat[ing] the skin surface with Nd:YAG laser pulses of about 3 J/cm² at a wavelength of 1.06 μm,” noting that the “[g]raphite [nanoparticles are] very absorptive of laser energy at the 1.06 μm wavelength.” *Id.* at 27 (citing Ex. 1007 ¶ 68), 28 (citing Ex. 1005, 4:3–8).

Patent Owner does not dispute Petitioner’s contentions. *See generally* PO Resp. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

Tankovich II discloses irradiating skin with light having a wavelength of 1.06 μm. *See* Ex. 1005, 4:3–4. Additionally, Tankovich II discloses the use of graphite nanoparticles that are “very absorptive of laser energy at 1.06 μm wavelength. *See id.* at 4:6–8. Based on the entirety of the record, we find Tankovich II meets this limitation recited in claim 59 of the ’730 patent.

d. Summary

Accordingly, for the foregoing reasons, we determine based on the entirety of the record before us, Petitioner has established by a preponderance of the evidence that challenged claim 59 of the ’730 patent is unpatentable under 35 U.S.C. § 102(b) as anticipated by Tankovich II.

G. Alleged Obviousness of Claims 58 and 59 in view of Tankovich I and Anderson I

Petitioner contends that claims 58 and 59 of the ’730 patent are unpatentable under 35 U.S.C. § 103 in view of Tankovich I and Anderson I. Pet. 28–36. Patent Owner disputes Petitioner’s contentions. PO Resp. 32–39. For reasons that follow, we determine Petitioner has established by a preponderance of the evidence that the challenged claims of the ’730 patent

are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Tankovich I and Anderson I

1. Overview of Tankovich I

Tankovich I is a U.S. patent titled “Hair Removal Device and Method.” Ex. 1004, Title. Tankovich I is directed to the permanent removal of unwanted human hair. *Id.* at [57]. One embodiment disclosed in Tankovich I is shown in Figures 2A, 2B, and 2C, reproduced below.

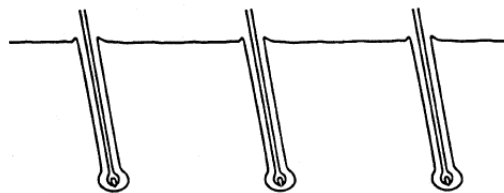


FIG. 2A

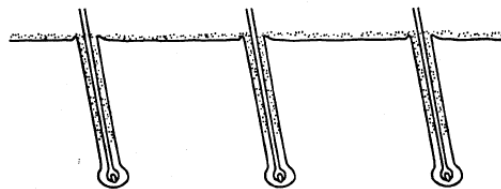


FIG. 2B

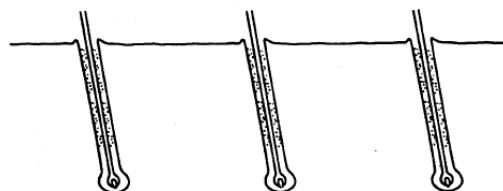


FIG. 2C

Figure 2A, above, shows a cross section of skin and three hairs. *Id.* at 1:44–46. In Figure 2B, a laser absorbing carbon suspension is rubbed on the skin so that the suspension infiltrates the hair ducts of the hair. *Id.* at 2:4–8. According to the teachings of Tankovich I, the particle size of the powder in the suspension is about 10–20 nm. *Id.* at 1:68–2:1. In Figure 2C, the surface of the skin is wiped clean so that only the hair pores are contaminated with the suspension. *Id.* at 2:8–11.

Tankovich I indicates its invention produces death of the follicles by heating and by photochemical reaction. According to Tankovich I, the heating and photochemical reaction are created using a laser device, such as a CO₂ pulse laser that has spikes in the range of 10.6 microns. *Id.* at [57], 2:14–16. Tankovich I discloses that light in this range will pass through the surface of the skin of a fair skin person and be absorbed by the carbon suspension as shown in Figure 3, reproduced below. *Id.* at 2:16–18.

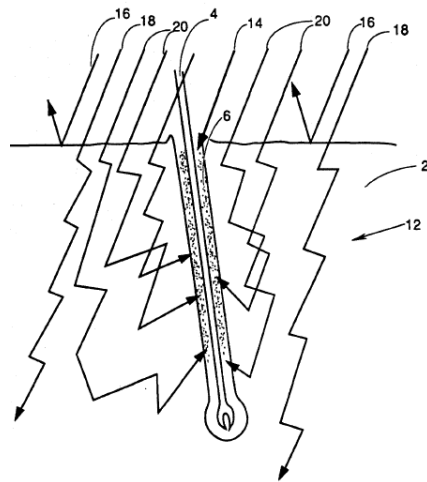


Figure 3 illustrates using laser pulse illumination to heat the suspension, which in turn heats the hair follicles and the blood vessels feeding the follicles to temperatures high enough to kill the hair follicles and the tissue feeding the follicles but to minimize the heat to the rest of the skin tissue. *Id.* at 2:51–57.

2. Overview of Anderson I

See supra Section II.E.1.

3. Analysis of Cited Art as Applied to Challenged Independent Claims 58 and 59

Petitioner contends the limitations of claims 58 and 59 of the '730 patent would have been obvious to a person of ordinary skill in the art in view of the combined teachings of Tankovich I and Anderson I. Pet. 28–35.

Patent Owner contests Petitioner's position. PO Resp. 32–39. Patent Owner specifically argues that neither Tankovich I nor Anderson I meet the limitations recited in claim 58 and 59. *Id.* According to Patent Owner, neither reference teaches or suggests the use of plasmonic nanoparticles that target specific cells or tissue with localized heating that avoids collateral damage to non-targeted cells or tissue. *Id.* at 36 (citing Ex. 2004 ¶ 103; Ex. 1001, 13:16–24).

For reasons detailed above, we find Anderson I discloses the recited limitations. *See supra* Section II.E.2.

Furthermore, Tankovich I discloses rubbing a carbon particle suspension (with particles in the size range of 10–20 nm) on skin so that the suspension infiltrates the hair ducts of the hair that is to be removed. Ex. 1004, 1:67–2:8. Based on the definition of “delivering” nanoparticles provided in the '730 patent (Ex. 1001, 5:54–58), we find that Tankovich I “delivers” nanoparticles to the hair follicle. Additionally, based on our construction of “nanoparticles” and the failure of the challenged claims to recite “plasmonic” nanoparticles, we do not agree with Patent Owner's position that the carbon powder particles of Tankovich I must be plasmonic. *See supra* Section II.A.1. Moreover, we find that Tankovich I's disclosure of particle size ranges from 10–20 nanometers is within the size range of “nanoparticles” of 1 to 1000 nanometers, according to our construction.

Ex. 1004, 1:68–2:1; *see supra* Section II.A.1. Tankovich I also discloses using a laser device, such as a CO₂ pulse laser that has spikes in the range of 10.6 microns, with light in this range passing through the surface of the skin of a fair skin person and being absorbed by the carbon particles. *Id.* at [57], 2:14–18, Fig. 3. Thus, we find Tankovich I discloses “exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles,” as recited by claims 58 and 59.

4. Alleged Rationale to Combine Asserted Art References

Petitioner contends a person of ordinary skill in the art would have had reasons to use aspects of Anderson I’s system for skin resurfacing and tissue ablation within Tankovich I’s system for hair removal using locally heated nanoparticles. Pet. 34. According to Petitioner, both Tankovich I and Anderson I use nanoparticles capable of absorbing electromagnetic radiation, which are introduced to human tissue, and exposed to such radiation in order to induce a localized heating effect. *Id.* (citing Ex. 1002, 5:37–67, 7:58–65, 10:33–38, 11:19–25; Ex. 1004, 1:67–2:8, 2:14–18, 2:51–64; Ex. 1007 ¶ 78).

Petitioner relies on the testimony of its declarant, who opines that not only would the prior art combination of Tankovich I and Anderson I contain all of the elements recited in claims 58 and 59, but it would have been obvious to a person of ordinary skill to combine the references because each would have performed the same function in combination as they do separately (i.e., hair removal as described by Tankovich I and skin resurfacing and/or ablation as described by Anderson I). Ex. 1007 ¶ 79. Furthermore, according to Petitioner, the results of the combination (the aforementioned skin resurfacing and skin ablation) would have been

predictable to a person of ordinary skill inasmuch as they were explicitly disclosed to occur in Anderson I. Pet. 35.

Patent Owner contends Petitioner fails to provide a reason to combine Tankovich I and Anderson I, because the Petition fails to (1) specify which elements would be combined from each reference, (2) demonstrate a reasonable expectation of success in combining the teachings of the references, and (3) show that the combine teachings would result in the methods of claim 58 or 59. PO Resp. 36–37. According to Patent Owner, although Anderson I and Tankovich I both target hair follicles, such a commonality is not a reason to combine the two different processes. *Id.* at 36 (citing Ex. 2004 ¶ 104). Patent Owner further argues that Anderson I expressly teaches away from Tankovich I. *Id.* at 37 (citing Ex. 2004 ¶ 106; Ex. 1002, 7:37–41). Patent Owner notes that “Tankovich I uses an energy activatable material [that] undergo[es] fragmentation or vaporization [to produce] photo-mechanical destruction of the surrounding tissue” (Ex. 1004, 4:21–22), while “Anderson I directs one to avoid such materials” and specifically “identifies Tankovich I” (Ex. 1002, 6:48–53, 7:37–41). PO Resp. 38 (citing Ex. 2004 ¶¶ 107–108). Patent Owner, thus, concludes claims 58 and 59 of the ’730 patent would not have been rendered obvious by Tankovich I in view of Anderson I. *Id.* at 39 (citing Ex. 2004 ¶ 112).

Despite Patent Owner’s arguments, we are persuaded by Petitioner’s position, as supported by the testimony of Dr. Suslick. Specifically, both references teach the use of nanoparticles capable of absorbing electromagnetic radiation, which are targeted to hair follicle cells, and exposed to such radiation in order to induce a heating effect and damage cells. Ex. 1002, 1:41–50, 7:3–17, 10:24–38, Fig. 1; Ex. 1004, 1:67–2:8,

2:14–18, 2:51–64, Fig. 3. We credit the testimony of Dr. Suslick that a person of ordinary skill in the art would have a rationale to combine these references based on the explicit teachings in both references to target nanoparticles to follicle cells for “cosmetic applications.” See Ex. 1007 ¶ 79. Additionally, we find both Tankovich I and Anderson I disclose therapeutic processes having a high degree of similarity in structure and purpose. Given the similarities between the processes of Tankovich I and Anderson I, we agree with Petitioner that a person of ordinary skill in the art would have had a reasonable expectation of success using Tankovich I’s nanoparticles in Anderson I’s system. See, e.g., Pet. 34–35; Ex. 1007 ¶¶ 78–79; Ex. 1002, 7:8–17; Ex. 1004, 2:58–61, Fig. 4B. Thus, crediting the testimony of Dr. Suslick, we determine it would have been obvious to a person of ordinary skill in the art to use aspects of Anderson I’s system for skin resurfacing and tissue ablation within Tankovich I’s system for hair removal using locally heated nanoparticles, to achieve skin resurfacing and ablation. Ex. 1007 ¶ 78. We, thus, find Petitioner has articulated sufficient reasoning with rational underpinning to combine Tankovich I and Anderson I.

We disagree with Patent Owner’s argument that Anderson I teaches away from Tankovich I. A reference teaches away “when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.” *Mouttet*, 686 F.3d 1322, 1333–34 (Fed. Cir. 2012) (quoting *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994)). For a reference to teach away, however, it must state more than a general preference for an alternative invention—it must

“‘criticize, discredit, or otherwise discourage’ investigation into the invention claimed.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed.Cir.2009). A reference may not teach away even if a particular solution is not the preferred solution or is inferior to another solution. *In re Fulton*, 391 F.3d 1195, 1200 (Fed. Cir. 2004) (discussing *Gurley*, 27 F.3d at 552–53).

Anderson I specifically discloses:

[a]lthough thermal confinement is achieved with pulses shorter than the target’s thermal relaxation time, very short pulses cause unwanted mechanical injury which can rupture the follicles. For example, the method of Tankovich, US. Pat. Nos. 5,752,949, 5,425,728, 5,226,907 and 5,752,948, employs explosive, photomechanical mechanism to damage hair follicles.

Ex. 1002, 7:35–41. Anderson I further discloses:

It is [] desired to avoid rupture of the follicle or sebaceous gland. Such mechanical injury can be avoided by using pulses longer than about 0.1 milliseconds. Thus, the preferred range of pulse duration is 0.1–100 ms, and the ideal pulse duration is about 10–50 ms.

Id. at 7:47–52.

We are not persuaded that Anderson I’s desire to avoid rupturing the follicle or sebaceous gland, and its resulting disclosure to alter the pulse duration from that taught in Tankovich I, amounts to teaching away as Patent Owner suggests. Rather, it appears that Anderson I employs a similar technique as disclosed in Tankovich I with minor alterations to fit its specific goals and targeted tissue.

Accordingly, for the foregoing reasons, we determine based on the entirety of the record before us, that Petitioner has established by a

preponderance of the evidence that the challenged claims 58 and 59 of the '730 patent are unpatentable under 35 U.S.C. § 103(a) as obvious over the teachings of Tankovich I and Anderson I.

H. Alleged Obviousness of Claims 58 and 59 in view of Tankovich II and Anderson I

Petitioner contends independent claims 58 and 59 of the '730 patent are unpatentable under 35 U.S.C. § 103 in view of Tankovich II and Anderson I. Pet. 36–41. Patent Owner disputes Petitioner's contentions. PO Resp. 39–44. For reasons that follow, we determine Petitioner has established by a preponderance of the evidence that the challenged claims of the '730 patent are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Tankovich II and Anderson I.

1. Overview of Tankovich II

See supra Section II.F.1.

2. Overview of Anderson I

See supra Section II.E.1.

3. Analysis of Cited Art as Applied to Challenged Claims 58 and 59

Petitioner contends the limitations of claims 58 and 59 of the '730 patent would have been obvious to a person of ordinary skill in the art in view of the combined teachings of Tankovich II and Anderson I. Pet. 36–41. Patent Owner disputes Petitioner's contentions. PO Resp. 39–44.

For the same reasons discussed above, we find that Tankovich II and Anderson I each disclose the limitations recited in claims 58 and 59. *See supra* Sections II.F.2, II.E.2.

4. Alleged Rationale to Combine Asserted Art References

Petitioner contends that a person of ordinary skill in the art would have had reasons to use aspects of Anderson I's system for skin resurfacing and tissue ablation within Tankovich II's system for hair removal using locally heated nanoparticles. Pet. 39. According to Petitioner, both Tankovich II and Anderson I use nanoparticles capable of absorbing electromagnetic radiation, which are introduced to human tissue, and exposed to such radiation in order to induce a localized heating effect. *Id.* at 39–40 (citing Ex. 1002, 5:37–67, 7:58–65, 10:33–38, 11:19–25; Ex. 1005, 3:47–50, 4:3–8; Ex. 1007 ¶ 88). Petitioner further argues that Tankovich II and Anderson I both teach delivery of nanoparticles to the skin by the same methods. *Id.* at 40 (citing Ex. 1002, 1:44–50, 11:19–25; Ex. 1005, 3:47–50, 5:19–24).

Petitioner relies on the testimony of its declarant, Dr. Suslick to support its position. *Id.* at 40. Dr. Suslick testifies that not only would the prior art combination of Tankovich II and Anderson I contain all of the elements recited in claims 58 and 59, but it would have been obvious to a person of ordinary skill to combine the references because each would have performed the same function in combination as they do separately (i.e., skin treatment including hair removal, acne mitigation, and removal of epidermal skin cells as described by Tankovich II and skin resurfacing and/or ablation as described by Anderson I). Ex. 1007 ¶ 89. Furthermore, according to Petitioner, the results of the combination (the aforementioned skin resurfacing and skin ablation) would have been predictable to a person of ordinary skill inasmuch as they were explicitly disclosed to occur in Anderson I. Pet. 40.

Patent Owner contests Petitioner’s position, arguing that Petitioner fails to provide a reason to combine Tankovich II with Anderson I or to demonstrate a likelihood of success in combining the teachings of the references. PO Resp. 40–41 (citing Ex. 2004 ¶ 118). Patent Owner further argues that Anderson I expressly teaches away from Tankovich II. *Id.* at 42 (citing Ex. 2004 ¶ 127; Ex. 1002, 6:48–53, 7:37–41). Patent Owner notes that “Tankovich II uses an energy activatable material [that] undergo[es] fragmentation or vaporization [to produce] photo-mechanical destruction of the surrounding tissue” (Ex. 1004, 4:21–22), while “Anderson I directs one to avoid such materials” and specifically “identifies Tankovich II” (Ex. 1002, 6:48–53, 7:37–41). PO Resp. 42 (citing Ex. 2004 ¶¶ 127–128). Patent Owner, thus, concludes claims 58–59 of the ’730 patent are not rendered obvious by Tankovich II in view of Anderson I. *Id.* at 44 (citing Ex. 2004 ¶ 132).

Despite Patent Owner’s arguments, we agree with Petitioner’s position, as supported by the testimony of Dr. Suslick. Specifically, both references teach the use of nanoparticles capable of absorbing electromagnetic radiation, which are targeted to hair follicle cells, and exposed to such radiation in order to induce a heating effect and damage cells. *See* Ex. 1002, 1:41–50, 5:37–67, 7:3–17, 7:58–65, 10:24–38, 11:19–25, Fig. 1; Ex. 1005, 3:47–50, 4:3–8. We credit the testimony of Dr. Suslick that a person of ordinary skill the art would have a rationale to combine these reference based on the explicit teachings in both references to target nanoparticles to follicle cells for “cosmetic applications.” *See* Ex. 1007 ¶ 89. Additionally, we find both Tankovich II and Anderson I disclose therapeutic processes having a high degree of similarity in structure and

purpose. Given the similarities between the processes of Tankovich II and Anderson I, we agree with Petitioner that a person of ordinary skill in the art would have had a reasonable expectation of success using Tankovich II's nanoparticles in Anderson I's system. *See, e.g.*, Pet. 39–40; Ex. 1007 ¶¶ 88–89; Ex. 1002, 7:3–17; Ex. 1005, 3:47–50. Thus, crediting the testimony of Dr. Suslick, we determine it would have been obvious to a person of ordinary skill in the art to use aspects of Anderson I's system for skin resurfacing and tissue ablation within Tankovich I's system for hair removal using locally heated nanoparticles. Ex. 1006 ¶ 88. We, thus, find Petitioner has articulated sufficient reasoning with rational underpinning to combine Tankovich II and Anderson I.

We disagree with Patent Owner's argument that Anderson I teaches away from Tankovich II. A reference teaches away “when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.” *Mouttet*, 686 F.3d at 1333–34 (quoting *In re Gurley*, 27 F.3d at 553). For a reference to teach away, however, it must state more than a general preference for an alternative invention—it must “‘criticize, discredit, or otherwise discourage’ investigation into the invention claimed.” *DePuy Spine, Inc.*, 567 F.3d at 1327. A reference may not teach away even if a particular solution is not the preferred solution or is inferior to another solution. *In re Fulton*, 391 F.3d at 1200.

As discussed previously, Anderson I specifically discloses:

[a]lthough thermal confinement is achieved with pulses shorter than the target's thermal relaxation time, very short pulses cause

unwanted mechanical injury which can rupture the follicles. For example, the method of Tankovich, US. Pat. Nos. 5,752,949, 5,425,728, 5,226,907 and 5,752,948, employs explosive, photomechanical mechanism to damage hair follicles.

Ex. 1002, 7:35–41. Anderson I further discloses:

It is [] desired to avoid rupture of the follicle or sebaceous gland. Such mechanical injury can be avoided by using pulses longer than about 0.1 milliseconds. Thus, the preferred range of pulse duration is 0.1–100 ms, and the ideal pulse duration is about 10–50 ms.

Id. at 7:47–52. We are not persuaded that Anderson I’s desire to avoid rupturing the follicle or sebaceous gland, and its resulting disclosure to alter the pulse duration from that taught in Tankovich II, amounts to teaching away as Patent Owner suggests. Rather, it appears that Anderson I employs a similar technique as disclosed in Tankovich II with minor alterations to fit its specific goals and targeted tissue.

Accordingly, for the foregoing reasons, we determine based on the entirety of the record before us, Petitioner has established by a preponderance of the evidence that challenged claims 58 and 59 would have been obvious under 35 U.S.C. § 103 in view of the teachings of Tankovich II and Anderson I.

I. Alleged Obviousness of Claim 57 in view of Tankovich III and Anderson II

Petitioner contends claim 57 of the ’730 patent is unpatentable under 35 U.S.C. § 103 in view of Tankovich III and Anderson II. Pet. 41–45. Patent Owner disputes Petitioner’s contentions. PO Resp. 45–47. For reasons that follow, we determine Petitioner has not established by a preponderance of the evidence that the challenged claims of the ’730 patent

are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Tankovich III and Anderson II.

1. Overview of Tankovich III

See supra Section II.D.1.

2. Overview of Anderson II

Anderson II is a U.S. patent titled “Method and Apparatus for Treating Wrinkles in Skin Using Radiation.” Ex. 1003, Title. Anderson II is directed to treatment of wrinkles in skin by using a beam of pulsed, scanned, or gated continuous wave laser or incoherent irradiation. *Id.* at [57]. According to the teachings of Anderson II, the beam of radiation has a wavelength of between 1.3 and 1.8 microns. *Id.* Anderson II specifically discloses that its method causes thermal injury in the dermal region of the skin sufficient to elicit a healing response that produces a substantially unwrinkled skin. *Id.* at 1:13–19.

3. Analysis of Cited Art as Applied to Challenged Independent Claim 57

Petitioner contends the limitations of claim 57 of the ’730 patent would have been obvious to a person of ordinary skill in the art in view of the combined teachings of Tankovich III and Anderson II. Pet. 41–45.

Patent Owner contests Petitioner’s position. PO Resp. 45–47. Patent Owner specifically argues that neither Tankovich III nor Anderson II meet the limitations recited in claim 57. *Id.* at 45.

For reasons detailed above, we find Tankovich III discloses the recited limitations of claim 57. *See supra* Section II.D.2. Regarding Anderson II, it discloses “a method for treating wrinkles in human skin using a beam of laser or incoherent radiation to cause thermal injury in the dermal

region of the skin sufficient to elicit a healing response that produces substantially unwrinkled skin.” See Ex. 1003, 1:14–19. Thus, we find it meets the preamble of claim 57.

4. *Alleged Rationale to Combine Asserted Art References*

Petitioner contends that a person of ordinary skill in the art would have had reasons to use aspects of Anderson II’s system for reducing wrinkles in skin within Tankovich III’s system for laser treatment system for resurfacing skin using locally heated nanoparticles. Pet. 43. According to Petitioner, both Tankovich III and Anderson II disclose cosmetic treatments having a high degree of similarity in structure, purpose and operation, because both are directed to a technique for exposing human skin tissue to electromagnetic radiation in order to induce a localized heating effect in order to effect a cosmetic change to the skin surface. *Id.* (citing Ex. 1003, 1:13–19; Ex. 1006, 1:40–46, 10:20–27; Ex. 1007 ¶ 95). Petitioner further argues that both Anderson II and Tankovich III describe the goal of targeting tissues of interest for localized heating while avoiding damage to surrounding tissue. *Id.* at 43–44.

Petitioner also contends that given the disclosure of Anderson II, there was a teaching to use resurfacing techniques for the removal of wrinkles, and thus a person of ordinary skill in the art would have been motivated to extend Tankovich III’s laser resurfacing technique using radiation-absorbing nanoparticles to achieve Anderson II’s goal of laser-based wrinkle removal. *Id.* at 45 (citing Ex. 1007 ¶ 97). Petitioner argues that at the very least, the use of Tankovich III’s resurfacing system for wrinkle removal, as disclosed in Anderson II, would have been obvious to try, inasmuch as wrinkle removal was a known problem and skin resurfacing a known technique to

address that problem such that there would have been a reasonable expectation of success in applying the latter to the former. *Id.* Thus, Petitioner concludes that it would have been obvious to a person of ordinary skill in the art to extend Tankovich III's treatment of skin disorders to include Anderson II's treatment of wrinkles. *Id.*

Patent Owner contests Petitioner's position, arguing that Petitioner fails to provide a reason to combine Tankovich III with Anderson II or to demonstrate a likelihood of success in combining the teachings of the references. PO Resp. 46–47 (citing Ex. 2004 ¶¶ 136, 138). Patent Owner further argues that because the processes in Anderson II are so different from those in Tankovich III a person of ordinary skill in the art would not have a reason to combine the teachings. Patent Owner notes that Tankovich III delivers radiation to the hair ducts using exogenous contaminants, while Anderson II does not use an exogenous chromophore instead it relies on naturally occurring light-absorbing material in the dermis so it can deliver radiation directly to a region below the epidermis and the upper dermis. *Id.* at 45–46 (citing Ex. 2004 ¶ 136; Ex. 1003, 4:24–27) (“to cause thermal injury to the dermis while avoiding injury to the epidermis and upper layers of the dermis”). Patent Owner asserts that Tankovich III's exploding exogenous contaminant is not delivered to the dermis below the upper layers of the dermis, and without a contaminant delivery means, a person of ordinary skill would not have a rational for combining these references. *Id.* at 46 (citing Ex. 2004 ¶ 137).

Patent Owner further argues that any suggestion to use Tankovich III's exploding exogenous contaminant in Anderson II's wrinkle reduction method is contrary to the express statements in Anderson II. *Id.* (citing

Ex. 2004 ¶ 137). According to Patent Owner, Anderson II's process was designed to minimize the post-operative recovery. *Id.* (citing Ex. 2004 ¶ 139; Ex. 1003, 2:14–16 (“[E]rythema or redness of the skin may be significant for weeks to months after the [prior art] procedure, requiring the patients to wear conspicuous amounts of make-up.”)). Yet, Patent Owner argues that Tankovich III uses an explosive exogenous contaminant into the dermis, which would be understood to increase the post-operative recovery. *Id.* at 47 (citing Ex. 2004 ¶ 141). Because a goal of the Anderson II process is to minimize the post-operative recovery, Patent Owner concludes that a person of ordinary skill in the art would not have modified the process of Anderson II to either insert an exogenous contaminant into the dermis or to explode such a contaminant in the dermis. *Id.* (citing Ex. 2004 ¶ 142).

We do not agree with Patent Owner's position that Anderson II teaches away from the use of an exogenous contaminant or some form of photomechanical process. To establish teaching away, the prior art reference must criticize, discredit, or otherwise discourage the solution claimed. *See In re Fulton*, 391 F.3d at 1201.

We agree, however, with Patent Owner that Petitioner fails to offer sufficient explanation as to why a person of ordinary skill in the art would have combined the teachings of Tankovich III and Anderson II. Rather, Petitioner appears to argue that Anderson II and Tankovich III share a goal of effecting cosmetic change to the skin surface, and such a shared purpose is sufficient to show a person of ordinary skill in the art would have reason to combine disparate elements taught in the prior art references to render the challenged claims obvious. Pet. 43–45. We do not agree that simply

demonstrating similar purposes without more is sufficient reasoning with rational underpinning to combine these particular references.

Petitioner must articulate a *reason why* a person of ordinary skill in the art would have combined the prior art references. *In re NuVasive*, 842 F.3d 1376, 1382 (Fed. 2016); *Metalcraft of Mayville, Inc. v. The Toro Co.*, 848 F.3d 1358, 1366 (Fed. Cir. 2017) (“[I]t is insufficient to simply conclude the [prior art] combination would have been obvious without identifying any reason why a person of skill in the art would have made the combination.”); *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) (“[O]bviousness concerns whether a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or modifications of prior art to arrive at the claimed invention”). Conclusory statements alone, even those provided by a declarant, are inadequate to demonstrate a rationale for why a person of ordinary skill in the art would combine the teachings from prior art references. *NuVasive*, 842 F.3d at 1383. Instead, Petitioner’s arguments must be supported by a “reasoned explanation.” *Id.* (citing *In re Lee*, 277 F.3d 1338, 1342, 1345 (Fed. Cir. 2002)). We understand that a person of ordinary skill is a person of ordinary creativity, not an automaton, but “[w]ithout any explanation as to how or why the references would be combined to arrive at the claimed invention, we are left with only hindsight bias that *KSR* warns against.” *Metalcraft*, 848 F.3d at 1367 (“[T]he obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation,’ we also recognize that we cannot allow hindsight bias to be the thread that stitches together prior art patches into something that is the claimed invention.” (quoting *KSR*, 550 U.S. at 420–21)).

Accordingly, for the foregoing reasons, we determine Petitioner has not established by a preponderance of the evidence that the challenged claim 57 would have been obvious under 35 U.S.C. § 103 in view of the teachings of Tankovich III and Anderson II.

III. MOTIONS TO EXCLUDE EVIDENCE

A. Patent Owner's Motion to Exclude Evidence

Patent Owner filed Objections to Evidence (Papers 12, 30) and a Motion to Exclude Evidence (Paper 38, "PO Mot."). Petitioner opposed the Motion to Exclude (Paper 43, "Pet Opp.") and Patent Owner submitted a Reply in support of its Motion to Exclude (Paper 45, "PO Reply").

Patent Owner specifically moves to exclude the testimony of Petitioner's declarant, Dr. Suslick, as submitted in Dr. Suslick's Declaration (Ex. 1007) and Dr. Suslick's Supplemental Declaration (Ex. 1018). PO Mot. 1. According to Patent Owner, Dr. Suslick's declarations fail to comply with PTAB rules because (1) the original declaration (Ex. 1007) is not an affidavit as it was not made under oath (PO Mot. 2–3), (2) Dr. Suslick's supplemental declaration (Ex. 1018) is untimely and unauthorized (*id.* at 4), (3) Dr. Suslick's opinions are unsupported because he did not review the prosecution history of the '730 patent (*id.* at 3–4), and (4) Dr. Suslick did not apply the correct legal standards, thus, his testimony is unreliable (*id.* at 5–6). During oral argument, Patent Owner further argued that Dr. Suslick's testimony in Exhibit 1018 is inconsistent with the testimony in Exhibit 1007, and the submission of Exhibit 1018 prejudiced Patent Owner. Tr. 30:2–31:12, 42:11–43:5.

Patent Owner also moves to exclude Exhibits 1002, 1003, 1004, 1005, and 1006 under Federal Rules of Evidence 401, 402 (relevance), 403 (probative value outweighed by prejudice, confusing of issues, wasting time), 602, 802/805, 901, as well as 37 C.F.R. § 42.61(c). PO. Mot. 6. Patent Owner contends that neither Petitioner nor Dr. Suslick have personal knowledge of the statements recited in this exhibit, and that there is no objective scientific data reflected in the exhibits. *Id.* at 6–7. Patent Owner further moves to exclude Exhibits 1010, 1011, 1012, 1013, 1014, 1015, 1017, and 1020 under various provision of the Federal Rules of Evidence. *Id.* at 7–9.

Petitioner opposes Patent Owner’s Motion. Pet. Opp. Specifically, Petitioner argues that Patent Owner’s objection to Exhibit 1007 was untimely and is rendered moot by Exhibit 1018 (Dr. Suslick’s Supplemental Declaration). *Id.* at 1–2. Petitioner lists citations within Dr. Suslick’s original declaration (Ex. 1007), which demonstrate support for each of Dr. Suslick’s opinions and which show the application of the correct legal standards. *See* Pet. Opp. 2–5, 6–7. Petitioner contests Patent Owner’s characterizations that Exhibit 1007 is “at odds with” Exhibit 1018 and that Exhibit 1018 “introduces a belated and new opinion centered on the prosecution history.” *Id.* at 3–4. Rather, according to Petitioner, Dr. Suslick explicitly states that he “would not change and ha[s] not changed any of the opinions expressed in” his first declaration. *Id.* (citing Ex. 1018 ¶ 2). Petitioner then argues that “[t]he basis of [Patent Owner]’s assertion that Ex. 1018 is ‘belated’ or that it should be excluded as ‘new opinion’ is unclear, and [Patent Owner] cites no legal authority to support its position.” *Id.*

Regarding Exhibits 1002 (Anderson I), 1003 (Anderson II), 1004 (Tankovich I), 1005 (Tankovich II), and 1006 (Tankovich III), Petitioner contends the statements in these issued patents are not offered to prove the truth of what is asserted, but rather as evidence to prove what the specification describes. *Id.* at 8 (citing 37 C.F.R. § 42.61(c) (“A specification . . . is admissible as evidence only to prove what the specification . . . describes.”); *Noven Pharms., Inc. v. Novartis AG*, IPR2014-00550, Paper 69 at 41 (PTAB Sept. 28, 2015) (denying exclusion under 37 C.F.R § 42.61(c) because statement only offered to prove what the specification describes).

Petitioner also opposes Patent Owner’s arguments regarding Exhibits 1010, 1011, 1012, 1013, 1014, 1015, 1017, and 1020 and presents arguments in support of its position. *Id.* at 9–15.

Because our Decision does not rely on the challenged Exhibits 1010, 1011, 1012, 1013, 1014, 1015, 1017, and 1020, we *dismiss* Patent Owner’s motion as moot as to these exhibits.

The party moving to exclude evidence bears the burden of proving that it is entitled to the relief requested, namely, that the material sought to be excluded is inadmissible under the Federal Rules of Evidence. *See* 37 C.F.R. §§ 42.20(c), 42.62(a). We do not find Patent Owner has met its burden to demonstrate that Exhibits 1002, 1003, 1004, 1005, and 1006 are inadmissible. Contrary to Patent Owner’s assertions, we do not find that Petitioner or Dr. Suslick relies on statements in these issued U.S. patents to prove a fact other than what the specification describes in each patent. *See* 37 C.F.R. § 42.61(c) (specification of a patent is admissible as evidence only

to prove what the specification describes). Thus, for Exhibits 1002, 1003, 1004, 1005, and 1006, we *deny* Patent Owner's motion.

Regarding Exhibits 1007 and 1018, as an initial matter, we find Patent Owner's objection to Exhibit 1007, which objection was filed on April 24, 2017 (Paper 12), to be filed timely from the issuance of the Decision to Institute on April 21, 2017 (Paper 8). See 37 C.F.R. 42.64(b)(1) ("Any objection to evidence submitted during a preliminary proceeding must be filed within ten business days of the institution of the trial."). Despite the timely objection, we do not find Patent Owner has met its burden to demonstrate that either of Exhibit 1007 or Exhibit 1018 is inadmissible. Although Exhibit 1007 does not include the required statement of oath, Exhibit 1018 does include such an oath and explicitly states "[h]aving reviewed the prosecution history of the '730 patent, I would not change any of the opinions expressed in my October 7, 2016 declaration." Considering that none of the opinions were changed, we do not agree with Patent Owner that the opinions thereby expressed in Exhibit 1018 are new, changed, or prejudicial to Patent Owner. Moreover, having analyzed Exhibit 1007, we find Dr. Suslick's testimony to be supported by citations to the record and in accord with the correct legal standards. Thus, for Exhibits 1007 and 1018, we *deny* Patent Owner's motion.

Accordingly, we *deny* Patent Owner's motion to exclude Exhibits 1002, 1003, 1004, 1005, 1006, 1007, and 1018, and we *dismiss* as moot Patent Owner's motion to exclude Exhibits 1010, 1011, 1012, 1013, 1014, 1015, 1017, and 1020.

B. Petitioner's Motion to Exclude Evidence

Petitioner filed Objections to Evidence (Paper 26) and a Motion to Exclude (Paper 40, “Pet. Mot.”) Exhibits 2004, 2007–2069, and 2071–2074. Patent Owner opposed the Motion to Exclude (Paper 44, “PO Opp.”) and Petitioner submitted a Reply in support of its Motion to Exclude (Paper 46).

Petitioner specifically argues that “[t]he opinions of Rice’s expert, Dr. Dmochowski, as set forth in Exhibit 2004, are founded on incorrect and incomplete legal standards, and thus must be excluded as irrelevant and prejudicial under Fed. R. Evid. 401–403.” Pet. Mot. 1. Petitioner further notes multiple deficiencies in Exhibit 2004 that it argues warrant exclusion. *Id.* at 3–7. Petitioner also moves to exclude Exhibits 2007–2069, and 2071–2074 under various provision of the Federal Rules of Evidence. *Id.* at 8–15.

Patent Owner opposes Petitioner’s arguments regarding Exhibits 2004, 2007–2069, and 2071–2074 and presents arguments in support of its position. PO Opp. 1–14.

Because our Decision does not rely on Exhibits 2007–2069 and 2071–2074, we *dismiss* Petitioner’s motion as moot as to those challenged exhibits.

Regarding Exhibit 2004, the party moving to exclude evidence bears the burden of proving that it is entitled to the relief requested, namely, that the material sought to be excluded is inadmissible under the Federal Rules of Evidence. *See* 37 C.F.R. §§ 42.20(c), 42.62(a). We do not find Petitioner has met its burden to demonstrate this exhibit is inadmissible. Rather, Petitioner’s arguments go to the weight to be accorded to the evidence. The Board is capable of determining and assigning the appropriate weight to the

evidence. Additionally, even without excluding this evidence, we have determined that Petitioner has established, based on a preponderance of the evidence, the unpatentability of claims 57–59 of the '730 patent.

Accordingly, we *deny* Petitioner's motion to exclude Exhibit 2004, and we *dismiss* as moot Petitioner's motion to exclude Exhibits 2007–2069 and 2071–2074.

IV. CHALLENGE TO PETITIONER'S REPLY ARGUMENTS

Patent Owner filed a list of alleged improper reply arguments (Paper 32) to which Petitioner filed a Reply (Paper 33). Patent Owner lists several portions of Petitioner's Reply and evidence allegedly beyond the scope of what can be considered appropriate for a reply. *See* Paper 32 (citing Reply).

We have considered Patent Owner's listing, but disagree that the cited portions of Petitioner's Reply and reply evidence are beyond the scope of what is appropriate for a reply. Replies are a vehicle for responding to arguments raised in a corresponding Patent Owner Response. Petitioner's arguments and evidence are not beyond the proper scope of a reply because we find that they fairly respond to Patent Owner's arguments raised in Patent Owner's Response. *See Idemitsu Kosan Co., LTD. v. SFC Co. LTD*, 870 F.3d 1376, 1381 (Fed. Cir. 2017) ("This back-and-forth shows that what [Patent Owner] characterizes as an argument raised 'too late' is simply the by-product of one party necessarily getting the last word. If anything, [Patent Owner] is the party that first raised this issue, by arguing—at least implicitly—that [a reference] teaches away from non-energy-gap combinations. [Petitioner] simply countered, as it was entitled to do.").

V. CONCLUSION

For the foregoing reasons, we conclude Petitioner has shown by a preponderance of the evidence that: (1) claims 57–59 are unpatentable under 35 U.S.C. § 102(b) as anticipated by Tankovich III; (2) claims 58 and 59 are unpatentable under 35 U.S.C. § 102(e) as anticipated by Anderson I; (3) claim 59 is unpatentable under 35 U.S.C. § 102(b) as anticipated by Tankovich II; (4) claims 58 and 59 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Tankovich I and Anderson I; and (5) claims 58 and 59 are unpatentable under 35 U.S.C. § 103(a) as obvious in view of Tankovich II and Anderson I. We conclude, however, that Petitioner has not shown by a preponderance of the evidence that claim 57 is unpatentable under 35 U.S.C. § 103(a) as obvious in view of Tankovich III and Anderson II.

VI. ORDER

For the reasons given, it is

ORDERED that, by a preponderance of the evidence, claims 57–59 of the '730 patent are unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Exclude Exhibits 1010, 1011, 1012, 1013, 1014, 1015, 1017, and 1020 is *dismissed as moot*;

FURTHER ORDERED that Patent Owner's Motion to Exclude Exhibits 1002, 1003, 1004, 1005, 1006, 1007, and 1018 is *denied*;

FURTHER ORDERED that Petitioner's Motion to Exclude Exhibits 2007–2069 and 2071–2074 is *dismissed as moot*;

FURTHER ORDERED that Petitioner's Motion to Exclude Exhibit 2004 is *denied*; and

FURTHER ORDERED that because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

IPR2017-00046
Patent 6,685,730 B2

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