UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MERCK SHARP & DOHME CORP., MERCK SHARP & DOHME B.V., and ORGANON USA, INC.,
Petitioners,

v.

MICROSPHERIX LLC,
Patent Owner.

CASE NO: IPR2018-00393
U.S. PATENT: 9,636,402 B2

NOTICE OF APPEAL

Via PTAB E2E
Patent Trail and Appeal Board

Via Express Mail
Director of the United States Patent and Trademark Office
c/o Office of the General Counsel
P.O. Box 1450
Alexandria, VA 22313-1450

Via CM/ECF
United States Court of Appeals for the Federal Circuit

Pursuant to 35 U.S.C. § 141 and 37 C.F.R. § 90.2, Petitioners Merck Sharp & Dohme Corp., Merck Sharp & Dohme B.V., and Organon USA, Inc. ("Merck" or "Petitioners") hereby provide notice that they appeal to the United States Court of Appeals for the Federal Circuit from the Final Written Decision entered July 8, 2019 (Paper 43) and from all underlying orders, decisions, rulings, and opinions adverse to them regarding U.S. Patent No. 9,636,402 ("the '402 patent") at issue in *Inter Partes* Review IPR2018-00393. A copy of the Final Written Decision is attached as Exhibit A.

In accordance with and for the purpose of providing the Director with the information requested pursuant to 37 C.F.R. § 90.2(a)(3)(ii), Petitioners anticipate that the issue(s) on appeal may include, but are not limited to the following, as well as any underlying findings, determinations, rulings, decisions, opinions, or other related issues:

- Whether the Board erred in determining that challenged claims 6 and 9 have not been shown to be unpatentable.
- Any and all explicit or implicit findings or determinations supporting or related to the above identified issues, and all other issues decided adversely to Petitioner in any order, decision, ruling, or opinion by the Board in this *Inter Partes* Review.

Simultaneous with this filing and in accordance with 35 U.S.C. § 142 and 37 C.F.R. § 90.2(a)(1), this Notice is being filed with the Director of the United States Patent and Trademark Office, and a copy of this Notice is being concurrently filed

with the Patent Trial and Appeal Board. In addition, a copy of this Notice along with the required docketing fees are being filed with the Clerk's Office for the United States Court of Appeals for the Federal Circuit via CM/ECF.

Dated: July 22, 2019

Respectfully submitted,

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CERTIFICATE OF SERVICE

The undersigned certifies that, in addition to being filed electronically through the Patent Trial and Appeal Board's End to End system (PTAB E2E), the foregoing Notice of Appeal was filed by Express Mail on July 19, 2019, with the Director of the United States Patent and Trademark Office, at the following address:

Director of the United States Patent and Trademark Office
c/o Office of the General Counsel
P.O. Box 1450
Alexandria, VA 22313-1450

The undersigned certifies that a copy of the foregoing Notice of Appeal, along with the required docket fee, was filed on July 19, 2019, with the Clerk's Office of the United States Court of Appeals for the Federal Circuit through the Court's CM/ECF filing system.

The undersigned certifies service pursuant to 37 C.F.R. § 42.6(e) of a copy of this Notice of Appeal by electronic mail on July 19 2019, on the counsel of record for Patent Owner:

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DATED: July 22, 2019

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EXHIBIT A

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Paper No. 43
Entered: July 8, 2019

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MERCK SHARP & DOHME CORP., MERCK SHARP & DOHME B.V., and ORGANON USA, INC.,
Petitioner,

v.

MICROSPHERIX LLC,
Patent Owner.

Case IPR2018-00393
Patent 9,636,402 B2

Before ULRIKE W. JENKS, TINA E. HULSE, and JAMES A. WORTH, *Administrative Patent Judges*.

WORTH, *Administrative Patent Judge.*

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

On December 22, 2017, Merck Sharp & Dohme Corp., Merck Sharp & Dohme B.V., and Organon USA, Inc. (collectively, "Merck" or "Petitioner") filed a Petition (Paper 1, "Pet.") requesting an *inter partes* review of claims 1–19 (the "challenged claims") of U.S. Patent No. 9,636,402 B2 (Ex. 1001, "the '402 patent"). On April 10, 2018, Microspherix LLC ("Microspherix" or "Patent Owner") filed a Preliminary Response (Paper 6, "Prelim. Resp."). With our authorization, Petitioner filed a Reply to the Preliminary Response (Paper 9), and Patent Owner filed a Surreply (Paper 10). On July 9, 2018, we instituted an *inter partes* review of claims 1–19 of the '402 patent. Paper 13 ("Dec. Inst."), 34–35.

Patent Owner filed a Response to the Petition. Paper 24 ("PO Resp."). Petitioner filed a Reply. Paper 27 ("Pet. Reply"). With our authorization, Patent Owner filed a Surreply (Paper 34, "PO Surreply") and Petitioner filed a Sur-Surreply (Paper 37, "Pet. Sur-Surreply").

Petitioner also filed a Motion to Exclude certain evidence (Paper 36, "Pet. MTE"), to which Patent Owner filed an Opposition (Paper 38, "PO MTE Opp'n"), and Petitioner filed a Reply (Paper 40, "Pet. MTE Reply").

An oral hearing was held on April 8, 2019, a transcript of which has been entered in the record. Paper 42 ("Tr.").

We have authority under 35 U.S.C. § 6(c). 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 Petitioner has shown by a preponderance of the evidence that claims 1–5, 7, 8, 10–19 of the '402 patent are obvious, but has not shown by a preponderance of the evidence that claims 6 and 9 of the '402 patent are unpatentable as obvious.

A. Related Proceedings

The parties note as related litigation: *Microspherix LLC v. Merck Sharp & Dohme Corp.*, No. 2:17-cv-03984-CCC-JBC (D.N.J., filed June 5, 2017). Pet. 69–70; Paper 4, 1.

Petitioner has also filed petitions for *inter partes* review of related U.S. Patent Nos. 9,636,401 (IPR2018-00402) and 8,821,835 (IPR2018-00602). We instituted *inter partes* review in both proceedings and enter Final Written Decisions in those proceedings concurrently with this Decision.

B. The '402 Patent

The '402 patent is titled "Flexible and/or Elastic Brachytherapy Seed or Strand" and relates to "imagable implantable brachytherapy devices, and methods of use thereof." Ex. 1001, [54], 1:28–29.

The Specification of the '402 patent describes disadvantages in prior art brachytherapy devices that were temporary, i.e., patients most often stayed in the hospital for the entire time that low dose rate sources were indwelling or between sessions if high dose sources were used. *Id.* at 3:34–37. The '402 patent discloses a brachytherapy strand that is elastic and/or flexible and preferably biodegradable. *Id.* at 3:66–67. A drug or other therapeutically active substance or diagnostic can be included in the strand in addition to, or as an alternative to, a radioisotope. *Id.* at 3:67–4:3.

The rate of release in the implantation site can be controlled by controlling the rate of degradation and/or release at the implantation site.

Id. at 4:3–5. In the preferred embodiment, the strands also contain a radio-opaque[1] material or other means for external imaging. *Id.* at 4:5–7.

C. Illustrative Claim

Claims 1, 10, and 16 are independent claims. Claim 1, reproduced below, is illustrative of the subject matter:

> 1. A strand for administration of a therapeutic agent to a subject in need thereof comprising (a) a therapeutically effective amount of a therapeutic agent; (b) a biocompatible component comprising a polymer; (c) a radio-opaque material, wherein the radio-opaque material is encapsulated in the biocompatible component; and (d) a polymeric coating, wherein the therapeutic agent is a small molecule, wherein the polymeric coating covers the strand and wherein radiopaque material allows for the position of the strand to be determined following administration wherein the strand is non-radioactive and does not contain a radioisotope.

Ex. 1001, 24:8–19.

D. The Instituted Grounds of Unpatentability

We instituted an *inter partes* review of claims 1–19 of the '402 patent on the following grounds:

References	**Basis**	**Claims challenged**
Zamora[2] and Brem[3]	§ 103(a)	1–19

[1] The '402 patent variously uses the spellings "radio-opaque," "radioopaque," and "radiopaque."
[2] Zamora et al., US 6,575,888 B2, issued June 10, 2003 ("Zamora," Ex. 1003). As further explained below, Petitioner relies on Zamora as prior art under pre-AIA 35 U.S.C. § 102(e). Pet. 2. Zamora claims priority to U.S. Provisional Application No. 60/178,083, filed Jan. 25, 2000. Ex. 1043 ("the '083 provisional application" or "the Zamora provisional").
[3] Brem et al., US 5,626,862, issued May 6, 1997 ("Brem," Ex. 1004).

References	Basis	Claims challenged
Zamora, Brem, and De Nijs[4]	§ 103(a)	6–9, 11, 12, 14, 18
De Nijs and Schopflin[5]	§ 103(a)	1–19

Petitioner also relies on the Declaration of Robert S. Langer, Sc.D. (Ex. 1002) to support its assertions. Patent Owner relies on the Declaration of Dr. Patrick F. Kiser, Ph.D. (Ex. 2147) to support its opposition to the Petition.

II. ANALYSIS

A. Person of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art would have had at least a Master's degree in biomedical engineering, chemical engineering, or a related field with several years of experience with biomedical implants and drug delivery systems. Pet. 21 (citing Ex. 1002 ¶¶ 13–16). Patent Owner contends that a person of ordinary skill in the art would have had a Master's degree and several years of experience in the field of pharmaceutics, bioengineering, mechanical engineering, and/or materials science, or, alternatively, a Ph.D. degree in the same field. PO Resp. 12 (citing Ex. 2147 ¶ 64). Patent Owner further states that an ordinary artisan may have also had experience working with or designing medical implants for humans. *Id.*

[4] Hendrik De Nijs, US 5,150,718, issued Sept. 29, 1992 ("De Nijs," Ex. 1005).
[5] Gisela Schopflin, US 4,012,497, issued Mar. 15, 1977 ("Schopflin," Ex. 1006).

On this record, we do not discern a substantive difference between the parties' respective definitions of the level of ordinary skill in the art that would impact our Decision. We further note that the prior art itself demonstrates the level of skill in the art at the time of the invention. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (explaining that specific findings regarding ordinary skill level are not required "where the prior art itself reflects an appropriate level and a need for testimony is not shown") (quoting *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 163 (Fed. Cir. 1985)). We adopt Petitioner's definition for purposes of this Decision because it is consistent with the level of skill reflected in the asserted prior art references.

B. Claim Construction

In an *inter partes* review, the Board interprets claim terms in an unexpired patent according to the broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 100(b) (2017)[6]; *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2142 (2016) (affirming applicability of broadest reasonable construction standard to *inter partes* review proceedings). Under that standard, and absent any special definitions, we generally give claim terms their ordinary and customary meaning, as would be understood by one of ordinary skill in the art at the

[6] The Office recently changed the claim construction standard applicable to an inter partes review. *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018). The rule changing the claim construction standard, however, does not apply to this proceeding because Petitioner filed its Petition before the effective date of the final rule, i.e., November 13, 2018. *Id.* at 51,340 (rule effective date and applicability date), 51,344 (explaining how the Office will implement the rule).

time of the invention. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Any special definitions for claim terms must be set forth with reasonable clarity, deliberateness, and precision. *See In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

Petitioner requests construction of the term "encapsulated." Pet 22. Patent Owner requests construction of the following terms: "radio-opaque material"/"radiopaque material." PO Resp. 12–13. These claim terms are found in independent claims 1, 10, and 16.

Petitioner argues that "encapsulated" means "enclosed," citing a dictionary definition. Pet. 22. Patent Owner does not dispute Petitioner's proposed construction. *See* PO Resp. 12–13. We adopt Petitioner's definition as it is undisputed. We observe that independent claim 1 refers to radiopaque material encapsulated "in" the biocompatible polymer material. Ex. 1001, 24:13–14. Based on the broadest reasonable interpretation of the term, we determine that this means that the radiopaque material may be in the interior space of a device or within the wall of a device with a polymer wall, e.g., may be inside the matrix or admixed to the polymer material itself. We note that the Specification refers to encapsulating as an example of containing, i.e., "For example, strands made of a radiopaque polymer are co-mingled with strands containing a biocompatible component and strands containing (e.g., encapsulating) a therapeutically active component (or strands containing both a biocompatible component and a therapeutically active component)." Ex. 1001, 18:63–19:1.

In the Decision on Institution, we interpreted "strand" as an "elongated device." Dec. Inst. 6. Having reviewed the record anew, we maintain that construction. Petitioner argues that the term "strand" must require a certain length. Reply 24–25. Petitioner argues that Patent Owner

asserts the De Nijs and Nexplanon implants, which are 40 mm long, constitute strands, and that claim 12 of the '402 patent recites strands up to 50 cm long. *Id.* at 24. We understand the '402 patent to describe a variable length. Ex. 1001, 4:8–11 ("Strands can be formed as chains or continuous arrays of seeds up to 50 centimeters or more, with or without spacer material, flaccid, rigid, or flexible"). Accordingly, we do not agree that a strand has a certain absolute length. Instead, we understand "strand" to have merely the relative length of being longer in one dimension than in other dimensions under the broadest reasonable interpretation.

For purposes of this decision we do not provide a construction of any other terms. In particular, we determine that construction of "radio-opaque material"/"radiopaque material" is not essential to resolving the dispute between the parties. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (courts only construe claims to the extent necessary to resolve the dispute).

C. Obviousness of De Nijs and Schopflin[7]

Petitioner asserts that claims 1–19 of the '402 patent are unpatentable as obvious over De Nijs and Schopflin. Pet. 50–69. Patent Owner disagrees. PO Resp. 49–64.

1. Schopflin (Ex. 1006)

Schopflin is titled "Drug Excipient of Silicone Rubber" and relates to organopolysiloxane molding composition drug excipients having a regular, uniform, and prolonged drug dispensation rate. Ex. 1006, 1:16–19.

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[7] We begin our analysis with Petitioner's third ground, which Petitioner focuses on in its Reply and which Petitioner asserts is "straightforward." Pet. Reply 1; Tr. 6:25–7:5.

Schopflin discloses that nonionic, lipid-soluble medicaments enclosed in organosiloxane elastomers and in organosiloxane-resin-reinforced organopolysiloxane elastomers are released with a delay from the carrier material. *Id.* at 1:27–31. Schopflin explains that vulcanization of organopolysiloxane containing a drug is impossible due to heat instability, and two-component compositions often failed, *inter alia*, because they required near saturation with a drug. *See id.* at 2:7–11, 2:62–68.

Schopflin discloses a vulcanizable composition capable of being catalytically cured with a platinum metal-based vulcanization catalyst in the presence of a pharmaceutically active amount of a nonionic, lipophilic drug to form a nontoxic elastomeric sustained release pharmaceutical composition. *Id.* at 3:33–38. Schopflin discloses that the vulcanizable composition consists essentially of: (a) a polydimethylsiloxane having vinyl groups on both ends; (b) a copolymer consisting essentially of SiO_2 units, $(CH_3)_3SiO_{0.5}$ units, and Vinyl $(CH_3)_2SiO_{0.5}$ units; and (c) a cross-linking Si-H component, consisting essentially of $(CH_3)_3SiO_{0.5}$ units, $(CH_3)_2SiO$ units, and CH_3HSiO units. *Id.* at 3:40–47.

Schopflin further discloses that its drug excipients are suitable as vehicles for one or more nonionic, lipophilic drugs. *Id.* at 5:37–39. The drugs can be bound singly or in admixture and in pure form or with conventional additives. *Id.* at 5:47–50. The additives include lactose, magnesium stearate, highly dispersed barium sulfate with a particle size smaller than 4 μm, and silicon oil with a molecular weight of 300–20,000. *Id.* at 5:50–53. Schopflin discloses that for X-ray localization of the implant in the body, a radiopaque amount of barium sulfate is incorporated in the active agent carrier. *Id.* at 7:41–43.

2. De Nijs (Ex. 1005)

De Nijs is titled "Method of Contraception" and relates to "an implant of polymeric material which can release a contraceptive agent for a relatively long time when fitted subcutaneously or locally" and more specifically to "an implant of such small dimensions that it can be fitted subcutaneously with an ordinary hypodermic needle." Ex. 1005, [54], 1:8–14. De Nijs identifies a problem with the prior art, i.e., the polymeric material of an implant often had to be charged with large amounts of a contraceptive agent to guarantee release for about 4 years. *Id.* at 1:23–27. This large amount of material leads to very large implants that could only be fitted surgically, or to several smaller implants that had to be fitted simultaneously. *Id.* at 1:27–30.

De Nijs discloses an implant characterized by a core of ethylene/vinyl acetate copolymer (EVA) having a molecular weight such that the melt index is higher than 10 grams per 10 minutes, and a vinyl acetate content of 20% by weight or more. *Id.* at 2:3–8. De Nijs discloses that the core material functions as a matrix for 3-keto-desogestrel, levonorgestrel, or gestodene as active contraceptive substances, in a quantity that is sufficient for a long-lasting constant release of at least 15–30 µg of active substance per day. *Id.* at 2:7–13. De Nijs further discloses a membrane having a layer thickness of 50–250 µm, which encases the core material and also consists of EVA material, but with such a molecular weight that the melt index is less than 10 grams per 10 minutes, and an acetate content of less than 20% by weight. *Id.* at 2:14–18. De Nijs discloses that the implant is completely or virtually completely cylindrical with a maximum external diameter of about 2 mm and a length that is smaller than about 5 cm. *Id.* at 2:18–22.

3. Analysis

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter 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 the 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. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

"[A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." *KSR*, 550 U.S. at 418. "[I]t can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine elements in the way the claimed new invention does." *Id.* Moreover, a person of ordinary skill in the art must have had a reasonable expectation of success of doing so. *PAR Pharm., Inc. v. TWi Pharms., Inc.*, 773 F.3d 1186, 1193 (Fed. Cir. 2014).

a. Independent claim 1

Petitioner asserts that De Nijs teaches every limitation of claim 1 of the '402 patent except for the "radio-opaque material," "wherein the radio-opaque material is encapsulated in the biocompatible component," and "wherein radiopaque material allows for the position of the strand to be determined following administration." Pet. 53–58; Pet. Reply 4–8. Petitioner relies on Schopflin for teaching the inclusion of a marker component in a strand. Pet. 55–57.

i. "A strand for administration of a therapeutic agent to a subject in need thereof comprising"; "(a) a therapeutically effective amount of therapeutic agent"; "wherein the therapeutic agent is a small molecule"

Petitioner asserts, *inter alia*, that De Nijs discloses a strand that is "virtually cylindrical with a maximum section of about 2 mm" and a "length [that is] preferably between 1 and 4 cm" and, in one embodiment, the implant is a "coaxial filament" cut to a desired length. Pet. 54 (citing Ex. 1005, 1:62–67, 3:19–24, 5:55–66, 6:35–53, 7:11–24, cl. 5). Petitioner further asserts that De Nijs discloses a therapeutically effective amount of a therapeutic agent, such as "3-ketodesogestrel, levonorgestrel, or gestodene active contraceptive substances." Pet. 54 (citing Ex. 1005, 2:3–14, 2:23–29; Ex. 1002 ¶ 144). Petitioner asserts that the aforementioned progestin hormones would have been understood to be small molecules. Pet. 56–57 (citing Ex. 1002 ¶ 149).

Patent Owner does not separately dispute this limitation.

Applying the claim construction of "strand" set forth above, we determine on this record that De Nijs discloses the recited "strand." In particular, De Nijs discloses a cylindrical device (*see* Ex. 1005, 1:62–65) that would have been understood to release a therapeutically effective amount of hormone (*see* Ex. 1002 ¶ 144 (discussing Ex. 1005, 2:3–13)).

ii. "(b) a biocompatible component comprising a polymer"

Petitioner asserts, *inter alia*, that De Nijs discloses EVA, which would have been understood to be a biocompatible polymer. Pet. 55 (citing, e.g., Ex. 1005, 1:34–36, 2:41–61, cls. 1–3; Ex. 1002 ¶ 145).

Patent Owner does not separately dispute this limitation.

We find that De Nijs discloses biocompatible polymers. Ex. 1005, 2:41–61; Ex. 1002 ¶ 145.

iii. "(d) a polymeric coating"; "wherein the polymeric coating covers the strand"; "wherein the strand is non-radioactive and does not contain a radioisotope"

Petitioner relies on De Nijs for the limitations of a polymeric coating that covers the strand and wherein the strand is non-radioactive. Pet. 56–58 (citing, e.g., Ex. 1005, 2:3–22; Ex. 1002 ¶ 152). Patent Owner does not separately dispute these limitations. We determine that De Nijs discloses the recited limitations. Ex. 1005, 2:3–22; Ex. 1002 ¶¶ 150, 152.

iii. "(c) a radio-opaque material"; "wherein the radio-opaque material is encapsulated in the biocompatible component"; "wherein radiopaque material allows for the position of the strand to be determined following administration"[8]

Petitioner asserts, *inter alia*, that Schopflin discloses the use of barium sulfate for X-ray localization. Pet. 55–56, 57 (citing, e.g., Ex. 1006, 5:50–53, 7:37–43, 9:5–22, 12:30–56; Ex. 1002 ¶ 146); Pet. Reply 7–8 (citing Ex. 1002 ¶ 147). Schopflin discloses the use of a barium marker. Ex. 1006, 5:50–53, 7:37–43, 9:5–22, 12:30–56; Ex. 1002 ¶ 146. Schopflin discloses that its "active agent carrier can contain a radiopaque amount of barium sulfate." Ex. 1006, 7:42–43. Petitioner asserts that Examples 3 and 15 of Schopflin also disclose that barium sulfate is blended with a biocompatible polymer and a contraceptive hormone and subsequently molded into an implant, and that a person of ordinary skill would understand this barium to be "surrounded, dispersed within, and thus enclosed" within the polymer. Reply 7 (citing Ex. 1002 ¶ 147). Dr. Langer avers that "at least a portion" of the barium becomes "surrounded, dispersed within, and thus enclosed" the polymer in this process. *See* Ex. 1002 ¶ 147.

[8] We are analyzing the claim limitations out of sequence for purposes of this discussion in order to group related issues.

We find that Schopflin discloses that barium becomes encapsulated in the biocompatible polymer. In particular, Schopflin discloses that a suspension of active agent in the carrier material is prepared such that the active agent is dispersed in the carrier material or surrounded by the elastomer in the carrier material. Ex. 1006, 7:55–65. The resultant LTV-silicone elastomer is described as having a certain hardness and does not crumble upon mechanical stress. *See id.* at 8:5–14. In Examples 3 and 15 of Schopflin, the suspension contains active agent, barium, and carrier material prior to heating and vulcanization. *Id.* at 9:3–22, 12:30–40. We credit Dr. Langer's testimony that a suspension of both active agent and barium in elastomer result in both the active agent and barium dispersed or enclosed in the polymer as being consistent with Schopflin's description of a suspension of active agent alone in elastomer resulting in the active agent being dispersed or enclosed in the polymer.[9]

Patent Owner argues that Schopflin does not necessarily disclose barium encapsulated in a biocompatible polymer because Merck has reported that it was surprising (at a later time, even after the critical date) that there was radiopaque material encapsulated in the polymer in the Nexplanon implant device and the Veenstra[10] patent that was expected to be encapsulated in the active agent. PO Resp. 60–61 (citing Ex. 2002, 3:62–67; Ex. 1005, 2:30–31, examples 4–5; Ex. 2147 ¶ 221). Whether the barium is

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[9] Petitioner also points to Examples 3 and 15 of Schopflin in arguing that Schopflin has an open system (*see* Reply 16) and that it would have been obvious to add barium to the EVA material of De Nijs. However, as we discuss below, De Nijs's EVA is a different material than Schopflin's vulcanizable silicone rubber composition.

[10] US 8,722,037 B2, iss. May 13, 2014 (Ex. 2002, "Veenstra").

encapsulated with the active agent, it would still also be enclosed and encapsulated in the polymer, i.e., indirectly.[11] We find that Patent Owner's discussion of the Nexplanon implant relates more to the question of whether a person of ordinary skill would have modified the device of De Nijs with Schopflin's teachings and does not detract from the disclosure in Schopflin discussed above. Accordingly, we determine that Schopflin discloses barium encapsulated within a biocompatible polymer.

Would a person of ordinary skill have combined the teachings of De Nijs and Schopflin by adding barium sulfate to De Nijs's EVA polymer?

Petitioner asserts that Schopflin teaches the addition of a radiopaque amount of barium sulfate for the purpose of improved localization of the strand by X-ray. Pet. 55–56, 57 (citing, e.g., Ex. 1006, 5:50–53, 7:37–43, 9:5–22, 12:30–56; Ex. 1002 ¶¶ 146, 151). Petitioner asserts that De Nijs discloses a biocompatible component consisting of two layers of EVA material, i.e., core material consisting of EVA and a membrane that also consists of EVA. Pet. 55 (citing Ex. 1005, 1:34–36. 2:41–61, claims 1–3; Ex. 1002 ¶ 145). Petitioner asserts adding barium sulfate to the biocompatible material taught by De Nijs would result in the inclusion of a marker to allow for precise placement of implants and to track their location within the body. *See* Pet. 52, 54–55; *see also* Pet. Reply 9–10 ("The radiopacity imparted by the barium sulfate allows for more precise placement as well as another means to find the implant if lost during removal . . . which is consistent with the frequent inclusion of barium sulfate

[11] We note that claim 1 of the '402 patent does not disclose the negative limitation of the Veenstra patent which recited that the material was not encapsulated in the hormone. Ex. 2002, 11:44–46.

in prior art contraceptive implants.") (citing Ex. 1002 ¶¶ 138–139; Ex. 2110; Ex 2107; Ex. 2026). Petitioner asserts that this is particularly true for the non-biodegradable implants, like those disclosed in De Nijs, which must eventually be removed and were known in the art to be at risk of migrating within the patient and thus may be difficult to locate when the time comes to remove them. Pet. 52 (citing Ex. 1002 ¶¶ 38–39, Ex. 1029,[12] 224–25).

Petitioner's expert, Dr. Langer, avers that a person of ordinary skill would have had a reasonable expectation of success in combining the teachings of De Nijs and Schopflin because they both rely on similar hormones. Ex. 1002 ¶ 140. Dr. Langer also avers that a person of ordinary skill in the art would also have had a reasonable expectation that the teachings of De Nijs and Schopflin could be successfully combined because they disclose implants with features that overlap heavily. *Id.* Dr. Langer avers that De Nijs and Schopflin both teach cylindrical implants about 2 to 2.5 mm in diameter and 1 to 4 cm in length. *Id.* (citing Ex. 1005, 1:62–67, 2:3–27; Ex. 1006, 8:62–9:2). Dr. Langer avers that both teach the use of therapeutic hormones as the drug inside the implant. *Id.* (citing Ex. 1005, 2:3–29; Ex. 1006, 5:54–67, 7:16–24). Dr. Langer avers that both teach the use of a polymeric coating to cover the implant. *Id.* (citing Ex. 1005, 1:34–36, 2:3–20, 3:34–36; Ex. 1006, 1:21–26, 5:31, 7:2–4). Dr. Langer avers that given the substantial overlap, a person of ordinary skill in the art would have expected that these references could be successfully combined to create a radiopaque device. *Id.*

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[12] Russel Thomsen, *Ultrasonic Visualization of Norplant® Subdermal Contraceptive Devices*, 23 INT. J. GYNAECOL. OBSTET. 223–27 (1985) (Ex. 1029, "Thomsen 1985").

Patent Owner contends that Petitioner has not made a prima facie case of obviousness. PO Resp. 49–64. Specifically, Patent Owner contends that a person of ordinary skill would not have looked to add a marker component to De Nijs in the first place (*see* PO Resp. 53–56), that Zamora "provides no motivation to use a marker with contraceptive implants like De Nijs" (*see id.* at 56), and even if there were a reason to add such a marker there is no reasonable expectation of success in adding a barium sulfate marker because this would affect release rate of the drug (*see id.* at 56–64). Patent Owner further argues that Petitioner is estopped from making the unpatentability arguments as proposed because these arguments are opposite to prior arguments made during the prosecution of one of Petitioner's own patents. *See id.* at 50–52. We address these arguments below, starting with judicial estoppel.

A. Judicial Estoppel

Patent Owner requests that the Board apply a form of judicial estoppel against Petitioner in this proceeding. In particular, Patent Owner argues that Petitioner's current position – that the addition of marker material to De Nijs's implant is obvious – is "the exact opposite [of the position taken] to obtain its own patent and [Petitioner] is estopped from reversing itself now. During prosecution of Merck's patent, the Examiner argued (as Merck does now) that adding a marker to De Nijs was obvious." PO Resp. 50 (citing Ex. 2062, 8). According to Patent Owner:

> The doctrine of estoppel prevents Merck from changing positions just because its interests have changed. *New Hampshire v. Maine*, 532 U.S. 742, 749 (2001). Estoppel applies both in federal courts and in proceedings before administrative agencies, including the PTAB, and "protect[s] the integrity of the judicial process by prohibiting parties from deliberately changing positions according to the exigencies of the moment."

> *New Hampshire*, 532 U.S. at 743; *Data Gen. Corp. v. Johnson*, 78 F.3d 1556, 1565 (Fed. Cir. 1996).

PO Resp. 52–53.

Petitioner contends that judicial estoppel does not apply because "Merck's arguments were not accepted by the Examiner in that prosecution, which is necessary for the doctrine of judicial estoppel to apply." Pet. Reply 16–17 (citing *New Hampshire*, 532 U.S. at 750–51; *Trustees in Bankr. of N. Am. Rubber Thread Co. v. United States*, 593 F.3d 1346, 1353–55 (Fed. Cir. 2010)). "Merck only obtained allowance of the '037 patent ['Veenstra patent' (Ex. 2002)] claims through repeated amendment, ultimately reciting that the barium sulfate be 'encapsulated' within the microstructure of the polymer matrix '***and not*** in the crystalline desogestrel or 3-ketodesogestrel,' a surprising result it supported with experimental evidence demonstrating such microencapsulation." Pet. Reply 18 (citing Ex. 2002, claim 1, 8:40–9:25, Fig. 10) (emphasis in brief).

Having considered the arguments and evidence presented at trial, we agree with Petitioner that significant amendments were made during the prosecution of the Veenstra patent (Ex. 2002) in order to address the examiner's concern regarding the toxicity of barium sulfate. For example, in the notice of allowance of the Veenstra patent, the examiner explained that barium sulfate is known to be toxic and care must be taken to ensure that barium sulfate does not leach out of an implant device:

> Priewe (US 2003/0010929) [Ex. 2131], newly cited, discloses that barium sulfate can be used as an X-Ray visible elements only as long as it is sufficiently and permanently encapsulated as barium ions are very toxic and despite the low solubility of barium iron, toxic effects can be expected in the case of long-term implantation (0010 and 0034[])]. Priewe teaches that when barium sulfate is used in the polymeric structure, it should be

> further coated with a non-resorbable polymer, in order to prevent the barium sulfate from being released in the body of a patient in the long term [0027], however, Priewe does not suggest the use of barium sulfate in contraceptive implant or in combination with hormonal drugs, particularly desogestrel and 3-ketodesogestrel.

Ex. 2070, 4. The examiner's notice of allowance thus makes clear that the addition of the limitation that the polymer and not the hormone encapsulates barium sulfate was something that is not found in prior art and was a necessary amendment in order for the claim to reach allowance.

We agree with Petitioner's position that the examiner did not accept the relevant arguments made during the prosecution of the Veenstra patent for which Patent Owner claims estoppel. *See* Pet. Reply 18–20. During prosecution of the Veenstra patent, Merck took the position that "it was not obvious how to incorporate a radio-opaque material into a controlled-release contraceptive implant without affecting the hormone release profile, while also ensuring that the radio-opaque material does not migrate outside of the implant in undesired amounts, particularly wherein the implant is a rod having open ends." Ex. 2063, 44. This argument, however, was ultimately not adopted by the examiner.

Instead, Merck relied on the unexpected finding that when mixing barium sulfate, the radiopaque component, with the hormone crystals and EVA polymer (*see* Ex. 2002, 5:5–38), the barium sulfate did not localize with the hormone component. *Compare* Ex. 2003, 7–8, *with* Ex. 2070, 4.

> Applicants [i.e., Merck] believe that having almost all the radio-opaque material encapsulated within the polymer and hardly any radio-opaque encapsulated in the hormone crystals contributes in allowing the device to demonstrate two unexpected features; (1) prevents the radio-opaque material from leaching out of the device and (2) enables the radio-opaque material to not affect the

> release rate of the desogestrel or 3-ketodesogestrel as compared to the same device without a radio opaque material.

Ex. 2003, 7–8. According to the applicants, that barium sulfate is encapsulated in the polymer at a location separate from the hormone is a surprising finding as described in the Veenstra patent prosecution:

> When evaluating where the radio-opaque component was located in the implant after production thereof, it was surprisingly found that almost all of the radio-opaque component was encapsulated within the polymer component and hardly any radio-opaque component was encapsulated in the hormone crystals. This was unexpected in view of the fact that the polymer component represents only about 36 wt % of the implant whereas the hormone component comprises about 52.5 wt % of the implant. As a result of the encapsulation within the polymer component, the radio-opaque component crystals could not migrate out of the implant through the open ends of the implant in undesired amounts. Had the radiopaque component been present in the hormone crystals, it may have been able to migrate outside of the implant in case where the hormone crystals are inter-connected.

Ex. 2002, 3:62–4:9.

Based on this record, we agree with Petitioner that its other arguments were not relied on by the examiner during the prosecution of the unrelated Veenstra patent and, for at least this reason, do not give rise to judicial estoppel. *See SanDisk Corp. v. Memorex Prods., Inc.*, 415 F.3d 1278, 1290–91 (Fed. Cir. 2005) (discussing *New Hampshire v. Maine*, 532 U.S. 742, 750–51 (2001)) (several factors inform the decision whether to apply the doctrine of judicial estoppel including whether a party's later position is "clearly inconsistent" with its earlier position; whether the party "has succeeded in persuading a court to accept that party's earlier position"; and whether the party would derive an "unfair advantage.").

We recognize that Petitioner's current position is the same as that of the examiner during the prosecution of the Veenstra patent. We note, however, that the claims in the prosecution of the unrelated Veenstra patent only reached allowance after incorporation of language that captured Veenstra's unexpected results for localization of the barium sulfate as set out the specification. In other words, Merck's other positions during the prosecution of the Veenstra patent were not successful. Because, Merck did not succeed "in persuading a court[13] to accept that party's earlier position" we do not find that estoppel applies to Petitioner in this proceeding. *New Hampshire*, 532 U.S. at 750–51. Accordingly, we do not agree with Patent Owner's position that Petitioner is estopped from arguing that the addition of a marker disclosed in Schopflin to De Nijs's implant is obvious.

B. Motivation to Combine De Nijs and Schopflin

The parties dispute whether a person of ordinary skill in the art would have had a reason to add an X-ray detectable marker into a contraceptive implant in the first place. Petitioner argues that it was known in the art to use radiopaque markers both to allow for precise placement of implants and to track their location within the body. Pet. 52 (citing Ex. 1002 ¶¶ 138–39). Patent Owner argues that Petitioner is arguing based on hindsight, that it is undisputed that Merck's Implanon product did not use a marker, and that

[13] The Federal Circuit does not limit the application of judicial estoppel to courts and has applied it to other administrative agencies. *See Data Gen. Corp. v. Johnson*, 78 F.3d 1556, 1565 (Fed. Cir. 1996) ("Although the Board [i.e., the General Services Administration Board of Contract Appeals] is not a court, we assume it has authority by analogy to apply the doctrine in an appropriate case.").

problems with localization of an implant were rare. PO Resp. 54–55 (citing Ex. 1029, 224–25 ("rare problem of difficult localization")).

We recognize that there are multiple techniques to improve the localization of implanted material for later retrieval purposes. *See, e.g.*, Ex. 1029, 227 ("use of ultrasound to locate in situ NORPLANT® rods"), 224–25 ("When devices are implanted within the body. . . careful attention must be given to both the clinical and programmatic aspects of their eventual removal"). One known solution for improving localization of an implant was to include a radiopaque marker with the device. Ex. 1006, 7:37–43 ("For improved X-ray localization in the body, the active agent carrier can contain a radiopaque amount of barium sulfate") (*cited in* Pet. 55); Ex. 1002 ¶ 146). Petitioner's position is that Schopflin teaches the inclusion of 5% by weight barium sulfate to an implant for improved localization, a sufficient teaching for the inclusion of a marker. Pet. Reply 8–9 (citing Ex. 1006, 7:41–43, Example 3). Petitioner, additionally, directs our attention to contraceptive intrauterine devices (IUDs) that are known to incorporate barium sulfate to support the position that adding barium sulfate to an implanted device would have been obvious. *Id.* at 13 (citing Ex. 2110; Ex. 2107; Ex. 2026).

We consider the parties' respective arguments in two parts. First, we consider whether a person of ordinary skill in the art would have had a reason to use a marker component for localization generally. Then, we consider whether a person of ordinary skill in the art would have had a reason to use barium sulfate for localization specifically.

1. Using a Marker Component for Localization Generally

Based on the evidence presented, we find that Petitioner has shown by a preponderance of the evidence that the teaching of a retrieval or

localization problem with an implant is sufficient motivation to improve the visualization of the implanted device. *See* Ex. 1002 ¶ 139; Ex. 1029, 224–225. We, therefore, disagree with Patent Owner's assertions to the contrary. *See* PO Resp. 55. Here, Schopflin teaches that X-ray localization of an implant can be achieved with the incorporation of barium sulfate into the implant matrix. Ex. 1006, 7:41–43. We find that this teaching in Schopflin in conjunction with the knowledge in the prior art that it can be difficult to locate a Norplant implant in a patient is sufficient motivation for one of ordinary skill in the art to consider incorporating a marker with an implant device. *See* Ex. 1002 ¶¶ 138–139; Ex. 1029, 224–25. This identified retrieval problem is especially pertinent for implants such as the birth control implants taught by De Nijs and Schopflin that are intended to reside within a patient for years.

We, therefore, accept Petitioner's position that the difficulty of locating an implant provides sufficient motivation to incorporate a general radiopaque marker to facilitate retrieving the implant by using X-ray.

2. Selecting Barium Sulfate as the Marker Component

The question now turns on whether one of ordinary skill in the art would have been motivated to incorporate a radiopaque marker known to be toxic into an implant. The ordinary skilled artisan is not limited to only considering the teaching in the references themselves, but would also consider the knowledge in the prior art as a whole. *See Star Scientific, Inc. v. R.J. Reynolds Tobacco Co.*, 655 F.3d 1364, 1374–75 (Fed. Cir. 2011) ("Through the lens of one of ordinary skill in the art, even when all claim limitations are found in prior art references, the fact finder must not only determine what the prior art teaches, but whether prior art teaches away from

the claimed invention and whether there is a motivation to combine teachings from separate references.").

Because the De Nijs and Schopflin implants relied on by Petitioner in making their unpatentability arguments are intended for long-term use in the patient's body, these implants would need to be made of materials that are not known to be toxic to the patient. *See* PO Resp. 46–50, 52–62; (citing, e.g., Ex. 2130, 2:13–15; Ex. 2143, 1:30–33; Ex. 2142, 81:7–16, 83:2–5). In other words, one of ordinary skill would not have looked to incorporate marker material that is known to be toxic and susceptible to leaching from a matrix. Patent Owner makes certain arguments against combining barium sulfate with an implant that has open ends. *See, e.g.*, PO Resp. 49. However, aside from a few introductory remarks (*e.g.*, PO Resp. 1, 51), Patent Owner places the body of these arguments against open-ended implants under headings relating to claims 6 and 9 of the '402 patent. Patent Owner does not meaningfully make or develop arguments that barium would be toxic with respect to independent claim 1.

We understand claim 1 of the '402 patent to include both implants with open ends and implants with closed ends based on the principle of claim differentiation. Because dependent claim 9 recites an implant with open ends, we understand independent claim 1 to be broader in scope and to include a device with closed ends as well. *See, e.g.*, 35 U.S.C. § 112, ¶ 4; *Comark Commc'ns, Inc. v. Harris Corp.*, 156 F.3d 1182 (Fed. Cir. 1998) (presumption that claims are different in scope). As such, the embodiment of De Nijs with a charged EVA core surrounded by an additional EVA layer (a non-resorbable layer) and with sealed ends would meet claim 1 of the '402 patent if the charged EVA core of De Nijs were modified by adding barium sulfate to the charged core, based on the teachings of Schopflin

regarding the use of barium sulfate with a therapeutic agent. Petitioner additionally refers to the embodiment in De Nijs's disclosure where "the implant of the invention possesses a thin layer of polysiloxane around the whole external surface of the implant." Pet. 56 (citing Ex. 1005, 3:34–36). Dr. Langer avers that polysiloxane is also a polymer. Pet. 56; Ex. 1002 ¶ 148. In such an embodiment of De Nijs, as modified by Schopflin, the closed ends would not pose the same concerns that Patent Owner raises with respect to devices with open ends. *Compare* Ex. 1005, 3:34–36, *with* Ex. 2070, 4 and Ex. 2131 ¶ 10; *see also* Ex. 2147 ¶ 136 ("Therefore, ***if*** a skilled artisan were motivated to look to De Nijs, a skilled artisan would have used the implants ***of the invention***: fully-encased (end-sealed) implants functioning as desired to provide De Nijs' stated goal of virtually constant release.").

Accordingly, we determine that Petitioner has shown by a preponderance of the evidence that a person of ordinary skill in the art would have been motivated to combine Schopflin and De Nijs to arrive at a sealed implantable device, within the scope of independent claim 1, in order to allow for improved X-ray localization of the implant with barium sulfate.

C. Reasonable Expectation of Success

Petitioner asserts that a person of ordinary skill in the art would have had a reasonable expectation that the teachings of De Nijs and Schopflin could be successfully combined because they disclose implants that heavily overlap. Pet. 52–53 (citing Ex. 1002 ¶ 140); *see* Ex. 1002 ¶ 140 ("Given the substantial overlap, a POSA would have an expectation that these references could be successfully combined" to create a radiopaque device.). Petitioner proposes that a person of ordinary skill would have retained the polymer of

De Nijs and added the barium sulfate marker of Schopflin to arrive at the claimed implants. Pet. 53–58.

Patent Owner argues that "[m]erely showing that references 'overlap' does not show it would have been obvious to combine [the] references." PO Resp. 56 (citing *Securus Techs., Inc. v. Glob. Tel*Link Corp.*, 701 F. App'x 971, 977 (Fed. Cir. 2017); *Leo Pharma. Prods. Ltd. v. Rea*, 726 F.3d 1346, 1356 (Fed. Cir. 2013); *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1070 (Fed. Cir. 2012)). Patent Owner observes that the matrices of De Nijs and Schopflin differ, and argues that a person of ordinary skill would not have added barium to the device of De Nijs because a person of ordinary skill would have had concerns about impacting the release rate of the therapeutic substance. PO Resp. 59 (citing Ex. 2147 ¶ 214). Patent Owner asserts that Dr. Langer agrees that including marker material could have had a profound influence on the release properties of the implant. *Id.* (citing Ex. 2142, 130:17–22). Patent Owner also states that "a 2003 study (also relied on by Merck) showed that even adding filler to progesterone reduced the release rate" and "adding filler to the Norplant contraceptive device increased pregnancy rates." PO Resp. 59 (citing Ex. 2106, 3043–44; Ex. 2142, 17–22).

Petitioner argued at the hearing that Patent Owner's arguments as to release rate of the therapeutic agent are not relevant because they relate to unclaimed subject matter. Reply 15; *see also* Tr. 25–26 (referring to *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367

(Fed. Cir. 2016)[14,15]). We are persuaded by Petitioner that Patent Owner's arguments relating to the release rate of the therapeutic agent relates to unclaimed subject matter.

Patent Owner argues as a matter of objective indicia of obviousness that Merck failed to add a radiopaque marker to its Implanon device and that the lack of a negative impact on release rates shows unexpected success. PO Resp. 64; *see also id.* at 54 ("There is no dispute De Nijs does not discuss using a marker, and that Implanon did not use a marker."). Petitioner states that the Implanon device is the commercial embodiment of Example 5 of De Nijs. Reply 5 (citing Ex. 2002, 3:15–16; Ex. 1067, 297:7–9). Example 5 of De Nijs has no polysiloxane jacket and no sealing of implant ends. Accordingly, this argument would be more relevant to claims 6 and 9 discussed below, which recite open ends or pores. Our analysis of claim 1 focuses on the broader scope of claim 1, which includes both sealed and

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[14] Patent Owner cited this case in its response. *See* PO Resp. 32. Accordingly, we do not find Petitioner's reliance on this case at oral argument to be waived.

[15] The Court in *Intelligent Bio-Systems* emphasized that there is a distinction between reasonable expectation of success and reason to pursue the references' teachings. *Id.* at 1366–1368. According to *Intelligent Bio-Systems*, reasonable expectation of success only looks to "likelihood of success in combining references to meet the limitations of the claimed invention" and that, for example, appropriate cleavage conditions would have been irrelevant to the inquiry where such conditions are not required by the claim at issue. *Id.* at 1367. Inquiry into motivation to combine, however, considers whether a person having skill in the art would have believed that there was a reason for reaching the claimed invention in the first place. *Id.* at 1368; *see also KSR Int'l Co.*, 550 U.S. at 418 ("it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does").

unsealed devices. Nor has Patent Owner explained how there would be unexpected results for the devices with sealed ends that are within the scope of independent claim 1. *See In re Harris*, 409 F.3d 1339, 1344 (Fed. Cir. 2005) (unexpected results must be "commensurate in scope with the degree of protection sought by the claimed subject matter.").

On consideration of the totality of the evidence, we conclude that it would have been obvious to a person of ordinary skill to add barium sulfate to a sealed device, i.e., with a polysiloxane jacket, in order to better locate the device on X-ray. The record evidence expresses concerns (before the filing date) for barium toxicity for unsealed devices but does not express such concerns in the same fashion for sealed devices. We conclude that Petitioner has demonstrated, by a preponderance of the evidence, that independent claim 1 is obvious over De Nijs and Schopflin.

b. claims 6 and 9

Petitioner relies on similar evidence for claims 6 and 9 but focuses on De Nijs's embodiments with open ends. Petitioner asserts that De Nijs discloses open pores or cavities (as recited in claim 6) and open ends (as recited in claim 9). Pet. 60. Petitioner points to the disclosure in De Nijs that the ends of the implant "*may—if desired*—be additionally protected by an inert polymer." *Id.* (citing Ex. 1005, 3:25–27).

We find that De Nijs discloses embodiments of devices with open ends or pores. *See* Ex. 1005, 3:25–27; Ex. 1002 ¶ 129. De Nijs indicates that the coaxial extrusion process would have been understood by a person of ordinary skill in the art. *See* Ex. 1005, 3:16–18. De Nijs discloses that the extruded filaments are cut into pieces. Ex. 1005, 3:22–24. Dr. Langer testifies that a person of ordinary skill in the art would have understood De

Nijs to describe pores in the outer polymer coating that may be filled. Ex. 1002 ¶ 129.

Nevertheless, Patent Owner argues that a person of ordinary skill would not have added barium sulfate to a device with open ends because of potential toxicity from leaching barium. We agree.

Patent Owner directs us to evidence in the art that barium sulfate, the only radiopaque material contemplated in Schopflin, is toxic:

> [T]he prior art is replete with evidence barium sulfate "gradually leached out" of polymer matrices causing the "release of heavy metal toxins" (EX2130, 2:13–15), and was "toxic to tissues." (EX2143, 1:30–33.) Merck's expert admits as much, agreeing a circa-2000 POSAs developing a De Nijs-like implant with barium sulfate would have concerns about potential adverse effects of leakage from the unsealed ends in an undesired amount. (EX2142, 81:7–16, 83:2–5.).

PO Resp. 62.

The preponderance of the evidence shows that at the time the invention was made, barium sulfate was known to leak out of matrices and this was of concern because it was understood to be toxic. *See, e.g.*, Ex. 2131 ¶¶ 10 (stating barium is toxic if "not sufficiently encapsulated"), 27 (warning barium sulfate, "which has a toxic effect" must be coated to prevent "being released in the body of a patient"); Ex. 2147 ¶¶ 157, 219, 276; Ex. 1067, 132:13–133:12 (barium sulfate "not completely insoluble"); Ex. 2143, 1:20–33 ("Current methods of rendering objects radio-opaque involve compounding materials like barium sulfate (i.e., BaSO) into the objects. . . . In particular, medical devices treated with the current methods have low biocompatibility and may be toxic to tissues."); Ex. 2130, 2:13–15 ("The [barium] salt gradually leached out of the matrix causing discoloration of the polymer and release of heavy metal toxins"). Thus, we agree with

Patent Owner that a person of ordinary skill in the art at the time of the invention would have known that barium sulfate is toxic, and would have looked to encapsulate barium sulfate to ensure that it would not leach out of an implant, especially when the implant is intended for long-term use in the body.

Given that barium sulfate leaching was a problem, we find that Petitioner has not provided a sufficient reason that would have prompted a person of ordinary skill in the art to consider adding barium sulfate to the embodiments of De Nijs's devices with open ends or pores. Petitioner does not explain how to successfully combine De Nijs and Schopflin to ensure that the known leaching issue of barium sulfate would have been controlled. Pet. 51–52 (citing Ex. 1002 ¶ 137). We agree with Patent Owner that Petitioner has not established by a preponderance of evidence that, given the knowledge that barium sulfate is toxic and was known to leach out of polymer matrices, a skilled artisan would have contemplated using barium sulfate as the marker in a long-term implantable device. Here, the weight of the evidence is such that one of ordinary skill would have known to encapsulate any barium sulfate in order to prevent any toxic side effects. We, therefore, agree with Patent Owner that, on this record, a skilled artisan would not have selected barium sulfate as the marker in De Nijs's open-ended devices.

Reasonable Expectation of Success

In discussing dependent claims 6 and 9 of the '402 patent, Patent Owner asserts that the prior art is replete with evidence that barium sulfate "gradually leached out" of polymer matrices causing the "release of heavy metal toxins," and was "toxic to tissues." PO Resp. 61–62 (citing Ex. 2130, 2:13–15; Ex. 2143, 1:30–33).

With respect to claims 6 and 9 of the '402 patent, Patent Owner also argues that a person of ordinary skill in the art "would have concerns about potential adverse effects of leakage [of barium sulfate] out of the unsealed ends in an undesired amount." PO Resp. 62 (citing Ex. 2142, 81:7–16, 83:2–5). Patent Owner argues that the De Nijs implant with open ends releases the drug in a burst through the open end and one would expect any other material in the implant to similarly be released. *See* PO Resp. 17 ("[T]he open ends release a drug burst much more rapidly than the membrane [covered section], suggesting anything in the core could be rapidly released (and result in high local concentrations of the released material)." (citing Ex. 2147 ¶ 82)) (emphasis omitted).

Patent Owner argues that around 2000, a person of ordinary skill in the art would have had concerns about leakage of material from an implant, especially material that is toxic. PO Resp. 60, 62. Petitioner's expert, Dr. Langer, generally agrees. Ex. 2142, 80:19–83:5. Patent Owner's expert, Dr. Kiser also agrees that barium sulfate has low solubility, but low solubility does not mean no solubility. *See* Ex. 1067, 133:5–7 ("But by toxicity it's a huge worry that any barium sulfate could -- because it does have a nonzero solubility; it's not completely insoluble."); Ex. 1068, 457:18–21 ("I would agree that barium salt -- barium sulfate is -- is quite insoluble. I don't -- but that doesn't mean that it has zero solubility."). Moreover, additional evidence supports the position that it was known in 2000 that barium salt is toxic. Ex. 2130, 2:13–15 ("The [barium] salt gradually leached out of the matrix causing discoloration of the polymer and release of metal toxins"); Ex. 2143, 1:30–33 ("There are several disadvantages with the current methods [such as compounding materials like barium sulfate into an object for the purpose] of rendering objects radio-opaque. In particular, medical

devices treated with the current methods have low bio compatibility and may be toxic to tissues.").

Petitioner contends that both experts agree that barium sulfate is an ionic, insoluble compound. Pet. Reply. 16 (citing Ex. 2142, 78:13–22, 151:4–23, 174:22–175:8; Ex. 1067, 131:16–22; Ex. 1068, 457:15–21). Petitioner's expert, Dr. Langer, testified that barium sulfate would bind tightly to the EVA. Pet. Reply 16; Tr. 34:18–19 (referring to Ex. 2142, 78:13–22 ("Q. And in your view, the barium sulfate wouldn't migrate through that EVA out any open ends of a De Nijs-like implant? A. It's hard for me to see how one of ordinary skill would think that. I mean, you know, in contrast, to say, a progesterone, which might. I mean, you know -- but in other words, this is an ionic compound, so I wouldn't expect it to migrate now. I wouldn't expect one of ordinary skill to think it would migraine [sic]."), 151:12–13 ("I wouldn't expect it [i.e., barium sulfate] to come out if it's De Nijs [matrix]."), 174:22–175:8 ("one of ordinary skill in the art would have the expectation that because of its low solubility -- you know, now it's embedded in ethylene-vinyl acetate – that's one of the parameters that I mentioned, would be key to -- you know, like if it was high solubility, then it might come out faster. With low solubility, I'd expect it to come out very slowly, if at all.")).

We find that there is insufficient evidentiary support for Petitioner's position that around 2000 it was known that barium sulfate binds tightly to EVA membrane. Dr. Langer does not explain how the barium sulfate binds tightly to the EVA membrane, or why, based on barium sulfate's low solubility, a person of ordinary skill would expect barium sulfate not to be released from the matrix when combined with EVA. Dr. Langer's opinion is that "there's no such thing as a toxic substance, just toxic amounts of

substances." Ex. 2142, 173:5–7. Dr. Langer, however, does not provide any evidence that barium sulfate in the concentration contemplated by Schopflin would be in a non-toxic amount if any or all of it leaches out of the implant. One's expertise, even when draped with a skilled-artisan veil, does not entitle a bare opinion to much weight. *See Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 294 (Fed. Cir. 1985) ("Lack of factual support for expert opinion going to factual determinations" is sufficient to "render the testimony of little probative value in a validity determination.").

Because barium sulfate was known to be toxic and leaching of the material from devices was a concern to an ordinary artisan at the time the invention was made, we are not persuaded that Petitioner has shown a person of ordinary skill in the art to have had a reasonable expectation of successfully combining De Nijs and Schopflin for purposes of claims 6 and 9. *See* Ex. 2131 ¶¶ 10 (barium is toxic if "not sufficiently encapsulated"), 27 (warning barium sulfate, "which has a toxic effect" must be coated to prevent "being released in the body of a patient."); Ex. 2147 ¶¶ 157, 219, 276. We credit the testimony of Patent Owner's expert, Dr. Kiser, who testified that "toxicity [of barium sulfate] it's a huge worry that any barium sulfate could -- because it does have a nonzero solubility; it's not completely insoluble. And any barium sulfate leaching out of that implant for the types of durations that we're looking at here could be -- could be a real cause of -- of concern for, you know, anyone designing an implant." Ex. 1067, at 133:5–12.

When balancing Patent Owner's unrebutted evidence showing that leaching of barium sulfate was a known concern with other medical implants (*see* Ex. 2142, 81:7–16, 83:2–5; Ex. 2131 ¶¶ 10; Ex 2143, 1:30–33; Ex. 2147 ¶¶ 49, 156; PO Sur Reply 14–15) against Petitioner's inadequately

supported position that barium sulfate binds EVA tightly, we find that the weight of the evidence does not support Petitioner's assertion that a person of ordinary skill in the art would have had a reasonable expectation of success in combining De Nijs and Schopflin to achieve the invention of claims 6 and 9.

c. claims 2 and 3

Claim 2 depends from claim 1, and further recites "wherein the radio-opaque material is imageable." Ex. 1001, 24:20–21. Claim 3 depends from claim 1, and further recites "wherein the radio-opaque material comprises a high Z element." Ex. 1001, 24:22–23. Petitioner asserts that Schopflin discloses the use of imageable radiopaque material such as barium sulfate. Pet. 58–59 (citing Ex. 1006, 5:50–53, 7:37–43, 9:5–22, 12:30–56; Ex. 1002 ¶ 153). Patent Owner does not separately dispute these limitations. We find that Schopflin discloses the recited radiopaque material. In particular, Schopflin discloses barium sulfate for improved X-ray localization. *See* Ex. 1006, 7:37–43. Petitioner asserts that the '402 patent uses the term "high Z" as a synonym for high atomic number elements such as silver, and that Dr. Langer avers that barium in barium sulfate has a higher atomic number than silver and is therefore a high Z material. Pet. 59 (citing Ex. 1001, 2:29–34, 10:37–44; Ex. 1002 ¶ 154). We find that barium is a high Z element and that barium sulfate is a high Z material. We credit the testimony of Dr. Langer in this regard as consistent with the definition of high Z in the '402 patent. *See* Ex. 1002 ¶ 154; Ex. 1001, 2:29–34 ("high atomic number (i.e. 'high Z') elements or alloys or mixtures containing such elements."). We

determine that claims 2 and 3 would have been obvious over De Nijs and Schopflin.

d. claim 4

Claim 4 depends from claim 1, and further recites "wherein the device/strand is an implant." Ex. 1001, 24:24–25. Petitioner asserts, *inter alia*, that De Nijs discloses that the strand is an implant. Pet. 59 (citing Ex. 1005, Abstract, 1:8–11, 1:20–29, 2:3, 3:58–60, cls. 1–8; Ex. 1002 ¶ 155). Patent Owner does not separately dispute this limitation. We find that De Nijs discloses an implant. In particular, De Nijs discloses "[t]he implant of the invention is preferably be used [sic] as a subcutaneous implant, but may also be applied locally, e.g. in the uterine or cervical region." *See* Ex. 1005, 3:58–60. We determine that claim 4 would have been obvious over De Nijs and Schopflin.

e. claim 5

Claim 5 depends from claim 1, and further recites that the strand of claim 1 is "in the form of a rod or cylinder." Ex. 1001, 24:26. Petitioner asserts, *inter alia*, that De Nijs discloses a strand in the form of a rod or cylinder, by teaching an implant that is "virtually cylindrical with a maximum section of about 2 mm" and a "length [that is] preferably between 1 and 4 cm" and, in one embodiment, the implant is a "coaxial filament" cut to a desired length. Pet. 59–60 (citing Ex. 1005, 1:62–67, 3:19–24, 5:55–66, 6:35–53, 7:11–24, cl. 5; Ex. 1002 ¶ 156). Patent Owner does not separately dispute this limitation. We find that De Nijs discloses the recited shape. In particular, De Nijs discloses embodiments with a length, e.g., 1–4 cm, longer than the sectional width, e.g., about 2 mm. *See* Ex. 1005, 1:62–67, 3:19–24, 5:55–66, 6:35–53, 7:11–24, cl. 5. We determine that claim 5 would have been obvious over De Nijs and Schopflin.

f. claim 10

Claim 10 is an independent claim with similar language and requirements as claim 1. In addition, independent claim 10 recites that the biocompatible material comprises a "non-biodegradable polymer." Ex. 1001, 24:37–38. Petitioner asserts that De Nijs discloses EVA, which would be understood to be a non-biodegradable biocompatible polymer (as recited in claim 10). Pet. 62 (citing Ex. 1005, 2:3–4; Ex. 1002 ¶ 163). Patent Owner does not separately dispute this limitation. Petitioner has not provided separate reasoning for using a non-biodegradable polymer. Nevertheless, we find that Petitioner has established an adequate showing that the EVA disclosed in De Nijs would have been understood to be non-biodegradable. *See* Ex. 1005, 2:3–4; Ex. 1002 ¶ 163. We determine that claim 10 would have been obvious over De Nijs and Schopflin.

g. claim 16

Claim 16 is an independent claim with similar language and requirements as claim 1. *See* Pet. 44–45. We determine that claim 16 would have been obvious for similar reasons as for independent claim 1.

h. claim 12

Claim 12 depends from claim 1, and further recites "having a length of up to 50 cm." Ex. 1001, 24:47. This means that claim 12 encompasses lengths between 0 and 50 cm. *See In re Mochel*, 470 F.2d 638, 640 (CCPA 1972).

Petitioner asserts De Nijs teaches "[t]he implant of the invention … possesses a variable length[,] … preferably between 1 and 4 cm." Pet. 63 (citing Ex. 1005, 1:62–68, 2:3–29, 3:19–24, 5:47–67, Ex. 5, cl. 5; Ex. 1002 ¶ 171). Patent Owner does not separately dispute this limitation.

Petitioner has omitted an intermediate sentence from its quotation of De Nijs, which states that "[t]he length of the implant will, however, not exceed about 5 cm for practical reasons." Ex. 1005, 1:65–66. We do not regard this sentence as teaching away from lengths longer than 5 cm because De Nijs's reference to "practical reasons" does not indicate that there would be a change in functionality for devices longer than 5 cm and we determine that a person of ordinary skill would understand from De Nijs that the device could be longer than 5 cm. As such, a longer length would have been obvious over the device of De Nijs. *Cf. Gardner v. TEC Syst., Inc.*, 725 F.2d 1338 (Fed. Cir. 1984) (where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device); *see also In re Rinehart*, 531 F.2d 1048, 1053 (CCPA 1976); *In re Rice*, 341 F.2d 309 (CCPA 1965).

Moreover, claim 12, which encompasses a range of 0 to 50 cm, would claim a broader range than the prior art range of 1 to 5 cm taught by De Nijs. As such, De Nijs would be understood to meet the recitation of claim 12, albeit in a combination for obviousness rather than as a matter of anticipation. *Cf. In re Petering*, 301 F.2d 676, 682 (CCPA 1962) ("The compound of claim 10 is one of the 20 compounds in the limited class of compounds we find in Karrer. In the light of our previous discussion of this particular limited class, therefore, the compound recited in claim 10 has been described in a prior art printed publication and hence is unpatentable. Generic claims 1, 2, 4 and 7 include the compound of claim 10 and are therefore unpatentable for the same reason.") In other words, this is not a situation as discussed in *Galderma* where a claimed range falls within a

prior art range because here the claimed range is broader. *Galderma Labs, L.P. v. Tolmar*, 737 F.3d 731, 738 (Fed. Cir. 2013).

Nevertheless, even if claim 12 were analyzed under the more general rubric of overlapping ranges, and even if De Nijs were considered to teach away from lengths longer than 5 cm, claim 12 would be unpatentable because it encompasses both critical and non-critical values. *Cf. In re Harris*, 409 F.3d 1339, 1344 (Fed. Cir. 2005) (unexpected results must be commensurate with the scope of the claims).

i. claims 7, 8, and 11

Claims 7, 8, and 11 each depend, directly or indirectly, from claim 1 and further recite specific dimensions for the device of claim 1. Claim 7 depends from claim 1, and further recites "having a diameter between 0.5 and 3 mm and a length of 40 mm." Ex. 1001, 24:30–31. Claim 8 depends from claim 7, and further recites "wherein the strand has a diameter of 2 mm." Ex. 1001, 24:32–33. Claim 11 depends from claim 1, and further recites "having a diameter between 0.8 and 3 mm and a length of 40 mm." Ex. 1001, 24:45–46.

For claims 7 and 8, Petitioner relies on similar evidence as for claim 5. For claim 11, Petitioner asserts that De Nijs discloses a length of 40 mm. Pet. 63 (citing Ex. 1005, 7:48–8:15; Ex. 1002 ¶ 170). De Nijs discloses strands having a diameter of preferably between 1.5 and 2.0 mm and a length preferably between 1 and 4 cm (10–40 mm). Ex. 1005, 1:62–68; Ex. 1002 ¶ 158. Patent Owner does not argue for the criticality of the recited dimensions of claims 7, 8, or 11. *See E.I. DuPont de Nemours & Co. v. Synvina C.V.*, 904 F.3d 996, 1007 (Fed. Cir. 2018) (discussing overlapping values in context of *inter partes* review); *see also Gardner v. TEC Syst., Inc.*, 725 F.2d 1338 (Fed. Cir. 1984). Accordingly, we determine

that Petitioner has shown that claims 7, 8, and 11 would have been obvious over De Nijs and Schopflin.

j. claims 13 and 15

Claim 13 depends from claim 1, and further recites "wherein the strand is in the form of a rod or cylinder, and the therapeutic agent is a hormone." Ex. 1001, 24:48–49. Claim 15 depends from claim 13, and further recites "wherein the therapeutic agent is not an anti-neoplastic agent." Ex. 1001, 24:53–54. For the reasons discussed above with respect to claim 5, we find that De Nijs discloses a cylindrical implant. Petitioner asserts, *inter alia*, that De Nijs discloses hormone with a progestational activity. Pet. 64, 65 (citing Ex. 1005, Abstract, 1:8–11, 1:20–23, 2:4–29, 3:46–57, cls. 1, 4; Ex. 1002 ¶¶ 173, 175). Dr. Langer asserts that this hormone does not have anti-tumor activity. Ex. 1002 ¶ 173, 175. Patent Owner does not separately dispute this limitation. We find that De Nijs discloses the recited hormone limitations. In particular, De Nijs discloses 3-keto-desogestrel, levonorgestrel, or gestodene active contraceptive substances. Ex. 1005, 2:3–13. We determine that claims 13 and 15 would have been obvious over De Nijs and Schopflin.

k. claim 14

Claim 14 depends from claim 13, and has the same further recitation as claim 7. Ex. 1001, 24:51–52. We determine that claim 14 is obvious over De Nijs and Schopflin for similar reasons as claims 7 and 13.

l. claim 17

Claim 17 depends from claim 16, and has the same further recitation as claim 13. Ex. 1001, 24:65–67. We determine that claim 17 is obvious over De Nijs and Schopflin for similar reasons as claims 13 and 16.

m. claim 18

Claim 18 depends from claim 17, and has the same further recitation as claim 7. Ex. 1001, 25:1–2. We determine that claim 18 is obvious over De Nijs and Schopflin for similar reasons as claims 7 and 17.

n. claim 19

Claim 19 depends from claim 17, and has the same further recitation as claim 15. Ex. 1001, 25:3–4. We determine that claim 19 is obvious over De Nijs and Schopflin for similar reasons as claims 15 and 17.

D. Obviousness over Zamora and Brem

Petitioner asserts that claims 1–19 of the '402 patent are unpatentable as obvious over Zamora and Brem. Pet. 22–46. Patent Owner disagrees. PO Resp. 19–49.

1. Zamora (Ex. 1003)

Zamora is titled "Bioabsorbable Brachytherapy Device" and relates to "radiation delivery devices and combination radiation and drug delivery devices" "having elements that will be absorbed in tissue over time." Ex. 1003, [54], 1:30–35.[16] Zamora observes drawbacks to prior art devices that were expensive, difficult to manufacture, involved a precise welding step, contained a highly radioactive component, and involved difficult and time consuming quality control. *Id.* at 2:63–67. Zamora discloses a brachytherapy device with a bioabsorbable polymeric housing, with a radioisotope that may be chelated. *See id.* at 4:15–25. Zamora further discloses that its device optionally includes a therapeutic drug. *Id.* at 4:46–58.

[16] Unless indicated otherwise, we cite to the page, column, and line numbers in the original references, rather than the page numbers provided by the parties pursuant to 37 C.F.R. § 42.63(d)(2).

Figure 7 of Zamora is depicted below (*id.* at 6:44–45):

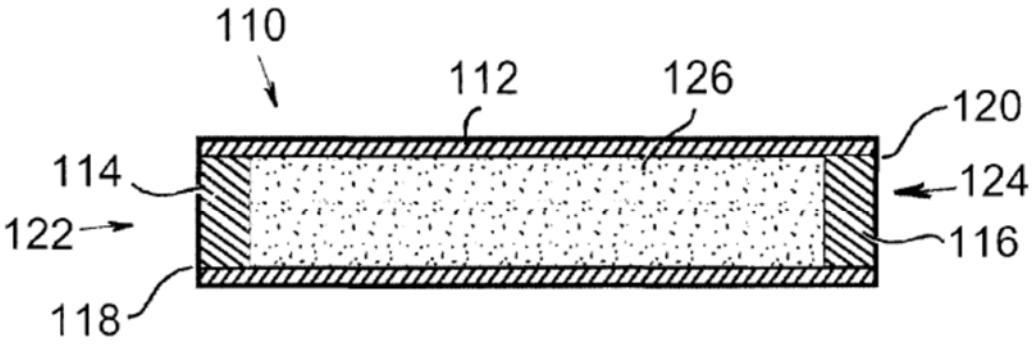

FIG. 7

Figure 7 of Zamora is a drawing of a bioabsorbable polymer brachytherapy device. Zamora's tube 112 is filled with complex 126 that includes the radioisotope. *Id.* at 7:63–64. The device also includes ends 122 and 124 that are sealed with plugs 114 and 116. *Id.* at 7:60–67. In an alternative embodiment, ends 122 and 124 "may be sealed by heating and compressing the ends, and optionally adding a quantity of molten bioresorbable polymer at each of ends 122 and 124." *Id.* at 9:50–54.

2. Brem (Ex. 1004)

Brem is titled "Controlled Local Delivery of Chemotherapeutic Agents for Treating Solid Tumors" and relates to "localized delivery of chemotherapeutic agents to solid tumors." Ex. 1004, [54], 1:12–13. Brem describes a problem with systemic administration of chemotherapy, i.e., that high dosages may be required to compensate for poor bioavailability, and that these dosages may be associated with life-threatening toxicity. *See id.* at 3:8–16. Brem discloses devices consisting of reservoirs that release drug over an extended time period, preferably consisting of biodegradable polymeric matrixes or reservoirs connected to implanted infusion pumps. *Id.* at 3:55–62. Brem discloses that the devices are implanted within or

immediately adjacent the tumors, e.g., such that the agent does not have to cross the blood-brain barrier. *Id.* at 3:51–53, 3:61–63.

As an initial matter, the parties dispute whether Zamora constitutes § 102(e) prior art. As explained further below, we find Petitioner has not satisfied its burden to establish that it is.

3. Legal Background Regarding § 102(e) Prior Art

Petitioner has the burden of persuasion to prove unpatentability by a preponderance of the evidence. 35 U.S.C. § 316(e) ("In an inter partes review . . ., the petitioner shall have the burden of proving a proposition of unpatentability by a preponderance of the evidence."). Where, as here, Petitioner asserts the challenged claims are unpatentable over a prior art reference because it is § 102(e) prior art, it is Petitioner's burden to prove that reference is entitled to the filing date of its provisional application. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

The Federal Circuit has made clear that determining whether a reference is § 102(e) prior art involves a burden-shifting framework. *Id.* at 1379. In *Dynamic Drinkware*, although the burden of persuasion to prove unpatentability never shifted from the petitioner, the burden of production regarding whether the Raymond reference was § 102(e) prior art shifted between the petitioner and patent owner. *Id.* The petitioner met the initial burden of production by arguing Raymond anticipated the challenged claims under § 102(e). *See id.* The burden then shifted to the patent owner to argue or produce evidence that Raymond did not actually anticipate the claims, or that the claims of the patent at issue were entitled to the benefit of a filing date before the filing date of Raymond. *Id.* at 1380. The patent owner produced evidence that the claimed invention was reduced to practice before

the actual filing date of Raymond and thus was entitled to a date of invention before that of the Raymond patent. *Id.* As a result, the burden then shifted back to the petitioner to prove that the claimed invention was not reduced to practice, as argued by the patent owner, or that the Raymond patent was entitled to the benefit of a filing date before the date of the patent owner's proposed reduction to practice. *Id.*

The Federal Circuit noted that 35 U.S.C. § 119(e)(1) addresses the requirements for a patent to claim priority from the filing date of its provisional application. *Id.* at 1378. Under § 119(e)(1), the specification of the provisional application must "contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms," 35 U.S.C. § 112 ¶ 1, to enable an ordinarily skilled artisan to practice the invention claimed in the non-provisional application. *Dynamic Drinkware*, 800 F.3d at 1378 (quoting *New Railhead Mfg., L.L.C. v. Vermeer Mfg. Co.*, 298 F.3d 1290, 1294 (Fed. Cir. 2002)). In other words, "[a] reference patent is only entitled to claim the benefit of the filing date of its provisional application if the disclosure of the provisional application provides support for the claims in the reference patent in compliance with § 112, ¶ 1." *Id.* at 1381 (citing *In re Wertheim*, 646 F.2d 527, 537 (CCPA 1981)).

In *Dynamic Drinkware*, the Federal Circuit determined that the petitioner failed to compare the claims of the Raymond patent to the disclosure of its provisional application. *Id.* The petitioner had only compared the claims of the patent at issue with the disclosures of the Raymond patent and the Raymond provisional. *Id.* at 1381. That is insufficient. As *Dynamic Drinkware* makes clear, "[a] provisional application's effectiveness as prior art depends on its written description

support for the claims of the issued patent of which it was a provisional." *Id.* at 1382.

4. Whether Zamora Is § 102(e) Prior Art

Zamora was filed on January 24, 2001. Ex. 1003, [22]. Zamora claims priority to U.S. Provisional App. No. 60/178,083, which was filed on January 25, 2000 (Ex. 1043, "Zamora Provisional"). *Id.*, [60].

The '402 patent was filed on May 13, 2015. Ex. 1001, [22]. The '402 patent claims priority to a string of continuation and continuation-in-part applications, the earliest of which was filed May 18, 2001. *Id.*, [63]. The '402 patent also claims priority to two provisional applications: U.S. Provisional App. No. 60/249,128 (Ex. 2071, "the '128 Provisional"), which was filed on November 16, 2000 (Ex. 1001, [60]), and U.S. Provisional App. No. 60/412,050 (Ex. 1049, "the '050 Provisional"), which was filed on September 19, 2002 (Ex. 1001, [60]).

Patent Owner argues that Zamora is not prior art to the '402 patent. PO Resp. 22–28. Based on Petitioner's assertion of Zamora as prior art under § 102(e), there is therefore a burden of production on Patent Owner to show that the '402 patent is entitled to the filing date of the '128 Provisional. *Dynamic Drinkware*, 800 F.3d at 1378. If Patent Owner makes this showing, the burden of production shifts back to Petitioner to show that Zamora is also entitled to the filing date of the Zamora Provisional, which was filed January 25, 2000, which is before the earliest effective filing date of the '128 Provisional on November 16, 2000.

Petitioner has satisfied its initial burden of production by asserting the challenged claims of the '402 patent are unpatentable as obvious over Zamora as § 102(e) prior art and showing that the actual filing date of Zamora predates the actual filing date of the '402 patent. Pet. 1–2; *see*

Dynamic Drinkware, 800 F.3d at 1378. Petitioner also identifies where in the Zamora '083 Provisional it contends there is written description support for claims 1 and 9 of Zamora. Pet. 2–3.

Patent Owner contends that the '402 patent is entitled to the benefit of the filing date of the '128 Provisional. PO Resp. 19–22. In response, Petitioner asserts the '402 patent cannot claim priority to any application before the '050 Provisional. Pet. Reply 24–25. Moreover, Petitioner asserts that each limitation of Zamora's claim 1 is supported in the Zamora Provisional, which "is all that the law requires." *Id.* at 25–26. And even if the law does require that the relied-upon disclosures are supported by the Zamora Provisional, Petitioner asserts that disclosure is supported by the Zamora Provisional. *Id.* at 26.

In its Surreply, Patent Owner asserts Zamora is not prior art because Petitioner has failed to show the challenged claims are not entitled to the benefit of the filing date of the '128 Provisional. PO Surreply 22–23. Patent Owner also asserts that Petitioner's argument fails because it did not show the relied-upon disclosures of Zamora were carried forward from the Zamora Provisional. *Id.* at 23–24.

We now turn to the first question of whether the '402 patent claims are entitled to the benefit of the earliest effective filing date of the '128 Provisional.

a. Whether the '402 Patent Claims Are Entitled to the Benefit of the Earliest Effective Filing Date of the '128 Provisional

Patent Owner asserts that the '128 Provisional and all intervening applications fully support the challenged claims. PO Resp. 19–22 (citing Ex. 2147 ¶ 90). Petitioner disagrees. Pet. Reply 24–25. We find that claims 1–6, 9, 10, 13, 15–17, and 19 of the '402 patent are supported by the

disclosure of the ’128 Provisional for the reasons stated by Patent Owner and as supported by its declarant, Dr. Kiser. However, we find that Patent Owner has not identified support in the ’128 Provisional for the claims that recite specific dimensions or dimensional ranges, i.e., claims 7, 8, 11, 12, 14, and 18 of the ’402 patent. We focus our discussion on the limitations whose priority are in dispute.

Petitioner argues that the ’128 Provisional fails to provide written description support for the full scope of the term “strand” recited in the ’402 patent claims. Pet. Reply 24–25. That is, Petitioner notes that Patent Owner asserts the De Nijs and Nexplanon implants, which are 40 mm long, constitute strands, and that claim 12 of the ’402 patent recites strands up to 50 cm long. *Id.* at 24. Petitioner argues that the ’128 Provisional does not describe any implant longer than 10 mm, which is consistent with “traditional ‘brachytherapy seeds’” described in the ’128 Provisional. *Id.* at 25 (citing Ex. 2071, 3:3–7). Moreover, Petitioner asserts that Figures 5A and 5B of the ’128 Provisional do not provide written description support for a “strand” because it merely depicts “a plurality of brachytherapy seeds . . . conjoined into a chain [] using a plurality of spacers.” *Id.* at 25 (quoting Ex. 2071, 29:3–13). Thus, Petitioner argues the inventor was not in possession of the full scope of the claimed invention before the ’050 Provisional. *Id.* at 24–25.

The test for written description support is “whether the disclosure of the application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.” *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (en banc). “[T]here is no categorical rule that a species cannot suffice to claim the genus.” *Hynix Semiconductor Inc. v. Rambus Inc.*, 645 F.3d

1336, 1352 (Fed. Cir. 2011). Rather, "a sufficient description of a genus instead requires the disclosure of either a representative number of species falling within the scope of the genus or structural features common to the members of the genus so that one of skill in the art can 'visualize or recognize' the members of the genus." *Ariad*, 598 F.3d at 1350 (citation omitted). "Different claims of [a CIP] application may therefore receive different effective filing dates." *Augustine Med., Inc. v. Gaymar Indus., Inc.*, 181 F.3d 1291, 1302–03 (Fed. Cir. 1999) (*cited in PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299 (Fed. Cir. 2008)).

Independent claims 1, 10, and 16

We find Petitioner's arguments regarding the term "strand" in independent claims 1, 10, and 16 to be unconvincing. Here, we find the disclosure of various species of strands in the '128 Provisional to be sufficient to describe the claimed genus of strands of the '402 patent. The '128 Provisional teaches "brachytherapy seeds shaped into a cylinder (or rod) having a diameter of between about 0.8 to 3 millimeters . . . and a length of between about 4 to 6 millimeters . . . are preferred." Ex. 2071, 15:3–17. The '128 Provisional also teaches an implant depicted in Figures 5A and 5B, which are reproduced below:

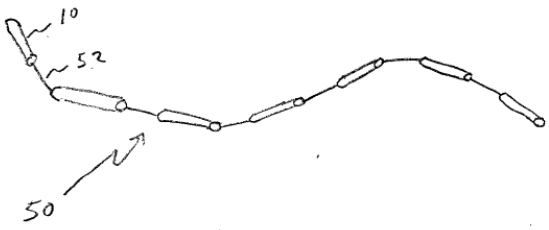

FIG. 5A

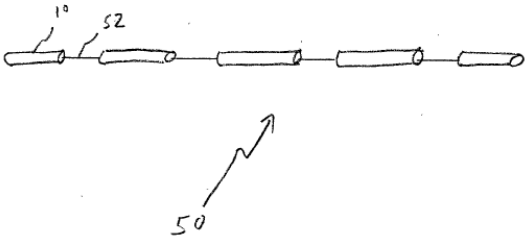

FIG. 5B

Figures 5A and 5B depict an implant where "a plurality of brachytherapy seeds 10 may be conjoined into a chain 50 using a plurality of spacers 52 to connect the plurality of seeds 10." Ex. 2071, 29:3–5, Figs. 5A, 5B. Moreover, the '128 Provisional teaches that spacers "can have any size suitable for use with brachytherapy seed 10" and that for many applications, the length will vary from "between about 0.5 mm to about 50 mm." *Id.* at 29:6–9.

Petitioner asserts that Figures 5A and B of the '128 Provisional do not provide written description support for a "strand" because it merely depicts "a plurality of brachytherapy seeds . . . conjoined into a chain [] using a plurality of spacers." Pet. Reply 25 (quoting Ex. 2071, 29:3–13). Petitioner appears to equate the term "strand" in the '402 patent with the individual "seeds" described in the '128 Provisional.

We decline to interpret the term "strand" so narrowly. As explained above, the broadest reasonable interpretation of a "strand" includes an "elongated implant." *See supra*. Moreover, the '402 patent states that "[s]trands can be formed as chains or continuous arrays of seeds up to 50 centimeters or more, with or without spacer material, flaccid, rigid, or flexible." Ex. 1001, 4:9–12. Thus, a strand can be composed of multiple seeds with spacers in between.

The '128 Provisional describes seeds of 2–10 mm with certain needles, and a preferred length of 4–6 mm with other needles. Ex. 2071, 15:3–17. Thus, we determine that the '128 Provisional, including the descriptions of Figures 5A and 5B, provide sufficient written description support for the "strand" (i.e., elongated implant) recited in the '402 patent claims. Although Petitioner argues that Patent Owner does not support a strand of length longer than 10 mm, there is no length requirement for the strand and therefore no need to support a longer strand for independent claims 1, 10, and 16.

As we found in the Decision on Institution, the '128 Provisional discloses "a brachytherapy seed for implantation into a subject including a biocompatible component, a therapeutically active component, and a radiopaque marker." Ex. 2071, 6:1–3. The '128 Provisional discloses that microspheres of a radio-opaque polymer may be co-mingled with microspheres containing a biocompatible component. Ex. 2071, 26:10–15. The '128 Provisional discloses that component 12 can be a biodegradable polymer (Ex. 2071, 17:1–2) and that the biocompatible component may serve as a coating (*id.* at 31:6–7). In satisfaction of another limitation of independent claims, 1, 10, and 16, the '128 Provisional discloses that "some version of the seeds of the invention" "do not contain a radioisotope." Ex.

2071, 5:18–21. Accordingly, we determine that independent claims 1, 10, and 16 are sufficiently supported by the '128 Provisional.[17]

Claims 7, 8, 11, 12, 14, and 18

With respect to the recited length of 40 mm in claims 7, 8, 11, 14, and 18, and the length of up to 50 cm in claim 12, Petitioner argues that the '128 Provisional does not provide written description support for a strand of 40 mm or up to 50 cm. *See* Reply 24. Petitioner contends that the addition of specific lengths of implants in the '050 Provisional "necessitated a Continuation in Part ('793 Application), which eventually matured into the '402 patent." Pet. Reply 25.

Patent Owner argues that the '128 Provisional discloses that a strand "has a size and shape suitable for passing through the bore of a brachytherapy needle." PO Sur Reply 23 (citing Ex. 2071, 10:16–18, 13:16–17, 15:18–20, 24:3–6, 26:21–25, 27:12–28:3). Patent Owner argues that Dr.

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[17] Petitioner argued during the oral hearing that Patent Owner is estopped from asserting Zamora is not prior art. Tr. 52:15–53:7. Petitioner's counsel admitted, however, that that argument was only made in the Reply to Patent Owner's *Preliminary Response*. *Id.* at 53:8–12. That is, Petitioner did not raise the argument in its Reply to Patent Owner's Response after trial was instituted. We, therefore, find that argument is waived and do not consider it here. *See In re NuVasive*, 842 F.3d 1376, 1380–81 (Fed. Cir. 2016) (finding patent owner waived arguments made in Preliminary Response and not raised in Patent Owner Response); *cf.* Scheduling Order (Paper 14), 6 (cautioning patent owner that "any arguments for patentability not raised in the response will be deemed waived"). Although Patent Owner addressed Petitioner's estoppel argument in its Patent Owner Response (PO Resp. 25), Petitioner did not respond to Patent Owner's argument in its Reply. We find this further supports waiver of Petitioner's argument, as Petitioner could have raised the estoppel issue by responding to Patent Owner's arguments in its Reply, but it chose not to.

Kiser's testimony establishes that this disclosure teaches that there is no limit on implant length and that Merck provides no contrary evidence. *Id.* (citing Ex. 2147 ¶ 90, Table B). We find that Patent Owner has not identified embodiments in the '128 Provisional that would support the lengths recited in claims 7, 8, 11, and 12 of the '402 patent. *Dynamic Drinkware*, 800 F.3d at 1378. Patent Owner relies on the following passages of the '128 Provisional: 6:4–7, 15:3–17, 29:3–10, claim 4. PO Resp. 21. These passages disclose a length of 4 to 6 mm (e.g., 3.9, 4, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 5, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, 5.8, 5.9, 6, or 6.1 mm), about 4.5 mm, and a spacer length of about 0.5 mm to about 50 mm (e.g., 0.4, 0.5, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30, 35, 40, 45, 50, or 51 mm). Ex. 2071, 6:4-7, 15:3-17, 29:3-10, claim 4. However, Patent Owner does not explain how these values would be combined to arrive at an embodiment with a specific length.

Based on our own review of the evidence, we note that the '128 Provisional discloses certain ranges of lengths for components of the device, *i.e.*, seeds and spacers, and also discloses ranges for numbers of seeds per strand. For example, above we find that the '128 Provisional describes seeds of 2–10 mm with certain needles, and a preferred length of 4–6 mm with other needles. Ex. 2071, 15:3–17. Further, the '128 Provisional discloses a spacer length of between 0.5 and 50 mm (*id.* at 29:9); the '128 Provisional describes a strand as possibly having "one (or 2, 3, 4, 5, *or more*) spacer 52 being interposed between every two seeds 10" and "one (or 2, 3, 4, 5, *or more*) seed 10 being interposed between every two spacers 52" (*id.* at 30:13–16 (emphases added)); and the '128 Provisional states that "[i]n a typical application of brachytherapy for treating prostate cancer, about 50-150 small seeds containing a radioisotope that emits a relatively short-acting

type of radiation are surgically implanted in the diseased tissue." (*id.* at 1:15–18).

However, the Federal Circuit has explained that "[t]he disclosure of a broad range of values does not by itself provide written description support for a particular value within that range." *General Hospital Corp. v. Sienna Biopharms. Inc.*, 888 F.3d 1368, 1372 (Fed. Cir. 2018). Thus, although the '128 Provisional describes a broad range of possible strand lengths, we are not persuaded that the disclosure "allow[s] one skilled in the art to 'immediately discern the limitation at issue in the claims.'" *See id.* (quoting *Purdue Pharma L.P. v. Faulding Inc.*, 230 F.3d 1320, 1323 (Fed. Cir. 2000)). We find the '128 Provisional fails to provide written description support for the length of up to 50 cm limitation, i.e., with a maximum length of 50 cm, recited in claim 12 and the length of 40 mm limitation recited in claims 7, 8, 11, 12, 14, and 18 of the '402 patent.

Remaining Claims

Patent Owner points to written description support for the remaining claims of the '402 patent. PO Resp. 19–21. For example, Patent Owner asserts that the '128 Provisional describes the composition of the radio-opaque material (claims 2 and 3) (citing Ex. 2071, 24:10-13, 25:2-4); the specifics of the claimed strand (claims 4, 5, and 13) (citing *id.* at 12:8-9, 13:7-8; 11:3-7); the pores, cavities, and open ends (claims 6 and 9) (citing *id.* at Figs. 1-5, 12:10-11, 16:1-4); and the composition of the therapeutic agent (claims 13, 15, 17, and 19) (citing *id.* at 11:3-7, 12:8-9). Petitioner does not separately dispute these limitations. Based on our review of the evidence, we find the limitations of the following remaining claims are sufficiently supported, e.g., radiopaque material with a high Z element (claims 2 and 3), an implant (claim 4), cylindrical (claim 5), with a cavity

and open ends (claims 6 and 9), and a hormone (claims 13 and 17). Ex. 2071, 24:10-13, 25:2-4; 12:8-9, 13:7-8; 11:3-7; Figs. 1-5, 12:10-11, 16:1-4; 11:3-7, 12:8-9.

However, we find that the '128 Provisional does not disclose the negative limitation of claims 15 and 19 that the hormonal agent is not an anti-neoplastic agent. On the contrary, the context of the disclosure indicates that the therapeutic agents are adjuvants to the treatment of cancer. *See, e.g.*, Ex. 2071, 1:10–15, 19:19–22.

Accordingly, we determine that the '128 Provisional provides written description support for claims 1–6, 9, 10, 13, 16, and 17 of the '402 patent.

Having found the effective filing date of claims 1–6, 9, 10, 13, 16, and 17 of the '402 patent is November 16, 2000, we now turn to whether Zamora is entitled to claim the benefit of the January 25, 2000, filing date of the Zamora Provisional to antedate those claims of the '402 patent.

b. Whether Zamora Is Entitled to the Benefit of the Earliest Effective Filing Date of the Zamora Provisional

The Petition asserts that Zamora is § 102(e) prior art and provides a claim chart identifying where the limitations of claims 1 and 9 of Zamora are supported by the written description of the Zamora Provisional. Pet. 1–3.

Patent Owner argues that the Zamora Provisional does not support the location of the radiopaque medium, which Patent Owner asserts must be on at least "an external surface of the tube." PO Resp. 26–27.

Claim 1 of Zamora recites that the radiopaque medium is "disposed either on at least a portion of an external surface of the tube, within at least [a] portion of a structure of the tube, or within the radioactive material." Ex. 1003, 14:19–22. In other words, claim 1 of Zamora functions as a *Markush*

group with three possible ways to dispose the radiopaque medium relative to the device.

Petitioner relies on two different passages in the Zamora Provisional to support this limitation. First, Petitioner relies on a passage in Zamora in which radiosensitization material coats an external surface. Ex. 1043, 8:10–17.[18] However, at oral argument, counsel for Petitioner conceded that radiosensitization material refers to "a drug that makes tissue sensitive to radiation," which is different than radiopaque material, as recited. Tr. 50:19–51:6. Therefore, this passage in Zamora does not disclose *radiopaque* material disposed *on an external surface* of the tube, as recited.

Second, Petitioner relies on a passage in the Zamora Provisional in which radiopaque material is "[a]dmixed into the seed core or the cylinder walls is an X-ray contrast agent." Ex. 1043, 5:13. We determine that radiopaque material admixed into the cylinder walls is not necessarily found on an external surface of the tube. Further, claim 1 of Zamora recites that the material be disposed on an external surface. At most, the Zamora provisional might support radiopaque material disposed *in* a tube wall, but does not disclose radiopaque material *disposed on* an external surface of the tube, as recited.

As an initial matter, we must determine the meaning of the limitation "disposed . . . on at least a portion of an external surface" of claim 1 of Zamora. Turning first to the claim language, Zamora distinguishes between radiopaque medium that is disposed "on at least a portion of an external

[18] We refer to the page numbers of the application that constitutes the Zamora Provisional rather than to the Exhibit's page numbers provided by the parties.

surface of the tube" and radiopaque medium that is disposed "within at least [a] portion of a structure of the tube." Ex. 1003, 14:19–22. Consistent with that, Zamora teaches that the radiopaque medium can be incorporated into the device in several ways:

> The device may further include a radiopaque medium, which may be disposed on at least a portion of the external surface of the bioabsorbable polymeric housing, such as a tube, may be disposed within at least a portion of the structure of the bioabsorbable polymeric housing, such as a tube, or may be disposed within the radioactive material.

Ex. 1003, 4:19–24. Zamora also describes various embodiments for applying the radiopaque medium:

> In one embodiment, an iodine-based radiopaque agent is admixed with the other constituent elements forming complex 125 [sic, 126]. In another embodiment, a barium-based radiopaque agent is admixed with the other constituent elements forming complex 126. In yet another embodiment, the radiopaque agent forms a part of a coating over the device 110.

Id. at 12:31–37. Thus, Zamora teaches that admixing radiopaque material into the complex is disposing radiopaque medium "in" the structure. And Zamora teaches that coating radiopaque material over the device is disposing radiopaque medium "on" the structure. We, therefore, determine the term "disposed . . . on" an external surface includes material "coated on an external surface," but does not include material that is admixed into the complex.

The Zamora Provisional does not disclose coating radiopaque material on an external surface. Nor would we here attempt to combine the teachings of disposing a radiosensitization material coating the surface with the teaching of an interior radiopaque material, as Petitioner appears to suggest. Pet. Reply 26. That would be in the nature of an obviousness inquiry, which

is not the standard for written description required here. *See Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1571–72 (Fed. Cir. 1997) ("Entitlement to a filing date does not extend to subject matter which is not disclosed, but would be obvious over what is expressly disclosed."). Thus, we are not persuaded that the Zamora Provisional provides written descriptive support for the radiopaque medium being disposed "on at least [a] portion of a structure of the tube." As such, the Zamora Provisional only supports two out of the three possible locations for radiopaque material in claim 1 of Zamora. We, therefore, find Petitioner has not shown that the Zamora Provisional provides representative disclosures to support claim 1 of Zamora. Petitioner does not argue written description support for any other independent claim of Zamora.[19] There is no evidence in the record to support the contention that a person of ordinary skill in the art would have understood the inventor to have possessed the claim limitation, as recited. *See* Ex. 1043, 5:13, 8:13–17.

[19] Petitioner also refers to claim 9 of Zamora in Petitioner's chart attempting to show written description support for a claim of the Zamora reference. Claim 9 is written in multiple dependent form and depends from claim 1 as well as other independent claims, i.e., claims 2, 4, and 6. *See* Pet 3; Ex. 1003, 15:8–10. Thus to show support for claim 9 in the Zamora Provisional, Petitioner would have to support the independent claim limitations which carry over to claim 9 from at least one of claims 1, 2, 4, and 6. Above, we determine that Petitioner has not shown support for the limitations of independent claim 1. Further, Petitioner does not explain how independent claims 2, 4, and 6 would have been supported by the Zamora provisional. We determine that Petitioner has not met its burden to show written descriptive support for claim 9 by virtue of its dependency from any of claims 1, 2, 4, and 6.

Having considered the arguments and evidence presented at trial, we find Petitioner has not satisfied its burden of establishing Zamora constitutes § 102(e) prior art with respect to claims 1–6, 9, 10, 13, 16, and 17.

5. Obviousness Analysis

Petitioner asserts that each limitation of the challenged claims 1–19 is taught by the combination of Zamora and Brem. Pet. 24–46. Because we determine that Petitioner has not established that Zamora is prior art to claims 1–6, 9, 10, 13, 16 and 17 of the '402 patent, we determine that Petitioner has not shown that challenged claims 1–6, 9, 10, 13, 16, and 17 are unpatentable over Zamora and Brem.

We turn to the parties' arguments, with respect to claims 7, 8, 11, 12, 14, 15, 18, and 19, applying the Zamora patent as part of the asserted grounds of unpatentability, i.e., whether the Zamora patent and Brem render obvious the remaining claims of the '402 patent (Ground 1). Pet. 22–46; PO Resp. 19–48. We note that the combination of Zamora and Brem may actually be considered two subgrounds. Petitioner proposes to modify Brem's device in view of Zamora by adding a radiopaque marker to Brem's device, i.e., a subground of Brem in view of Zamora. Petitioner also proposes to modify Zamora's device in view of Brem by removing the radioisotope from Zamora's device, i.e., a subground of Zamora in view of Brem.

Modifying Zamora in view of Brem

Claims 7, 8, 11, 12, 14, 15, 18, and 19 ultimately depend from claims 1 and 16 and further recite dimensional limitations. We begin with claim 12.

Claim 12

Claim 12 can be understood as containing the following requirements, incorporating the subject matter of independent claim 1:

> 12. [A strand for administration of a therapeutic agent to a subject in need thereof comprising (a) a therapeutically effective amount of a therapeutic agent; (b) a biocompatible component comprising a polymer; (c) a radio-opaque material, wherein the radio-opaque material is encapsulated in the biocompatible component; and (d) a polymeric coating, wherein the therapeutic agent is a small molecule, wherein the polymeric coating covers the strand and wherein radiopaque material allows for the position of the strand to be determined following administration wherein the strand is non-radioactive and does not contain a radioisotope]
>
> having a length of up to 50 cm.

i. "A strand for administration of a therapeutic agent to a subject in need thereof comprising"; "(a) a therapeutically effective amount of a therapeutic agent"; "wherein the therapeutic agent is a small molecule"

Petitioner asserts, *inter alia*, that Zamora discloses a brachytherapy device for treatment of an affected region that may be made of any desired dimension, and also discloses devices for delivery of localized chemotherapeutic, bioactive, or other drugs. *See* Pet. 27–29 (citing, e.g., Ex. 1003, 1:46–55, 3:31–34, 4:3–5, 4:11–18, 4:22–25, 4:46–58, 4:63–65, 5:8–10, 5:19–27, 8:1, 8:20–31, 7:56–60, 9:9–24, 9:25–29, 9:62–66, 10:49–52, 12:50–61, cls. 1–17, Figs. 1–7; Ex. 1004, Abstract, 1:12–13, 3:39–48, 4:41–63, 6:37–42, 7:19–28, 7:36–40, 7:65–66, 8:31–9:42, 11:30–41, Table 1, cls. 1–18). Petitioner asserts that a person of ordinary skill would have understood the therapeutic agent to be a small molecule. Pet. 31–32 (citing Ex. 1002 ¶¶ 76–77).

Patent Owner does not dispute this limitation during the trial.

Applying the claim construction of "strand" set forth above, we determine on this record that Zamora discloses the recited "strand." In particular, Zamora discloses a device that may include "an effective amount of a therapeutic drug . . . disposed on at least a portion of the external surface

of the bioabsorbable polymeric housing, such as a tube, or may be disposed within at least a portion of the structure of the bioabsorbable polymeric housing, such as a tube." Ex. 1003, 4:46–51, Fig. 7; *see also* Ex. 1043, 5:12–13. Brem also discloses delivery of an effective amount of a chemotherapeutic agent. Ex. 1004, 7:32–40.

ii. "(b) a biocompatible component comprising a polymer"

Petitioner asserts, *inter alia*, that Zamora discloses the use of biocompatible polymers such as "polycaprolactone, poly(D,L-lactide) poly(L-lactide), polyglycolide, poly(dioxanone), poly(glycolideco-trimethylene carbonate), poly(L-lactide-co-glycolide), poly(D,L-lactide-coglycolide), poly(L-lactide-co-D,L-lactide) or poly(glycolide-co-trimethylene carbonate-co-dioxanone)." Pet. 29–30 (citing, e.g., Ex. 1003, Abstract, 4:36–45, 6:6–10, 11:16–12:19, cls. 1–27; Ex. 1002 ¶ 70).

Patent Owner does not separately dispute this limitation.

We find that Zamora discloses biocompatible polymers. Ex. 1003, 6:6–10; *see also* Ex. 1043, 6:21–26.

iii. "(c) a radio-opaque material"; "wherein the radio-opaque material is encapsulated in the biocompatible component"; "wherein radiopaque material allows for the position of the strand to be determined following administration"

Petitioner asserts, *inter alia*, that Zamora discloses a radio-opaque material capable of being detected by X-rays and conventional radiographic methods, including iodine-containing radio-opaque agents, ethiodized oils, and metal-containing contrast agents. Pet. 30–31, 32–33 (citing Ex. 1003, Abstract, 4:19–24, 7:23–26, 7:26–55; 12:20–49, cls. 1, 12, 15, 18). Petitioner asserts that Zamora describes radio-opaque material disposed within the interior of a polymeric housing. *Id.* (citing 4:19–24, 12:21–46).

Patent Owner does not separately dispute this limitation.

We find that Zamora discloses radio-opaque material within the housing of a drug delivery system. Ex. 1003, 4:19–24, 7:22–26; *see also* Ex. 1043, 8:13–18. We are persuaded that a person of ordinary skill would have included radio-opaque material within a drug delivery system in order to be visualized on X-ray, as taught by Zamora, i.e., in order to aid placement of drug delivery devices. Ex. 1003, 7:22–26; Ex. 1002 ¶ 61. As Dr. Langer states, radio-opacity was a known solution to the known problem that devices were capable of migrating in a patient. *See* Ex. 1002 ¶ 61. Zamora expressly discloses that its device can be used to verify the location of the device within the tumor of the patient by means of X-rays, CT scanning, MRI, and ultrasound, and that the use of a radio-opaque medium can overcome the problem caused by the use of radiotransparent polymers elsewhere in the device. *See* Ex. 1003, 12:20–29.

iv. "(d) a polymeric coating"; "wherein the polymeric coating covers the strand"

Petitioner asserts that Zamora discloses that its device may contain surfaces that can be easily coated with any of a variety of polymers. Pet. 32 (citing Ex. 1003, 4:54–55, 5:35–55, 12:61–64, 13:17–23).

Patent Owner does not separately dispute this limitation.

We find that Zamora discloses the limitation. In particular, Zamora discloses that the surfaces of the brachytherapy devices can easily be coated with polymers. Ex. 1003, 5:35–37; *see also* Ex. 1043, 6:21–26.

v. "having a length of up to 50 cm"

Petitioner asserts Zamora teaches a strand with a length of 5 or 6 mm, which is less than 50 cm. Pet. 42 (citing Ex. 1003, 9:9–10, 9:65–66). We find that Zamora discloses a strand with a length of 5 or 6 mm. Ex. 1003,

9:9–12. These lengths overlap the recited range. Patent Owner does not argue for the criticality of the recited lengths of up to 50 cm. Nevertheless, as a matter of secondary considerations, Patent Owner argues that Merck failed to add a radiopaque marker to its Implanon device and that the lack of a negative impact on release rates shows unexpected success. PO Resp. 64. However, we find Patent Owner's secondary considerations arguments unpersuasive for similar reasons as discussed above with respect to the ground of obviousness over De Nijs and Schopflin. We find that Zamora's disclosure renders obvious the recited range for similar reasons as for the ground of obviousness over De Nijs and Schopflin.

vi. "wherein the strand is non-radioactive and does not contain a radioisotope"

Petitioner asserts, *inter alia*, that Zamora's device provides radiation and chemotherapy, that Brem's device provides chemotherapy, and that it would have been obvious to modify Zamora's device to exclude radiation in order to resemble Brem's device. Pet. 22–27, 33–34 (citing, e.g., Ex. 1004, Abstract, 11:58–59; Ex. 1002 ¶ 80). In other words, Petitioner proposes, *inter alia*, to modify Zamora's device to remove a radioisotope and its radioactivity while keeping the remainder of the device to deliver chemotherapy, as in Brem. *See* Pet. 24.

Petitioner argues that the Board has previously held in a related proceeding discussing Zamora explained that "it was recognized in the art that it was optional to include a radionuclide in an implantable device." Pet. 25 (citing App. No. 10/854,407, Appeal No. 2010-010368, slip op at 7 (PTAB Apr. 30, 2012) (Ex. 1007)). Petitioner argues that Brem teaches that its non-radioactive implants may optionally be combined with radiation therapy, and that radioisotope may be removed from Zamora. Pet. 23–24

(citing Ex. 1004, 8:31–34, 11:31-41, 11:58-61; Ex. 1031, 1356; Ex. 1033, 243; Ex. 1034, 7–8; Ex. 1035, 44; Ex. 1036, 435). We are persuaded by Petitioner that Brem discloses that chemotherapy can be provided in the absence of radiotherapy (*see id.*), and that this is evidence that a person of ordinary skill would have sought to omit radiotherapy from a treatment regimen while retaining chemotherapy where radiotherapy is not required for treatment. Ex. 1004, 11:31–41; *see also id.* at 8:31–34, 11:58-61.

Patent Owner argues that Merck does not rely on brachytherapy devices lacking radioactive material. PO Resp. 37. This appears to be a tautology, i.e., that brachytherapy requires radioactive material. Patent Owner also argues that the types of cancer addressed by Zamora and Brem required radiation. *Id.* at 37 (citing Ex. 2147 ¶ 178). Dr. Kiser avers that "Merck points to nothing in Brem that expressly teaches a skilled artisan to ***not*** use radiation to treat cancer." Ex. 2147 ¶ 175. However, we determine that Brem discloses that chemotherapy may be given "alone" or in combination with radiation therapy. *See* Ex. 1004, 11:31–41 ("The chemotherapeutic agents described herein or their functionally equivalent derivatives can be administered alone or in combination with, either before, simultaneously, or subsequent to, treatment using other chemotherapeutic or radiation therapy or surgery."); *see also id.* at 8:31–34, 11:58–61.

Patent Owner essentially argues that Petitioner has engaged in hindsight analysis. PO Resp. 37–38. Patent Owner argues that it would not have been obvious to combine the devices in this manner, *inter alia*, because Zamora would be inoperable for its intended purpose of providing radiation or would change the principle of operation. PO Resp. 33, 35 (citing *In re Gordon*, 733 F.2d 900, 902 (Fed. Cir. 1984); *Plas-Pak Indus., Inc. v. Sulzer Mixpac AG*, 600 F. App'x 755, 760 (Fed. Cir. 2015); *Broadcom Corp. v.*

Emulex Corp., 732 F.3d 1325, 1334 (Fed. Cir. 2013)). However, although a device without radiation would be inoperable for the purpose of delivering radiotherapy, it would still be operable for the purpose of delivering chemotherapy. Further, Brem discloses that chemotherapy alone may still be useful for treating cancer in certain situations. Ex. 1004, 11:31–41.

Patent Owner also argues that a person of ordinary skill would not have started with Zamora's device, i.e., for the purpose of delivering chemotherapy because Zamora is a sealed device. PO Resp. 34–35 (citing Ex. 2147 ¶ 175). However, Dr. Kiser also avers that the therapeutic agent is on the outside of the Zamora device. Ex. 2147 ¶ 75 (citing Ex. 1003, 12:50–61), 100 n.19.[20] Dr. Kiser also avers that Zamora taught a sealed device. We determine that a person of ordinary skill would have found it desirable to

[20] Patent Owner also argues that *In re Edge*, 359 F.2d 896 (CCPA 1966), cited in the Decision on Institution, does not weigh in favor of obviousness because the court found nonobviousness in that case; the fact that an invention may be obvious does not mean it is obvious; and the critical question is whether a component was necessary. PO Resp. 36 (citing *In re Fischer*, 58 F.2d 1060, 1062 (CCPA 1932)). *In re Edge* is part of a line of cases which stand for the proposition that the removal of a structure and its function from a device is generally obvious, but the removal of a structure without the removal of its function is generally nonobvious. *In re Fischer* is not to the contrary. *See id.*, 58 F.2d at 1061–62 (citing, e.g., *Richards v. Chase Elevator Co.*, 159 U. S. 477 (1895)). *See also KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007) ("a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions"). Nevertheless, in our view, reliance on this line of cases is not necessary to our decision because we determine the evidence in this case is sufficient to provide a motivation to omit radioisotope, i.e., Brem's teaching that targeted chemotherapy may be given without radiation in certain situations.

have a device that is radiopaque and also sealed, so that it did not leak the radiopaque material.

Zamora discloses that "[t]he therapeutic drug may be one or more radiosensitizer drugs, chemotherapeutic drugs, anti-angiogenesis drugs, hormones, or apoptosis inducing drugs. The device may also include one or more coating constituents admixed with the therapeutic drug, which may assist in adhering the therapeutic drug to the device, control the rate of release of the therapeutic drug or provide similar functions." Ex. 1003, 4:51–58. We determine that a person of ordinary skill, in view of the teachings of Zamora and Brem, would have found it obvious to use the device of Zamora, optionally without radioisotope and with chemotherapy alone in order to perform cancer therapy based on chemotherapy alone. *See* Ex. 1004, 11:31–41.[21]

Weighing the evidence as a whole, we determine that Petitioner has shown that Zamora and Brem render obvious claim 12.

Claims 7, 8, and 11

As with claim 12, claims 7, 8, and 11 depend from independent claim 1 and recite additional dimensions. However, instead of reciting a length of up to 50 cm, claims 7, 8, and 11 each recite a length of 40 mm. Claim 7 also recite a diameter between 0.5 mm and 3 mm, claim 8 recites a diameter of 2 mm, and claim 11 recites a diameter between 0.8 mm and 3 mm. Petitioner relies on Zamora's disclosure for these limitations. *See* Pet. 37–38, 41 (citing Ex. 1002 ¶¶ 88–90). Patent Owner argues that the largest implant that Petitioner identifies is 6 mm, and that Merck has not identified a reason

[21] A person of ordinary skill would have also understood that chemotherapy and radiotherapy could have been given in sequence. Ex. 1004, 11:31–41.

to modify Zamora's device. PO Resp. 31 (citing Ex. 1002 ¶ 170). We find that the combination of Zamora and Brem renders obvious the length of 40 mm. *See Gardner v. TEC Syst., Inc.*, 725 F.2d 1338 (Fed. Cir. 1984) (where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device); *see also In re Rinehart*, 531 F.2d 1048, 1053 (CCPA 1976) (mere scaling up of a prior art process capable of being scaled up, if such were the case, would not establish patentability in a claim to an old process so scaled); *see also In re Rice*, 341 F.2d 309 (CCPA 1965). Patent Owner has not argued criticality for the claimed value or that the functional properties would change with larger dimensions. Based on the evidence of record, we find that it would have been within the skill in the art to scale up the device to a length of 40 mm or 4 cm in order to provide more therapeutic agent. *See* Ex. 1002 ¶ 89. We note that Dr. Langer averred that therapeutic agent could be in a reservoir within the device (*see id.*) and Dr. Kiser acknowledged that Zamora could have therapeutic agent on the outside of the device even if Zamora's device were sealed (Ex. 2147 ¶¶ 75, 100 n.19). We find that Zamora's device could be scaled up even if the device were sealed, and has therapeutic agent on the outside. *See also* Ex. 1003, 9:25–29 (indicating that Zamora's device can have variable dimensions and exterior size).

As to the diameter limitations, we find that Zamora discloses an embodiment with a diameter of 1.5 mm. Ex. 1003, 9:9–10. We find that it would have been obvious to scale up the diameter to 2 mm, as recited in claim 8, for similar reasons as for scaling up the length, i.e., to provide additional therapeutic agent. *See, e.g.*, Ex. 1002 ¶ 89.

We find that the diameter ranges recited in claims 7 and 8 would have been obvious for similar reasons in claim 12. In particular, claims 7 and 8 recite ranges which overlap the prior art disclosure and Patent Owner does not argue for criticality for the claimed range.

Accordingly, we determine that the combination of Zamora and Brem renders obvious claims 7, 8, and 11.

Claim 14

Claim 14 depends from claim 13 and further recites the dimensions of claim 7. Claim 13 recites that the therapeutic agent is a hormone and is a rod or a cylinder.

As to the hormone limitation, Petitioner asserts that Zamora teaches this limitation. Pet. 42 (citing Ex. 1003, 4:51-53, 12:50-61, cls. 10, 14, 17, 26). Patent Owner does not dispute this aspect of claim 14, rather only disputing the dimension limitation. *See* PO Resp. 31. We find that Zamora recites the limitation that the therapeutic agent is a hormone. In particular, Zamora discloses that the therapeutic drug may be one or more hormones and may include natural or synthetic peptide hormones such as octreoride. Ex. 1003, 4:51–53, 12:50–61.

Petitioner relies on Zamora for the limitation that the strand is a rod or a cylinder. Pet. 36 (citing Ex. 1003, Abstract, 9:9-18, 9:62-10:1; Fig. 7, 4:11-14, 5:4-18, 7:58-60, 8:1-4, 8:20-31, 10:61-62; Ex. 1002 ¶ 85), 45. Patent Owner does not dispute this aspect of claim 14, rather only disputing the dimension limitation. *See* PO Resp. 31. We find that Zamora discloses a rod or a cylinder. *See, e.g.*, Ex. 1003, 9:9–24, 9:66–67. We, therefore, conclude that the combination of Zamora and Brem renders obvious claim 14.

Claim 18

Claim 18 depends from claim 17, and further recites the dimension limitation of claim 7. Claim 17 depends from independent claim 16, and further recites that the strand is a rod or a cylinder and that the therapeutic agent is a hormone. Independent claim 16 has similar language and requirements as independent claim 1. We, therefore, conclude that the combination of Zamora and Brem renders obvious claim 18, for similar reasons as for claim 14.

Claims 15 and 19

Petitioner primarily relies on the same evidence as for claim 13 for the further recitations of claims 15 and 19 that the hormone is not an anti-neoplastic agent. *See* Pet. 43–44, 46 (citing Ex. 1002 ¶¶ 108–109). Petitioner argues that the disclosure of hormones includes some that are not anti-neoplastic because, as a general matter, some hormones are not anti-neoplastic. *Id.* However, the context of Zamora is for treating cancer. *See, e.g.*, Ex. 1003, 1:30–32, 16:51–54. We determine that Petitioner has not satisfied the negative limitation that the hormones disclosed in Zamora's device are not for treating cancer, such as prostate cancer. Silence as to whether a hormone is anti-neoplastic is not sufficient. *See, e.g.*, *Int'l Business Machines Corp. v. Iancu*, 759 F. App'x. 1002, 1011 (Fed. Cir. 2019) (non-precedential).

Petitioner also relies on passages in Zamora and Brem that describe, by way of background, that analogous prior art devices have been used for contraceptive hormones. Pet. 43–44 (citing Ex. 1003, 3:34–37, Ex. 1004, 2:6–7). However, Petitioner does not adequately develop whether contraceptive hormones could have been used in Zamora's device as a

matter of simple substitution. Therefore, we conclude that Petitioner has not shown that claims 15 and 19 are obvious over Zamora and Brem.

Summary

For these reasons, we conclude that the combination of Zamora and Brem renders obvious claims 7, 8, 11, 12, 14, and 18. Because Zamora is not prior art for the claims 1–6, 9, 10, 13, 16, and 17, these claims are not unpatentable over Zamora and Brem. We determine that Petitioner also has not shown that claims 15 and 19 are unpatentable over Zamora and Brem.

Modifying Brem in view of Zamora

As part of a discussion of "Zamora in view of Brem" (*see* Pet. 22–27), Petitioner asserts that a person of ordinary skill would have been motivated to incorporate Zamora's radiopaque marker in Brem's device, i.e., to modify Brem in view of Zamora (*see* Pet. 25 (citing Ex. 1002 ¶ 61); Reply 20–21. Patent Owner argues that the subground of modifying Brem in view of Zamora is not adequately laid out in the Petition, that the arguments have shifted in the Reply and are essentially new, and that the subground is not adequately addressed in the Reply because Petitioner does not provide contentions for how Brem discloses the "strand" limitation or the "biocompatible component comprising a polymer" limitation. *See* Surreply 18–19.

We agree with Patent Owner that Petitioner does not provide a full set of contentions for this subground. For example, under headings relating to the "strand" preamble and to the "biocompatible component" limitation, Petitioner only provide contentions to where Zamora discloses corresponding structure, but not to where Brem discloses corresponding structure. *See* Pet. 27–28, 29–30. Although Petitioner states that Brem discloses a polymer in a separate heading, it is unclear whether Petitioner is

relying on Zamora for its biocompatible material, e.g., as a substitution for Brem's polymer. Pet. 31. If so, Petitioner does not provide a reason for such a substitution. On the other hand, Petitioner states in its Reply that it is relying on Brem for all elements except for the radiopaque material. Reply 20. However, Petitioner does not set forth where each element (aside from the radiopaque marker of Zamora) is intended to derive from Brem. We conclude that Petitioner has not provided a full set of contentions for the subground of Brem in view of Zamora, nor provided adequate explanation for how it seeks to satisfy the limitations. We therefore conclude that Petitioner has not shown that any of the claims are unpatentable on this basis.

E. Obviousness over Zamora, Brem, and De Nijs

Petitioner asserts that claims 6–9, 11, 12, 14, and 18 of the '402 patent are unpatentable as obvious over Zamora, Brem, and De Nijs. Pet. 46–50. Patent Owner disagrees. PO Resp. 43–49.

Because we determine that Zamora is not prior art to claims 6 and 9, we determine that the combination of Zamora, Brem, and De Nijs does not render obvious claims 6 and 9. For the remaining claims, we determine that the combination of Zamora, Brem, and De Nijs renders obvious claims 7, 8, 11, 12, 14, and 18 for similar reasons as for the ground based on Zamora and Brem.

III. CONCLUSION

For the foregoing reasons, we conclude that Petitioner has shown by a preponderance of the evidence that claims 1–5, 7, 8, 10–19 are obvious, but has not shown by a preponderance of the evidence that claims 6 and 9 of the '402 patent are unpatentable as obvious.

IV. PETITIONER'S MOTION TO EXCLUDE

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 ("FRE"). *See* 37 C.F.R. §§ 42.20(c), 42.62(a).

Petitioner moves to exclude a number of exhibits for various reasons. First, Petitioner asserts certain exhibits and testimony should be excluded as irrelevant because they have not been discussed in any substantive paper. Paper 36, 2–4. But, as Patent Owner notes, Dr. Kiser cited the objected-to exhibits in his declarations to show his understanding of the state of the art. Paper 38, 3. Moreover, we agree with Patent Owner that the uncited portions of Dr. Kiser's declarations include paragraphs of technical and legal background that provide context for his opinions. *Id.* at 5–6. We agree with Patent Owner that Dr. Kiser's understanding of the state of the art and the exhibits supporting that understanding are relevant to the understanding of persons of ordinary skill in the art. *Id.* at 3–5. Accordingly, we deny Petitioner's motion to exclude such testimony and exhibits.

Petitioner also moves to exclude exhibits related to the prosecution history of Merck's unrelated, later-filed patent as irrelevant and prejudicial. Paper 36, 4–5. Petitioner asserts the exhibits should be excluded because Patent Owner's estoppel argument is meritless. *Id.* We are not persuaded. Petitioner's assertion goes to the weight of Patent Owner's estoppel argument, and not to the admissibility of the challenged exhibits. Although we ultimately rejected Patent Owner's estoppel argument, the exhibits are relevant to the issues in this proceeding. Accordingly, we deny Petitioner's motion to exclude Exhibits 2002, 2003, 2020, 2062–2064, 2070, and 1078.

Petitioner also moves to exclude Dr. Kiser's testimony as irrelevant and prejudicial and not related to his area of expertise. Paper 36, 6–8. Specifically, Petitioner asserts that it was improper for Dr. Kiser to discuss the prosecution history of the '402 patent, the alleged bias of Dr. Langer, the post-priority activities of Merck in marketing Implanon and Nexplanon products, the Zamora priority issue, and Patent Owner's Amended Complaint. *Id.* We are not persuaded that any of the objected-to testimony is irrelevant or prejudicial to Petitioner. Regardless, we do not rely on the majority of the objected-to paragraphs of Dr. Kiser's testimony in making our decision here. To the extent we rely on Dr. Kiser's testimony regarding the Zamora priority issue (i.e., Ex. 2147 ¶¶ 88–97), we rely on these exhibits with respect to factual issues relating to understanding the art and not legal issues.

Finally, Petitioner moves to exclude various exhibits as irrelevant evidence that post-dates the filing date of the '402 patent and as hearsay. Paper 36, 8–14. Of the objected-to exhibits (Exs. 2005, 2010–2012, 2057–58, 2065, 2074, 2093, 2106, 2117, 2131, 2143, and 2145), we have only relied on Exhibits 2131 and 2143. Petitioner's motion with respect to the other exhibits is, therefore, dismissed as moot.

Regarding Exhibits 2131 and 2143, these exhibits relate to the safety of barium sulfate. Exhibit 2131 is a U.S. Patent Application Publication No. 2003/0010929 A1, which was filed January 8, 2001, from a foreign application that was filed January 31, 2000. Ex. 2131, [22], [30]. Exhibit 2143 is U.S. Patent No. 6,599,448 B1, which was filed May 10, 2000. Ex. 2143, [22]. Thus, Exhibits 2131 and 2143 are prior art to the '402 patent, whose earliest effective filing date is November 2000. Petitioner objects to both Exhibits 2131 and 2143 as hearsay, arguing Patent Owner is

offering the exhibits for their truth that barium is toxic. Paper 36, 12. Patent Owner argues it is properly offering the exhibits to support Dr. Kiser's opinions about the understanding of an ordinary artisan, and not for the truth of the matter asserted. Paper 38, 13. Specifically, Patent Owner argues it offers Exhibit 2131 to show a person of ordinary skill in the art's understanding of the dangers associated with leaching barium sulfate, and Exhibit 2143 to show their understanding of the potential adverse effects of barium sulfate. *Id.* We agree with Patent Owner that the exhibits are not being offered for their truth, but as a reflection of what a person of ordinary skill in the art understood at the time of the invention. Thus, we deny Petitioner's motion to exclude as to those exhibits.

V. ORDER

In consideration of the foregoing, it is hereby

ORDERED that on the record before us, Petitioner has shown by a preponderance of the evidence that claims 1–5, 7, 8, 10–19 are unpatentable, but has not shown by a preponderance of the evidence that claims 6 and 9 of the '402 patent are unpatentable.

FURTHER ORDERED that Petitioner's Motion to Exclude is *denied* with regard to Exhibits 1078, 2002, 2003, 2009, 2013–25, 2029, 2030, 2032, 2033, 2035, 2036, 2038–52, 2054, 2057–64, 2065, 2068–70, 2075–76, 2084–85, 2097, 2107, 2109, 2131, 2143–44, 2148, as well as designated portions of Exhibits 2001 and 2147, and are *dismissed* as *moot* with regard to Exhibits 2005, 2010–2012, 2057–58, 2065, 2074, 2093, 2106, 2117, and 2145;

FURTHER ORDERED that 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.

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