

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SIENNA BIOPHARMACEUTICALS, INC.,

Petitioner

v.

RICE UNIVERSITY,

Patent Owner

U.S. Patent No. 6,685,730

Issued: February 3, 2004

Named Inventors: Jennifer L. West, Rebekah Drezek,
Scott Sershen & Nancy J. Halas

Title: OPTICALLY-ABSORBING NANOPARTICLES
FOR ENHANCED TISSUE REPAIR

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 6,685,730 UNDER 37 C.F.R. § 1.68**

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EXHIBIT LIST

Exhibit	Description
1001	U.S. Patent No. 6,685,730 (the '730 patent)
1002	U.S. Patent No. 6,183,773 (Anderson I)
1003	U.S. Patent No. 5,810,801 (Anderson II)
1004	U.S. Patent No. 5,226,907 (Tankovich I)
1005	U.S. Patent No. 5,817,089 (Tankovich II)
1006	U.S. Patent No. 6,050,990 (Tankovich III)
1007	Declaration of Kenneth S. Suslick, Ph.D.
1008	Curriculum Vitae of Kenneth S. Suslick, Ph.D.
1009	'730 Patent Prosecution History
1010	Merriam-Webster's Collegiate Dictionary, Eleventh Edition, 2012
1011	"40 nm, but not 750 or 1,500 nm, Nanoparticles Enter Epidermal CD1a+ Cells after Transcutaneous Application on Human Skin," A. Vogt et al., Journal of Investigative Dermatology, Vol. 126 (2006) (Vogt).

In accordance with 35 U.S.C. §§ 311-319 and 37 C.F.R. § 42.100 *et seq.*, Petitioner Sienna Biopharmaceuticals, Inc. (“Sienna” or “Petitioner”) respectfully requests that the Board institute *inter partes* review of claims 57-59 (“challenged claims”) of U.S. Patent 6,685,730 (“the ’730 patent”), which is owned by Rice University (“Rice” or “Patent Owner”), and cancel those claims because they are unpatentable in view of prior art patents and printed publications.

I. INTRODUCTION

The three claims challenged in this Petition are all directed to methods for treating human skin using light-absorbing nanoparticles. In the method, the nanoparticles are delivered to the skin and then exposed to light at one or more wavelengths that are absorbed by the nanoparticles.

As set forth below, the claims of the ’730 patent are unpatentable because they recite known methods that were described in printed publications before the effective filing date of the claimed invention, and are obvious because they are nothing more than the result of combining “familiar elements according to known methods” to “yield predictable results.” *KSR Intern. Co. v. Teleflex Inc.*, 550 U.S. 398, 415-16 (2007). As the Supreme Court has held, “when a patent ‘simply arranges old elements with each performing the same function it had been known to perform’ and yields no more than one would expect from such an arrangement, the combination is obvious.” *Id.* at 417 (*quoting Sakraida v. Ag Pro, Inc.*, 425 U.S.

273, 282 (1976) (*reh'g denied*, 426 U.S. 955 (1976))). The key question is whether the alleged improvement “is more than the predictable use of prior art elements according to their established functions.” *Id.* at 401. As set forth below, the answer to this question is “no” for the '730 patent because, well before the purported invention, the claimed skin treatments utilizing light-absorbing nanoparticles were well known and/or obvious. Patents and printed publications predating the purported invention also taught and disclosed such skin treatments utilizing light-absorbing nanoparticles.

It would have been obvious to a person having ordinary skill in the art to use the teachings of these references to practice the method of the challenged claims. Notably, “the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference....” *In re Keller*, 642 F.2d 413, 425 (CCPA 1981). Rather, “obviousness focuses on what the combined teachings would have suggested.” *In re Mouttet*, 686 F.3d 1322, 1330 (Fed. Cir. 2012) (citations omitted).

II. FORMALITIES

A. Notice of Real Party-In-Interest (37 C.F.R. § 42.8(b)(1))

The real-parties in interest for this Petition are Sienna Biopharmaceuticals, Inc., 2111 Palomar Airport Rd. #120, Carlsbad, CA 92011; and David Maki, 1014 Market St., Suite 200, Kirkland, WA 98033.

B. Notice of Related Matters (37 C.F.R. § 42.8(b)(2))

There are no other judicial or administrative matters that would directly affect, or be directly affected by, a decision in this proceeding. Petitioner notes that a separate Petition is being concurrently filed to challenge claims of U.S. Patent No. 6,530,944, which shares a common assignee and has overlapping subject matter with the '730 patent, although the patents do not share any priority or other familial relationship.

C. Designation of Lead and Back-up Counsel (37 C.F.R. § 42.8(b)(3))

Lead Counsel: Michael R. Fleming (Reg. No. 67,933)

Backup Counsel: Andrei Iancu (Reg. No. 41,862), Kamran Vakili (Reg. No. 64,825)

Address: Irell & Manella LLP, 1800 Avenue of the Stars, Suite 900, Los Angeles, CA 90067 | Tel: (310) 277-1010 | Fax: (310) 203-7199

D. Service Information (37 C.F.R. § 42.8(b)(4))

Please address all correspondence to the lead and backup counsel above.

Petitioner also consents to email service at: SiennaIPR@irell.com.

E. Payment of Fees (37 C.F.R. § 42.103)

The Office is authorized to charge the required fees, including the fee set forth in 37 C.F.R. § 42.15(a), to Deposit Account No. 09-0946 referencing Docket No. 163301-0001(730IPR), and for any other required fees.

F. Certification of Grounds for Standing (37 C.F.R. § 42.104(a))

Petitioner certifies that the '730 patent is eligible for *inter partes* review and that Petitioner is not barred or estopped from requesting an *inter partes* review of the challenged claims of the '730 patent on the grounds identified herein.

III. CHALLENGE AND RELIEF REQUESTED

Pursuant to 37 C.F.R. § 42.22(a)(1) and §§ 42.104(b) and (b)(1), Petitioner challenges claims 57-59 of the '730 patent. Petitioner respectfully requests *inter partes* review and cancellation of claims 57-59 of the '730 patent based on the grounds detailed below.

A. Specific Art and Statutory Ground(s) on Which the Challenges Are Based

Pursuant to 37 C.F.R. § 42.104(b)(2), *inter partes* review of the '730 patent is requested in view of the following references, each of which is prior art to the '730 patent under 35 U.S.C. § 102(b):

1. Nikolai I. Tankovich, *Hair Removal Device and Method*, U.S. Patent No. 5,226,907 (filed October 29, 1991; issued July 13, 1993) (Tankovich I).
2. Nikolai I. Tankovich, et al., *Skin Treatment Process Using Laser*, U.S. Patent No. 5,817,089 (filed June 12, 1995; issued October 6, 1998) (Tankovich II).
3. Nikolai I. Tankovich, et al., *Methods and Devices for Inhibiting Hair Growth and Related Skin Treatments*, U.S. Patent No. 6,050,990 (filed December 4, 1997; issued April 18, 2000) (Tankovich III).

4. Richard R. Anderson, *Targeting of Sebaceous Follicles as a Treatment of Sebaceous Gland Disorders*, U.S. Patent No. 6,183,773 (filed January 4, 1999; issued February 6, 2001) (Anderson I).
5. Richard R. Anderson, et al., *Method and Apparatus for Treating Wrinkles in Skin Using Radiation*, U.S. Patent No. 5,810,801 (filed February 5, 1997; issued September 22, 1998) (Anderson II).

The Tankovich I, Tankovich II, Tankovich III and Anderson II references each qualify as prior art under pre-AIA 35 U.S.C. § 102(b) because each was published or issued more than one year prior to the earliest priority date recited by the '730 patent, September 26, 2001. The Anderson I reference qualifies under pre-AIA 35 U.S.C. §§ 102(a) and 102(e) having a filing date of January 4, 1999 and a publication date of February 6, 2001.

Ground 1: Claims 57-59 are anticipated by Tankovich III under 35 U.S.C. § 102(b)

Ground 2: Claims 58-59 are anticipated by Anderson I under 35 U.S.C. § 102(e)

Ground 3: Claim 59 is anticipated by Tankovich II under 35 U.S.C. § 102(b)

Ground 4: Claims 58-59 are rendered obvious by Tankovich I in view of Anderson I under 35 U.S.C. § 103(a)

Ground 5: Claims 58-59 are rendered obvious by Tankovich II in view of Anderson I under 35 U.S.C. § 103(a)

Ground 6: Claims 57 is rendered obvious by Tankovich III in view of Anderson II under 35 U.S.C. § 103(a)

Section VII demonstrates, for each of the statutory grounds, that there is a reasonable likelihood that the Petitioner will prevail. *See* 35 U.S.C. § 314(a). Additional explanation and support for each ground is set forth in the expert declaration of Dr. Kenneth Suslick. Ex. 1007 [Suslick decl.].

IV. THE '730 PATENT

The application leading to the '730 patent was filed on September 25, 2002, and included a priority claim to provisional patent application no. 60/325,038, filed September 26, 2001. Ex. 1001-1. The references relied upon in this Petition are prior art to the '730 patent because they all predate the provisional patent application filing date, September 26, 2001, the earliest possible priority date for the '730 patent. Tankovich I, Tankovich II, Tankovich III and Anderson II are 35 U.S.C. § 102(b) references because they were published more than a year prior to the earliest possible priority date of the '730 patent. Anderson I is a 35 U.S.C. § 102(e) reference because its application filing date is prior to the earliest possible priority date of the '730 patent.

A. Representative Claim 57

The crux of the alleged invention of the '730 patent is the straightforward and well-known process of treating human skin using light-absorbing nanoparticles by delivering the nanoparticles to the skin and applying light that is absorbed by the nanoparticles. *See, e.g.*, Ex. 1007 [Suslick decl.] at ¶ 30. For example, claim 57 recites a method “for reducing wrinkles in tissue” comprising (a) “delivering nanoparticles that absorb light at one or more wavelengths to the tissue,” and (b) “exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles.” Ex. 1001 ['730 patent] at 20:17-23. Claims 58 and 59 are identical to each other and to claim 57, except for their preambles which recite “A method for resurfacing tissue” (claim 58) and “A method for ablating tissue” (claim 59).

B. The '730 Patent Disclosure**1. Delivering Nanoparticles That Absorb Light At One Or More Wavelengths To The Tissue**

The '730 patent defines nanoparticle generally, stating “[a]s used herein, ‘nanoparticle’ is defined as a particle having dimensions from 1 to 5000 nanometers,” and specifies that “‘nanoparticle’ means one or more nanoparticles.” Ex 1001 ['730 patent] 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; Ex. 1007 [Suslick decl.] at ¶ 33.

2. Exposing Said Nanoparticles To Light At One Or More Wavelengths That Are Absorbed By The Nanoparticles

The '730 patent discusses “the use of nanoparticles which effect a localized heating when exposed to an excitation source which is typically light and more typically laser light.” *Id.* at 6:29-32. It states, “[t]he excitation light used in typically NIR [near infrared], although other excitation may be used such as the rest of the IR spectrum, UV, and VIS or combinations of,” and that “[t]ypically, the light is in the wavelength range of 600-2000 nm.” *Id.* at 6:35-39. The '730 patent describes specific applications of the localized heating produced by the exposed nanoparticles, including skin resurfacing (i.e., “removal and/or minimization of wrinkles”) and tissue ablation, the latter achieved “by increasing the power of the light source used.” *Id.* at 12:63-64, 14:38-39; Ex. 1007 [Suslick decl.] at ¶ 34

V. PERSON HAVING ORDINARY SKILL IN THE ART

A Person Having Ordinary Skill In The Art (“PHOSITA”) would generally 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 [Suslick decl.] at ¶¶ 18-21.

VI. CLAIM CONSTRUCTION

In an *inter partes* review, the challenged claims must be given their “broadest reasonable construction” in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *see also* *Cuozzo Speed Techs., LLC v. Lee*, 136 S.Ct. 2131, 2146 (2016) (affirming the broadest reasonable construction standard). Because of this rule, for the purpose of this *inter partes* review, Petitioner has employed the broadest reasonable construction of the challenged claims throughout this petition. The broadest reasonable construction of claim terms, of course, will often be quite different from the construction those terms would receive in district court claim construction proceedings. *See Agilent Technologies Inc. v. Affymetrix, Inc.*, No. C 06-05958 JW, 2008 WL 7348188, at *5 (N.D. Cal. June 13, 2008). Pursuant to 37 C.F.R. § 42.104(b)(3), the following subsections explain the proper construction of particular claim terms at issue for purposes of this review.

A. “nanoparticles”

The challenged claims of the ’730 patent recite the limitation of “nanoparticles.” For example, independent claims 57-59 each recite, “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 [’730 patent] at 20:17-35.

The broadest reasonable interpretation (“BRI”) of the claim term “nanoparticles” is “particles of any size, shape or morphology having dimensions of from 1 to 1000 nanometers” because that is its plain and ordinary meaning. This is evidenced, for example, in the definition of “nanoparticle” provided in a standard dictionary: “a microscopic particle whose size is measured in nanometers.” Ex. 1010 [Merriam-Webster’s] at 824. A particle having a diameter between 1 and 1000 nanometers would typically be measured in units of nanometers, as opposed to a coarser or finer unit. Ex. 1007 [Suslick decl.] at ¶ 42. However, despite the plain and ordinary meaning of the term, the specification of the ’730 patent provides an explicit definition, whereby, “[a]s used herein, ‘nanoparticle’ is defined as a particle having dimensions of from 1 to 5000 nanometers, having any size, shape or morphology.” Ex. 1001 [’730 patent] at 5:62-67. “Under a broadest reasonable interpretation, words of the claim must be given their plain meaning, unless such meaning is inconsistent with the specification and prosecution history.” *Trivascular, Inc. v. Samuels*, No. 2015-1631, 2016 WL 463539, at *3 (Fed. Cir. Feb. 5, 2016) (citing *Straight Path IP Grp., Inc. v. Sipnet EU S.R.O.*, 806 F.3d 1356, 1362 (Fed. Cir. 2015)).

Accordingly, “nanoparticles” should be construed to mean “particles of any size, shape or morphology having dimensions of from 1 to 5000 nanometers.” Ex. 1007 [Suslick decl.] at ¶ 42.

B. “ablating tissue”

The challenged claims of the ’730 patent recite “ablating tissue.” For example, the preamble of independent claim 59 recites, “A method for **ablating tissue.**” Ex. 1001 [’730 patent] at 20:24. Although Petitioner argues below that the claim preambles should not be accorded patentable weight, Petitioner provides a proposed construction clarifying the meaning of the term “ablating tissue” in case the Board deems the preamble to deserve patentable weight.

The broadest reasonable interpretation (“BRI”) 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. Ex. 1007 [Suslick decl.] at ¶ 44. This is evidenced, for example, in the definition of “ablate” provided in a standard dictionary: “to remove or destroy esp. by cutting, abrading, or evaporating.” Ex. 1010 [Merriam-Webster’s] at 3. “Under a broadest reasonable interpretation, words of the claim must be given their plain meaning, unless such meaning is inconsistent with the specification and prosecution history.” *Trivascular, Inc. v. Samuels*, No. 2015-1631, 2016 WL 463539, at *3 (Fed. Cir. Feb. 5, 2016) (citing *Straight Path IP Grp., Inc. v. Sipnet EU S.R.O.*, 806 F.3d

1356, 1362 (Fed. Cir. 2015)). Ex. 1007 [Suslick decl.] at ¶ 44.

VII. THERE IS A REASONABLE LIKELIHOOD THAT AT LEAST ONE CLAIM OF THE '730 PATENT IS UNPATENTABLE

Claims 57-59 of the '730 patent are unpatentable on the following grounds:

Ground	35 U.S.C.	References(s)	Claims
1	§ 102(b)	Tankovich III	57-59
2	§ 102(e)	Anderson I	58-59
3	§ 102(b)	Tankovich II	59
4	§ 103(a)	Tankovich I in view of Anderson I	58-59
5	§ 103(a)	Tankovich II in view of Anderson I	58-59
6	§ 103(a)	Tankovich III in view of Anderson II	57

In support of these grounds, the Petition includes a Declaration of Dr. Kenneth Suslick, a nanoparticle and nanochemistry expert. Ex. 1007 [Suslick decl.].

None of the asserted prior art references was before the Examiner during the prosecution of the '730 patent. The Petition does not present the same or substantially the same prior art or arguments previously presented during the prosecution of the '730 patent or any parent applications. Petitioner further notes that the grounds set forth below lack redundancy at least because they include references qualifying as prior art under both 35 U.S.C. § 102(b) and § 102(e).

Pursuant to 37 C.F.R. § 42.104(b)(4), Petitioner provides in the following claim charts a detailed comparison of the claimed subject matter and the prior art specifying where each element of the challenged claims is found in the prior art.

A. Ground 1: Claims 57-59 Are Anticipated By Tankovich III Under 35 U.S.C. § 102(b)

As set forth below, Tankovich III teaches the well-known process of treating human skin using light-absorbing nanoparticles by delivering the nanoparticles to the skin and applying light that is absorbed by the nanoparticles, and teaches all of the elements of independent claims 57-59. Ex. 1007 [Suslick decl.] at ¶ 46.

1. Tankovich III Teaches All the Limitations of Independent Claim 57

The preamble of claim 57 recites “[a] method for reducing wrinkles in tissue.” Petitioner submits that the preamble should not be given patentable weight, at least because “the preamble merely recites the purpose of the process [and] the remainder of the claim . . . does not depend on the preamble for completeness and the process steps are able to stand alone.” *In re Hiraio*, 535 F.2d 67, 70 (CCPA 1976); *see also Intirtool, Ltd. v. Texar Corp.*, 369 F.3d 1289, 1294-96, 70 USPQ2d 1780, 1783-84 (Fed. Cir. 2004) (holding that the preamble of a patent claim directed to a “hand-held punch pliers for simultaneously punching and connecting overlapping sheet metal” was not a limitation of the claim because (i) the body of the claim described a “structurally complete invention” without the preamble, and (ii) statements in prosecution history referring to the “punching and connecting” function of invention did not constitute “clear reliance” on the preamble needed to make the preamble a limitation); *Bristol-Myers Squibb Co. v.*

Ben Venue Labs, Inc., 246 F.3d 1368, 1374-75 (Fed. Cir. 2001); *Kropa v. Robie*, 187 F.2d 150, 151-52 (CCPA 1951). The preamble here, “[a] method for reducing wrinkles in tissue,” merely recites an intended purpose of the claim, but has no further substantive relationship to the elements recited by the claim, which stand alone as a structurally complete invention, and thus the preamble is undeserving of patentable weight. Tankovich III 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.” Ex. 1006 [Tankovich III] at 1:48-50; Ex. 1007 [Suslick decl.] at ¶ 47.

- a) Delivering nanoparticles that absorb light at one or more wavelengths to the tissue

Tankovich III teaches and suggests “delivering nanoparticles that absorb light at one or more wavelengths to the tissue,” as recited by claim 57. It describes using “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.” Ex. 1006 [Tankovich III] at 9:35-38, 9:66-10:2. 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 and discussed above in Section

VI.A in relation to claim construction. The 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 10:6-8. Ex. 1007 [Suslick decl.] at ¶ 48.

- b) Exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles

Tankovich III teaches “exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles,” as recited by claim 57.

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.” Ex. 1006 [Tankovich III] at 10:20-23; Ex. 1007 [Suslick decl.] at ¶ 49.

2. Tankovich III Teaches All the Limitations of Independent Claim 58

Tankovich III teaches “A method for resurfacing tissue,” as recited by claim 58. The preamble here reciting “[a] method for resurfacing tissue” is merely a statement of intended purpose unrelated to the claim elements, which are identical across the challenged claims. Accordingly, the preamble of claim 58 should not be given patentable weight for at least the same reasons discussed above in Section VII.A.1, which are incorporated by reference herein and not repeated for brevity. However, should the Board deem the preamble as deserving patentable weight,

Petitioner notes that Tankovich III describes how “[a] contaminant applied topically can also be used to facilitate laser skin resurfacing.” Ex. 1006

[Tankovich III] at 1:40-41. Tankovich III further 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.” Ex. 1006

[Tankovich III] at 1:48-50; Ex. 1007 [Suslick decl.] at ¶ 50.

- a) Delivering nanoparticles that absorb light at one or more wavelengths to the tissue

Tankovich III teaches and suggests “delivering nanoparticles that absorb light at one or more wavelengths to the tissue,” as recited by claim 58. Tankovich III’s teaching is discussed above in Section VII.A.1.a, and is fully incorporated by reference herein and not repeated for brevity.

- b) Exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles

Tankovich III teaches “exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles,” as recited by claim 58.

Tankovich III’s teaching is discussed above in Section VII.A.1.b, and is fully incorporated by reference herein and not repeated for brevity.

3. Tankovich III Teaches All the Limitations of Independent Claim 59

Tankovich III teaches “A method for ablating tissue,” as recited by claim 58. The preamble here reciting “[a] method for ablating tissue” is merely a statement

of intended purpose unrelated to the claim elements, which are identical across the challenged claims. Accordingly, the preamble of claim 58 should not be given patentable weight for at least the same reasons discussed above in Section VII.A.1, which are incorporated by reference herein and not repeated for brevity.

Tankovich III 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.” Ex. 1006 [Tankovich III] at 1:48-50; Ex. 1007 [Suslick decl.] at ¶ 53.

- a) Delivering nanoparticles that absorb light at one or more wavelengths to the tissue

Tankovich III teaches and suggests “delivering nanoparticles that absorb light at one or more wavelengths to the tissue,” as recited by claim 59. Tankovich III’s teaching is discussed above in Section VII.A.1.a, and is fully incorporated by reference herein and not repeated for brevity.

- b) Exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles

Tankovich III teaches “exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles,” as recited by claim 59. . Tankovich III’s teaching is discussed above in Section VII.A.1.b, and is fully incorporated by reference herein and not repeated for brevity.

4. Chart for Claims 57-59

'730 Claim	Disclosure of Tankovich III
57. A method for reducing wrinkles in tissue comprising the steps of:	<i>See, e.g.</i> , Ex. 1006 [Tankovich III] 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.”).
[57.a] delivering nanoparticles that absorb light at one or more wavelengths to the tissue; and	<p><i>See, e.g.</i>, Ex. 1006 [Tankovich III] at 9:35-10:2 (“For instance an oil or water-based suspension of carbon particles or other chromophore particles that absorb light in the near IR region of the spectrum, can be employed as the externally applied contaminant. . . . As one example, the contaminant can be a suspension of carbon particles 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.”).</p> <p><i>Id.</i> at 10:6-19 (“When applied to the skin section prior to irradiation, at least a portion of the contaminant must enter the upper region of the hair follicles, i.e., the mouth of the hair follicles. Generally, merely applying the contaminant to the skin surface will cause the particles to infiltrate only about 20 microns into the hair follicles. Increased penetration of a contaminant containing oil may be obtained by allowing the contaminant to rest on the skin section for a period of time sufficient for the opening of the hair follicle to become enlarged before the next step is taken. This effect is thought to be due to the action of the light oil on the skin and hair follicles. Usually, allowing an oil-based contaminant to remain on a skin section for a period of about 15 minutes is sufficient to enlarge the openings of hair follicles to the fullest extent.”).</p>
[57.b] exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles.	<i>See, e.g.</i> , Ex. 1006 [Tankovich III] at 10:20-27 (“Next, to shock the hair follicles, the contaminated skin section is illuminated with one or two short pulses of light having a frequency highly absorbed by the contaminant particles. For example, if the contaminant contains carbon particles, a frequency is used that is well absorbed in carbon, but relatively transparent to skin,

	such as is provided by a Nd:YAG laser. Additional useful light sources are discussed in the Tankovich patents incorporated herein by reference.”).
58. A method for resurfacing tissue comprising the steps of:	<i>See, e.g.</i> , Ex. 1006 [Tankovich III] at 1:40-46 (“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.”). <i>Id.</i> 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.”).
[58.a] delivering nanoparticles that absorb light at one or more wavelengths to the tissue; and	<i>See</i> Tankovich III disclosures above for Section VII.A.1.a & 4 [57.a] .
[58.b] exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles.	<i>See</i> Tankovich III disclosures above for Section VII.A.1.b & 4 [57.b] .
59. A method for resurfacing tissue comprising the steps of:	<i>See, e.g.</i> , Ex. 1006 [Tankovich III] 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.”).
[59.a] delivering nanoparticles that absorb light at one or more wavelengths to the tissue; and	<i>See</i> Tankovich III disclosures above for Section VII.A.1.a & 4 [57.a] .
[59.b] exposing said nanoparticles to light at one or more	<i>See</i> Tankovich III disclosures above for Section VII.A.1.b & 4 [57.b] .

wavelengths that are absorbed by the nanoparticles.	
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B. Ground 2: Claims 58-59 Are Anticipated By Anderson I Under 35 U.S.C. § 102(e)

As set forth below, Anderson I teaches the well-known process of treating human skin using light-absorbing nanoparticles by delivering the nanoparticles to the skin and applying light that is absorbed by the nanoparticles, and teaches all of the elements of independent claims 58-59. Ex. 1007 [Suslick decl.] at ¶ 57.

1. Anderson I Teaches All the Limitations of Independent Claim 58

Anderson I teaches “A method for resurfacing tissue,” as recited by claim 58. This preamble is merely a statement of intended purpose unrelated to the claim elements, which are identical across the challenged claims. Accordingly, the preamble of claim 58 should not be given patentable weight for at least the same reasons discussed above in Section VII.A.1, which are incorporated by reference herein and not repeated for brevity. However, should the Board deem the preamble as deserving patentable weight, Petitioner notes that Anderson I describes the use of “laser dermatology treatments” as “‘cures’ – producing a permanent anatomic, microsurgical effect on the skin” including “skin resurfacing.” Ex. 1002 [Anderson I] at 1:42-45. Ex. 1007 [Suslick decl.] at ¶ 58.

- a) Delivering nanoparticles that absorb light at one or more wavelengths to the tissue

Anderson I teaches and suggests “delivering nanoparticles that absorb light at one or more wavelengths to the tissue,” as recited by claim 58. It describes energy activatable materials 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.” Ex. 1002 [Anderson I] at 5:47-50. It describes how “[d]elivery of the energy activatable material . . . 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” *Id.* at 11:19-25. Anderson I states that “[a] sufficient amount of the material infiltrates the pilosebaceous unit.” *Id.* at 4:25-29. A PHOSITA would understand, from Anderson I’s discussion of infiltration of the pilosebaceous unit and/or delivery by liposome encapsulation technology, that the disclosed energy activatable material, including “carbon particles,” should be of size in the range from 1 to 5000 nanometers. *See, e.g.,* Ex. 1011 [Vogt] at Abstract (“[F]low cytometry after transcutaneous application of 40, 750, or 1,500 nm nanoparticles on human skin samples revealed that only 40 nm particles entered epidermal LCs [Langerhans cells]. . . . [O]nly 40

nm particles deeply penetrate into vellus hair openings and through the follicular epithelium,"); Ex. 1007 [Suslick decl.] at ¶ 59.

- b) Exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles

Anderson I teaches “exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles,” as recited by claim 58. It discusses “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.” Ex. 1002 [Anderson I] at 10:33-38; Ex. 1007 [Suslick decl.] at ¶ 60.

2. Anderson I Teaches All the Limitations of Independent Claim 59

Anderson I teaches “A method for ablating tissue,” as recited by claim 59. Similar to claim 58 above, the preamble here reciting “[a] method for ablating tissue” is merely a statement of intended purpose unrelated to the claim elements, which are substantively identical to claim 58. Accordingly, the preamble of claim 59 should not be given patentable weight for at least the same reasons discussed above in Section VII.A.1 for claim 58, which are incorporated by reference herein and not repeated for brevity. However, should the Board deem the preamble as deserving patentable weight, Petitioner notes that Anderson I describes the use of “laser dermatology treatments” as “‘cures’ – producing a permanent anatomic,

microsurgical effect on the skin” including “skin resurfacing.” Ex. 1002

[Anderson I] at 1:42-45. In particular, it describes the curing of skin disorders by means of “[s]elective photothermolysis or controlled skin ablation.” *Id.* at 1:46-47.

Ex. 1007 [Suslick decl.] at ¶ 61.

- a) Delivering nanoparticles that absorb light at one or more wavelengths to the tissue

Anderson I teaches and suggests “delivering nanoparticles that absorb light at one or more wavelengths to the tissue,” as recited by claim 59. The teaching of Anderson I for independent claim 58 discussed above in Section VII.B.1.a is fully incorporated by reference herein and not repeated for brevity.

- b) Exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles

Anderson I teaches and suggests “exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles,” as recited by claim 58. The teaching of Anderson I for independent claim 59 discussed above in Section VII.B.1.b is fully incorporated by reference herein and not repeated for brevity.

3. Chart for Claims 58-59

'730 Claim	Disclosure of Anderson I
58. A method for resurfacing tissue comprising the steps of:	<i>See, e.g.,</i> Ex. 1002 [Anderson I] at 1:42-50 (“Unlike medical dermatology, most laser dermatology treatments are actually ‘cures’ – producing a permanent anatomic, microsurgical effect on the skin. This includes skin resurfacing, portwine stain treatment, tattoo and

	<p>pigmented lesion removal, and hair removal. Selective photothermolysis or controlled skin ablation with lasers or other extremely intense light sources, might therefore be capable of curing skin disorders, such as acne, if appropriately targeted to the primary site(s) of pathophysiology.”).</p>
<p>[58.a] delivering nanoparticles that absorb light at one or more wavelengths to the tissue; and</p>	<p><i>See, e.g.</i>, Ex. 1002 [Anderson I] at 5:47-67 (“Suitable materials useful in the invention include metal oxides, such as aluminum oxide, iron oxides, carbon particles (graphite and amorphous carbon particles) and natural and synthetic chromophores. The term “chromophore” is art recognized and is intended to include those compounds which absorb energy at a given wavelength, often by sites of unsaturation, carbon-oxygen bonds, and/or charged species, or combinations thereof. Suitable chromophoric groups include nitro groups, azo, quinoids, alkylene units, carbonyls, esters, alkynes, aldehydes, carboxylic acids, and those groups associated with $n \rightarrow \pi^*$ and $\pi \rightarrow \pi^*$ transitions. Preferred energy activatable materials include laser sensitive dyes, for example, methylene blue, indocyanine green and those in U.S. Pat. No. 4,651,739, issued Mar. 24, 1987, the entire contents of which are incorporated herein by reference. Preferred dyes are those dyes which are activated by laser stimulation. Preferred laser sensitive dyes are those which are FDA approved. A preferred dye, a laser sensitive dye, is methylene blue. In one embodiment, the laser sensitive dye is not indocyanine green. In another embodiment, the energy activatable material is not carbon particles.”).</p> <p><i>Id.</i> at 11:19-25 (“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.”).</p>
<p>[58.b] exposing said</p>	<p><i>See, e.g.</i>, Ex. 1002 [Anderson I] at 10:33-38 (“The</p>

nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles.	introduction of a energy activatable material in sebaceous glands followed by exposure to energy (light) with a wavelength that corresponds to the absorption peak of the chromophore, will increase the local absorption of light in tissue and lead to selective thermal damage of sebaceous glands.”). <i>Id.</i> at 7:58-65 (“It is highly preferred to use wavelengths of the optical spectrum in which natural skin pigments exhibit weaker absorption (to minimize heating at other sites), and which penetrate well to the anatomic depth of the infundibulum and/or sebaceous glands. The orange, red, and near-infrared wavelength region (600-1200 nm) is therefore most appropriate. At these wavelengths, there is very little absorption by natural skin pigments other than melanin.”).
59. A method for ablating tissue comprising the steps of:	<i>See</i> Anderson I disclosures above for Section VII.B.1 & 3 [58].
[59.a] delivering nanoparticles that absorb light at one or more wavelengths to the tissue; and	<i>See</i> Anderson I disclosures above for Section VII.B.1.a & 3 [58.a].
[59.b] exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles.	<i>See</i> Anderson I disclosures above for Section VII.B.1.b & 3 [58.b].

C. Ground 3: Claim 59 Is Anticipated By Tankovich II Under 35 U.S.C. § 102(b)

As set forth below, Tankovich II teaches the well-known process of treating human skin using light-absorbing nanoparticles by delivering the nanoparticles to

the skin and applying light that is absorbed by the nanoparticles, and teaches all of the elements of independent claim 59. Ex. 1007 [Suslick decl.] at ¶ 65.

1. Tankovich II Teaches All the Limitations of Independent Claim 59

Tankovich II teaches “A method for ablating tissue,” as recited by claim 59. The preamble here reciting “[a] method for ablating tissue” is merely a statement of intended purpose unrelated to the claim elements, which are substantively identical to claim 58. Accordingly, the preamble of claim 59 should not be given patentable weight for at least the same reasons discussed above in Section VII.A.1, which are incorporated by reference herein and not repeated for brevity. However, should the Board deem the preamble as deserving patentable weight, Petitioner notes that Tankovich II 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.” Ex. 1005 [Tankovich II] at 7:7-13. The vaporization of epidermal tissue corresponds to the claimed “ablating tissue.” Ex. 1007 [Suslick decl.] at ¶ 66.

- a) Delivering nanoparticles that absorb light at one or more wavelengths to the tissue

Tankovich II discusses “topically apply[ing] a layer of carbon solution to the skin surface,” wherein “[t]he solution is comprised of 1 micron graphite powder in

baby oil.” Ex. 1005 [Tankovich II] at 3:47-50. Tankovich II’s disclosed particle size, 1 micron, is equivalent to 1000 nanometers and therefore overlaps the size range of “nanoparticles” of 1 to 5000 nanometers, as described in the ’730 patent and discussed above in Section VI.A in relation to claim construction. Tankovich II explicitly notes that this “[g]raphite is very absorptive of laser energy at the 1.06 μm wavelength.” *Id.* at 4:7-8. Ex. 1007 [Suslick decl.] at ¶ 67.

- b) Exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles

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 ,” whereby the “[g]raphite [nanoparticles are] very absorptive of laser energy at the 1.06 μm wavelength.” *Id.* at 4:3-8. Ex. 1007 [Suslick decl.] at ¶ 68.

2. Chart for Claims 59

'730 Claim	Disclosure of Tankovich II
<p>59. A method for ablating tissue comprising the steps of:</p>	<p><i>See, e.g.,</i> Ex. 1005 [Tankovich II], 7:3-13 (“The process is very similar to that described above. Graphite is applied as above using the ultrasound to force some of the carbon below the surface. The laser pulses are applied as above and to the first two pulses produce similar results cleaning off the two layers of carbon. The third pulse however will in addition to vaporizing carbon below the skin surface will vaporize a thin surface of tissue. Therefore, we get the combined effect of (1) mechanical removal of tissues due to the explosion of particles below the surface and (2) vaporization of a surface layer of epidermal tissue about 2-3 microns thick.”).</p>
<p>[59.a] delivering</p>	<p><i>See, e.g.,</i> Ex. 1005 [Tankovich II], 3:47-50 (“The first</p>

nanoparticles that absorb light at one or more wavelengths to the tissue; and	step of this preferred embodiment is to topically apply a layer of carbon solution to the skin surface as shown in FIG. 3B. The solution is comprised of 1 micron graphite powder in baby oil.”). <i>Id.</i> at 4:3-8 (“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 μm. Pulse frequency is about 5 Hz but we scan the beam so that each location is subjected to pulses at a frequency of about 1 Hz. Graphite is very absorptive of laser energy at the 1.06 μm wavelength.”)
[59.b] exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles.	<i>See, e.g.</i> , Ex. 1005 [Tankovich II], 4:3-8 (“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 μm. Pulse frequency is about 5 Hz but we scan the beam so that each location is subjected to pulses at a frequency of about 1 Hz. Graphite is very absorptive of laser energy at the 1.06 μm wavelength.”)

D. Ground 4: Claims 58-59 Are Rendered Obvious By Tankovich I In View Of Anderson I Under 35 U.S.C. § 103(a)

As set forth below, Anderson I in view of Tankovich I teaches all the limitations of claims 58-59. Although Anderson I itself teaches all the limitations of these claims, to the extent it may lack explicit discussion of nanoparticles that absorb light at one or more wavelengths, Tankovich I expressly teaches such nanoparticles. As shown in the claim chart below, Anderson I in view of Tankovich I teaches the well-known process of treating human skin using light-absorbing nanoparticles by delivering the nanoparticles to the skin and applying light that is absorbed by the nanoparticles, and renders obvious all of the elements of independent claims 58-59. Ex. 1007 [Suslick decl.] at ¶ 70.

1. Tankovich I in View of Anderson I Teaches All the Limitations of Independent Claim 58

The combination of Anderson I and Tankovich I teaches “A method for resurfacing tissue,” as recited by claim 58. The preamble here reciting “[a] method for resurfacing tissue” is merely a statement of intended purpose unrelated to the claim elements, which are identical across the challenged claims. Accordingly, the preamble of claim 58 should not be given patentable weight for at least the same reasons discussed above in Section VII.A.1, which are incorporated by reference herein and not repeated for brevity. However, should the Board deem the preamble as deserving patentable weight, Petitioner refers to the teaching of Anderson I for independent claim 58 discussed above in Section VII.B.1, which is fully incorporated by reference herein and not repeated for brevity.

- a) Delivering nanoparticles that absorb light at one or more wavelengths to the tissue

The combination of Anderson I and Tankovich I teaches “delivering nanoparticles that absorb light at one or more wavelengths to the tissue,” as recited by claim 58. Anderson I’s teaching discussed above in Section VII.B.1.a is fully incorporated by reference herein and not repeated for brevity. Furthermore, Tankovich I discusses the use of “a laser absorbing carbon suspension prepared of carbon powder in peach oil,” where “[t]he particle size of the powder preferably is about 10-20 nm” Ex. 1004 [Tankovich I] at 1:67-2:1. Tankovich I’s

disclosed particle size range, from 10-20 nanometers, overlaps the size range of “nanoparticles” of 1 to 5000 nanometers, as described in the ’730 patent and discussed above in Section VI.A in relation to claim construction. These nanoparticles are “rubbed on the skin with a massaging action so that portions of the carbon suspension infiltrates the hair ducts” of the skin. *Id.* at 2:5-8.

Tankovich further describes use of a “laser which has the spikes in the range of 10.6 microns . . . and is readily absorbed in carbon.” *Id.* at 2:15-18. Ex. 1007 [Suslick decl.] at ¶ 72.

- b) Exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles

The combination of Anderson I and Tankovich I teaches “exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles,” as recited by claim 58. Anderson I’s teaching discussed above in Section VII.B.1.b is fully incorporated by reference herein and not repeated for brevity. Furthermore, Tankovich I describes use of a “laser which has the spikes in the range of 10.6 microns . . . and is readily absorbed in carbon” nanoparticles used in its topical skin preparation. Ex. 1004 [Tankovich I] at 2:15-18. It describes laser parameters “chosen to preferentially heat the suspension” whereby “a large amount of energy is deposited in the suspension quickly” *Id.* at 2:52-59. Ex. 1007 [Suslick decl.] at ¶ 73.

2. Tankovich I in View of Anderson I Teaches All the Limitations of Independent Claim 59

The combination of Anderson I and Tankovich I teaches “A method for ablating tissue,” as recited by claim 59. The teaching of Anderson I for independent claim 59 discussed above in Section VII.B.1 is fully incorporated by reference herein and not repeated for brevity.

- a) Delivering nanoparticles that absorb light at one or more wavelengths to the tissue

The combination of Anderson I and Tankovich I teaches “delivering nanoparticles that absorb light at one or more wavelengths to the tissue,” as recited by claim 59. Anderson I’s teaching is discussed above in Section VII.B.1.a and Tankovich I’s teaching is discussed above in Section VII.D.1.a, and both are fully incorporated by reference herein and not repeated for brevity.

- b) Exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles

The combination of Anderson I and Tankovich I teaches “exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles,” as recited by claim 59. Anderson I’s teaching is discussed above in Section VII.B.1.b and Tankovich I’s teaching is discussed above in section VII.D.1.b, and both are fully incorporated by reference herein and not repeated for brevity.

3. Chart for Claims 58-59

'730 Claim	Disclosure of Anderson I and Tankovich I
<p>58. A method for resurfacing tissue comprising the steps of:</p>	<p><i>See</i> Anderson I disclosures above for Section VII.B.1 & 3 [58].</p>
<p>[58.a] delivering nanoparticles that absorb light at one or more wavelengths to the tissue; and</p>	<p><i>See</i> Anderson I disclosures above for Section VII.B.1.a & 3 [58.a].</p> <p><i>See, e.g.</i>, Ex. 1004 [Tankovich I], 1:67-2:8 (“First, a laser absorbing carbon suspension is prepared of carbon powder in peach oil. The particle size of the powder preferably is about 10-20 nm and its concentration preferably is about 15% to 20% by volume. A clean section of skin is depicted in FIG. 2A. This suspension is rubbed on the skin with a massaging action so that portions of the carbon suspension infiltrates the hair ducts of the hair that is be removed as shown in FIG. 2B.”).</p> <p><i>Id.</i> at 2:14-18 (“The laser device used in this preferred embodiment is a CO₂ pulse laser which has the spikes in the range of 10.6 microns. Light in this range will pass through the surface of the skin of a fair skin person and is readily absorbed in carbon.”)</p>
<p>[58.b] exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles.</p>	<p><i>See</i> Anderson I disclosures above for Section VII.B.1.b & 3 [58.b].</p> <p><i>See, e.g.</i>, Ex. 1004 [Tankovich I], 2:14-18 (“The laser device used in this preferred embodiment is a CO₂ pulse laser which has the spikes in the range of 10.6 microns. Light in this range will pass through the surface of the skin of a fair skin person and is readily absorbed in carbon.”)</p> <p><i>Id.</i> at 2:51-64 (“Operating within the parameters specified is very important. They have been chosen to preferentially heat the suspension which in turns heats the hair follicles and the blood vessels feeding the</p>

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. The pulse width is a most important parameter. It must be chosen so that a large amount of energy is deposited in the suspension quickly so that the temperature of the suspension rises rapidly in steps to about above 70°-80° C. This temperature applied for about 1 to 3 seconds is high enough to kill the follicles and/or the vessels feeding the follicles but not high enough to vaporize the oil. ”).

Id. at Fig. 3

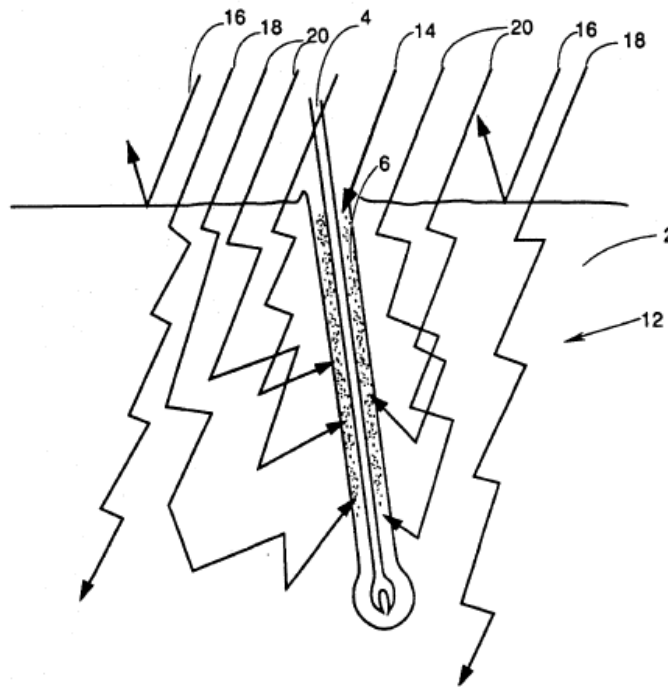


FIG. 3

59. A method for ablating tissue comprising the steps

See Anderson I disclosures above for Section VII.B.1 & 3 [58].

of:	
[59.a] delivering nanoparticles that absorb light at one or more wavelengths to the tissue; and	<i>See Anderson I disclosures above for Section VII.B.1.a & 3 [58.a] and Tankovich I disclosures above for Section VII.D.1.a & 3 [58.a].</i>
[59.b] exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles.	<i>See Anderson I disclosures above for Section VII.B.1.b & 3 [58.b] and Tankovich I disclosures above for Section VII.D.1.b & 3 [58.b].</i>

4. Reasons for Combinability for Claims 58-59

A PHOSITA 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. Both Tankovich I and Anderson I disclose cosmetic treatments having a high degree of similarity in structure, purpose and operation. For example, both are directed to the use of 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. Ex. 1002 [Anderson I] at 5:37-67, 7:58-65, 10:33-38, 11:19-25; Ex. 1004 [Tankovich I] at 1:67-2:8, 2:14-18, 2:51-64, Fig. 3; Ex. 1007 [Suslick decl.] at ¶ 78.

Not only do Tankovich I and Anderson I both discuss delivery of radiation-absorbing nanoparticles for cosmetic applications, but in fact specifically describe

the delivery of nanoparticles to the skin. Ex. 1002 [Anderson I] at 1:46-50, 11:19-25; Ex. 1004 [Tankovich I] at 1:67-2:8. Furthermore, they both discuss delivery by the same methods, with Tankovich I describing the suspension of particles being “rubbed on the skin with a massaging action so that portions of the carbon suspension infiltrates the hair ducts,” and Anderson I similarly describing “[d]elivery . . . to the follicle matrix . . . by topical application . . . [and] massage.” Ex. 1002 [Anderson I] at 11:19-25; Ex. 1004 [Tankovich I] at 1:67-2:8. Anderson I states that this technique, which is disclosed in Tankovich I, results in “skin resurfacing” and “controlled skin ablation.” Ex. 1002 [Anderson I] at 1:44-50. Accordingly, not only did the prior art combination of Tankovich I and Anderson I contain all of the elements recited in claims 58-59, but the two could be combined by a PHOSITA in accordance with the methods disclosed therein with each performing the same function in combination as separately (i.e., hair removal as described by Tankovich I and skin resurfacing and/or ablation as described by Anderson I). Ex. 1007 [Suslick decl.] at ¶ 79. Furthermore, the results of the combination (the aforementioned skin resurfacing, wrinkle reduction, and skin ablation) would have been predictable to a PHOSITA inasmuch as they were explicitly disclosed to occur in Anderson I. *Id.*

E. Ground 5: Claims 58-59 Are Rendered Obvious By Tankovich II In View Of Anderson I Under 35 U.S.C. § 103(a)

As set forth below, Anderson I in view of Tankovich II teaches all the limitations of claims 58-59. Although Anderson I itself teaches all the limitations of these claims, to the extent it may lack explicit discussion of nanoparticles that absorb light at one or more wavelengths, Tankovich II expressly teaches such nanoparticles. As shown in the claim chart below, Anderson I in view of Tankovich II teaches the well-known process of treating human skin using light-absorbing nanoparticles by delivering the nanoparticles to the skin and applying light that is absorbed by the nanoparticles, and renders obvious all of the elements of independent claims 58-59. Ex. 1007 [Suslick decl.] at ¶ 80.

1. Tankovich II in View of Anderson I Teaches All the Limitations of Independent Claim 58

The combination of Anderson I and Tankovich II teaches “A method for resurfacing tissue,” as recited by claim 58. The preamble here reciting “[a] method for resurfacing tissue” is merely a statement of intended purpose unrelated to the claim elements, which are identical across the challenged claims. Accordingly, the preamble of claim 58 should not be given patentable weight for at least the same reasons discussed above in Section VII.A.1, which are incorporated by reference herein and not repeated for brevity. However, should the Board deem the preamble as deserving patentable weight, Petitioner refers to the teaching of

Anderson I for independent claim 58 discussed above in Section VII.B.1, which is fully incorporated by reference herein and not repeated for brevity.

- a) Delivering nanoparticles that absorb light at one or more wavelengths to the tissue

The combination of Anderson I and Tankovich II teaches “delivering nanoparticles that absorb light at one or more wavelengths to the tissue,” as recited by claim 58. Anderson I’s teaching is discussed above in Section VII.B.1.a and Tankovich II’s teaching is discussed above in Section VII.C.1.a, and both are fully incorporated by reference herein and not repeated for brevity.

- b) Exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles

The combination of Anderson I and Tankovich II teaches “exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles,” as recited by claim 58. Anderson I’s teaching is discussed above in Section VII.B.1.b and Tankovich II’s teaching is discussed above in Section VII.C.1.b, and both are fully incorporated by reference herein and not repeated for brevity.

2. Tankovich II in View of Anderson I Teaches All the Limitations of Independent Claim 59

The combination of Anderson I and Tankovich II teaches “A method for ablating tissue,” as recited by claim 59. The teaching of Anderson I for independent claim 59 discussed above in Section VII.B.1 is fully incorporated by

reference herein and not repeated for brevity.

- a) Delivering nanoparticles that absorb light at one or more wavelengths to the tissue

The combination of Anderson I and Tankovich II teaches “delivering nanoparticles that absorb light at one or more wavelengths to the tissue,” as recited by claim 59. Anderson I’s teaching is discussed above in Section VII.B.1.a and Tankovich II’s teaching is discussed above in Section VII.C.1.a, and both are fully incorporated by reference herein and not repeated for brevity.

- b) Exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles

The combination of Anderson I and Tankovich II teaches “exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles,” as recited by claim 59. Anderson I’s teaching is discussed above in Section VII.B.1.b and Tankovich II’s teaching is discussed above in Section VII.C.1.b, and both are fully incorporated by reference herein and not repeated for brevity.

3. Chart for Claims 58-59

'730 Claim	Disclosure of Anderson I and Tankovich II
58. A method for resurfacing tissue comprising the steps of:	<i>See</i> Anderson I disclosures above for Section VII.B.1 & 3 [58].
[58.a] delivering nanoparticles that absorb light at one	<i>See</i> Anderson I disclosures above for Section VII.B.1.a & 3 [58.a] and Tankovich II disclosures above for Section VII.C.1.a & 2 [59.a].

or more wavelengths to the tissue; and	
[58.b] exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles.	<i>See Anderson I disclosures above for Section VII.B.1.b & 3 [58.b] and Tankovich II disclosures above for Section VII.C.1.b & 2 [59.b].</i>
59. A method for ablating tissue comprising the steps of:	<i>See Anderson I disclosures above for Section VII.B.1 & 3 [58].</i>
[59.a] delivering nanoparticles that absorb light at one or more wavelengths to the tissue; and	<i>See Anderson I disclosures above for Section VII.B.1.a & 3 [58.a] and Tankovich II disclosures above for Section VII.C.1.a & 2 [59.a].</i>
[59.b] exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles.	<i>See Anderson I disclosures above for Section VII.B.1.b & 3 [58.b] and Tankovich II disclosures above for Section VII.C.1.b & 2 [59.b].</i>

4. Reasons for Combinability for Claims 58-59

A PHOSITA would have had reasons to use aspects of Anderson I's system for skin resurfacing and tissue ablation within Tankovich II's system for skin treatment using locally heated nanoparticles. Both Tankovich II and Anderson I disclose cosmetic treatments having a high degree of similarity in structure, purpose and operation. For example, both are directed to the use of 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.

Ex. 1002 [Anderson I] at 5:37-67, 7:58-65, 10:33-38, 11:19-25; Ex. 1005

[Tankovich II] at 3:47-50, 4:3-8; Ex. 1007 [Suslick decl.] at ¶ 88.

Not only do Tankovich II and Anderson I both discuss delivery of radiation-absorbing nanoparticles for cosmetic applications, but in fact specifically describe the delivery of nanoparticles to the skin. Ex. 1002 [Anderson I] at 1:46-50, 11:19-25; Ex. 1005 [Tankovich II] at 3:47-50. Furthermore, they both discuss delivery by the same methods, with Tankovich II describing the nanoparticle mixture being topically “applied to the area to be treated. . . . [and] massaged into the skin,” and Anderson I similarly describing “[d]elivery . . . to the follicle matrix . . . by topical application . . . [and] massage.” Ex. 1002 [Anderson I] at 11:19-25; Ex. 1005 [Tankovich II] at 5:19-24. Anderson I states that this technique, which is disclosed in Tankovich II, results in “skin resurfacing” and “controlled skin ablation.” Ex. 1002 [Anderson I] at 1:44-50. Accordingly, not only did the prior art combination of Tankovich II and Anderson I contain all of the elements recited in claims 58-59, but the two could be combined by a PHOSITA in accordance with the methods disclosed therein with each performing the same function in combination as separately (i.e., skin treatment including hair removal, acne mitigation, and removal of epidermal skin cells described by Tankovich II and skin resurfacing and/or ablation as described by Anderson I). Ex. 1007 [Suslick decl.] at ¶ 89.

Furthermore, the results of the combination (the aforementioned skin resurfacing, wrinkle reduction, and skin ablation) would have been predictable to a PHOSITA inasmuch as they were explicitly disclosed to occur in Anderson I. *Id.*

F. Ground 6: Claim 57 is Rendered Obvious By Tankovich III In View Of Anderson II Under 35 U.S.C. § 103(a)

As set forth below, Tankovich III in view of Anderson II teaches the well-known process of treating human skin using light-absorbing nanoparticles by delivering the nanoparticles to the skin and applying light that is absorbed by the nanoparticles, and renders obvious all of the elements of independent claim 57. Ex. 1007 [Suslick decl.] at ¶ 90.

1. Tankovich III in View of Anderson II Teaches All the Limitations of Independent Claim 57

The combination of Anderson II and Tankovich III teaches “A method for reducing wrinkles in tissue,” as recited by claim 57. Similar to claim 58 above, the preamble here reciting “[a] method for reducing wrinkles in tissue” is merely a statement of intended purpose unrelated to the claim elements, which are substantively identical to claim 58. Accordingly, the preamble of claim 57 should not be given patentable weight for at least the same reasons discussed above in Section VII.A.1, which are incorporated by reference herein and not repeated for brevity. However, should the Board deem the preamble as deserving patentable weight, Petitioner notes that Anderson II is generally directed to “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.” Ex. 1003 [Anderson II] at 1:14-19; Ex. 1007 [Suslick decl.] at ¶ 91.

- a) Delivering nanoparticles that absorb light at one or more wavelengths to the tissue

The combination of Anderson II and Tankovich III teaches “delivering nanoparticles that absorb light at one or more wavelengths to the tissue,” as recited by claim 57. Tankovich III’s teaching is discussed above in Section VII.A.1.a, and is fully incorporated by reference herein and not repeated for brevity.

- b) Exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles

The combination of Anderson II and Tankovich III teaches “exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles,” as recited by claim 57. Tankovich III’s teaching is discussed above in Section VII.A.1.b, and is fully incorporated by reference herein and not repeated for brevity.

2. Chart for Claims 57

'730 Claim	Disclosure of Anderson II and Tankovich III
57. A method for reducing wrinkles in tissue comprising the steps of:	<i>See, e.g.,</i> Ex. 1003 [Anderson II] at 1:13-19 (“The invention relates generally to the treatment of wrinkles in human skin using radiation. In particular, the invention relates to 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 a substantially unwrinkled skin.”).
[57.a] delivering nanoparticles that absorb light at one or more wavelengths to the tissue; and	<i>See</i> Tankovich III disclosures above for Section VII.A.1.a & 4 [57.a] .
[57.b] exposing said nanoparticles to light at one or more wavelengths that are absorbed by the nanoparticles.	<i>See</i> Tankovich III disclosures above for Section VII.A.1.b & 4 [57.b] .

3. Reasons for Combinability for Claim 57

A PHOSITA would have had reasons to use aspects of Anderson II’s laser treatment system for reducing wrinkles in skin within Tankovich III’s laser treatment system for resurfacing skin using locally heated nanoparticles. Both Tankovich III and Anderson II disclose cosmetic treatments having a high degree of similarity in structure, purpose and operation. For example, 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. Ex. 1003 [Anderson II] at 1:13-19; Ex. 1006 [Tankovich III] at 1:40-46; 10:20-27; Ex. 1007 [Suslick decl.] at ¶ 95.

In particular, both Anderson II and Tankovich III describe the goal of targeting tissues of interest for localized heating while avoiding damage to

surrounding tissue. For example, Anderson II describes using a “wavelength of the radiation beam . . . to maximize absorption in the targeted region of the dermis” while “avoiding injury to the epidermis and upper layers of the dermis.” Ex. 1003 [Anderson II] at 4:24-32. Tankovich III acknowledges that “[i]t is known to vary the wavelength of the laser beam to control the depth to which the laser beam penetrates into skin so as to direct laser energy only so deeply into skin as necessary,” but notes “[f]urther methods of controlling the depth . . . would be advantageous.” Ex. 1006 [Tankovich III] at 16:41-48. It goes on to describe how its system of radiation-absorbing nanoparticles “solves the problem by providing an improved method for infiltrating” targeted tissues, thus “control[ing] delivery of mechanical and/or thermal damage” to those tissues “while avoiding significant damage to the surface of the skin.” *Id.* at 16:49-52, 28:48-52. Thus, it would have been obvious for a PHOSITA to extend Anderson II’s laser-based wrinkle removal system with Tankovich III’s radiation-absorbing nanoparticles to further the common motivation of targeting tissues of interest while avoiding damage to surrounding non-targeted tissue. Ex. 1007 [Suslick decl.] at ¶ 96.

Also, as noted above, Tankovich III specifically describes the use of its system “to facilitate laser skin resurfacing,” whereby “the skin surface . . . is illuminated so as to remove the surface layers of the stratum corneum.” Ex. 1006 [Tankovich III] at 1:41-46. The ’730 patent itself describes the knowledge

generally available to a PHOSITA at the time of the invention, that “[c]onventional laser resurfacing is a technique used for removal and/or minimization of wrinkles and involves the direct application of laser light to the tissue to be treated.” Ex. 1001 [’730 patent] at 12:62-65. Indeed, Anderson II describes just such a system, whereby “a beam of laser . . . cause[s] thermal injury in the dermal region of the skin sufficient to elicit a healing response that produces substantially unwrinkled skin.” Ex. 1003 [Anderson II] at 1:16-19. Accordingly, there was a teaching in the knowledge generally available to a PHOSITA to use resurfacing techniques for the removal of wrinkles, and thus a PHOSITA 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. Ex. 1007 [Suslick decl.] at ¶ 97. In 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.*

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CERTIFICATE OF SERVICE

I hereby certify, pursuant to 37 C.F.R. sections 42.6 and 42.105, that a complete copy of the Petition for Inter Partes Review of U.S. Patent No. 6,685,730 and Exhibits 1001 through 1011 are being served by Priority Mail Express on the 7th day of October, 2016, the same day as the filing of the above-identified documents in the United States Patent and Trademark Office/Patent Trial and Appeal Board, to the Assignee of record as reflected in the USPTO patent assignment recordation database,

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

Pursuant to 37 C.F.R. § 42.24 (d), I certify that the present paper contains 10,637 words as counted by the word-processing program used to generate the brief. This total does not include the tables of contents and authorities, the caption page, table of exhibits, signature blocks, certificate of service, or this certificate of word count.

Dated: October 7, 2016

Respectfully submitted,

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