

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

EMBODY, INC. AND ZIMMER BIOMET HOLDINGS, INC.,
Petitioners

v.

LIFENET HEALTH,
Patent Owner.

Case IPR2025-00249
U.S. Patent No. 11,318,227

**OPPOSITION TO PATENT OWNER'S REQUEST
FOR DISCRETIONARY DENIAL**

Filed on behalf of Petitioners:

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I. INTRODUCTION

Petitioners herein oppose Patent Owner’s request for discretionary denial. Patent Owner’s request focuses exclusively on 35 U.S.C. § 325(d). Specifically, Patent Owner argues that the prior art cited in the Petition is substantially the same as art previously considered during prosecution of U.S. Patent No. 11,318,227 (“the ’227 patent”). Patent Owner further asserts that the Examiner rejected “claims” of the ’227 patent under § 102(b) based on the cited prior art, and that the cited art was used by the Examiner in the same “manner” as the art newly cited in the petition. (*See e.g.*, Req., 2, 23.)¹ These assertions are wrong.

Initially, Patent Owner’s § 325(d) argument relies on prior art and a rejection that was applied *only* to amended claim 26—a claim that was ultimately canceled by the Applicant during prosecution. Indeed, Patent Owner acknowledges that only amended claim 26 received a § 102(b) rejection; yet, it improperly extends that rejection and associated prior art to the issued claims currently challenged in the Petition. Further, the grounds for the Examiner’s rejection to canceled claim 26 are *different* than the grounds raised in the Petition to the issued claims of the ’227 patent—claims with *different* limitations. Thus, the Examiner did not use the cited

¹ The Patent Owner’s Request for Discretionary Denial, dated April 4, 2025, is referred to as “Req., ____.”

art in the same “manner” as the newly cited art relied on in the Petition. As such, the arguments raised during prosecution of the canceled claim are not cumulative of the arguments raised in the Petition to the issued claims.

Further, Patent Owner is wrong that the newly cited prior art in the Petition is cumulative to the art considered during prosecution. These new references, namely Huang² and Lee, disclose a unique combination of features not found in the prior art cited during the prosecution history of the '227 patent. In particular, the newly cited art teaches the *actual* preparation of electrospun fibers comprising collagen with adjacent major FFT peaks approximately 180° apart. It also teaches that such collagen fibers can be crosslinked—a limitation in some of the challenged claims. Neither Simpson nor Patel cited by the Examiner during the prosecution of the '227 patent possess either of these features.

This is not a case involving cumulative art or recycled arguments. None of the challenged claims were previously rejected under §§ 102 or 103, and the prior art cited in the Petition addresses critical gaps that were not considered during the original examination. As set forth in the Petition, had the newly cited art been considered, the claims would not have been allowed.

For all these reasons—supported by the record, legal standards, and the strength of the merits—Patent Owner’s request for discretionary denial should be denied, and institution should be granted.

II. FACTUAL BACKGROUND

A. Procedural History

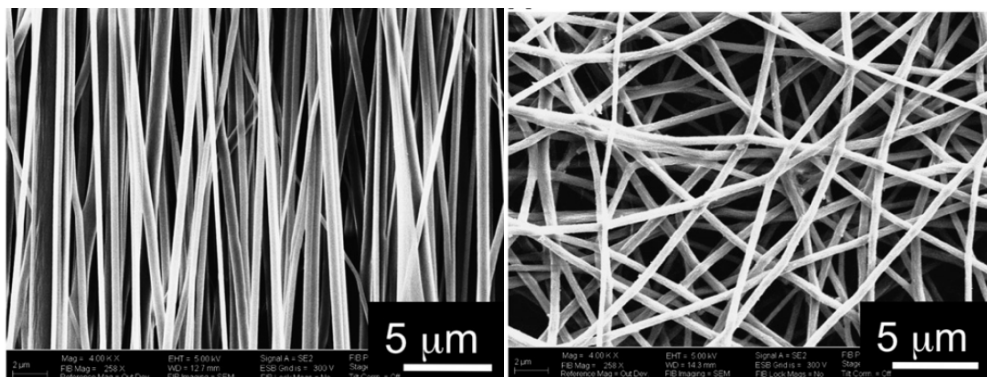
On December 4, 2024, Petitioners filed an IPR Petition challenging claims 1-8 of the '227 patent. (*See* Case No. IPR2025-00249.) Specifically, the Petition raises new prior art not previously considered during prosecution of the '227 patent that invalidates the challenged claims. The PTAB afforded the Petition a filing date of February 6, 2025. (IPR2025-00249, Paper 5.) On March 26, 2025, the Director issued a Memorandum (referred to herein as “Memo”) outlining new procedures for discretionary denial.² On April 3, 2025, the Patent Office issued a memorandum in this case setting out the schedule for the parties to file their papers under the new discretionary denial procedures. (IPR2025-00249, Paper 6.) According to this schedule, Patent Owner’s request for discretionary denial was due May 3, 2025. (*Id.*) Under the updated PTAB procedures, Petitioners’ response is due a month from this date, or June 3, 2025, regardless of whether Patent Owner

² *See* <https://www.uspto.gov/sites/default/files/documents/InterimProcessesPTABWorkloadMgmt-20250326.pdf>.

filed its brief early. (See FAQ at ¶¶ 3,7.)³ Accordingly, Petitioners submit this opposition on June 3, 2025, in accordance with the PTAB’s schedule.

B. Technical Background

The ’227 patent pertains to electrospinning, which is a technique that can be used to create fibers for scaffolds that can repair injuries to tissue. Electrospinning was a well-established method for producing fibers as of March 14, 2013, the earliest priority date alleged for the ’227 patent. (See EX1006, 1–2; EX1003, §§ III.A–B.) The fibers in the scaffold can either be aligned or randomly oriented as shown in the following images obtained from a scanning electron microscope:



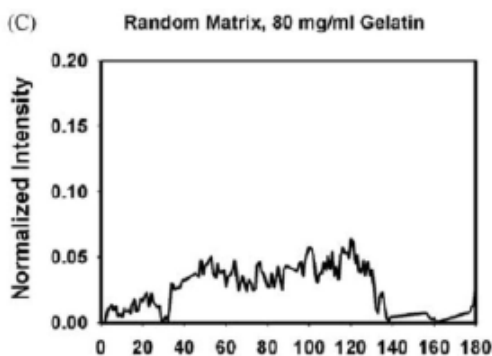
(EX1005, 1793; *see also* EX1003, ¶¶ 38–45.) The image on the left shows fibers that are aligned, while the image on the right shows fibers that are randomly

³ “FAQs for Interim Processes for PTAB Workload Management” is referred to herein as “FAQ.” See <https://www.uspto.gov/patents/ptab/faqs/interim-processes-workload-management>.

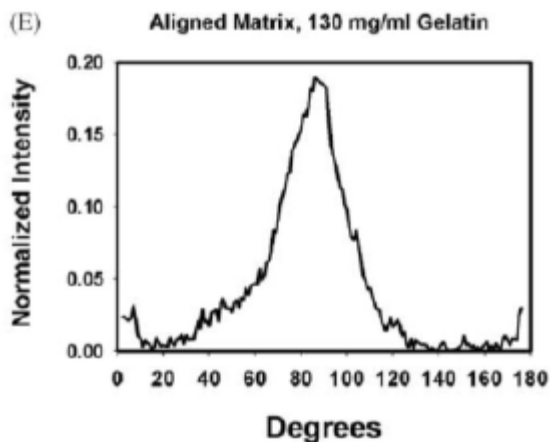
oriented. Increased fiber alignment was well-known in the prior art to enhance the mechanical and biological properties of scaffolds. (EX1010, 604; EX1006, 6; EX1018, [0112]; EX1003, ¶¶ 36–38.)

To quantify fiber alignment, Dr. Simpson, Petitioners’ declarant, pioneered a method, which is incorporated into the specification of the ’227 patent and is recited in its claims. The details of this method are discussed more fully in Dr. Simpson’s declaration accompanying the Petition. (EX1003, § III.D.)

The method uses a mathematical tool called fast Fourier transform (2D FFT) in order to generate a 2D FFT alignment plot. (EX1013, 4; EX1010, 609; EX1003, ¶¶ 38–39.) The plot illustrates the degree of fiber alignment. (EX1013, 4; EX1010, 610; EX1003, ¶ 42.) Randomly aligned fibers can produce multiple shorter peaks (see figure below) while aligned fibers show a single main peak between 0° and 180° (see figure below). (EX1013, 12; EX1010, 608, 614; EX1003, ¶¶ 44–45.)



(EX1013, 15 (Unaligned 2D FFT alignment plot).)



(EX1013, 15 (Aligned 2D FFT alignment plot).)

Typical practice was (and is) to report 2D FFT alignment plots from 0° to 180°, because the FFT, through its inherent mathematical properties, produces a symmetrical plot. Thus, according to Dr. Simpson’s seminal papers on the method, reporting beyond 180° is unnecessary. (EX1013, 4; EX1010, 609; EX1003, ¶ 47.)

“Typically, the [FFT] data from this analysis is reported for 0° to 180°; the frequency plot is symmetric so a complete summation from 0° to 360° is not technically necessary.” (EX1010, 609; EX1003, ¶ 63.) Therefore, a single peak in a 2D FFT alignment plot from 0° to 180° indicates that the plot from 0° to 360° has adjacent major peaks that are 180° apart from each other. (EX1003, ¶ 47.)

III. THE ’227 PATENT

The ’227 patent is a divisional application of U.S. Application No. 14/776,106 (“the ’106 application”). The ’106 application resulted in U.S. Patent No. 10,137,223 (“the ’223 patent”). The parent ’223 patent issued with 15 claims.

The independent claim of the parent '223 patent, claim 1, is directed to scaffolds that include collagen, wherein an FFT analysis shows major peaks 180° apart.

The divisional '227 patent claims methods of using the scaffolds recited in the claims of '223 patent to treat a tissue defect by applying the scaffold to the tissue defect to repair a tendon, ligament, or nerve in need of repair. The '227 patent also claims culturing cells on a scaffold and promoting differentiating cells on the scaffold.

A. The Specification of the '227 Patent

As a divisional application, the '227 patent shares essentially the same specification as the '223 patent. In some embodiments, the specification states that the fibers of the scaffold are aligned such that “a fast Fourier transform (FFT) analysis result of the fibers [in the scaffold] have adjacent major peaks with about 180° apart from each other.” (EX1001, 13:25–28.) According to the specification, “[t]he ‘major peaks’ . . . refer to peaks higher than the average of the peaks in the result.” (*Id.*, 13:28–29.)

The specification states that “the FFT analysis may be performed by the methods described in *Measuring fiber alignment in electrospun scaffolds: a user's guide to the 2D fast Fourier transform approach*, Ayres C.E., Jha B.S., Meredith H., Bowman J.R., Bowlin G.L., Henderson S.C., and Simpson D.G., J. Biomater Sci Polym Ed. 2008; 19(5):603-21, which is incorporated by reference in its

entirety herein.” (*Id.*, 13:40–46.) Dr. Simpson, whose declaration is included with the Petition at issue here, is the senior author of the Ayres 2008 paper. (EX1003, §§ I.A–C.)

As described in Ayres 2008, in conducting an FFT analysis, peaks can be measured from 0° to 360°. (EX1003, ¶ 47). The analysis, however, need only be reported from 0° to 180°. (*Id.*) This is because, as discussed above, the positions of the peaks from 180° to 360° are symmetrical to the positions of the peaks from 0° to 180°. (*Id.*; EX1010, 609; *see also* EX1001, 13:38–49.)

FIG. 8 of the '227 patent, reproduced below, discloses the results of an FFT analysis of fibers prepared by the Applicants: “FIG. 8 . . . depicts exemplary FFT analysis results [(a)] of the fibers described herein . . . [and (b)] a control sample.” (EX1001, 2:10–12.) The specification further states that “[i]n some embodiments, FFT result of the fibers described herein may have adjacent major peaks with about 180° apart from each other as shown in FIG.8A.” (*Id.*, 13:46–49.)

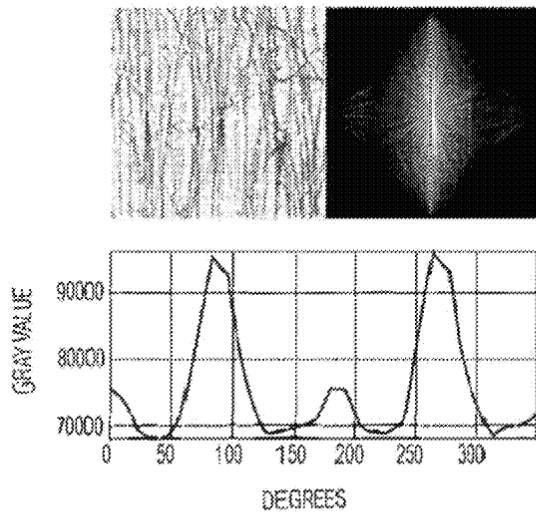


FIG. 8A

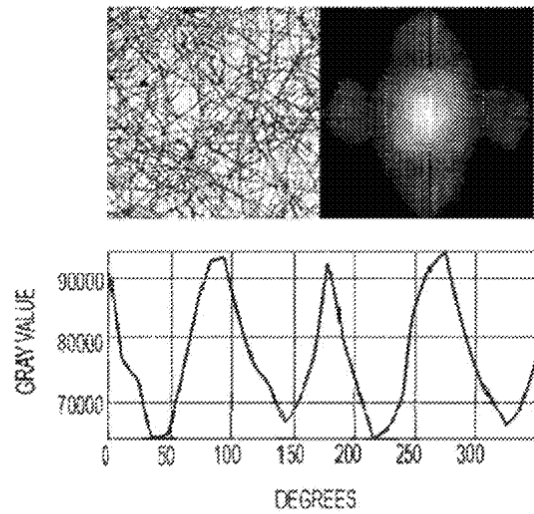


FIG. 8B

In FIG. 8A, the FFT analysis shows aligned fibers that have major peaks at about 90° and 270°. Thus, these major peaks are about 180° apart from one another (270° minus 90° = 180°), and there are no other major peaks. (EX1003, ¶ 65.) As noted above, and according to Ayres, which the specification incorporates for the performance of the FFT method, the graph in FIGS. 8A would only need to be reported through 180°. (*Id.*; EX1010, 609; EX1001, 13:38–49.) This is because, as discussed above, the peaks from 0° to 180° are symmetrical to the peaks from 180° to 360°. (EX1010, 609; EX1003, ¶ 47.) Thus, even if FIG. 8A only reported data from 0° to 180°, a Person of Ordinary Skill in the Art (“POSA”) would understand that the sample in FIG. 8A would necessarily have a second peak at about 270° and no other because of the symmetry discussed in Ayres above and because there are no other major peaks appearing in the 0-180° range. (EX1003, ¶ 65.) In contrast,

the control sample in FIG. 8B, shows peaks at about 0°, 90°, 180°, and 270°. (*Id.*, ¶ 67.) These fibers do not appear aligned, as shown in FIG. 8B. (*Id.*) Like above, and according to Ayres, the graph in 8B would only need to be reported to 180°.

The '227 patent further states that “[i]n some embodiments, the aligned fiber and/or electrospun fiber in the scaffold is crosslinked.” (EX1001, 15:16–17.) The '227 patent explains that the crosslinking may be obtained “by any conventional chemical crosslinking method.” (*Id.*, 12:52–54.)

The '227 specification states that the invention “relates to methods of promoting nerve repair using the aligned fiber, electrospun fiber, and/or scaffold described herein.” (*Id.*, 16:53–55.) In terms of implanting the scaffold, the specification states that “the tissue defect may be treated by applying an elongated sheet described herein to surround the defect, or by applying an elongated roll implant described herein between the tissue defect or gap.” (*Id.*, 19:9–12.) “Optionally, the elongated sheet may be applied around the tissue defect, and/or the elongated roll implant may be applied to facilitate surgery and healing.” (*Id.*, 19:15–17.)

B. The Claims

The '227 patent contains 14 claims, three independent claims and 11 dependent claims. These claims were pursued as a divisional application from the '106 application, which, as mentioned above, resulted in the '223 patent.

Claim 1 recites: “A method of treating a tissue defect in a subject comprising implanting at the tissue defect a scaffold comprising crosslinked fibers comprising collagen wherein a result of a fast Fourier transform (FFT) analysis of the fibers demonstrates that the fibers have major adjacent peaks that are about 180° apart from each other, and applying the scaffold to the tissue defect to repair a tendon, a ligament or a nerve defect.” (EX1001, Claim 1.)

Independent claim 7 recites a method of culturing cells on a scaffold that contains fibers that also has “major adjacent peaks that are about 180° apart from each other.” (*Id.*, Claim 7.)

C. The Prosecution History

The parent '223 patent issued on November 27, 2018. It issued from U.S. Application No. 14/776,106 filed September 14, 2015. The face of the patent also lists a provisional application, Provisional App. No. 61/785,031, which was filed on March 14, 2013. Both the '223 and '227 patents claim priority to this provisional application.

1. The '106 application leading to the '223 patent

The '106 application received one office action rejection before allowance. The Examiner rejected then pending claims 1, 11, 12, and 17 (corresponding to allowed claims 1, 4-6, respectively), as anticipated under 35 U.S.C. § 102(b) by Huang, et al., *Electrospun collagen-chitosan-TPU nanofibrous scaffolds for tissue*

engineered tubular grafts, 82 Colloids and Surfaces B: Biointerfaces 307-315

(2011) (referred to herein as “Huang1”).⁴ The Examiner stated that “Huang discloses a scaffold comprising one or more electrospun fibers” where the “aligned nanofibrous scaffolds” were “based on collagen, chitosan, thermoplastic polyurethane (TPU) blends” and showed peaks about 180° apart from each other in a FFT analysis. (EX1007, 210–11.)

The Patent Owner responded to the rejection, arguing that the prior art fibers disclosed in Huang1 satisfied the claimed alignment but only for “pure thermoplastic polyurethane fibers that comprise *no collagen*.” (*Id.*, 238 (emphasis added).) In contrast, for the fibers that *did contain collagen*, the Patent Owner argued that those fibers were *not* aligned. (*Id.*) “[Huang1]’s electrospun fibers comprising TPU, *collagen*, and chitosan did *not* exhibit the degree of alignment as recited in present claim 1.” (*Id.* (emphasis added).) Indeed, Huang1 itself states that for the collagen blended fibers: “[a]lthough two main peaks could also be found at 5° and 185°, *the existence of other peaks indicates that some nanofibers are not well aligned*.” (EX1008, 309 (emphasis added).) The Patent Owner thus amended independent claim 1 to require the inclusion of collagen. Because the

⁴ Huang1 was attached as EX1008 to the Petition.

pending dependent claims depended from claim 1, the amendment to include collagen applied to those claims as well.

The Examiner further rejected pending claims 1, 5-6, 11-12, 17, 19, and 20-22 (corresponding to allowed claims 1 and 2-10, respectively) as obvious under 35 U.S.C. § 103(a) by U.S. Patent App. Pub. No. 2004/0037813 (“Simpson”). (EX1007, 211–13.) The Examiner explained that based on Simpson, a POSA “would have had a reasonable expectation of success in producing the claimed invention.” (*Id.*, 213)

The Patent Owner overcame Simpson by arguing that the scaffold in Simpson was prepared the same way as the scaffold described in Huang1, and because Huang1 was not able to obtain aligned fibers with collagen (according to the Applicant), a skilled artisan following Simpson would also not be able to achieve aligned collagen fibers. (*Id.*, 238–39.) Thus, a POSA “would not have expected to obtain the claimed fiber alignment” following the Simpson reference. (*Id.*)

On June 12, 2018, the Examiner issued a Notice of Allowance for claims 1, 5, 6, 11, 12, 17, 19, 20, 21, and 22, that were examined during prosecution, but also included claims 27-28, and 31-33, that had been previously withdrawn in response to a restriction requirement. (*Id.*, 250.) The Examiner found the withdrawn claims, amended to depend from claim 1, which now required the

presence of collagen in the fibers, were “directed to the process of making or using an allowable product, previously withdrawn from consideration as a result of a restriction requirement” and were thus rejoined. (*Id.*, 249.)

2. The ’159 application leading to the ’227 patent

The application underlying the ’227 was subsequently filed a month after the issuance of the ’223 patent, on July 25, 2018, as Patent Application No. 16/045,159 (“the ’159 application”). As mentioned above, the ’159 application is a divisional application of U.S. Patent Application No. 14/776,106, which issued as the ’223 patent. The Examiner for the ’159 application, however, was not the same as the Examiner for the ’106 application. In the ’159 divisional application, the Patent Owner pursued claims 25-35 that were originally included in the ’106 application. Claims 25, 26, 27, and 31 were independent.

As discussed above, the arguments advanced by the Patent Owner in the parent ’106 application (issuing as the ’223 patent) convinced the Examiner that the claims, once amended to require that the fibers comprise collagen, were patentable. For this reason, the Patent Owner stated that the pending divisional claims carrying over from the parent “are amended to be rewritten in independent form,” that “[n]o new matter has been added,” and thus, “[e]arly examination on the merits and allowance are earnestly solicited.” (EX1002, 5.)

The Examiner then advanced *no* prior art rejections in the first office action, but rejected the pending claims only on the basis of 35 U.S.C. § 112. (*Id.*, 488–98.) In response, the Applicant amended the pending claims, on April 26, 2021, and added new claims 36–45. (*Id.*, 524–26.) In the context of these amendments, the Applicants amended claim 25, which ultimately issued as claim 1, to indicate where the tissue defect and the applying step occurs by adding the following language to the claim: “implanting at the tissue defect” the scaffold that has the claimed properties. (*Id.*, 524.) Further, the applicants also addressed the § 112 concerns raised by the Examiner as to the breadth of the claims by adding language that limited the type of tissue defect to be treated and that the purpose of implanting the scaffold is “to repair a tendon, ligament or nerve defect.” (*Id.*) The Applicant also amended claim 25 and the claims that depended from it to *require* collagen and to be crosslinked. (*Id.*)

In particular, pending claim 25 (which issued as claim 1) was amended as follows:

25. (Currently Amended) A method of treating a tissue defect in a subject comprising applying implanting at the tissue defect a scaffold comprising one or more crosslinked electrospun fibers comprising collagen, wherein a result of a fast Fourier transform (FFT) analysis result of the fibers demonstrates that the fibers have major adjacent major peaks with that are about 180° apart from each other, and wherein the scaffold is in a form of one or more elongated sheets, to surround surrounding the tissue defect with the scaffold to repair a tendon, ligament or never defect.

(*Id.*) In contrast, pending claim 26 was amended to recite:

26. (Currently Amended) A method of treating a tissue defect ~~or gap~~
in a subject comprising applying-implanting a scaffold comprising one
or more crosslinked electrospun-fibers comprising collagen, wherein
the fibers are anisotropic based on a fastfourier transform (FFT) FFT
~~analysis result of the fibers have adjacent major peaks with about 180°~~
~~apart from each other, and wherein the scaffold is in the form of one~~
~~or more elongated rolls, wherein the scaffold is inserted into between~~
the tissue defect ~~or gap~~ to repair a tendon, ligament or nerve.

(*Id.*) Accordingly, while pending claim 25 contained language that the peaks are aligned such that they showed an FFT analysis with major adjacent peaks about 180° apart, claim 26 used different words, requiring that the fibers are “anisotropic” based on a FFT analysis. (*Id.*)

Following these amendments, the Examiner issued an Office Action on July 19, 2021. (*Id.*, 529–40.) The Examiner again rejected the claims under 35 U.S.C. § 112, including 25 and 26. (*Id.*, 532–37.) The Examiner also issued a new rejection solely for claim 26 based on § 102(b). (*Id.*, 537–38.) According to the Examiner, “Claim 26 is rejected under pre-AIA 35 U.S.C. 102(b) as being anticipated Patel et al (WO 2012078472) [EX2002]⁵ and Simpson et al (US

⁵ Patel is primarily directed to diametrically aligned scaffolds. (EX2002, [002].) It teaches creating scaffolds out of PLCL, PPG, PLLA—all types of polymers. (*Id.*, [273]–[323].) Patel also discloses the potential use of collagen but does not

20120221025; see entire document) [EX2001].⁶ **This is a new rejection necessitated by applicant's amendment**" (*Id.* (emphasis in original).)

As shown above, the amendment to claim 26 added collagen and crosslinking but *removed* the requirement of aligned fibers with certain peaks as shown by an FFT (as was still required by claim 25) and instead replaced it with the requirement that the fibers be "anisotropic" based on FFT.⁷ According to the Examiner, "Simpson et al teach construction of fibrous scaffolds (see e.g. ¶ 0035) which is *anisotropic* (see e.g. ¶ 0011). The fibers comprise collagen (see e.g. 0049). They are used to repair nerve damage (see e.g. abstract). The fiber *anisotropy* is measured using Transform analysis (see e.g. ¶ 0100)." (*Id.*, 538

disclose collagen with aligned fibers. (*Id.*, [017].) Patel provides no FFT analysis or underlying data that can be used to do an FFT analysis.

⁶ Simpson discloses a scaffold that was prepared from aligned PCL (which is a polymer) fibers—*not* collagen. (EX2001, [0095], Table 1.) Further, while Simpson suggests the use of collagen at paragraph 49, as cited by the Examiner (EX1002, 538), collagen was not used to prepare any of the fibers described therein. (EX2001, [0061]–[0062].)

⁷ Anisotropic means a property of the substance where it has different strengths when measured in different directions.

(emphasis added).) The Examiner further stated that “Yeo [sic, Patel] et al teach construction of fibrous scaffolds with collagen (see e.g. ¶ 0189) which is *anisotropic* (see e.g. ¶ 0323). These [scaffolds] are used to repair tendon, ligament, or nerve damage (see e.g. ¶ 0168). As evidenced above, the fiber *anisotropy* is measured using Fourier Transform analysis.” (*Id.* (emphasis added).) Claim 26 also received a obviousness-type double patenting rejection based on a co-pending application No. 16/989,307. (*Id.*, 538–39.)

The Examiner, however, did *not* make the same § 102 rejection for claim 25, which issued as independent claim 1 and is challenged in the Petition. As discussed above, claim 25 maintained the language that the collagen comprising fibers had peaks 180° apart. (*Id.*, 524.)

In response to the Examiner’s rejection, on January 18, 2022, the Patent Owner did not address the merits of the rejection but instead canceled claim 26. (*Id.*, 653.)⁸ The Patent Owner asserted: “Without reaching the merits of the rejection, Applicant notes that claim 26 is canceled without prejudice or

⁸ Patent Owner criticizes Petitioners for not addressing the § 102 rejection as to claim 26 in the Petition (Req., 7–8), but this argument makes no sense as in response to the rejection, claim 26 was canceled. (EX1002, 653.) There was thus no reason to address this claim in the Petition.

disclaimer. Thus, the rejection is rendered moot. Withdrawal of the § 102 rejection is requested.” (*Id.*) Accordingly, the merits of the rejection under § 102(b) was never resolved during prosecution.

After additional prosecution, the Applicant and the Examiner had an interview where it was agreed that the Applicant will submit a terminal disclaimer to any patent term that would extend beyond the term of the parent ’223 patent because claims 11-15 of the ’223 patent “were found to overlap the instant claims 27-33 and 35.” (*Id.*, 663.) The Examiner stated that with this terminal disclaimer in place, the case would be in condition for allowance. (*Id.*) Claims 25, 27, and 31 were ultimately allowed and renumbered to claims 1, 7, and 11, respectively. The Applicant submitted the terminal disclaimer, and the Examiner issued the Notice of Allowability on February 28, 2022. (*Id.*, 668.)

D. The Asserted Art in the Pending IPR Petition

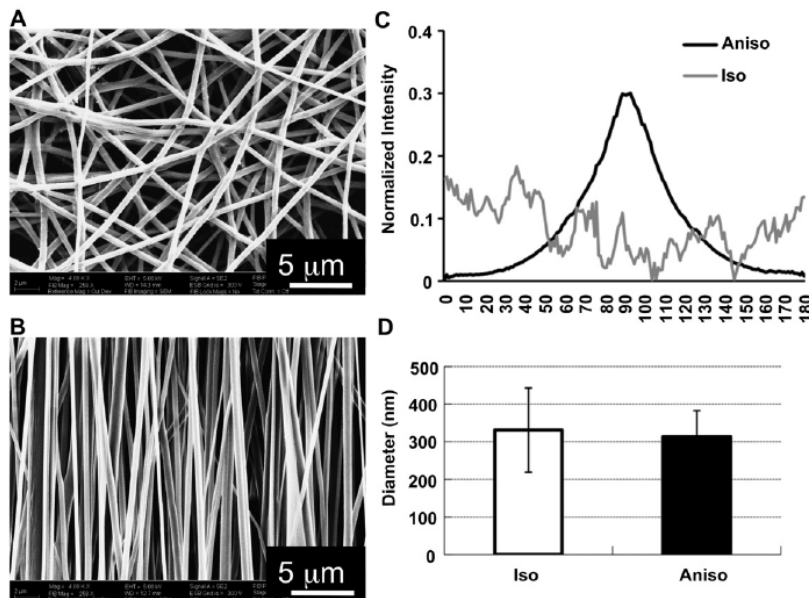
The two primary references cited in the Petition at issue here, Huang² and Lee, describe the preparation of collagen fibers, which can be or are crosslinked to enhance stability, with FFT peaks 180° apart as recited in claim 1 of the ’227 patent. Further, both references also discuss culturing cells on aligned fibers that have the requisite peaks 180° apart, as recited in claim 7. As mentioned above, these are the two independent claims challenged in the Petition.

1. Huang2

Huang2 (attached as EX1005 to the Petition) is a different prior art reference from a different research group than the Huang1 reference that was cited during prosecution of the '223 patent. Huang2 was not cited during prosecution of the '223 patent.

Huang2 studied fibers comprising collagen and sought to examine the effect of aligned fibers compared to non-aligned fibers on the attachment and growths of normal human dermal fibroblasts (“NHDFs”), including fibroblast-to-myofibroblast differentiation. (EX1005, 1797; EX1003, § V.C.) To do this, Huang2 created scaffolds of “stable” *collagen blended fibers* for engineering skin grafts. (EX1005, 1791–92.) Huang2 also notes the potential benefits of crosslinking, stating that crosslinking can be used to obtain a stable collagen scaffold. (*Id.*, 1791.)

Images of the fibers comprising collagen oriented in Huang2’s scaffolds, and an FFT analysis of such images, are shown in Figure 1:



These images show the aligned fiber sample (*Id.*, 1793 (Figure 1B)) and the non-aligned sample (*Id.* (Figure 1A)).

To determine and show the alignment of the fibers used in the scaffolds, Huang2 performed an FFT analyses using Dr. Simpson's technique. The FFT analysis graph is reported at Figure 1C. (*Id.*) The aligned sample has one major peak at about 90° with no other major peaks present. (*Id.*) Based on this readout, and as discussed in detail in the Petition, because of the symmetry in an FFT readout between 0° to 180° and 180° to 360°, a POSA would know that if the scale were extended to 360°, a second peak for the aligned sample would necessarily be at the symmetrical position of about 270°. (EX1003, ¶ 90.) No other major peaks would be present between 180° and 360° degrees for the aligned sample. (*Id.*) Therefore, Figure 1C in Huang2 for the aligned sample shows aligned fibers

containing collagen that have major peaks 180° apart from each other; and thus, squarely fall within the scope of the claims of the '223 and '227 patents. (*Id.*)

Dr. Simpson conducted his own analysis of Figure 1B using the FFT analysis published in his papers and described in Huang2 and the '223 and '227 patents, and reported data from 0° to 360°. (*Id.*, ¶¶ 125–26.) The graph generated from the FFT analysis performed by Dr. Simpson further confirmed that the aligned fibers comprising collagen in Huang2 have a major peak at about 90° and, because Dr. Simpson reported all the peaks through 360°, a second major peak at about 270°, which shows that the peaks are 180° apart as recited in claim 1. (*Id.*) None of this data was before the Examiner during prosecution.

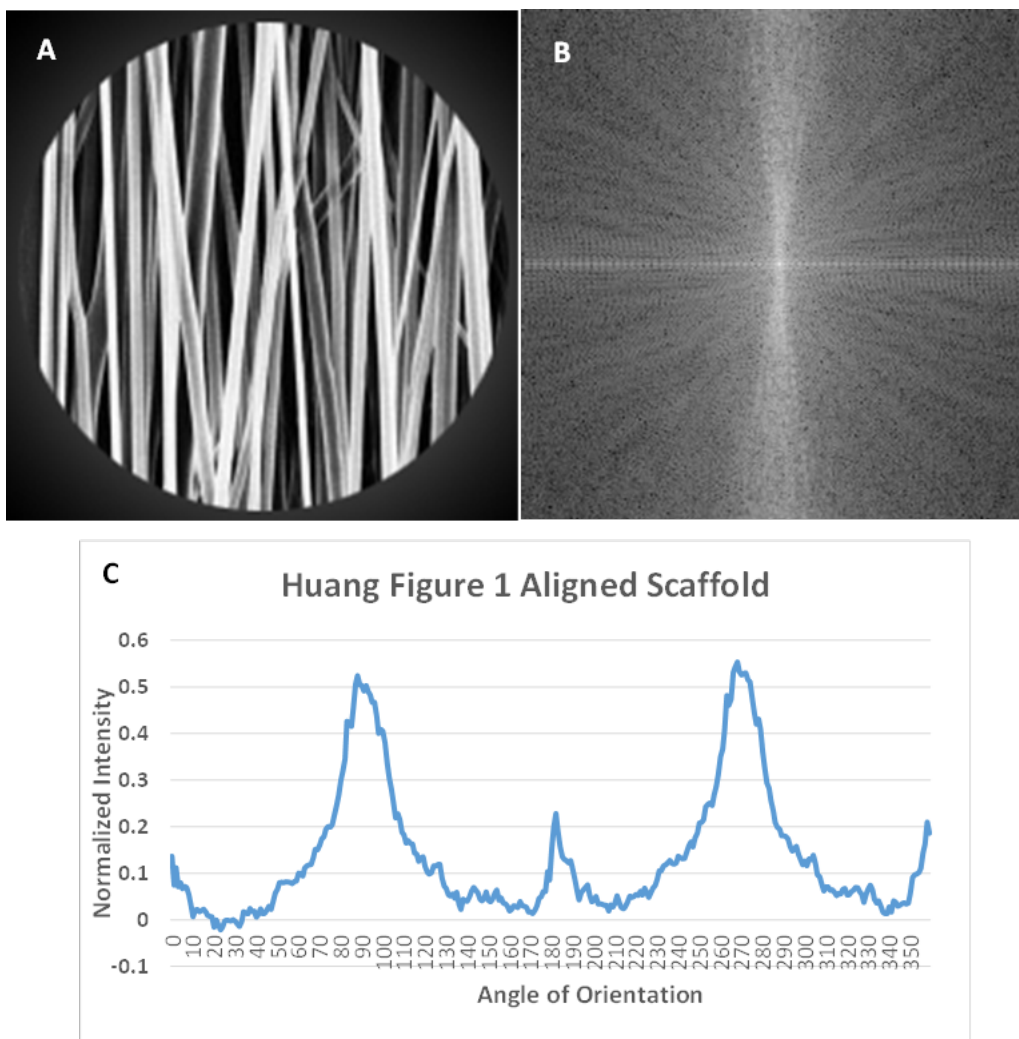


Figure 2. (A) Figure 1 from Huang aligned scaffold cropped and masked for 2DFFT. (B) 2DFFT spectrum of aligned scaffold, the image has been rotated to correct for the rotation intrinsic to the FFT analysis. (c) Normalized intensity values for aligned scaffold 0-360 degrees.

2. Lee

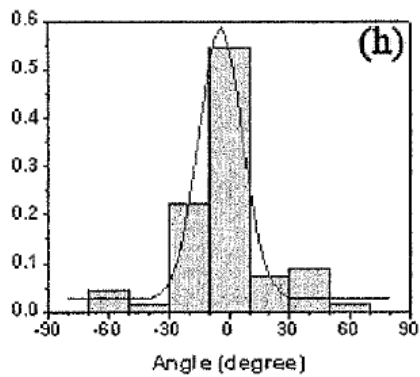
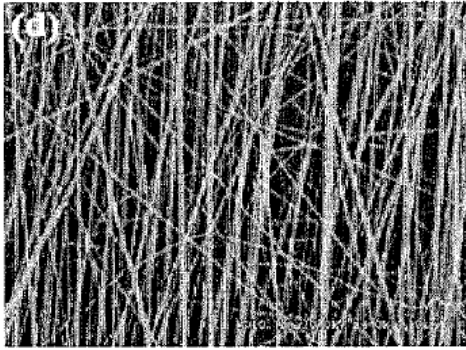
Lee (attached as EX1011 to the Petition) was also not cited as prior art during the prosecution of the '223 and '227 patents. Lee teaches that the reconstruction of skeletal muscle tissue due to a traumatic injury is difficult because of the lack of “functional muscle tissue substitutes.” (EX1011, [0003];

EX1003, § V.B.) To solve this problem, Lee describes engineered muscle tissue, including “a biodegradable scaffold comprising a plurality of fibers oriented along a longitudinal axis of the fibers” and “crosslinking said fibers to form the scaffold.” (EX1011, [0005] –[0006]; EX1003, § V.B.)

Lee further describes using fibers for the scaffold that are natural, such as collagen; synthetic, such as PCL; or blends of natural and synthetic fibers between 2:1 and 1:2 by weight. (EX1011, [0005].) Lee’s electrospun nanofiber meshes “were fabricated using a blend of PCL and collagen with a ratio of 1:1 in weight.” (*Id.*, [0063].) Lee further explained that “[a]fter the fabrication process, the electrospun PCL/collagen nanofiber meshes were cross linked under vapor of 2.5% glutaraldehyde solution for 6 hr. to increase stability and strength of collagen. The degrees of cross-linking were measured by Ninhydrin assay.” (*Id.*)

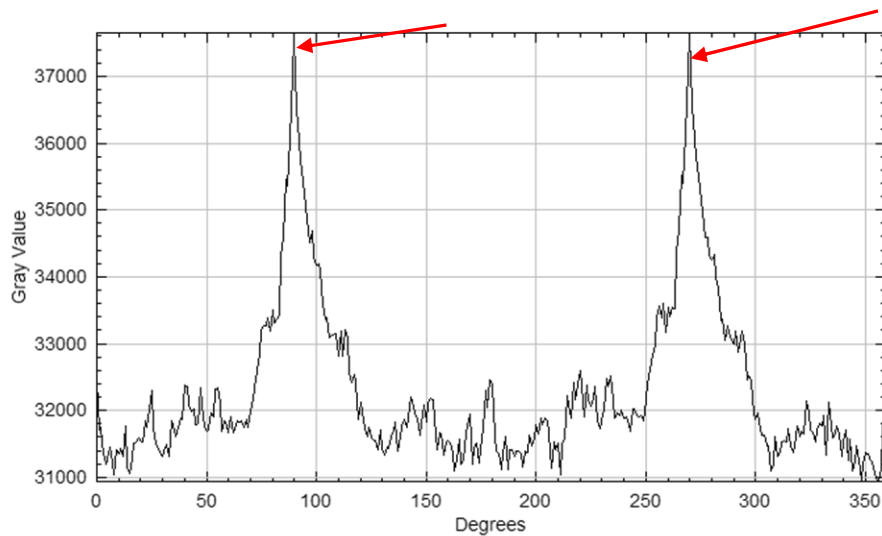
Lee’s most aligned fibers comprising collagen are shown in Figure 1D and corresponding histogram Figure 1H:⁹

⁹ The image analysis was done using Lee’s provisional, U.S. Provisional Patent App. No. 61/025,350 (EX1021), which discloses the same data, but with a clearer image.



(EX1021, Figs. 1D, 1H.)

Petitioners' expert, Dr. Simpson, ran an FFT analysis on Figure 1D. The resulting graph and analysis shows clear adjacent major peaks at around 90° and 270°. (EX1003, ¶¶ 183-184.) These peaks are thus about 180° apart from each other (annotated in **red**) (*Id.*)



Again, neither Lee, nor the FFT data analyzing Lee, was before the Examiner during the prosecution of the '223 patent.

E. The IPR Petition

The Petition at issue challenges independent claims 1 and 7, and dependent claims 2-6 (which depend from claim 1) and claim 8 (which depends from claim 7). The Petition does not include claim 26, which was withdrawn during prosecution. Because Huang² and Lee disclose scaffolds comprising collagen fibers with the claimed FFT peaks and crosslinking, those references render certain claims of the '227 patent unpatentable, as either anticipated or obvious in combination with other references such as Kuo (EX1018). Accordingly, on December 4, 2024, Petitioners filed their petition seeking *inter partes* review seeking to cancel them. (See Pet.)

IV. ARGUMENT

A. The Patent Owner's § 325(d) Arguments are Without Merit

The Patent Owner's request for discretionary denial is based solely on § 325(d). The Patent Owner asserts that the prior art and arguments raised in the Petition are cumulative to that raised by the Examiner during prosecution, and that the Petitioners failed to allege that the Examiner made "material errors."¹⁰ These assertions, however, mischaracterize the prosecution record and misstate the controlling legal test.

The proper inquiry—set forth in *Advanced Bionics* and guided by *Becton, Dickinson*—requires a threshold determination of whether the arguments and art are cumulative, i.e., whether the same or substantially the same art or arguments were previously presented to the Office. If that threshold is met, the Board then considers whether any material error occurred. *Advanced Bionics, LLC v. MED-EL Elektromedizinische Gerate GmbH*, IPR2019-01469, Paper 6, at 8-9 (P.T.A.B. Feb. 13, 2020) (precedential); *Samsung Elecs. Co., Ltd. v. Maxell, Ltd.*, No. IPR2024-

¹⁰ The new discretionary denial procedures make clear that error by the Examiner should not be raised in the Petition itself, but instead any "issues relating to 35 U.S.C. § 325(d)," should be discussed in Petitioner's opposition to the Patent Owner's Request for discretionary denial, which is this brief. (FAQ, ¶ 24.)

00867, 2024 WL 4709941, at *5 (P.T.A.B. Nov. 7, 2024); *Oticon Med. AB v. Cochlear Ltd.*, IPR2019-00975, Paper 15, at 19-20 (P.T.A.B. Oct. 16, 2019) (declining to exercise its discretion under § 325(d) based on the petition’s reliance on new, noncumulative prior art without the need to show error by the Examiner).

Here, as set forth in detail below, (1) the arguments raised during prosecution are not substantially the same as the arguments raised in the Petition, and (2) the art relied on in the Petition is not substantially the same as the art before the Examiner. There is thus no need to consider “material error” by the Examiner, and the Patent Owner’s § 325(d) argument fails.

1. Petitioners’ arguments advanced in the Petition raise different issues than the rejection of canceled claim 26 made during prosecution

As discussed above, one of the factors in determining whether to discretionarily deny a petition is whether the same or substantially the same arguments raised by the petition were already considered by the examiner during prosecution. Patent Owner argues that the Examiner allegedly rejected “claims” of the ’227 patent based on Simpson and Patel, which were cited during prosecution, in the same “manner” as the newly cited prior cited in the Petition. (See Req., 3, 23, 30.) But this is simply not accurate. The Examiner made prior art rejections based on Simpson and Patel *only* to claim 26—not the claims that ultimately issued and are challenged in the Petition. And claim 26 had *different* limitations than the

ultimately issued claims. Thus, at the very least, the arguments advanced in the Petition to the issued claims cannot be cumulative to the arguments raised during prosecution concerning a canceled claim with different limitations. The art cited during prosecution was simply not used in the same “manner” as the new art cited in the Petition.

As discussed above, in response to the § 112 rejections made by the Examiner, (see § III.C.2, *supra*), the Patent Owner amended the claims, including claim 25 and claims 26. (*Id.*) Claim 26 was amended to *remove* the language that the fibers have FFT peaks approximately 180° apart for fibers comprising collagen. (*Id.*) Instead, language was *added* to claim 26 that the fibers comprising collagen were “anisotropic.” (*Id.*) In contrast, claim 25, like the claims that were allowed in the parent ’223 patent, maintained the language that the fibers comprising collagen have peaks 180° apart. (*Id.*)

The Examiner rejected claim 26 under 35 U.S.C. § 102(b) over Simpson and Patel, which the Examiner ***emphasized in bold*** was a new rejection “necessitated” by the specific amendments made by the Applicant to claim 26 discussed above. (*Id.*) As discussed above, the Examiner pointed out, for example, that Simpson expressly stated that the PCL fibers constructed therein were “anisotropic,” which was the specific language that was added to claim 26. (*Id.*)

The Examiner, however, did not issue a similar rejection for pending claim 25, which ultimately issued as claim 1. The Examiner did *not* say that the disclosure of Simpson and Patel regarding fibers that are anisotropic anticipated claim 25 that recited fibers having aligned peaks 180° apart. This clearly demonstrates that the Examiner did not consider either Simpson or Patel to be material to claim 25, which, rather than reciting the measurement of “anisotropic” properties, instead recited fibers comprising aligned collagen with FFT peaks 180° apart. Yet, this is the very argument raised by the Petition, that the newly cited art, Huang² and Lee, both disclose collagen fibers with FFT peaks 180° apart. (Pet., 35–39, 47–51; EX1003, ¶¶ 115–28, 175–87.)

In its Request, the Patent Owner does not discuss the required claim elements for the issued claims—peaks 180° apart in the FFT. (See Req., 20–22, 27–29.) This is the case, even though in Patent Owner’s Preliminary Response on the merits (“POPR”), Patent Owner repeatedly argues that having peaks 180° apart, is the key element allegedly missing from the prior art. (POPR, 1-2.)

Thus, Patent Owner is wrong that the Examiner’s rejection of canceled claim 26, which had been amended to add the word “anisotropic,” based on Simpson and Patel, raised the same or substantially the same argument that is now raised in the Petition as to the invalidity of the issued claims, such as claim 25, which issued as claim 1, that contains different elements. For example, in *Bowtech, Inc. v. MCP IP*

LLC, IPR2019-00383, 2019 WL 3714347, at *2 (P.T.A.B. Aug. 6, 2019), the Board rejected a request for discretionary denial, noting that although one reference had been asserted as anticipating three claims, those claims were canceled. The Board further found “there is no evidence that any of the combinations asserted in the Petition were previously considered by the Office at all, let alone for the challenged claims.” *Id.*

Indeed, during prosecution, the Applicant specifically asserted that the rejection to claim 26 should be considered “moot” because claim 26 had been withdrawn and the merits of the rejection was never resolved. (*See* § III.C.2, *supra*.) Therefore, Patent Owner cannot now backtrack and rely on “moot” arguments to argue that substantially the same arguments were raised in the Petition as were raised during prosecution. The Patent Owner’s request for discretionary denial should be rejected on this basis alone.

2. Huang2 and Lee possess different features than the art before the Examiner during prosecution

Huang2 and Lee were never cited during either the prosecution of this divisional application leading to the ’227 patent or in the application leading to the parent ’223 patent. Further, and contrary to Patent Owner’s assertions, Huang2 and Lee, are not cumulative over Simpson and Patel cited during the prosecution of the ’227 patent because they have different technical features.

**(a) Huang2 and Lee Prepared Collagen Comprising
Fibers with the Requisite Peaks**

In contrast to the art before the Examiner, Huang2 and Lee show the *actual* preparation of fibers comprising *collagen* that have the requisite peaks 180° apart—just as recited in claim 25, which issued as claim 1. This was confirmed by Dr. Simpson’s FFT analysis of the images of the fibers disclosed in Huang2 and Lee, which was also not before the Examiner during prosecution. (Pet., 37–39, 48–51; EX1003, ¶¶ 125–26, 179–87.) The Patent Owner incorrectly argues that the Examiner considered this art in substance. (Req., 16–31.) But because the Examiner never considered references disclosing the preparation of fibers comprising *collagen*, where those fibers also had the claimed FFT peaks 180° apart, the Examiner could not have considered art substantially similar to Huang2 and Lee. *PLR Worldwide Sales Ltd. v. Flip Phone Games, Inc.*, IPR2024-00209, 2024 WL 2106683, at *7 (P.T.A.B. May 10, 2024) (criticizing the patent owner for relying on a “high-level comparison of the references,” and noting that the newly cited art in the petition was not “substantially the same” as the prior art cited during prosecution—particularly because the new art disclosed a claim element that had been specifically added during prosecution to distinguish over the earlier cited art). Simpson, which was before the Examiner, does not disclose *collagen* fibers with the requisite FFT peaks 180° apart.

Patent Owner, however, argues that the “fiber scaffold” formed in both Simpson and Patel did include collagen. (Req., 21, 27–28.)¹¹ This is not correct. The scaffolds created in Simpson and Patel do *not* comprise collagen, but instead contain only polymers. Simpson’s scaffold is composed of PCL. (EX2001, [0095], Table 1, Fig. 9(a)–(c).) Patel’s scaffolds are composed of PLCL, PLLA, and PPG. (EX2002, [273]–[323].) While Patent Owner points to prophetic language suggesting that collagen could be used (EX2001, [0061]–[0062]; EX2002, [017]), that prophetic disclosure cannot be co-extensive, or considered cumulative, with the disclosure in Huang2 and Lee of actually preparing collagen comprising fibers and showing that such fibers possess peaks 180° apart as recited in the claim.

This is particularly so where, in the prosecution of the parent application that resulted in the ’223 patent, the Applicant argued that the prior art (Huang1, for example) also suggested using collagen but that there was *no expectation* of obtaining aligned collagen fibers with the requisite peaks because of the devices and methods used to collect the fibers. (EX1007, 238–39.) The Applicant argued

¹¹ Moreover, Patel provides no FFT analysis or underlying data that can be used to do an FFT analysis. Instead, Patent Owner points only to Patel’s vague suggestion that alignment can be “controlled.” (Req., 28.) That cannot be cumulative of Huang2 and Lee that have the claimed peaks.

that the prior art did not disclose “a collector comprising rotating, rod-shaped electrodes,” which is what the Applicant asserted was necessary for aligned collagen fibers, and thus there could not be a reasonable expectation of success in obtaining aligned collagen fibers with the requisite peaks where such rods were not used. (*Id.*) That argument secured allowance of the claims in the ’223 patent. (*See id.*, 247–51.) The Patent Owner cannot now claim that aligned fibers with the requisite peaks can be achieved using collector devices it previously asserted could not produce such results, simply to serve its strategic interests in opposing the Petition. *See, e.g., Azurity Pharms., Inc. v. Alkem Labs. Ltd.*, 133 F.4th 1359, 1368 (Fed. Cir. 2025) (explaining patent owner’s “amendments and arguments” while prosecuting the parent application “apply directly” to the later related applications that follow); *Belcher Pharms., LLC v. Hospira, Inc.*, 11 F.4th 1345, 1353 (Fed. Cir. 2021) (rejecting “argument that the withheld art . . . is ‘cumulative’” because the patent owner’s current “argument is directly at odds with its argument during prosecution that the claimed range was ‘critical’”); *Tide Int’l (USA), Inc. v. UPL NA, Inc.*, IPR2020-01113, 2021 WL 225942, at *9–11 (P.T.A.B. Jan. 22, 2021) (finding art not cumulative where the new art cited in the petition contradicted the reasons stated by the examiner in allowing the claims to issue).

Thus, according to Patent Owner’s own arguments, that Simpson prophetically suggests the use of collagen does not render references such as

Huang2 and Lee cumulative, especially where both references actually made fibers comprising collagen and have the requisite peaks recited in claim 1, as confirmed by Dr. Simpson. (*See* §§ III.D.1-2, *supra*); *see also* *Regeneron Pharms., Inc. v. Merus N.V.*, 864 F.3d 1343, 1355–56 (Fed. Cir. 2017) (finding withheld references were not cumulative where patent owner had argued during prosecution that references before the Examiner during prosecution had prophetic teachings, were not enabled, and where a POSA “would not have a reasonable expectation of successfully using” the prior art method). Accordingly, if Huang2 and Lee were before the Examiner during prosecution, claim 25 (issued claim 1), would have been rejected. This alone establishes that these references are not cumulative.

(b) Huang2 and Lee Disclose Crosslinking

Additionally, Simpson and Patel are not cumulative of Huang2 and Lee for the additional reason that they do not disclose crosslinking, which challenged claims 1 and its dependent claims 2-6 also require. (EX1001, Claims 1–6.) Crosslinking is a chemical process that strengthens the fibers by forming covalent bonds between polymer chains. (*See, e.g.*, EX1005, 1791; EX1011, [0005]–[0006], EX1003, ¶ 55.) As set forth in the Petition, chemically crosslinking collagen fibers was also well-known in the prior art and constitutes a routine method to increase the stability and structural integrity of the scaffold, especially when using collagen as a material. (Pet., 2.) Nevertheless, crosslinking is an element of independent

claim 1 and dependent claims 2-6, which depend on claim 1, which both Huang2 and Lee disclose. (EX1005, 1791; EX1011, [0005]–[0006].) Simpson and Patel do not disclose crosslinking (*see* § III.C.2, *supra*)—and Patent Owner does not contend otherwise. This further confirms that Simpson and Patel are not cumulative of Huang2 and Lee.¹² Thus, Huang2 and Lee plainly discuss features that were missing from the prior art—the preparation of aligned collagen fibers

¹² In the prior art rejection by the Examiner, although crosslinking was an element of amended claim 26, it was not discussed by the Examiner in his initial rejection of claim 26. (*See* EX1002, 524, 537–38.) However, given that it was a well-known process, the use of crosslinking alone likely could not have supported patentability. In an interview summary, there is language that: “[t]he reference teaches the fibers are anisotropic and therefore they are cross-linked.” (*Id.*, 636.) It is unclear what reference this statement is referring to, but even if referring to Simpson, for example, the implication that the fibers are crosslinked due to being anisotropic would not render a reference that expressly suggests using crosslinking to improve stability, such as Huang2 or Lee, cumulative.

with peaks 180° apart as shown by FFT and also the concept of chemical crosslinking.¹³ As such, neither Huang² nor Lee are cumulative.

B. The Merits Overwhelmingly Support Institution

The March 26th Memo expressly invites the parties to address the strength of the unpatentability grounds. (Memo, 2.) Here, the merits are extremely strong and warrant institution.

All the claims of the '227 patent require scaffolds of aligned fibers that have major peaks 180° apart as analyzed by FFT. (See §§ III.B, III.C.2, *supra*.) Claims 1-6 additionally require that the fibers comprise collagen, are crosslinked, and are used to treat a tendon, ligament or nerve injury. And claims 7-8 additionally require that cells are cultured on the fibers. (See § III.B, *supra*.)

The Petition relies on two separate references, Huang² and Lee, that constructed electrospun fibers comprising collagen that have peaks 180° apart (as confirmed by Dr. Simpson) and also suggest the use of chemical crosslinking. (See § III.D, *supra*.) Further, both references cultured cells on the aligned fibers therein. (Id.) There were no references before the Examiner during prosecution that had all

¹³ Further, contrary to patent owner's assertions, (POPR, 30-32), there was motivation to crosslink a blend of collagen and PCL fibers, which is precisely what Lee did (*see* EX1003, ¶ 76).

of these elements. Moreover, the Petition cites Kuo that specifically teaches seeding scaffolds made from aligned collagen fibers to treat various tissue injuries by seeding them with the appropriate cells types that correspond to the particular tissue that is injured. (EX1018, [0058]; Pet., 39–40, 53; EX1003, ¶¶ 73, 96–97, 102, 107, 169, 189.) Indeed, Dr. Simpson explained that “a POSA would have been able to make and use a scaffold comprising Huang2’s aligned fibers and seeded with various cell types using well-known established methods described in both Huang2 and Kuo to achieve predictable results with a reasonable expectation of success.” (EX1003, ¶ 102.)¹⁴ As set forth in the Petition, it would have been obvious to use the aligned fibers prepared in both Huang2 and Lee, and treat a tendon, ligament, or nerve injury as taught by Kuo, i.e., by seeding the scaffold with the cells that correspond to the corresponding tissue to be treated.

Patent Owner, however, contends in its POPR that neither Huang2 nor Lee actually disclose collagen fibers having FFT peaks 180° apart. (POPR, 15–30, 41–

¹⁴ Patent Owner mischaracterizes the Petition as saying one would use skin cells to treat, for example, a tendon injury. (POPR, 34–37, 54–57.) The Petition, however, does not say that. Instead, as discussed above, the Petition relies on Kuo, which expressly states to use the corresponding cells to treat an injury, as explained by Dr. Simpson.

49.) Yet, this is purely a technical question as to how a POSA would view the references. In addressing this question, the Petition relies on Dr. Simpson, a third party competent expert witness, who drafted much of the prior art and developed the very test described in Huang2 and the '227 patent. *See Sage Prods., LLC v. Stewart*, 133 F.4th 1376, 1385 (Fed. Cir. 2025) (“Our precedents establish that expert opinion may be used to interpret [an] allegedly anticipating reference and to shed light on what it would have meant to” a POSA.) In contrast, the Patent Owner offers solely attorney argument, which can be discounted. *Elbit Sys. of Am., LLC v. Thales Visionx, Inc.*, 881 F.3d 1354, 1359 (Fed. Cir. 2018) (rejecting attorney argument about how a POSA would view the prior art in the face of contradictory expert evidence because “[a]ttorney argument is not evidence and cannot rebut other admitted evidence”); *KEYnetik, Inc. v. Samsung Elecs. Co., Ltd.*, No. 2022-1127, 2023 WL 2003932, at *2 (Fed. Cir. Feb. 15, 2023) (rejecting Patent Owner’s attorney argument that petitioner’s expert’s testimony was “inadequate” because “attorney argument is no substitute for evidence”).

As set forth above, Huang2 discloses a single peak in a 180° field, which a POSA would understand would show a second peak at the symmetrical position if the field were extended to 360°. (EX1005, 1793 (Figure 1B); EX1003, ¶¶ 118–24 (citing EX1013, 4; EX1010, 609).) Indeed, Huang2 specifically states it captured data for the full 360 degree field—“360 points such that the degree interval was

1°.” (EX1005, 1792.) Huang² only needed to show data through 180° because that is how the data is “typically” reported, as set forth by Ayers, (*see* EX1005, 1792; EX1003, ¶¶ 118–24 (citing EX1013, 4; EX1010, 609)),¹⁵ and because there was only one peak in the 180° field. A POSA, as testified by Dr. Simpson, would clearly understand that there would be a second peak at the symmetrical position if the full data was reported. (EX1003, ¶¶ 57–58, 123–24, 241–42.) The Patent Owner’s attorney argument that contradicts both Ayers (which is incorporated into the ’227 patent) and Dr. Simpson’s testimony should be discounted. *Elbit Sys. of Am.*, 881 F.3d at 1359; *KEYnetik*, 2023 WL 2003932, at *2.

Further, it was Dr. Simpson himself, the very pioneer of the FFT method recited in the claims, who applied the FFT method to Huang² and Lee and confirmed that these references disclose fibers comprising collagen with the

¹⁵ In contrast to Patent Owner’s assertions (POPR, 21–22), Ayres explains that this is the way data is “typically” reported, not that the plot is “typically” symmetrical. Ayres 2006 and 2008 makes clear that the positions of the peaks are in fact symmetrical in a 360 field. (EX1013, 4 (“the FFT is symmetric about the horizontal axis so a pixel summation to 360° is unnecessary”); EX1010, 609 (“the frequency plot is symmetric so a complete summation from 0 to 360° is not technically necessary”).)

claimed peaks. (Pet., §§ X.A.3, XI.A.3; EX1003, ¶¶ 120–26, 179–87.) The entire purpose of the FFT analysis is to measure fiber alignment, and it is clear from the reference that the fibers in both references are aligned. (EX1003, ¶¶ 38–52, 57, 115–36, 175–87.) Indeed, Patent Owner admits in its POPR that Lee confirmed that its collagen fibers were aligned *three* different ways. (POPR, 43 (“Lee already confirms fiber alignment through three different mechanisms . . .”).) None of this information was before the Examiner during prosecution. Had it been, it is clear the Examiner would not have erred in allowing the challenged claims.

Moreover, Patent Owner’s attacks on Dr. Simpson’s testing are without merit. (See POPR, 23-29, 45-49.) As before, Patent Owner’s assertions are based solely on attorney argument without any supporting expert testimony. Dr. Simpson performed the testing from the perspective of a skilled artisan, and Patent Owner’s attorney’s assertions that Dr. Simpson, the inventor of the technique, performed his own method incorrectly should be completely discounted. Indeed, the ’227 patent itself does not report a single parameter that the Patent Owner now alleges is essential in performing the method. (See EX1001, 13:38–49.) Moreover, Patent Owner does not put forward any evidence showing that an alleged “correct” application of the FFT technique would provide different results. This, of course, the Patent Owner could not do because Huang² and Lee do in fact disclose aligned

collagen fibers that have the requisite peaks in the FFT, which is simply a tool used to measure fiber alignment.

It is hard to conceive of a more straightforward showing of unpatentability: the prior art was analyzed using the claimed technique by its original developer who confirmed that the prior art possesses the elements recited in the claims. And in its POPR, Patent Owner failed to provide *any* expert evidence challenging the testimony by Dr. Simpson concerning how a POSA would understand the claims, the technology, or the references. Instead, Patent Owner merely puts forward its own biased attorney's arguments in an attempt to undermine Dr. Simpson's testimony and testing concerning the FFT analysis, a test he created. Such unsupported attacks—without any expert support—show the weakness of Patent Owner's position and favor the rejection of Patent Owner's request for discretionary denial.

V. CONCLUSION

Patent Owner's request for discretionary denial under § 325(d) fails. The arguments pointed to by the Patent Owner are not substantially the same as the arguments raised in the Petition, as they focus on a canceled claim with different limitations than the claims that issued and challenged in the Petition. Further, the Petition presents new, noncumulative prior art—Huang² and Lee—that discloses the preparation of aligned, collagen-containing fibers with adjacent major FFT

peaks approximately 180° apart—features that were missing from the prior art before the Examiner. The Examiner never considered those disclosures during prosecution nor Dr Simpson’s analysis of the references confirming their disclosure. Finally, the merits of the Petition are extremely strong. Accordingly, for all the above reasons, Patent Owner’s request for discretionary denial should be rejected and institution is warranted.

Respectfully submitted,

Dated: June 3, 2026

By: /Howard Levine/
Howard Levine (Reg. No. 41,453)

CERTIFICATE OF COMPLIANCE

The undersigned hereby certifies that the foregoing **Opposition to Patent Owner's Request for Discretionary Denial** contains 8620 words, as measured by the word-processing system used to prepare this paper.

Dated: June 3, 2026

By: /Howard Levine/
Howard Levine (Reg. No. 41,453)

CERTIFICATE OF SERVICE

I hereby certify that on June 3, 2025, I caused a true and correct copy of the forgoing Opposition to Patent Owner's Request for Discretionary Denial to be served via electronic upon to the Patent Owner's counsel of record at the following addresses:

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