

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ASPECT BIOSYSTEMS LTD.,
Petitioner,

v.

THE UNIVERSITY OF TOKYO,
Patent Owner.

IPR2023-00026
Patent 8,785,195 B2

Before ERICA A. FRANKLIN, GRACE KARAFFA OBERMANN,
and DEVON ZASTROW NEWMAN, *Administrative Patent Judges*.

OBERMANN, *Administrative Patent Judge*.

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

I. INTRODUCTION

Petitioner filed a Petition (Paper 1, “Pet.”) for *inter partes* review of claims 1–8 of U.S. Patent No. 8,785,195 B2 (Ex. 1001, “the ’195 patent”). Patent Owner filed a Preliminary Response. Paper 9 (“Prelim. Resp.”). We provide the following preliminary findings of fact and conclusions of law for the sole purpose of explaining our reasons for instituting an *inter partes* review. Any final determinations shall be based on the full trial record.

Petitioner identifies itself, Aspect Biosystems Ltd., as a real party-in-interest. Pet. 2. Patent Owner identifies itself, the University of Tokyo, as the owner of the ’195 patent and CellFiber Co., Ltd. as a licensee of the ’195 patent. Paper 4, 1. The parties do not identify any related matters involving this patent.

II. BACKGROUND

A. THE ’195 PATENT (EX. 1001)

1. Specification Overview

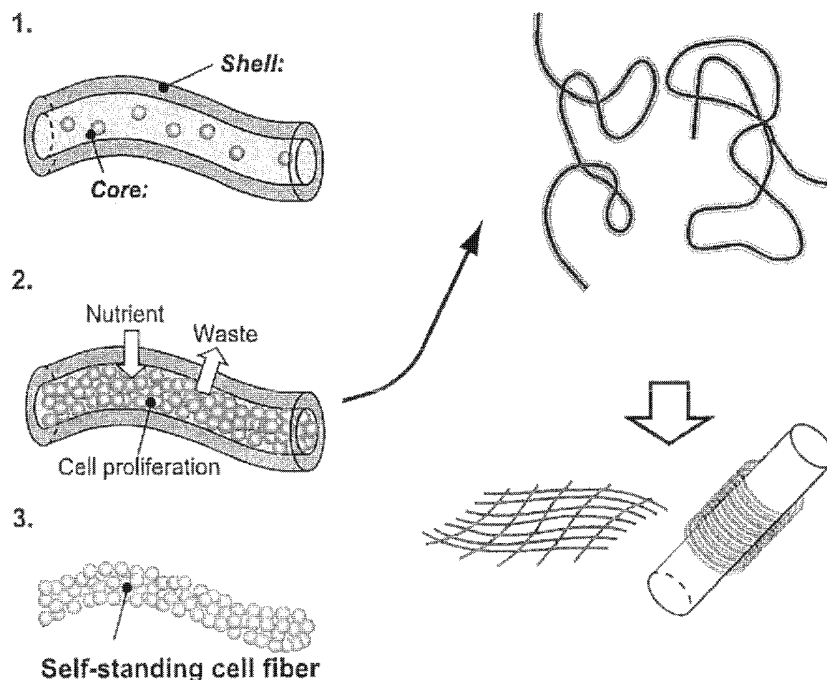
The ’195 patent, titled “Covered Micro Gel Fiber,” relates to “a microfiber showing improved mechanical strength.” Ex. 1001, codes (54), (57).¹ The microfiber “comprises a micro gel fiber consisting of collagen gel or the like covered with high strength hydrogel such as alginate gel.” *Id.* at code (57). The microfiber is characterized as “typically ha[ving] a core-shell structure comprising a core consisting of the micro gel fiber and a shell (coating) containing high strength hydrogel.” *Id.* at 6:6–10. The microfiber is useful for the “construction of

¹ Based on the preliminary record, for the sole purpose of deciding whether to institute review, we find that the ’195 patent has an effective filing date of October 14, 2009. Ex. 1001, code (30); Pet. 18; Prelim. Resp. 1–2.

biochemical sensors” and “artificial tissues.” *Id.* at 1:10–21. A plurality of microfibers may be woven together to create three-dimensional structures. *Id.*

Figure 12 of the '195 patent, reproduced below, illustrates an example of the microfiber of the claimed invention.

Fig. 12



Id., Fig. 12.

This figure shows the step of preparing a microfiber (1) consisting of a collagen macro gel fiber [the “core”] containing cells and covered with a high strength hydrogel (arginine) [the “shell”], and performing cell culture to prepare a microfiber (2) containing cell culture in the micro gel fiber, and the step of forming the microfiber (2) into a two-dimensional or three-dimensional structure or the step of removing the alginate gel from the microfiber (2) to prepare a cell fiber with exposed cell culture.

Id. at 4:17–25.

The Specification explains that “the micro gel fiber is a fiber comprising a hydrogel as a base material,” which includes “chitosan gel, collagen gel, gelatin,

peptide gel, fibrin gel, and a mixture thereof as a base material.” *Id.* at 2:2–7. The micro gel fiber may have “an external diameter in the range of from 100 nm to 1,000 μ m” but is “not particularly limited.” *See id.* at 6:30–33, 16:19–20.

The Specification further provides that a “high strength hydro gel may be a hydrogel having a mechanical strength substantially the same as or higher than, preferably higher than, that of the hydro gel used as the base material of the micro gel fiber to be covered.” *Id.* at 6:38–42. Examples of a “high strength hydro gel” include, but are not limited to, “alginate gel and agarose gel.” *Id.* at 6:50–61.

2. Relevant Prosecution History

After other rejections, the Examiner rejected claims 1–6 and 8–9 as anticipated by Lee² under 35 U.S.C. § 102. Pet. 9–11; Prelim Resp. 3–5; Ex. 1004, 603–606. In an interview, “Applicant suggested a claim limitation of ‘wherein the micro gel fiber completely occupies an interior volume defined by the shell’ to clarify the microfiber structure of independent claim 1 and further pointed out that the prior art disclosure of Lee is directed to hollow fibers.” Ex. 1004, 616. Applicant then made the amendment, and the Examiner allowed the claims to issue. *Id.* at 618–29, 633–35.

B. CHALLENGED CLAIMS

The Petition challenges claims 1–8 of the ’195 patent. Claim 1, reproduced below, is the only independent claim challenged.

1. A microfiber having a core/shell structure, the microfiber comprising:

² Kwang Ho Lee et al., *Synthesis of Cell-Laden Alginate Hollow Fibers Using Microfluidic Chips and Microvascularized Tissue-Engineering Applications* **, 5 WILEY INTERSCIENCE 1264 (published online, Mar. 19, 2009) (Ex. 1008, “Lee”).

a micro gel fiber forming a core of the core/shell structure; and
a high strength hydrogel forming a shell of the core/shell structure that covers the micro gel fiber,
wherein the micro gel fiber completely occupies an interior volume defined by the shell.

Ex. 1001, 16:4–11.

Clams 2–8 depend directly or indirectly from claim 1. *Id.* at 16:12–30.

Claims 2 and 3 further define material used as the micro gel fiber or high strength hydrogel. *Id.* Claim 4 limits the size of the microfiber components. *Id.* Claims 5 and 6 add a cell, cell culture, or growth factor to the micro gel fiber. *Id.* Claims 7 and 8 recite and define “[a] structure comprising” the microfiber of claim 1. *Id.*

C. ASSERTED GROUNDS OF UNPATENTABILITY

The Petition advances six grounds of unpatentability based on anticipation under 35 U.S.C. § 102 or obviousness under § 103.³ We provide below a chart that sets forth the grounds identified in the Petition.

Ground	35 U.S.C. §	Claim(s) Challenged	Reference(s)/Basis
I	102	1, 5	Prevost-2006 ⁴

³ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, 125 Stat. 284 (Sept. 16, 2011), includes revisions to Sections 102 and 103 that became effective on March 16, 2013. Because the challenged claims issued from an application filed before March 16, 2013, we apply pre-AIA law. *See* Pet. 18–19; Ex. 1001, codes (22), (30).

⁴ Ph. Prevost et al., *Application of AN69 Hydrogel to Islet Encapsulation: Evaluation in Streptozotocin-induced Diabetic Rat Model*, 831 ANNALS N.Y. ACAD. SCI., 344–49 (2006) (Ex. 1010, “Prevost-2006”). Petitioner avers, and Patent Owner does not contest at this juncture, that this reference qualifies as prior art “because it published in 2006.” Pet. 19; Ex. 1003, ¶¶ 31–37. Petitioner provides a librarian declaration directed to public accessibility. *See* Ex. 1003.

Ground	35 U.S.C. §	Claim(s) Challenged	Reference(s)/Basis
II-A	102	1–8	Nelson-603 ⁵
II-B	103	1–8	Nelson-603
III-A	103	1, 2, 4	Tanaka-1989; ⁶ Takei-2006; ⁷ Hong-2007 ⁸
III-B	103	3, 5	Tanaka-1989; Yu-1999; ⁹ Takei-2006; Hong-2007
IV	103	2, 3, 5	Nelson-603; Jain-1995; ¹⁰ Takei-2006; Hong-2007

⁵ U.S. Patent No. 7,033,603 (Ex. 1011, “Nelson-603”), issued April 25, 2006. Ex. 1011, code (45).

⁶ Hideo Tanaka et al., *A Novel Immobilization Method for Prevention of Cell Leakage from the Gel Matrix*, 68 J. FERMENTATION & BIOENG. 216 (1989) (Ex. 1012, “Tanaka-1989”). Petitioner avers, and Patent Owner does not contest at this juncture, that this reference qualifies as prior art “because it published in 1989.” Pet. 41; Ex. 1003, ¶¶ 38–44.

⁷ Takayuki Takei et al., *Development of Mammalian Cell-Enclosing Calcium-Alginate Hydrogel Fibers in a Co-Flowing Stream*, 1 BIOTECHNOL. J. 1014 (2006) (Ex. 1014, “Takei-2006”). Petitioner avers, and Patent Owner does not contest at this juncture, that this reference qualifies as prior art “because it published in 2006.” Pet. 41; Ex. 1003, ¶¶ 52–56.

⁸ Joung Sook Hong et al., *Spherical and Cylindrical Microencapsulation of Living Cells Using Microfluidic Devices*, 19 Korea-Austria Rheology Journal 157 (2007) (Ex. 1015, “Hong-2007”). Petitioner avers, and Patent Owner does not contest at this juncture, that this reference qualifies as prior art “because it published in 2007.” Pet. 41; Ex. 1003, ¶¶ 57–63.

⁹ Sun-Hee Yu et al., *Encapsulation of Rat Hepatocyte Spheroids for the Development of Artificial Liver*, 13 BIOTECH. TECH. 609 (1999) (Ex. 1013, “Yu-1999”). Petitioner avers, and Patent Owner does not contest at this juncture, that this reference qualifies as prior art “because it published in 1999.” Pet. 41; Ex. 1003, ¶¶ 45–51.

¹⁰ Kanti Jain et al., *Retrievable, Replaceable, Macroencapsulated Pancreatic Islet Xenografts*, 59 TRANSPLANTATION 319 (1995) (Ex. 1016, “Jain-1995”). Petitioner

Pet. 3. The Petition is supported by the Declarations of Dr. Todd Hoare (Ex. 1002) and Marla Hirth (Ex. 1003). Patent Owner's Preliminary Response is supported by the Declaration of Dr. Abigail M. Oelker. Ex. 2001.

III. ANALYSIS

A. LEVEL OF ORDINARY SKILL IN THE ART

The level of ordinary skill in the art at the time of the invention is a factual determination that provides a primary guarantee of objectivity in an obviousness analysis. *Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 1324 (Fed. Cir. 1999) (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966); *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991)).

Petitioner proposes that an ordinarily skilled artisan would have: “(1) a graduate-level degree in engineering, chemistry, or one of the biological sciences, or a similar field, and 1-2 years of experience involving gel-based structures and sterile technique for potential biological or medical use (including research done as part of the degree and/or thereafter), or (2) an undergraduate degree in engineering, chemistry, or one of the biological sciences, or a similar field, and 3-4 years of post-graduate experience involving gel-based structures and sterile technique for potential biological or medical use.” Pet. 11. At this stage of the proceeding, Patent Owner does not contest Petitioner's proposed definition of the ordinarily skilled artisan. Prelim. Resp. 5.

Based on the information presented, we find that the asserted prior art itself is sufficient to demonstrate 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) (prior art itself

avers, and Patent Owner does not contest at this juncture, that this reference qualifies as prior art “because it published in 1995.” Pet. 41; Ex. 1003, ¶¶ 64–70.

can reflect the appropriate level of ordinary skill in the art). To the extent a more precise definition is required, we apply Petitioner’s unopposed proposed definition for purposes of determining whether to institute review because it is consistent, on this record, with the disclosures of the asserted prior art references.

B. CLAIM CONSTRUCTION

In an *inter partes* review, the Board construes the terms of a patent claim “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R. § 42.100(b). Under that standard, claim terms generally are given their plain and ordinary meaning as would have been understood by the ordinarily skilled artisan at the time of the invention and within the context of the entire patent disclosure. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). We construe terms in controversy only to the extent necessary to resolve the controversy. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

Petitioner presents express constructions for three claim terms: “micro gel fiber,” “microfiber,” and “high strength hydrogel.” Pet. 12–18. At this stage of the proceeding, Patent Owner does not propose any express claim constructions and does not contest Petitioner’s proposed constructions. Prelim. Resp. 6.

No claim term requires express construction for purposes of this Decision. We observe, however, that the Specification defines a “micro gel fiber” as “a fiber to be covered” and a “microfiber” as “a covered fiber.” Ex. 1001, 6:9–10. Those definitions are consistent, moreover, with the words that appear in claim 1. *Id.* at 16:4–30 (specifying “[a] microfiber” that includes “a high strength hydrogel” shell “that covers a micro gel fiber” core).

C. THE PATENTABILITY CHALLENGES

1. Asserted Ground I: Anticipation of Claims 1 and 5

a. *Prevost-2006*

Prevost-2006 describes a study where hollow fibers made of AN69 (polyacrylonitrile-sodium methallylsulfonate) and filled with pancreatic islets (cells) were used to treat diabetic rats. Ex. 1010, 344–45. The hollow fibers “were filled with islets suspended in agarose.” *Id.* at 345. “Their dimensions” were “120 cm long, 1065 μm internal diameter and 140 μm wall thickness.” *Id.*

b. *Reasonable Likelihood that Prevost-2006 Anticipates At Least One Claim*

Petitioner argues that Prevost-2006 anticipates claims 1 and 5 of the '195 patent. Pet. 20–24. In that regard, Petitioner asserts that Prevost discloses “[a] microfiber having a core/shell structure” because an ordinarily skilled artisan would have understood AN69 to be a shell, the agarose filling to be a core, and the entire fiber to have a diameter of 1,345 μm . *Id.* at 20–21 (citing Ex. 1002, ¶¶ 120, 129–130; Ex. 1010, 344–45, 349). Petitioner further contends that the ordinarily skilled artisan “would have recognized the agarose interior of the fiber as a ‘micro gel fiber’” because 1) it forms a three-dimensional network of materials that swell in solvent and 2) its diameter is 1065 μm —65 μm larger than Petitioner’s construction that requires “micro gel fiber” to be limited to “an external diameter less than about 1,000 μm .” *Id.* at 21–22. Petitioner further contends that a POSA would have understood AN69 to be a “high strength hydrogel” because Prevost taught it has “a stress at breaking of 0.32 N/mm².” *Id.*; Ex. 1010, 345; Ex. 1002, ¶¶ 136–37. Petitioner concludes that Prevost-2006 discloses the “completely occupies” limitation because Prevost-2006 teaches that the AN69 “hydrogel shell is ‘filled’ by the agarose core.” Pet. 23–24.

Patent Owner responds only that Prevost-2006 does not anticipate these claims because Prevost-2006 does not teach that the agarose core “completely occupies an interior volume defined by the shell.” Prelim. Resp. 8–10. In other words, there is no dispute on this record that Prevost-2006 discloses a microfiber with a core/micro gel fiber (agarose) and a shell/high strength hydrogel (AN69). Ex. 1010, 344–45. Our analysis focuses on the disputed question whether the agarose core “completely occupies” the interior volume defined by the AN69 hydrogel shell in the microfiber of Prevost-2006.

Prevost-2006 teaches that “[t]he hollow fibers were filled with islets suspended in agarose . . . and closed with surgical clips.” Ex. 1010, 345, 349. Petitioner concludes that “filled” means the same thing as “completely occupies” based on Applicant’s amendment over Lee¹¹ and, moreover, because Figure 1(F) of the ’195 patent illustrates how “the volume inside the alginate shell is shown to be filled with gel.” Pet. 23.

Patent Owner disagrees and argues that Prevost-2006 does not provide enough detail to understand that “filled” means “completely occupies” in the reference—and that, in the absence of such detail, one could interpret “filled” to include the circumstance in which the shell is “filled in some regions but also contains bubbles that create unfilled regions, filled along the length of the fiber but empty near the ‘surgical clips’ etc.” Prelim. Resp. 9–10. Patent Owner asserts that Prevost-2006 lacks support for Petitioner’s analogy to Figure 1(F) because the prior art reference includes no comparable figure that illustrates a filled shell in

¹¹ There is agreement that, during examination, the “completely occupies” limitation was added to claim 1 to overcome a rejection based on Lee, which discloses hollow fibers. Ex. 1004, 616, 619, 623; *see* Pet. 23; Prelim. Resp. 9.

which the core material completely occupies the interior space. *Id.* (citing Ex. 2001, 29–30).

We understand “filled” to have a broad plain and ordinary meaning. That is, “filled” broadly embraces the circumstances where something is fully filled or partially filled. Here, Petitioner’s declarant, Dr. Hoare, provides an opinion that is consistent with our understanding of the regular meaning of the word. Pet. 23; Ex. 1002, ¶ 142. We understand that Patent Owner’s position essentially contends that “filled” does not include “fully filled”—arguing that Prevost-2006 does not describe the extent to which the core material “filled” the shell structure, or that Petitioner does not show sufficiently that “filled” means “completely occupies.” Prelim. Resp. 8–10; Ex. 2001, ¶ 39.

As an initial matter, we observe that neither Petitioner’s nor Patent Owner’s declarant directs us to information that would help us understand why an ordinarily skilled artisan would have understood “filled” to exclude the circumstance of being completely filled. Because of this, for purposes of deciding whether to institute review, we see no reason to interpret “filled” in a manner inconsistent with the term’s plain and ordinary meaning, which broadly includes the circumstance of being completely filled. Patent Owner is free to develop this issue in timely filed response to the Petition. On this record, however, we preliminarily find that Prevost-2006 meets the “completely occupies” limitation of claim 1 because its fiber is described as a shell structure that is “filled” with a core structure. Ex. 1010, 345, 349. That circumstance distinguishes Prevost-2006 from the Lee reference, which unlike Prevost-2006 concerned “hollow fibers” and, during examination, was overcome by an amendment that added the “completely occupies” limitation. Prelim. Resp. 9 (quoting Ex. 1004, 616) (emphasis omitted).

Claim 5 further recites that “a cell or cell culture is contained in the micro gel fiber.” As we observe above, Prevost-2006 discloses that its “hollow fibers were filled with islets [cells] suspended in agarose.” Ex. 1010, 345; Pet. 24. Thus, on this record, we also find that Prevost-2006 discloses the claimed microfiber containing “a cell or cell culture” within the micro gel fiber.

Accordingly, we determine that Petitioner has established a reasonable likelihood that it “would prevail with respect to” claim 1 and claim 5 based on anticipation by Prevost-2006. 35 U.S.C. § 314(a). To provide guidance to the parties and streamline the issues for trial, we discuss below the other challenges asserted in the Petition.

2. Asserted Grounds IIA/B: Anticipation and Obviousness of Claims 1–8

a. *Nelson-603*

Nelson-603 describes “fiber compositions comprising gels or hydrogels” and “methods of manipulating the rate of therapeutic agent release [sic] by changing both the biodegradable polymer properties as well as altering the properties of the incorporated gel or hydrogel.” Ex. 1011, code (57). We reproduce below Figure 2A of Nelson-603, which illustrates an example of the disclosed fibers.

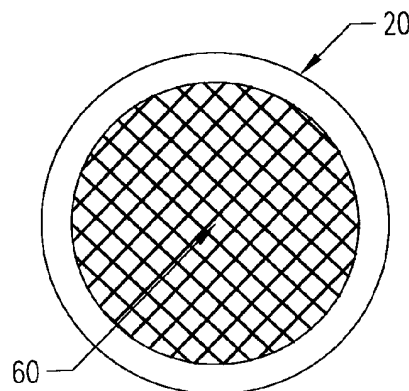


FIG. 2A

Id., Fig. 2A. Figure 2A “depicts a bicomponent fiber with a gel or hydrogel bore (60) and a wall comprising a hydrophobic polymer (20).” *Id.* at 3:55–57. The wall (hydrophobic polymer 20) is represented as an unfilled circle, and within the wall lays another circle filled with a grid pattern, representing gel/hydrogel bore 20. *Id.*

Nelson-603 further describes processes for making the disclosed fibers. *See id.* at 24:43–26:24. For example, “a fiber spinneret in which a coagulant bore fluid is fed through a small diameter hypodermic tube, which is centered in a blunt-end hypodermic needle. . . . This configuration allows for an annulus of polymer to flow through the spinneret, bored by a water-based gel or hydrogel.” *Id.* at 24:45–53. These processes can result in fibers “whose outer diameter are approximately 500 μm .”

b. Ground IIA: Anticipation by Nelson-603

Petitioner asserts that Nelson-603 anticipates claims 1–8 under 35 U.S.C. § 102. Pet. 24–25.

Regarding claim 1, Petitioner argues that an ordinarily skilled artisan “would have understood the ‘bore’ of Nelson-603’s bicomponent fibers to be the ‘core’ of the fiber, and would have understood the ‘wall’ of the bicomponent fibers to be the ‘shell’ of the fiber.” Pet. 26–27. Because Nelson-603 discloses “fibers whose outer diameter are approximately 500 μm ,” Petitioner contends that Nelson-603’s fibers are microfibers within the meaning of the challenged claims. *Id.* at 28. Petitioner further asserts that the bores containing gel/hydrogel, in a fiber having a diameter of 500 μm , “would necessarily be less than 500 μm ,” meaning that the bore is a “micro gel fiber.” *Id.* at 29–30.

In addition, Petitioner states that Nelson-603 discloses “a high-strength hydrogel” because it teaches the use of “alginate hydrogel.” *Id.* at 30–31; Ex. 1011, 26:30–66. Petitioner relies on Figures 2A through 3A of Nelson-603 to show that

the bicomponent fiber meets the “completely occupies” limitation of claim 1. Pet. 31–32.

Patent Owner counterargues that Nelson-603 does not disclose the claimed invention because the Petition and Dr. Hoare combine two separate examples of Nelson-603 to teach a core/shell combo where both the core *and* the shell are both hydrogels. Prelim. Resp. 13–15. Patent Owner also argues that Nelson-603 does not teach the high strength hydrogel, based on how Nelson-603 fibers are made and the fact that they are biodegradable. *Id.* at 16–18. Lastly, Patent Owner asserts that Petitioner does not explain adequately how Nelson-603 teaches the “completely occupies” limitation of claim 1. *Id.* at 18–19.

On this record, we have concerns about whether Petitioner shows sufficiently that Nelson-603 discloses the claimed microfiber. That reference generally describes different bicomponent fibers. *See, e.g.*, Ex. 1011, 5:7–32. For example, Nelson-603 discusses bicomponent fibers where the “inner bore” is “a gel or hydrogel” and the “outer wall” is a “biodegradable polymer,” and fibers where the bore is a polymer and the wall is a gel or hydrogel. *Id.* at 5:33–46; *see also* 3:55–4:3 (describing Figures 2A–2A). Petitioner, however, does not explain adequately why an ordinarily skilled artisan would have understood Nelson-603’s “alginate hydrogel” shell to represent a high strength hydrogel shell within the scope of any challenged claim. Ex. 1011, 26:30–67; Ex. 1001, 6:47–51. In addition to polymer fibers, Nelson-603 indicates that “alginate” can make up the core of its fibers too. Ex. 1011, 8:58–59, 10:29–31, 25:10–29, 26:34–40. Based on the information presented, even if we accept that Nelson-603 teaches some features of the claimed invention, we question whether Petitioner directs us to evidence that shows sufficiently, for purposes of trial institution, that Nelson-603 teaches a microfiber with a micro gel fiber core *and* a high strength hydrogel shell.

We have similar concerns about the sufficiency of Petitioner’s challenge as asserted against claims 2–8, which depend from claim 1, because those dependent claims inherit those same limitations from claim 1.

c. Ground IIB: Nelson-603 Obviousness

Petitioner asserts that, in the event we find Nelson-603 does not anticipate claims 1–8, we should determine that an ordinarily skilled artisan would have found those claims obvious over the disclosure of Nelson-603. Pet. 37–40. In that regard, Petitioner argues that “it also would have been obvious to create an alginate-alginate bicomponent fiber as described in the [’195 patent] in view of Nelson-603.” *Id.* at 39. By way of support, Petitioner directs us to paragraphs 162, 199, and 120 of Dr. Hoare’s declaration. *Id.*; Ex. 1002, ¶¶ 162, 199, 120.

We have concerns about whether Petitioner shows sufficiently that Nelson-603’s disclosures would have led an ordinarily skilled artisan to create an “alginate-alginate bicomponent fiber.” Petitioner’s arguments and Dr. Hoare’s opinions contain similar wording and do not explain adequately why an ordinarily skilled artisan would have created such a fiber—beyond Nelson-603’s general disclosure that “it will be apparent to those of skill in the art that variations may be applied to the compositions and methods.” Pet. 39–40; Ex. 1002, ¶¶ 162, 199, 120; Ex. 1011, 12:57–66; 33:58–66. Without additional evidence and reasoning, we assign Dr. Hoare’s testimony on this issue little weight. *See Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 (August 24, 2022) (designated: February 10, 2023) (holding declaration is entitled to little weight when it contains an exact restatement of the petition’s arguments without any additional supporting evidence or reasoning).

On this record, that general instruction is not sufficient to establish that Nelson-603 would have prompted an ordinarily skilled artisan to modify any fiber disclosed in the reference to achieve the claimed invention.

3. Asserted Ground IIIA/B: Obviousness of Claims 1–5

In Ground IIIA, Petitioner asserts that claims 1, 2, and 4 are obvious over Tanaka-1989, Takei-2006, and Hong-2007. Pet. 40–53. In Ground IIIB, Petitioner argues that claims 3 and 5 are obvious over Tanaka-1989, Yu-1999, Takei-2006, and Hong-2007.

a. *Tanaka-1989*

Tanaka-1989 discloses the use of double-layered alginate gel fibers to encapsulate cells and prevent cell leakage. Ex. 1012, 216. “The fibers are produced by simultaneously pumping a solution of sodium alginate through an outer nozzle and a mixture of sodium alginate and *Saccharomyces* sp. cell solution through an inner nozzle into a crosslinking bath containing 0.1 M calcium chloride solution.” *Id.* Figure 7 of Tanaka-1989 is reproduced below.

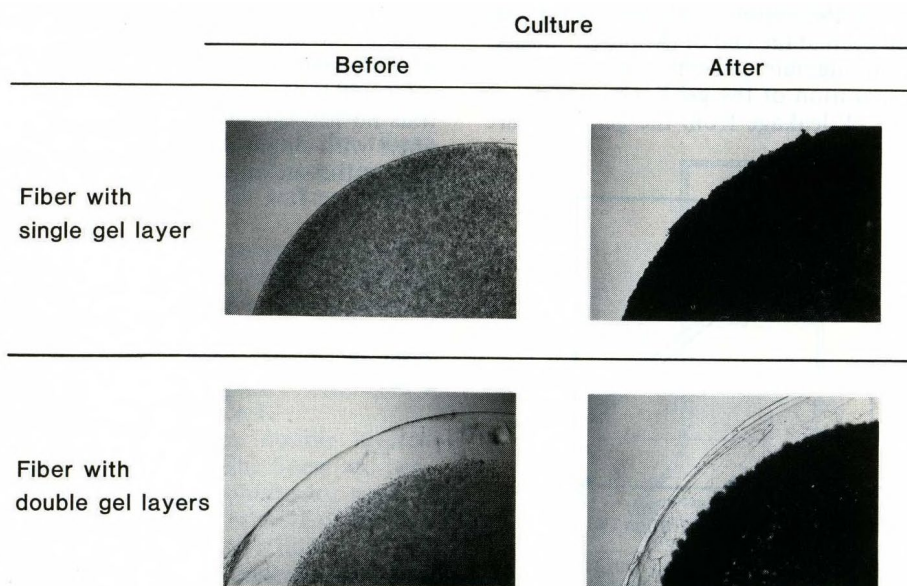


FIG. 7. Microphotographs of cross sections of fibers before and after 150 h of incubation.

Id. at 218. Figure 7 of Tanaka-1989 compares, in side-by-side microphotographs, fibers with a single gel layer and a double gel layer before and after 150 hours of incubation. *Id.* In the before microphotographs, the single gel layer is part of a dark grey semicircle whereas the double gel layer contains part of a similar dark grey opaque semicircle that is surrounded by an outline of a transparent semicircle. *Id.* In the after microphotographs, the dark grey semicircles in both the single and double gel layers appear to be black and have scalloped edges, representing cell leakage. *Id.* at 217–18.

b. Takei-2006

Takei-2006 discloses the use of a “jetting technique in a liquid-liquid co-flowing stream” to enclose cells in “calcium-alginate . . . hydrogel fibers of several hundred micrometers in cross-sectional diameter.” Ex. 1014, 1014. This technique yields fibers with a diameter of “approximately 100–800 μm .” *Id.* at 1016. Takei-2006 also describes how using different needle sizes results in different fiber thicknesses. *Id.* at 1015.

c. Hong-2007

Hong-2007 describes experiments involving “[s]pherical and cylindrical microencapsulation of living cells using microfluidic devices.” Ex. 1015, 157. The fibers in these experiments use cells suspended in alginate gel. *Id.* Hong-2007 discloses that “fibre diameters can be explicitly controlled through variations in the flowrates of either alginate or calcium ch[loride] solutions.” *Id.* at 162.

d. Yu-1999

Yu-1999 discloses the use of “chitosan/alginate capsules” to encapsulate mammalian hepatocytes cells for potential development of an artificial liver.

Ex. 1013, 609. The reference describes the methods used to form spherical cell structures and to encapsulate the cells in chitosan and alginate. *Id.* at 609–10.

e. Ground IIIA: Tanaka-1989, Takei-2006, and Hong-2007

Petitioner submits that an ordinarily skilled artisan “would have recognized the ‘double gel layer’ fiber of Tanaka-1989 as ‘having a core/shell structure, where the inner layer forms the ‘core’ of the core/shell structure and the outer later forms the ‘shell’ of the core/shell structure.’” Pet. 47–48 (emphasis omitted). Because Tanaka-1989 does not explicitly disclose the size of its fibers, Petitioner asserts that the ordinarily skilled artisan would have turned “to Takei-2006 to determine an appropriate needle size, and,” in addition, “would look to Hong-2007 to determine an appropriate needle size and flow rate” to make a double-layer microfiber from Tanaka-1989. *Id.* at 49. Petitioner further discusses how this combination discloses the micro gel fiber, high strength hydrogel, and the “completely occupies” limitation of claim 1, as well as the additional limitations of claims 2 and 4. *Id.* at 49–53.

Patent Owner counterargues that Petitioner does not explain adequately why an ordinarily skilled artisan would have been led to combine the asserted references or why the references would have been modified to achieve the claimed invention. Prelim. Resp. 27–29. Patent Owner further refutes Petitioner’s arguments concerning claim 1. *Id.* at 29–32.

Based on the record presented, we question the sufficiency of Petitioner’s showing as to this ground of unpatentability. Petitioner asserts that the references are combinable “given their similar apparatuses . . . and methods . . . for making fibers of the same material (alginate) for similar purposes.” Pet. 49 (citing Ex. 1002, ¶¶ 259, 256). We have concerns about whether this reasoning is adequate to

explain why an ordinarily skilled artisan would have been prompted to carry out the particular proposed modifications that form the basis for the challenge.

For example, Petitioner does not identify a reason why an ordinarily skilled artisan would have combined the teachings of double-layer and single-layer fibers. We recognize that “it is not necessary that the inventions of the references be physically combinable to render obvious the invention under review.” *In re Sneed*, 710 F.2d 1544, 1550 (Fed. Cir. 1983). Nevertheless, to support a conclusion of obviousness when combining the teachings of multiple references, an articulated reason with some rational underpinning to combine the known elements in the fashion claimed must be provided. *See KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 418 (2007); *see also In re Magnum Oil Tools, Int’l, Ltd.*, 829 F.3d 1364, 1381 (Fed. Cir. 2016) (It is the petitioner’s “burden to demonstrate both that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention[s], and that the skilled artisan would have had a reasonable expectation of success in doing so.”) (citation and internal quotation omitted). Having reviewed the parties’ arguments and evidence of record, we have doubts that Petitioner provides sufficient reasons an ordinarily skilled artisan would have combined the teachings of the multiple references asserted in this challenge to achieve the claimed invention or would have reasonably believed they would have been successful in doing so. *Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1360–61 (Fed. Cir. 2017) (showing of a motivation to combine references must include evidence that a skilled artisan would have reasonable expectation of success in doing so).

f. Ground IIIB: Tanaka-1989, Yu-1999, Takei-2006, and Hong-2007

In combination with the Ground IIIA references, Petitioner further advances Yu-1999’s teachings, which relate to cell encapsulation in “chitosan/alginate,” to

establish the obviousness of claims 3 and 5. Pet. 55–58. Patent Owner argues that this combination fails for the same reasons as Ground IIIA. Prelim. Resp. 32–33.

Our similar concerns regarding Ground IIIB apply with equal force to Ground IIIA. Because Petitioner incorporates most of Ground IIIA into Ground IIIB, the same inadequacies exist as to Petitioner’s showing regarding the reasons to combine the multiple prior art references at issue.

4. *Asserted Ground IV: Obviousness of Claims 2, 3, and 5*

Petitioner asserts that claims 2, 3, and 5 are obvious over Nelson-603, Jain-1995, Takei-2006, and Hong-2007. Pet. 59–69. This Ground relies on Petitioner’s arguments about how Nelson-603 discloses each feature of the microfiber specified in claim 1. *Id.* at 61; *see also* Grounds IIA/B.

Here again, we have the same concerns as to whether Nelson-603 discloses the microfiber of the claimed invention and whether Petitioner sufficiently shows, for purposes of trial institution, obviousness over Nelson-603. *See supra* Section III.C.2. Because claims 2, 3, and 5 include claim 1’s limitations, and given that Petitioner relies on Nelson-603 alone to teach those limitations, our concerns apply equally to Ground IV.

D. Notices

The Board shall deem waived any issue not raised in a timely response to the Petition, or as permitted in another manner during trial, even if asserted in the Preliminary Response or discussed in this Decision.

Nothing in this Decision authorizes Petitioner, in a manner not otherwise permitted by the Board’s rules, to supplement the information supporting any ground advanced in the Petition.

IV. CONCLUSION

Petitioner shows sufficiently for institution that the subject matter of claim 1 and claim 5 would have been anticipated based on the ground that asserts Prevost-2006. *See* Pet. 20–24 (Ground I). We have concerns about the sufficiency of Petitioner’s showing with respect to the grounds that do not assert Prevost-2006. *See id.* (Grounds II–IV). In any event, it is appropriate for us to institute an *inter partes* review of all challenged claims based on all grounds asserted in the Petition. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1354, 1359–60 (2018); Patent Trial and Appeal Board Consolidated Trial Practice Guide (Nov. 2019)¹² (“The Board will not institute on fewer than all claims or all challenges in a petition.”).

For the above reasons, we institute an *inter partes* review of all challenged claims based on all asserted grounds of unpatentability set forth in the Petition. 35 U.S.C. § 314(a)(1) (2018).

V. ORDER

It is

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–8 of the ’195 patent is hereby instituted based on all grounds set forth in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4(b), an *inter partes* review of claims 1–8 of the ’195 patent shall commence on the entry date of this Decision, and notice is hereby given of the institution of trial.

¹² Available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>.

IPR2023-00026
Patent 8,785,195 B2

For PETITIONER:

Tamara Fraizer
Todd Lorenz
SQUIRE PATTON BOGGS (US) LLP
tamara.fraizer@squirepb.com
todd.lorenz@squirepb.com

For PATENT OWNER:

George D. Moustakas
Jewell N. Briggs
HARNESSE, DICKY & PIERCE, P.L.C.
gdmoustakas@hdp.com
jbriggs@hdp.com