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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ZIMMER HOLDINGS, INC.
AND ZIMMER DENTAL INC.,
Petitioner

v.

FOUR MILE BAY, LLC
Patent Owner

U.S. Patent No. 8,684,734

PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 8,684,734

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1010	Excerpt from Merriam-Webster's Collegiate Dictionary, (11th ed. 2012)
1011	Prosecution History of U.S. Patent No. 8,297,974
1012	Prosecution History of U.S. Patent No. 8,043,090
1013	U.S. Patent No. 5,282,861 to Kaplan
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I. INTRODUCTION

Zimmer Holdings, Inc. and Zimmer Dental Inc. (collectively, "Petitioner") request *inter partes* review of claims 1-3, 5-10, 12-15, and 17-27 of U.S. Patent No. 8,684,734 ("the '734 patent") (Ex. 1001), which is assigned to Four Mile Bay, LLC ("Patent Owner"). This Petition shows that there is a reasonable likelihood that Petitioner will prevail with respect to at least one of the challenged claims, and thus a trial should be instituted. This Petition also establishes by a preponderance of the evidence that claims 1-3, 5-10, 12-15, and 17-27 of the '734 patent are unpatentable under 35 U.S.C. § 103(a). These claims should be canceled.

II. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8

Real Party-in-Interest: Pursuant to 37 C.F.R. § 42.8(b)(1), Petitioner identifies Zimmer Holdings, Inc., and Zimmer Dental Inc. as the real parties-in-interest.

Related Matters: Pursuant to 37 C.F.R. § 42.8(b)(2), Petitioner identifies the following related matter. The '734 patent is involved in *Four Mile Bay LLC v. Zimmer Holdings, Inc. et al.*, No. 3:14-CV-1300 (N.D. Ind.) (JVB)-(JEM). Petitioner is concurrently filing a second petition for *inter partes* review challenging claims 1-3, 5-10, 12-15, and 17-27.

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Telephone: 202.551.1700, Fax: 202.551.1705, E-mail: naveenmodi@paulhastings.com. Back-up counsel are Srikala P. Atluri (*pro hac vice* admission to be requested), Paul Hastings LLP, 875 15th St. N.W., Washington, D.C., 20005, Telephone: 202.551.1700, Fax: 202.551.1705, E-mail: srikalaatluri@paulhastings.com, and Paromita Chatterjee (Reg. No. 62,731), Paul Hastings LLP, 875 15th St. N.W., Washington, D.C., 20005, Telephone: 202.551.1700, Fax: 202.551.1705, E-mail: mitachatterjee@paulhastings.com. Petitioner consents to electronic service.

III. PAYMENT OF FEES UNDER 37 C.F.R. §§ 42.15 AND 42.103

Petitioner submits the required fees with this petition. Please charge any additional fees required for this proceeding to Deposit Account No. 50-2613.

IV. GROUNDS FOR STANDING AND IDENTIFICATION OF CHALLENGE

Petitioner certifies that the '734 patent is available for *inter partes* review, and that Petitioner is not barred or estopped from requesting such review of the '734 patent on the grounds identified.

Claims 1-3, 5-10, 12-15, and 17-27 of the '734 patent are unpatentable and should be cancelled in view of the following prior art references and grounds:

Reference 1: U.S. Patent No. 5,049,074 to Otani ("*Otani*") (Ex. 1008).

Reference 2: U.S. Patent No. 5,282,861 to Kaplan ("*Kaplan*") (Ex. 1013).

Reference 3: U.S. Patent No. 6,095,817 to Wagner et al. ("*Wagner*") (Ex. 1009).

Ground 1: Claims 1, 2, 5-10, 13-15, 17-23, and 25-27 are unpatentable under 35 U.S.C. § 103(a) as obvious over *Otani* in view of *Kaplan*.

Ground 2: Claims 3, 12, and 24 are unpatentable under 35 U.S.C. § 103(a) as obvious over *Otani* in view of *Kaplan* and *Wagner*.

V. BACKGROUND

The '734 patent issued from U.S. Patent Application No. 13/571,375 ("the '375 application" or "the '734 patent application"), filed August 10, 2012, and purports to be a continuation-in-part of U.S. Patent Application No. 13/195,872 ("the '872 application"), now Patent No.8,297,974, which purports to be a continuation of U.S. Patent Application No. 11/358,375 ("the '8,375 application"), filed on February 21, 2006, now U.S. Patent No. 8,043,090, which purports to be a continuation of U.S. Patent Application No. 10/375,343 ("the '343 application" or "the original application"), filed on February 27, 2003, now Patent No. 7,291,012 ("the '012 patent" or "the original patent"). Ex. 1001 at title page.

A. The '734 Patent

The '734 patent relates to dental implants, as shown in the embodiments of Figures 2 and 6, below. *See e.g.*, Ex. 1001 at 2:33-63. The disclosed dental implants include two components or bodies: a coronal body and a bone fixation

body. *See e.g.*, *id*. at 2:34-37; Figs. 1 and 2; Ex. 1002 at ¶ 13. Figure 2 shows a dental implant 10 having a coronal body 14 and bone fixation body 16 embedded in a jawbone 34 of a patient:

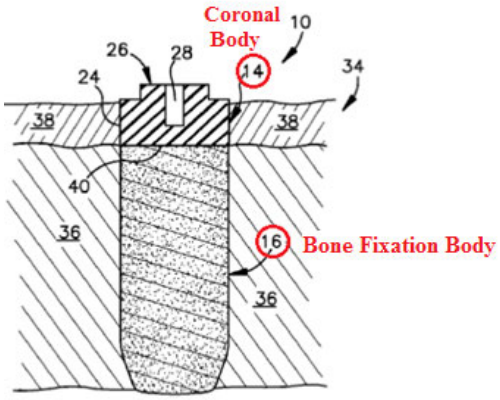

Fig. 2

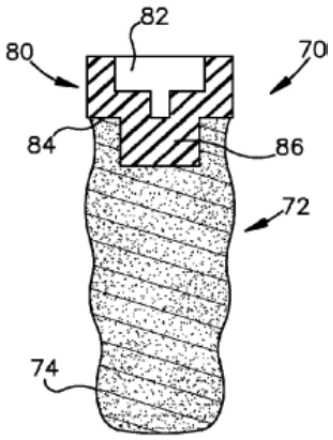

Fig. 6

The coronal body is formed from a solid metal piece of titanium or titanium alloy, and includes a transgingival section 24, which extends along the gum or gingival tissue 38. *See* Ex. 1001 at 2:38-41, 2:49-51, Fig. 2. It also includes a dental interface 26 extending upwardly from the transgingival section 24. *See id.* at 2:38-44, Fig. 2. Dental interface 26 is formed as a male connector (Fig. 2) or a female connector (Fig. 6) having a polygon shape and is provided with a threaded bore 28 adapted to receive a fixation screw for connecting the implant to a dental component such as a prosthesis. *See id.* at 2:42-49 (disclosing a male hexagon connector), 4:17-19 (disclosing a female connector having a hexagon or polygon shape). In some embodiments, coronal body 14 can include a first region having a smooth outer surface and a second region having a surface treatment such as, for

example, micro-texturing. *See id.* at 3:60–4:9, Figs. 3 and 4; *see also* Ex. 1002 at ¶ 13.

The specification includes an embodiment (shown in Figure 6 above) in which a distal end surface 84 of the coronal body 80 includes an elongated protrusion 86 that extends into the bone fixation body 72. *See* Ex. 1001 at 4:19-21, Fig. 6. Protrusion 86 can have any shape such as, for example, "cylindrical, square, rectangular, hexagonal, octagonal, polygonal, or other shapes." *Id.* at 4:24-27. In the embodiment shown in Fig. 6, the porous structure of the bone fixation body 72 connects to the metal coronal body at an interface that has a circular or elliptical cross-section. *See id.* at 11:40-46. According to the '734 patent, protrusion 86 is "adapted to increase the interface between the coronal body and bone fixation body." *Id.* at 4:21-23; *see also* Ex. 1002 at ¶ 14.

The bone fixation body has a generally cylindrical shape (Figs.1 and 2) or tapered shape (Figs. 3 and 4) that extends from a proximal end to a rounded distal end. *See* Ex. 1001 at 2:53-55, 3:62-65, Figs. 1-4. The bone fixation body is formed from titanium and has a "completely porous structure" that "extends throughout the entire body from the proximal to distal ends [*sic*]." *Id*. at 2:55-58. "By 'porous,' it is meant that the material at and under the surface is permeated with interconnected interstitial pores that communicate with the surface." *Id*. at 3:3-5. According to the specification, "the size and shape of the porous structure

emulates the size and shape of the porous structure of natural bone." *Id*. at 3:10-11. In one embodiment, the '734 patent explains that the average pore diameter "is about 40μm to about 800μm with a porosity from about 45% to 65%. Further, the interconnections between pores can have a diameter larger than 50-60 microns." *Id*. at 3:11-15; *see also* Ex. 1002 at ¶ 15.

The '734 patent, which is allegedly a continuation-in-part, also discloses a new embodiment—not present in the parent and grandparent applications from which the patent stems—in which "the porosity of the porous structure can be constant throughout the porous structure." *Compare* Ex. 1001 at 13:16-17 *with generally* Ex. 1003 at 160-174; Ex. 1011 at 94-107, Ex. 1012 at 238-252. Alternatively, the '734 patent explains, the porosity may "change within the porous structure." *See* Ex. 1001 at 13:17-18; *see also* Ex. 1002 at ¶ 16.

The specification alleges that the configuration of the porous structure "encourage[s] natural bone to migrate and grow into and throughout the entire body 16." Ex. 1001 at 3:16-17. The bone fixation body can also be adapted to induce bone growth through the body. *See id.* at 4:52-54. For example, the bone fixation body can be doped with biological active substances containing pharmaceutical agents to stimulate bone growth. *See id.* at 3:53-57; *see also* Ex. 1002 at ¶ 17.

The bone fixation body can be fabricated using various techniques including sintering, casting, plasma-spraying, sputter deposition techniques, and metallic deposition techniques. *See* Ex. 1001 at 12:64-67. The coronal body can be formed using known machining techniques. *See id.* at 3:21-22. In certain disclosed embodiments, these bodies are fabricated independently and subsequently connected or fused together. *See id.* at 3:55-59; *see also* Ex. 1002 at ¶ 18.

The '734 patent includes 27 claims, of which claims 1, 8, 14, 20, 25, and 27 are independent. *See* Ex. 1001; *see also* Ex. 1002 at ¶ 19. Claims 1, 8, 14, and 20 are directed to a dental implant comprising, among other things, a coronal body and a porous body that is "uniform"/has "uniform porosity." Claims 25 and 27 are directed to a method comprising, among other things, forming a porous body having "uniform porosity."

B. Prosecution History of the '734 Patent and Earlier Applications

1. The '012 Patent Prosecution (the Original Patent)

The original application, which matured into the '012 patent, included one independent claim that recited a dental implant comprising, among other aspects, "a bone fixation body . . . formed of a completely porous structure." Ex. 1003 at 169. Independent claim 1 was rejected as being anticipated and/or rendered obvious over a number of references including *Otani*. *See e.g.*, *id.* at 131-132; *see also* Ex. 1008. In response, Applicant amended independent claim 1 to recite that

the bone fixation body was formed of a completely **"**uniform" porous structure, and argued that the cited references do not teach a completely uniform porous structure because they teach different pore sizes. *See e.g.*, Ex. 1003 at 112, 115-121. The Examiner maintained the rejections, and Applicant appealed the rejections to the Board. *See id*. at 98, 103-108.

In its decision on appeal, the Board found that some of Appellant's arguments "appear[] to be grounded on the position that the language 'completely uniform porous structure' requires that the porosity and pore size of the body [*sic*] fixation body is the same throughout the body." *Id.* at 39. The Board found nothing in Applicant's specification to support this position. *Id.* In particular, the Board found that "[t]he term 'uniform' is not used in Appellant's Specification, outside of [the] claims." *Id.* The Board also found that "[t]here is nothing in this description that would convey to one of ordinary skill in the art that the porosity and pore size are the same throughout the entire body." *Id.* Accordingly, the Board concluded that the phrase "completely uniform porous structure" means only "that the entire structure be porous." *Id.*

Additionally, the Board sustained a number of the Examiner's rejections including the Examiner's rejection based on *Otani*. *See id.* at 36-38. It found that "porous layer 8 [of *Otani*] may be considered the bone fixation body" and that it is "'formed of a completely uniform porous structure'" because "porous layer 8 is

entirely porous throughout . . . ." *Id.* at 36. Based on this, the Board sustained the Examiner's rejections of claims 1, 2, 4, 5, 7-11, and 15-19 of the original application as anticipated by *Otani*. *See id*. at 37-38. In response, the Applicant conceded that *Otani* discloses an entirely porous structure and cancelled the rejected claims. *See id.*at 17-19.

2. The '734 Patent Prosecution

In the '734 patent application, which matured into the '734 patent, Applicant added new subject matter not disclosed in the original patent or any of the other intervening applications. Specifically, Applicant added that "the porosity of the porous structure can be constant throughout the porous structure . . . ." Ex. 1001 at 13:16-18. Applicant filed the '734 patent application with three independent claims broadly reciting, among other things, a "porous structure." Ex. 1004 at 123-128.

The Examiner issued a number of rejections based on *Otani*. *See id.* at 60-62. But, in a summary of an interview initiated by the Applicant, the Examiner agreed that the rejections based on *Otani* would be overcome if Applicant amended the independent claims to require the porous structure to be "uniform" based on the Applicant's representations that unlike the "uniform" porous structure of the amended claims, "the porosity of the porous layer [in *Otani*] changes." *Id*. at 51.

Applicant subsequently amended independent claim 21 (now claim 1) to recite a "porous metal structure that is uniform," independent claims 28 and 34 (now claims 8 and 14, respectively) to recite a porous body with "uniform porosity," independent claim 40 (now claim 20) to recite "a uniform porous metal structure," and added new independent claims 45 and 47 (now claims 25 and 27, respectively) which recite a porous body with a uniform porous metal structure. *See id.* at 29-36. Applicant argued that the amended claims and new claims distinguish from *Otani* because "Otani teaches a dental implant with a porous coating that has 'a pore distribution such that the interior of the fiber material i.e. the core material side is most dense and the porosity gradually increases toward the external surface.'" *Id.* at 38-39, 41 (citing *Otani* at 3:35-38). Based on the Applicant's representations that (1) a "uniform" porous structure requires unchanging porosity, and (2) *Otani* teaches a porous layer having changing porosity, the amended and new claims were ultimately allowed and issued as independent claims 1, 8, 14, 20, 25, and 27. *See* Ex. 1001 at 13:49–17:6.

VI. CLAIM CONSTRUCTION

In an *inter partes* review, the Board applies the broadest reasonable interpretation ("BRI") standard to construe claim terms.[1] Under the BRI standard, claim terms are given their "broadest reasonable interpretation, consistent with the specification." *In re Yamamoto*, 740 F.2d 1569, 1571 (Fed. Cir. 1984); Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,764 (Aug. 14, 2012). Claim terms are also "generally given their ordinary and customary meaning," which is the meaning that the term would have to a person of ordinary skill in the art.[2] *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007) (quoting *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312, 1313 (Fed. Cir. 2005) (*en banc*)). Petitioner proposes a construction for a few of the claim terms below, but all of the

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[1] Petitioner notes that the district courts apply a different claim construction standard and reserves its rights to make arguments based on that standard in the district court.

[2] A person of ordinary skill in the art would have had an undergraduate degree in a relevant engineering field (e.g., Mechanical Engineering, Materials Science Engineering, Biomedical Engineering) with 3-5 years of experience with dental implants or similar implants or a graduate degree in a relevant field with 1-3 years of experience with dental implants or similar implants. Ex. 1002 at ¶ 10.

claim terms in the '734 patent should be given their plain and ordinary meaning under the BRI standard.[3]

The independent claims of the '734 patent all include a "porous" feature that is "uniform," (hereinafter the "uniform porosity features"). Specifically, claim 1 recites a "porous . . . structure that is uniform." Ex. 1001 at 13:55-56. Claims 8 and 14 recite a "porous body" having "uniform porosity." *Id.* at 14:46-47, 15:9-10. And claims 20, 25, and 27 recite "a uniform porous . . . structure." *Id.* at 16:5, 32, 58-59; *see also* Ex. 1002 at ¶ 21. During both prosecution of the '734 patent, Applicant described the uniform porosity features of the independent claims similarly. *See* Ex. 1004 at 38-39, 41. In addition, the Patent Owner has grouped and construed these limitations similarly during litigation. Ex. 1005 at 1. Accordingly, these features should be construed together to have the same meaning.

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[3] Claims 2, 5, 10, and 21 do not further limit the independent claims from which they depend and/or fail to point out and distinctly claim the subject matter that is the invention. Petitioner understands that such grounds under 35 U.S.C. § 112 cannot be raised in this proceeding, but reserves the right to argue them before a district court or in another forum.

In the context of the '734 patent, the broadest reasonable interpretation of the claimed uniform porosity features is "a porous body or structure having a constant porosity throughout the body or structure." This understanding is consistent with the '734 patent's new disclosure, the plain language of the claims, and the Applicant's statements and the Office's findings during prosecution. *See* Ex. 1002 at ¶ 22.

The plain and ordinary meaning of "uniform" is "not varying or changing" or "constant." *See* Ex. 1010 at 1368; Ex. 1014 at 1561. Outside of the claims, the term "uniform" is not expressly used in the '734 patent specification. However, the new disclosure of the '734 patent, which is allegedly a continuation-in-part, discloses an embodiment with a porous body or structure having a "constant" porosity throughout. Ex. 1001 at 13:16-18. Like the term "uniform," "constant" has a plain and ordinary meaning of "unchanging," or "remaining free from variation or change" or "uniform". *See* Ex. 1010 at 267; Ex. 1014 at 312; Ex. 1002 at ¶ 23.

The '734 patent discloses a porous structure that is porous throughout. Ex. 1001 at 2:56-59 (describing a bone fixation body 16 made up of "a completely porous structure that extends through the entire body from the proximal to distal ends"); *see also id*. at 3:1-2. In the newly disclosed embodiment, the '734 patent further teaches that "the porosity of the porous structure can be **constant**

throughout the porous structure" (*id*. at 13:16-18) (emphasis added); Ex. 1002 at ¶ 24.

Consistent with the plain and ordinary meaning of both "uniform" and "constant," the '734 patent contrasts the porous structure having "constant" porosity with a porous structure in which the porosity "change[s] within the porous structure." Ex. 1001 at 13:16-18 (reciting that "the porosity of the porous structure can be constant throughout the porous structure **or** change within the porous structure"). Unlike the porous structure having "constant" porosity, the '734 patent explains that a "porous structure can have a gradient porosity in which the porosity changes from the surface of the bone fixation body to the center of the bone fixation bode [*sic*] (for example, the porosity near the [external] surface of the bone fixation body is different than the porosity [near] the internal [surface of the] cavity)." *Id.* at 13:18-23. In another embodiment, the '734 patent discloses a non-constant porous body in which porosity varies from 45% to 65% within the porous structure. *Id.* at 3:11-13; Ex. 1002 at ¶ 25.

The doctrine of prosecution history disclaimer further supports Petitioner's construction. This doctrine "preclud[es] patentees from recapturing through claim interpretation specific meanings disclaimed during prosecution." *Omega Eng'g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1323 (Fed. Cir. 2003). The Board has considered and applied prosecution history disclaimer in construing claim terms.

See, e.g., Ford Motor Co. et al. v. Vehicle Operation Techs., LLC, IPR2014-00594, Paper No. 26 at 13-19 (P.T.A.B. Oct. 15, 2014). During prosecution of the '734 patent, the Applicant advocated a construction similar to Petitioner's and clearly and unequivocally disclaimed a broader construction of the uniform porosity features in order to distinguish its claims over prior art.

In particular, the Applicant amended its claims to require the porous structure to be "uniform," and argued that the newly added limitations should have the same construction as Petitioner contends—constant porosity—to overcome *Otani*:

> Independent claim 1 recites a porous metal structure that is uniform. Independent claim 28 recites a porous body with a uniform porosity. Independent claim 34 recites a porous body with a uniform porosity. Independent claim 40 recites a bone fixation body with a uniform porous metal. . . . Independent claims 45 and 47 recite a porous body with a uniform porous metal structure. **By contrast, Otani teaches** a dental implant with a porous coating that has a 'pore distribution such that the interior of the fiber material i.e. the core material side, is most dense and **the porosity gradually increases** toward the external surface' (col. 3, lines 35-38)."

Ex. 1004 at 38-39. The Examiner likewise noted in an interview summary that he agreed with Applicant's statements that the porous structure in *Otani* was not

"uniform' because the porosity changes. *Id.* at 51. In prosecuting the original patent the Applicant similarly distinguished references applied by the Examiner as not teaching a completely **uniform** porous structure because they disclose different pore sizes. *See* Ex. 1003 at 112, 115-121 (emphasis added).

To gain allowance of its claims, the Applicant had no choice but to clearly and unequivocally disclaim a construction of a "uniform" porous structure broad enough to encompass a structure that is no more than "entirely porous." The Board had already previously found that "[t]here is no question that the porous layer 8 [of *Otani*] is entirely porous throughout . . . ." Ex. 1003 at 36. And in response to Applicant's contentions that *Otani's* porous layer is not a body or structure, but simply a coating, the Board also found that *Otani's* porous layer is a "body," as claimed. *See id.* at 37 ("Otani's porous layer is a 'body'"). Thus, the Applicant clearly and unmistakably distinguished *Otani's* changing porosity within the porous body from the claimed "uniform" porous body of the claims. *See Sentry Protection Products, Inc. v. Eagle Mfg Co.,*400 F.3d 910, 915 (Fed. Cir. 2005) (affirming the district court's finding that prosecution history modified the scope of the claim term "impact protection components" when Applicant "expressly disclaimed the use of multiple components to overcome a rejection"); *see also Fenner Invs., LTD. v. Cellco P'ship*, 778 F.3d 1320, 1325 (Fed. Cir. 2015) ("[T]he interested public has the right to rely on the inventor's statements made during

prosecution, without attempting to decipher whether the examiner relied on them, or how much weight they were given.").

Nonetheless, in litigation, Patent Owner has reversed course and contends that the uniform porosity features should be construed as "a metal structure that is porous throughout."[4] Ex. 1005 at 1. Patent Owner's construction should be dismissed at least because it directly contradicts its statements to the Office during prosecution—including the very statements that led to the allowance of the '734 patent claims. *See Biogen Idec. , Inc. v. GlaxoSmithKline LLC*, 713 F.3d 1090, 1095 (Fed. Cir. 2013) ("when the patentee unequivocally and unambiguously disavows a certain meaning to obtain a patent, the doctrine of prosecution history disclaimer narrows the meaning of the claim consistent with the scope of the claim surrendered"). Patent Owner's construction is also incorrect because it is inconsistent with the '734 patent's new disclosure of a porous structure having a porosity that is "constant throughout". Ex. 1001 at 13:16-18; *see also* Ex. 1002 at

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[4] The Board previously determined that a "completely uniform porous structure" simply refers to a structure in which no part is non-porous. Though the construed phrase has similarities to the uniform porosity features of the '734 patent claims, the Board's finding was made in view of the different disclosure of the original patent and thus does not apply here. *See* Ex. 1003 at 39-40.

¶ 26. Thus, the broadest reasonable interpretation of the "uniform" porous features is "a porous body or structure having a constant porosity throughout the body or structure."

VII. THE EFFECTIVE PRIORITY DATE OF THE '734 PATENT CLAIMS

The Board may consider priority in these types of proceedings. *See, e.g., SAP Am., Inc. v. Pi-Net Int'l, Inc.*, IPR2014-00414, Paper No. 11 at 11-16 (P.T.A.B. Aug. 18, 2014). Under 35 U.S.C. § 120, a claim in a U.S. application is entitled to the benefit of the filing date of an earlier filed U.S. application if the subject matter of the claim is disclosed in the earlier filed application in accordance with the written description requirement. *See, e.g., id.*; *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1571 (Fed. Cir. 1997). To comply with the requirements of Section 112, first paragraph, the specification "must describe the invention sufficiently to convey to a person of skill in the art that the patentee had possession of the claimed invention at the time of the application, i.e., that the patentee invented what is claimed." *Lizardtech, Inc. v. Earth Resource Mapping, Inc.*, 424 F.3d 1336, 1345 (Fed Cir. 2005).

The '734 patent attempts to claim priority to several earlier filed applications, namely the '872 application, the '8,375 application, and the '343 application. *See* Ex. 1001 at 1:6-11; *see also supra* Section V.A. These earlier field applications, however, do not provide written support for at least the "uniform

porosity" features of the independent claims, as required by section 112. Accordingly, the earliest possible effective filing date of claims 1-3, 5-10, 12-15, and 17-27 is the August 10, 2012, the filing date of the '734 patent. In fact, the "uniform porosity" features were first introduced in the'734 patent application. *Compare* Ex. 1004 at 122, ll. 7-8 *with* Ex. 1003 at 160-174. The '734 patent explicitly states that "the porosity of the porous structure can be constant throughout the porous structure." Ex. 1001 at 13:16-18. By contrast, the earlier-filed applications describe a bone fixation body that is "completely porous," but with varying pore diameter and porosity throughout. *See e.g.*, Ex. 1003 at 165 ("Preferably, the average pore diameter of body 16 is about 40μm to about 800μm with a porosity from about 45% to 65%."). The earlier applications do not describe or show a bone fixation body with the "uniform porosity" features. *See generally* Ex. 1003 at 160-174, Ex. 1011 at 94-107, Ex. 1012 at 238-252*; see also* Ex. 1002 at ¶ 27.

Indeed, the Board has confirmed that the earlier-filed applications lack written description support. During prosecution of the original patent, in response to Applicant's argument that the bone fixation body has a constant porosity, the Board found that "[t]here is nothing in [the original patent application] description that would convey to one of ordinary skill in the art that the porosity and pore size are the same through the entire body. In fact, the use of the term 'average' implies

that the pores in the body vary in size." Ex. 1003 at 39. All of the earlier-filed applications have the same disclosure as the original patent application. *Compare* Ex. 1003 at 160-174 *with generally* Ex. 1011 at 94-107, Ex. 1012 at 238-52. Thus, the challenged claims are not entitled to any priority date earlier than the filing date of the '734 patent, i.e., August 10, 2012.[5]

VIII. DETAILED EXPLANATION OF UNPATENTABILITY

Claims 1-3, 5-10, 12-15, and 17-27 are unpatentable under 35 U.S.C. § 103(a) over *Otani* in view of *Kaplan* and/or *Wagner* under both Petitioner's and Patent Owner's constructions. Ex. 1002 at ¶ 28. Moreover, because *Otani* issued on September 17, 1991, *Kaplan* issued on February 1, 1994, and *Wagner* issued on August 1, 2000, all are prior art under 35 U.S.C § 102(b) under any priority date (whether August 10, 2012, or February 27, 2003).

A. Consideration of the *Otani* Grounds Is Proper

As discussed above, *Otani* was previously considered by the Office during prosecution of the '734 patent and the original patent. However, because the Office did not have before it "substantially the same . . . arguments," an *inter partes* review in light of *Otani* is proper. *See Chimei Innolux Corp. v.*

[5] Petitioner does not concede that the '734 patent specification and claims comply with 35 U.S.C. § 112. Such issues cannot be raised in this proceeding. Petitioner reserves the right to argue them before a district court or in another forum.

Semiconductor Energy Lab. Co., LTD., IPR2013-00038, Paper No. 9 at 6 (P.T.A.B. Mar. 21, 2013). Specifically, *Otani's* current application to the claims presents a new question in view of Applicant's claim construction assertions during litigation which flatly contradict its statements to the Office to gain allowance over *Otani*. *See* Ex. 1005; Ex. 1004 at 38-39. 41. In addition, Petitioner presents new grounds, alleging *Otani* in combination with *Kaplan* and/or *Wagner*—neither of which were before the Office—and new arguments, including expert testimony and litigation documents, that address arguments Patent Owner made during prosecution. *See Chimei*, IPR2013-00038, Paper No. 9 at 6 (finding *inter partes* review proper over art considered during prosecution because new arguments that were not before the Examiner such as an expert report and other litigation documents were introduced).

B. The "Uniform Porosity" Features Are Obvious

As discussed above, the Patent Owner argued during prosecution that *Otani* does not disclose the uniform porosity features because it does not disclose constant porosity. Ex. 1004 at 38-39. In litigation, however, the Patent Owner has reversed course and argues for a broader construction of the uniform porosity features. Ex. 1005 at 1. Regardless, as discussed below, *Otani* in combination with *Kaplan* and/or *Wagner* teaches or suggests each and every feature of claims, including the uniform porosity features, under either construction.

Specifically, *Otani* discloses a dental implant. *See, e.g.*, Ex. 1008 at Title ("Dental Implant"), *id.* at 1:1 ("[t]he present invention relates to a dental implant."); *see also* Ex. 1002 at ¶ 29. The dental implant is "intended to supplement [] a missing tooth and to provide the same mastication function as a natural tooth." *Id.* at 1:9-12. As *Otani* explains, the implant comprises a core material and a porous layer formed on the core material. *See id.* at 2:50-53. The core material of *Otani* includes a neck portion 14 having a distal end surface with a base portion 13 extending outwardly therefrom, and is formed of a solid metal such as "platinum, titanium, tantalum, or tungsten." *See e.g., id.* at 2:57-58, 6:23-27, Figs. 10, 11; *see also* Ex. 1004 at 116.

Otani teaches that the porous layer can be made of a ceramic such as alumina or carbon materials to form a structure that is completely porous. *See* Ex. 1008 at 3:2-5; *see also id.* at 6:48-52 (describing the porous layer as being completely porous). *Otani* also teaches that it was known to have a porous structure formed of metal. *See id.* at 1:44-47 (disclosing "bonding of the core material and the porous layer . . .where both materials are made of metal . . . ."); *see also* Ex. 1002 at ¶ 30. The purpose of the porous layer, according to *Otani*, is to allow for "vital tissue [to] penetrate into pores of the porous layer, and [] firmly bond[] tissue" so that the "tissue can undergo calcification to form a bone tissue."

See id. at 2:66–3:2. *See also id.* at 7:14-19. *Otani* teaches that "[t]he porous layer is not particularly restrictive . . . ." *Id.* at 2:63-3:2.

Kaplan also discloses a porous metal structure for use in dental implants. *See, e.g.*, Ex. 1013 at Abstract, 1:24-39, 2:43-59, 3:5-8, 3:58-65; *see also* Ex. 1002 at ¶ 31. In particular, *Kaplan* teaches that "[t]he present invention may [] be used for tooth replacement because of the ability to induce tissue and bone growth." *Id.* at 3:58-59. *Kaplan* discusses the advantages of using metal over ceramic for the porous structure. It explains that "although certain porous ceramic materials do offer full porosity . . . they have properties inferior to metals." *Id.* at 6:15-18. For example, ceramics are "brittle and often fracture readily under loading." *See id.* at 2:48-51. "Metals, on the other hand, combine high strength and good ductility, making them attractive candidate material for implants (and effectively the most suitable for load-bearing applications)." *Id.* at 2:53-56; *see also id.* at 9:1-23.

In the context of dental implants, *Kaplan* further discloses that "[t]he open cell metal structure of the present invention offers highly interconnected, three-dimensional porosity that is ***uniform*** and consistent, a structure exceptionally similar to that of natural cancellous bone." *Id.* at 6:1-4 (emphasis added). The advantages of this structure include that it offers a "high [*sic*] interconnected, ***uniform***, three-dimensional porosity with high void fraction; structure similar to

natural cancellous bone, with resultant osteoconductivity." *Id.* at 9:6-9 (emphasis added); s*ee also* Ex. 1002 at ¶ 32.

It would have been obvious to one of ordinary skill in the art to incorporate the open cell metal structure of *Kaplan* in the dental implant of *Otani*. Ex. 1002 at ¶ 33. As *Otani* explains, the porous layer is not restrictive so long as tissue is able to penetrate the pores, undergo calcification, and ultimately form bone tissue. *See* Ex. 1008 at 2:63-3:2. *Kaplan* teaches that a porous metal structure formed of tantalum having uniform porosity provides a structure similar to natural cancellous bone that promotes bone ingrowth. Ex. 1013 at 6:1-6. Given *Kaplan's* teachings of the advantages of metals over ceramics, a person of ordinary skill in the art would have been motivated to use *Kaplan's* open cell metal structure for the porous layer of *Otani's* dental implant to form a high strength dental implant with a structure similar to natural cancellous bone. Ex. 1002 at ¶ 33. One of skill at the time of the alleged invention would have appreciated that modifying the dental implant of *Otani* in such a way would allow for a lightweight, low density implant that distributes the load applied to the implant throughout the structure and into both the new and existing bone to encourage bone growth and facilitate osseointegration. *See* Ex. 1002 at ¶ 33; *see* Ex. 1013 at 9:1-23. Indeed, doing so amounts to nothing more than a simple substitution of a known element and technique for another to improve a similar device that yields nothing more than

predictable results. *See also KSR Int'l. Co. v. Teleflex, Inc.*, 550 U.S. 398, 417 (2007); Ex. 1002 at ¶ 33.

The combination of *Otani* and *Kaplan* disclose the uniform porosity features under both Petitioner's and Patent Owner's construction. Specifically, *Otani* teaches that its porous layer is a completely porous body or structure, satisfying Patent Owner's broad construction of the uniform porosity features. *See* Ex. 1008 at 3:35-37; *see also id.* at 6:48-52; Ex. 1002 at ¶ 34. During prosecution, the Board agreed, concluding that *Otani's* porous layer, even if it is "formed on the base portion 13 does not preclude it being considered a 'body' [or a structure] by itself within the context of Appellant's specification . . . ." Ex. 1003 at 37. The Board also found that "[t]here is no question that the porous layer 8 is entirely porous throughout . . . ." *Id.* at 36. Likewise, *Kaplan* discloses that its open cell metal structure is a completely porous structure. *See, e.g.*, Ex. 1013 at Abstract, 3:33-42, Fig. 1. Thus, *Otani and Kaplan* both teach using porous metal structures that are porous throughout, satisfying the Patent Owner's construction. Ex. 1002 at ¶ 34. *Kaplan* further teaches that the porosity can be constant or uniform, thus satisfying Petitioner's construction. *See* Ex. 1013 at 6:1-4, 9:1-23; Ex. 1002 at ¶ 34.

For these reasons and those discussed below, *Otani* in combination with *Kaplan* and/or *Wagner* renders obvious the challenged claims. Ex. 1002 at ¶ 28.

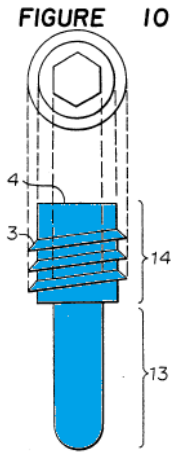
C. Ground 1: Claims 1, 2, 5-10, 13-15, 17-23, and 25-27 Are Obvious Over *Otani* in View of *Kaplan*

1. Claim 1

i. "A dental implant, comprising:"

Otani discloses a dental implant. *See e.g.*, Ex. 1008 at Title ("Dental Implant"), *id.* at 1:1 ("[t]he present invention relates to a dental implant."); *see also* Ex. 1002 at ¶ 36, *infra* Sections VIII.C.1.[1.2]-[1.5].

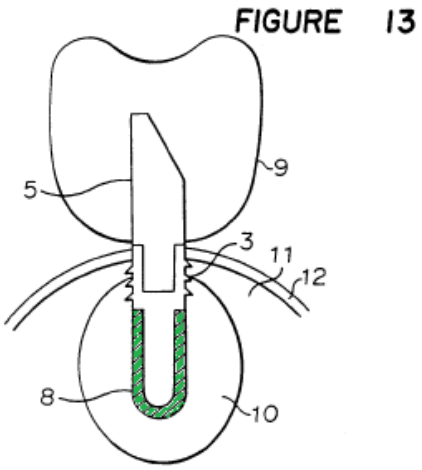
ii. "a coronal body having a proximal end with a connection shaped as a polygon to receive a dental component, having a distal end surface with an elongated protrusion that extends outwardly therefrom, and being formed of solid metal; and"



The dental implant of *Otani* comprises a core material. See Ex. 1008 at 2:50-54; *see also* Ex. 1002 at ¶ 37. The core material of *Otani* includes a neck portion 14 having a distal end surface with a base portion 13 extending outwardly therefrom, shown in blue. *See* Ex. 1008 at 6:23-27, Figs. 10 and 11. As shown in Fig. 10, neck portion 14 includes a hexagonal hole for receiving and fixing a dental

component such as, for example, a crown base. *See id*. at 6:29-32, Fig. 10. *Otani* discloses that the core material can be formed of a solid metal such as "platinum, titanium, tantalum, or tungsten." *See id.* at 2:57-58. *See also* Ex. 1004 at 116 (agreeing that *Otani* discloses that the core material is non-porous).

iii. "an elongated cylindrical porous body formed as a porous metal structure that is uniform and that includes a proximal end that engages the distal end surface of the coronal body at an interface,"



The dental implant of *Otani* includes a porous layer positioned on the surface of the core material, shown in green above. *See, e.g.*, Ex. 1008 at 2:50-53. *Otani* teaches that the porous layer has an elongated cylindrical shape. *See id.* at Fig. 13; *see also* Ex. 1002 at ¶ 38. As shown in Figure 13 and discussed in further detail below, the proximal end of porous layer engages the distal end surface of the core material of *Otani* at an interface. *See id.* at Fig. 13; *see also, e.g., id.* at 3:39-43 (describing that at least a part of the core material has a non-circular shape and the remainder has a circular shape), *infra* Section VIII.C.1.iv.

Otani further teaches that the porous layer is a completely porous body or structure, satisfying Patent Owner's broad construction of the uniform porosity features. *See* Ex. 1008 at 3:35-37, 6:48-52; *see also* Ex. 1003 at 36-37, Ex. 1002 at ¶ 39. The porous layer of *Otani* forms an interconnected porous structure. *See* Ex. 1008 at 3:5-14. *Otani* teaches that in addition to being completely porous, the porous layer can be made of a ceramic such as alumina or carbon materials. *See id*. at 3:2-5; *see also id.* at 3:35-37, 6:48-52. *Otani* also teaches that it was known to have a porous layer formed of metal. *See id.* at 1:44-47 (disclosing "bonding of the core material and the porous layer . . .where both materials are made of metal . . . .").

Further, one of ordinary skill in the art in the 2003 timeframe would have understood that there were a finite number of identified biomaterials for creating a biocompatible porous structure capable of allowing for bone and tissue ingrowth. Ex. 1002 at ¶ 40. Specifically, one of skill would have understood that not all materials are appropriate for implantation in the human body. *Id*. An appropriate material would not only need to be nonreactive or minimally reactive to the body's defense mechanisms, but would also need to have biomechanical properties allowing the formation of pore sizes that facilitate bone ingrowth. *Id.* Among the materials that would be suitable, one of skill would have understood that only certain biomaterials, including some metals and ceramics for instance, were

commonly known and used for dental implants in the 2003 timeframe. *Id.* Thus, one of ordinary skill in the art would have known that a ceramic porous layer in *Otani* could have easily and even advantageously been substituted with a metal porous layer at the relevant timeframe, especially in view of Otani's teachings of using such a layer. *Id.*

Indeed, *Kaplan* discloses the advantages of using a porous metal structure in dental implants. *See* Ex. 1013 at Abstract, 1:24-39, 43-59, 3:5-8. *Kaplan* teaches that "although certain porous ceramic materials do offer full porosity . . . they have properties inferior to metals." *Id.* at 6:15-18. For example, ceramics are "brittle and often fracture readily under loading." *Id.* at 2:48-51. "Metals, on the other hand, combine high strength and good ductility, making them attractive candidate material for implants (and effectively the most suitable for load-bearing applications)." *Id.* at 2:53-56; *see also* Ex. 1002 at ¶ 41.

In view of the known benefits of a metal structure, a person of ordinary skill in the art would have been motivated to modify the dental implant of *Otani* in view of *Kaplan* to be formed of metal, like the open cell metal structure of *Kaplan*. *See supra* Section VIII.B; *see also* Ex. 1002 at ¶ 42. Given *Kaplan's* teachings and the knowledge of one of ordinary skill in the art at the relevant timeframe, such a modification of *Otani* would constitute no more than an obvious design choice—one of a "finite number of identified, predictable solutions"—to one skilled in the

art. Ex. 1002 at ¶ 42; *see also KSR,* 550 U.S. at 402-3 ("When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill in the art has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense."). In short, *Otani* and *Kaplan* teach using porous metal structures that are porous throughout, thus satisfying the Patent Owner's construction. Ex. 1002 at ¶ 42.

In addition, *Otani* and *Kaplan* teach the uniform porosity features under Petitioner's construction. Ex. 1002 at ¶ 43. *Kaplan* teaches that "[t]he open cell metal structure of the present invention offers highly interconnected, three-dimensional porosity that is ***uniform*** and consistent, a structure exceptionally similar to that of natural cancellous bone." Ex. 1013 at 6:1-4 (emphasis added). "[W]hen [*Kaplan's* open cell metal structure is] placed next to bone or tissue, [it] initially serves as a prosthesis and then functions as a scaffold for regeneration of normal tissues." *Id.* at 3:43-46.

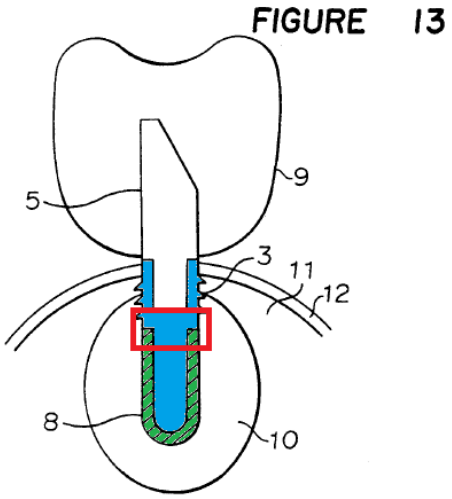
It would have been obvious to one of ordinary skill in the art to incorporate the uniform, open cell metal structure of *Kaplan* in the dental implant of *Otani*. *See supra* Section VIII.B; *see also* Ex. 1002 at ¶ 44. Modifying the implant of *Otani* to have the uniform, open cell metal structure of *Kaplan* would have been a

simple and common sense combination in light of *Kaplan*'s disclosure that its open cell metal structure provides a structure similar to natural cancellous bone that encourages bone growth on the surface of the implant to firmly secure the implant to the surrounding tissue—the importance of which is disclosed in *Otani*. Ex. 1002 at ¶ 44; *see* Ex. 1008 at 2:63-3:2. Moreover, one of skill in the art would have understood that creating a uniformly porous layer would have been easier to achieve than a layer in which the porosity varies on a gradient. *Id.* at ¶ 44. Accordingly, modifying the device of *Otani* to include the open metal structure of *Kaplan* would have amounted to nothing more than a simple substitution of one known element for another that yields nothing more than predictable results. *Id.*; *see KSR*, 550 U.S. at 417.

iv. "wherein the distal end surface of the coronal body has a circular shape, the proximal end of the porous body has a circular shape, and the solid metal of the circular shape of the coronal body interfaces with the porous metal structure of the circular shape of the porous body at the interface, and"

Otani teaches that the distal end surface of neck portion 14 has a circular shape. *See e.g.*, Ex. 1008 at Figs. 11 and 12; *see also id.* at 3:39-43 (describing that at least a part of the core material has a non-circular shape and the remainder has a circular shape). One of ordinary skill in the art would have further understood the distal end surface of neck portion 14 to have a circular shape in light of the threaded portion 3 of neck portion 14, which indicates that neck portion

14 is cylindrical in shape. Ex. 1002 at ¶ 45. The proximal end of the porous layer also has a circular shape because *Otani* teaches that the porous layer surrounds base portion 13, and that the shape of the dental implant is cylindrical. *See e.g.*, Ex. 1008 at 5:39-67, 6:37-41; *see also id.* at Fig. 13. Further, *Otani* teaches that the solid metal of the circular shape of the neck portion 14 interfaces with the porous metal structure of the circular shape of the porous layer 8 at the interface. *See e.g.* Ex. 1008 at Fig. 13 (annotated below); *see also* Ex. 1002 at ¶ 45.



v. "wherein the elongated protrusion of the coronal body includes a polygonal shape that extends into an opening of the porous body such that the porous metal structure completely surrounds and engages an exterior surface of the elongated protrusion that extends into the porous body."

As discussed above, *Otani* discloses that the core material includes a base portion 13 protruding from neck portion 14. *See supra* Section VIII.C.1.ii. *Otani* teaches that base portion 13 can have a "non-circular cross-sectional shape" so that

"the core material will not rotate." *See* Ex. 1008 at 3:40-43; *see also id.* at Figs. 1-7 (illustrating different embodiments of the non-circular cross-sectional shape of the core material of the dental implant). In one embodiment, *Otani* discloses that base portion 13 can have a hexagonal shape. *See id.* at Fig. 7; *see also* Ex. 1002 at ¶ 46.

Otani teaches that the porous layer is positioned on the surface of the core material. *See, e.g., id.* 2:51-53. As shown in Fig. 13, base portion 13 extends into an opening of the porous layer such that the porous metal structure of the porous layer completely surrounds and engages an exterior surface of base portion 13 that extends into the porous layer. *See id.* at Fig. 13; *see also* Ex. 1002 at ¶ 47.

2. Claim 2

i. "The dental implant of claim 1, wherein the elongated protrusion increases an engaging interface between the coronal body and the porous body since the coronal body engages the porous body at the exterior surface of the elongated protrusion that extends into the porous body and at the interface where the solid metal of the circular shape of the coronal body interfaces with the porous metal structure of the circular shape of the porous body."

Otani discloses that base portion 13 increases an engaging interface between the core material and the porous layer because the core material engages the porous layer at both an exterior surface of base portion 13 and at the interface where the

circular shape of neck portion 14 interfaces with the porous layer. *See e.g.*, Ex. 1008 at 2:51-53, 6:37-41, Fig. 13; *see also supra* fn.2, Ex. 1002 at ¶ 48.

3. Claim 5

i. "The dental implant of claim 1, wherein the circular shape of the coronal body at the interface and the circular shape of the porous body at the interface include one of a shape of a circle and a shape of an oval."

As discussed in connection with claim 1, *Otani* discloses that the circular shape of the core material and the circular shape of the porous layer at the interface between neck portion 14 and the porous layer includes a shape of a circle. *See supra* Section VIII.C.1.iv; *see also supra* fn.2, Ex. 1002 at ¶ 49.

4. Claim 6

i. "The dental implant of claim 1, wherein the porous body has one of a continuous taper shape in a side view and a straight cylindrical shape in the side view."

Otani discloses that the porous layer has as a straight cylindrical shape in the side view. *See e.g.*, Ex. 1008 at Fig. 13; *see also* Ex. 1002 at ¶ 50.

5. Claim 7

i. "The dental implant of claim 1, wherein the porous body is not a coating but is made separately from the coronal body and then attached to the coronal body at the interface."

Otani discloses that the core material can be formed of a solid metal such as "platinum, titanium, tantalum, or tungsten." *See* Ex. 1008 at 2:57-58. *Otani* in

view of *Kaplan* teaches a porous layer formed as a uniform, open cell metal structure. *See supra* Section VIII.C.1.iii. In one embodiment, *Otani* explains that a porous layer may be "formed on the surface of the core material." *See e.g.*, Ex. 1008 at 2:51-53. However, *Otani* also teaches that where both the porous layer and the core material are made of metal, they could be separately formed and attached via welding. *Id.* at 1:44-47; *see also* Ex. 1002 at ¶ 51.

One of ordinary skill in the art would have understood that in some circumstances, it would have been preferable to separately form and attach the porous layer to the core where both components are made of metal. Ex. 1002 at ¶ 52. Knowing that there were a finite number of known and commonly used solutions for creating a porous metal structure around a metal core, it would have been obvious to one of skill at the relevant timeframe to fabricate the components separately and attach them together by a number of known techniques including soldering, brazing, or welding—especially in light of the teaching of *Otani*. *Id*. Indeed, doing so amounts to nothing more than a simple substitution of a known element and technique for another to improve a similar device that yields nothing more than predictable results. *See KSR*, 550 U.S. at 417; Ex. 1002 at ¶ 52.

6. Claim 8

i. "A dental implant, comprising:"

As discussed above in connection with claim 1, *Otani* discloses a dental implant. *See supra* Section VIII.C.1.i. *See also* Ex. 1002 at ¶ 53, *infra* Sections VIII.C.6.ii-v.

ii. "a coronal body formed of solid metal and including a proximal end with a connection shaped to connect with a dental component and a distal end surface with an elongated protrusion that extends outwardly from the distal end surface; and"

As discussed above in connection with claim 1, the implant of *Otani* comprises a core material formed of solid metal having a neck portion 14 including a proximal end with a connection shaped to connect to a dental component (e.g., a crown base) and a distal end surface with a base portion 13 extending outwardly therefrom. *See supra* Section VIII.C.1.ii; *see also* Ex. 1002 at ¶ 54.

iii. "an elongated cylindrical porous body having a proximal end engaged with the distal end surface of the coronal body at an interface and having an interconnected porous structure;"

As discussed above in connection with claim 1, the dental implant of *Otani* includes an elongated cylindrical porous layer having a proximal end that engages with the distal end surface of neck portion 14 at an interface. *See supra* Section VIII.C.1.iii; *see also* Ex. 1002 at ¶ 55. *Otani* teaches that the porous layer can form an interconnected porous structure. *See* Ex. 1008 at 3:5-14.

iv. "wherein the interconnected porous structure includes metal, the distal end surface of the coronal body has a circular shape, the proximal end of the

porous body has a circular shape, and at the interface the circular shape of the coronal body includes the solid metal that interfaces with the circular shape of the porous body that includes the interconnected porous structure, and"

As discussed above in connection with claim 1, *Otani* discloses that the distal end surface of neck portion 14 has a circular shape, the proximal end of the porous layer has a circular shape, and that the solid metal of the circular shape of the core material interfaces with the circular shape of the porous layer. *See supra* Section VIII.C.1.iv. As further discussed above in connection with claim 1, *Otani* in view of *Kaplan* discloses an interconnected porous structure formed of metal. *See supra* Section VIII.C.1.iii. In light of the knowledge of one of ordinary skill in the art and the teachings of *Otani* and *Kaplan*, it would have been obvious to one of ordinary skill in the art to use *Kaplan's* open cell metal structure for the porous layer of *Otani's* dental implant to form a high strength dental implant with a structure similar to natural cancellous bone. *See supra* Sections VIII.B and VIII.C.1.iii; *see also* Ex. 1002 at ¶ 56.

v. "wherein the porous body is made separately from the coronal body to have a uniform porosity and subsequently attached to the coronal body at the interface such that the elongated protrusion of the coronal body extends into an opening at the proximal end of the porous body such that the interconnected porous structure surrounds and engages the elongated protrusion that extends into the opening of the porous body."

Otani discloses that the core material can be formed of a solid metal such as "platinum, titanium, tantalum, or tungsten." *See* Ex. 1008 at 2:57-58. As discussed in connection above, *Otani* in view of *Kaplan* discloses an interconnected porous structure formed of metal. *See supra* Section VIII.C.6.iv. In one embodiment, *Otani* explains that a porous layer may be "formed on the surface of the core material." Ex. 1008 at 2:51-53. However, *Otani* also teaches that where both the porous layer and the core are made of metal, they could be separately formed and attached via welding. *Id.* at 1:44-47. In light of the knowledge of one of ordinary skill in the art and the teachings of *Otani*, it would have been obvious to one of skill in the art to fabricate the metal components separately and subsequently attach them together by a number of known techniques including soldering, brazing, or welding, such that the interconnected porous structure surrounds and engages base portion 13 which extends into the opening formed in the porous layer. *See supra* Section VIII.C.5; *see also* Ex. 1002 at ¶ 57.

As discussed in connection with claim 1, *Otani* and *Kaplan* teach that the porous layer is a completely porous body or structure, satisfying Patent Owner's broad construction of the uniform porosity features. *See supra* Sections VIII.B and VIII.C.1.iii. In addition, *Otani* and *Kaplan* teach the uniform porosity features under Petitioner's construction. *See id.* In light of the knowledge of one of

ordinary skill in the art and the teachings of *Otani* and *Kaplan*, it would have been obvious to one of ordinary skill in the art to use *Kaplan's* uniform, open cell metal structure for the porous layer of *Otani's* dental implant to provide a high strength structure similar to natural cancellous bone that encourages bone growth on the surface of the implant to firmly secure the implant to the surrounding tissue—the importance of which is disclosed in *Otani*. *See supra* Sections VIII.B and VIII.C.1.iii, Ex. 1008 at 2:63-3:2; *see also* Ex. 1002 at ¶ 58.

7. Claim 9

i. "The dental implant of claim 8, wherein the porous body has a size and shape that emulate a size and shape of natural human bone."

Otani discloses that the porous layer has a size and shape that emulate a size and shape of natural human bone. *See e.g.*, Ex. 1008 at 7:14-19 ("since [the disclosed implant] has a porous layer, the vital tissue penetrates into pores . . . the penetrated connective tissue [is] calcified and converted to a bone tissue, [so that the] . . . dental implant firmly bond[s] and fixe[s] to the living body"); *see also* Ex. 1002 at ¶ 59.

8. Claim 10

i. "The dental implant of claim 8, wherein the circular shape of the coronal body at the interface and the circular shape of the porous body at the interface include one of a shape of a circle and a shape of an oval."

As discussed above with claim 5, *Otani* discloses that the circular shape of the core material and the circular shape of the porous layer at the interface between neck portion 14 and the porous layer include a shape of a circle. *See supra* Section VIII.C.3; *see also supra* fn.2, Ex. 1002 at ¶ 60.

9. Claim 13

i. "The dental implant of claim 8, wherein the elongated protrusion is shaped as one of a square, a rectangle, a hexagon, and an octagon."

Otani discloses an embodiment in which base portion 13 is shaped as a hexagon. *See e.g.* Ex. 1008 at Fig. 7; *see also* Ex. 1002 at ¶ 61.

10. Claim 14

i. "A dental implant, comprising:"

As discussed above in connection with claim 1, *Otani* discloses a dental implant. *See supra* Section VIII.C.1.i; *see also* Ex. 1002 at ¶ 62, *infra* Section VIII.C.10.ii-vi.

ii. "a cylindrical coronal body formed of solid metal, including a proximal end with an abutment-engaging end, and including a distal end surface with an elongated protrusion that extends outwardly therefrom; and"

As discussed above in connection with claim 1, the implant of *Otani* comprises a core material formed of solid metal having a neck portion 14 including an abutment-engaging end and a distal end surface with a base portion 13

extending outwardly therefrom. *See supra* Section VIII.C.1.ii; *see also* Ex. 1002 at ¶ 63.

iii. "an elongated cylindrical porous body having a uniform porosity and having a proximal end engaged with the distal end surface of the coronal body at an interface and having an interconnected porous structure that includes metal,"

As discussed above in connection with claim 1, the dental implant of *Otani* includes an elongated cylindrical porous layer having a proximal end that engages with the distal end surface of neck portion 14 at an interface. *See supra* Section VIII.C.1.iii. As also discussed in connection with claim 1, *Otani* and *Kaplan* teach that the porous layer is a completely porous body or structure, satisfying Patent Owner's broad construction of the uniform porosity features. *See supra* Sections VIII.B and VIII.C.1.iii; *see also* Ex. 1002 at ¶ 64.

As further discussed in connection with claim 1, *Otani* in view of *Kaplan* discloses an interconnected porous structure formed of metal. *See supra* Section VIII.C.1.iii. In light of the knowledge of one of ordinary skill in the art and the teachings of *Otani* and *Kaplan*, it would have been obvious to one of ordinary skill in the art to use *Kaplan's* open cell metal structure for the porous layer of *Otani's* dental implant to form a high strength dental implant with a structure similar to natural cancellous bone. *See supra* Sections VIII.B and VIII.C.1.iii; *see also* Ex. 1002 at ¶ 65.

In addition, *Otani* and *Kaplan* teach the uniform porosity features under Petitioner's construction. *See supra* Sections VIII.B and VIII.C.1.iii. In light of the knowledge of one of ordinary skill in the art and the teachings of *Otani* and *Kaplan*, it would have been obvious to one of ordinary skill in the art to use *Kaplan's* uniform, open cell metal structure for the porous layer of *Otani's* dental implant to provide a high strength structure similar to natural cancellous bone that encourages bone growth on the surface of the implant to firmly secure the implant to the surrounding tissue—the importance of which is disclosed in *Otani*. *See supra* Sections VIII.B and VIII.C.1.iii, *see* Ex. 1008 at 2:63-3:2; *see also* Ex. 1002 at ¶ 66.

iv. "wherein the distal end surface of the coronal body at the interface has a circular shape that is the solid metal, the proximal end of the porous body at the interface has a circular shape that is the interconnected porous structure, and the circular shape of the coronal body engages with the circular shape of the porous body at the interface,"

As discussed above in connection with claim 1, *Otani* teaches that the distal end surface of neck portion 14 has a circular shape, the proximal end of the porous layer has a circular shape, and that the solid metal of the circular shape of the neck portion 14 interfaces with the circular shape of the porous layer at the interface. *See supra* Section VIII.C.1.iv*; see also* Ex. 1002 at ¶ 67.

v. "wherein the elongated protrusion of the coronal body includes an elongated polygon that extends into

> **an opening of the porous body such that the interconnected porous structure surrounds and engages an exterior surface of the elongated polygon that extends into the porous body, and"**

As discussed above in connection with claim 1, base portion 13, which can have a polygonal shape, extends into an opening of the porous layer such that the interconnected porous metal structure of the porous layer completely surrounds and engages an exterior surface of base portion 13 that extends into the porous layer. *See supra* Section VIII.C.1.v; *see also* Ex. 1002 at ¶ 68.

> **vi. "wherein the elongated protrusion increases an interface between the coronal body and the porous body since the coronal body engages the porous body at the exterior surface of the elongated polygon that extends into the porous body and at the interface where the solid metal of the circular shape of the coronal body interfaces with the interconnected porous structure of the circular shape of the porous body."**

As discussed above in connection with claim 2, base portion 13 increases an interface between the core material and the porous layer because the core material engages the porous layer at (1) an exterior surface of base portion 13 that extends into the porous layer, and (2) an interface where the distal end surface of neck portion 14 interfaces with the proximal end of the porous layer. *See supra* Section VIII.C.2; *see also* Ex. 1002 at ¶ 69.

11. Claim 15

i. "The dental implant of claim 14, wherein the porous body has a porous structure that emulates a porous structure of natural human bone."

Otani discloses that the porous layer has a structure that emulates a porous structure of natural human bone. Ex. 1008 at 2:63-3:2 (disclosing that the "steric structure" of the porous layer allows for growth of bone tissue); *see also* Ex. 1002 at ¶ 70.

12. Claim 17

i. "The dental implant of claim 14, wherein the porous body has one of a shape of a continuous taper in a side view and a straight cylinder in the side view."

As discussed above in connection with claim 6, *Otani* discloses that the porous layer can have a straight cylindrical shape in a side view. *See supra* Section VIII.C.4; *see also* Ex. 1002 at ¶ 71.

13. Claim 18

i. "The dental implant of claim 14, wherein the elongated polygon of the elongated protrusion is shaped as one of a square, a rectangle, a hexagon, and an octagon."

As discussed above in connection with claim 13, *Otani* discloses an embodiment in which base portion 13 is shaped as a hexagon. *See supra* Section VIII.C.9; *see also* Ex. 1002 at ¶ 72.

14. Claim 19

i. "The dental implant of claim 14, wherein the porous body is made separately from the coronal body and

then attached to the coronal body at the interface and at the exterior surface of the elongated polygon."

Otani teaches that the core material can be formed of a solid metal such as "platinum, titanium, tantalum, or tungsten." *See* Ex. 1008 at 2:57-58. As discussed above in connection with claim 14, *Otani* in view of *Kaplan* teaches a porous layer formed as a uniform, open cell metal structure. *See supra* Section VIII.B.10.iii. As further discussed above in connection with claim 7, *Otani* discloses that where both the porous layer and the core material are made of metal, they could be separately formed and attached via welding. *See supra* Section VIII.C.5. In light of the knowledge of one of ordinary skill in the art and the teachings of *Otani*, it would have been obvious to one of skill to fabricate the metal components separately and attach them together by a number of known techniques including soldering, brazing, or welding at the interface and at the exterior surface of base portion 13. *See id.*; *see also* Ex. 1002 at ¶ 73.

15. Claim 20

i. "A dental implant, comprising:"

As discussed above in connection with claim 1, *Otani* discloses a dental implant. *See supra* Section VIII.C.1.i; *see also* Ex. 1002 at ¶ 74; *infra* Sections VIII.C.15.ii-vii.

ii. "a coronal body that includes a proximal end engageable with a dental component, includes an end surface with an elongated protrusion that extends

outwardly from the end surface, and is solid metal; and"

As discussed above in connection with claim 1, the implant of *Otani* comprises a core material formed of solid metal having a neck portion 14 engageable with a dental component (e.g., a crown base), and a distal end surface with a base portion 13 extending outwardly therefrom. *See supra* Section VIII.C.1.[1.2]; *see also* Ex. 1002 at ¶ 75.

iii. "an elongated cylindrical bone fixation body that includes a porous metal structure with a proximal end that engages the end surface of the coronal body at an interface,"

As discussed above in connection with claim 1, the dental implant of *Otani* includes an elongated cylindrical porous layer having a proximal end that engages with a distal end surface of neck portion 14 at an interface. *See supra* Section VIII.C.1.iii. As further discussed above in connection with claim 1, *Otani* in view of *Kaplan* discloses a porous structure formed of metal. *See id*. In light of the knowledge of one of ordinary skill in the art and the teachings of *Otani* and *Kaplan*, it would have been obvious to one of ordinary skill in the art to use *Kaplan's* open cell metal structure for the porous layer of *Otani's* dental implant to form a high strength dental implant with a structure similar to natural cancellous bone. *See supra* Sections VIII.B and VIII.C.1.iii; *see also* Ex. 1002 at ¶ 76.

iv. "wherein the end surface of the coronal body has a shape, the proximal end of the bone fixation body has

a shape, and the solid metal of the shape of the coronal body engages with the porous metal structure of the shape of the bone fixation body at the interface,"

As discussed above in connection with claim 1, *Otani* discloses the distal end surface of neck portion 14 having a shape that engages with the shape of a proximal end of the porous layer at the interface. *See supra* Section VIII.C.1.iv; *see also* Ex. 1002 at ¶ 77.

v. "wherein the elongated protrusion of the coronal body extends into an opening of the bone fixation body such that the porous metal structure surrounds and engages an exterior surface of the elongated protrusion that extends into the bone fixation body,"

As discussed above in connection with claim 1, base portion 13 extends into an opening of the porous layer such that the porous metal structure of the porous layer completely surrounds and engages an exterior surface of base portion 13. *See supra* Section VIII.C.1.v; *see also* Ex. 1002 at ¶ 78.

vi. "wherein the bone fixation body is made separately from the coronal body to have a uniform porous metal structure and then attached to the coronal body at the interface and at the exterior surface of the elongated protrusion, and"

Otani discloses that the core material can be formed of a solid metal such as "platinum, titanium, tantalum, or tungsten." *See* Ex. 1008 at 2:57-58. As discussed above, *Otani* in view of *Kaplan* discloses an interconnected porous structure formed of metal. *See supra* Section VIII.C.15.iii. In one embodiment,

Otani explains that a porous layer may be "formed on the surface of the core material." Ex. 1008 at 2:51-53. However, *Otani* also teaches that where both the porous layer and the core are made of metal, they could be separately formed and attached via welding. *Id.* at 1:44-47. In light of the knowledge of one of ordinary skill in the art and the teachings of *Otani*, it would have been obvious to one of skill to fabricate the metal components separately and subsequently attach them together by a number of known techniques including soldering, brazing, or welding, at the interface and the exterior surface of base portion 13. *See supra* Section VIII.C.5; *see also* Ex. 1002 at ¶ 79.

As discussed in connection with claim 1, *Otani* and *Kaplan* teach that the porous layer is a completely porous body or structure, satisfying Patent Owner's broad construction of the uniform porosity features. *See supra* Sections VIII.B and VIII.C.1.iii. In addition, *Otani* and *Kaplan* teach the uniform porosity features under Petitioner's construction. *See id.* In light of the knowledge of one of ordinary skill in the art and the teachings of *Otani* and *Kaplan*, it would have been obvious to one of ordinary skill in the art to use *Kaplan's* uniform, open cell metal structure for the porous layer of *Otani's* dental implant to provide a high strength structure similar to natural cancellous bone that encourages bone growth on the surface of the implant to firmly secure the implant to the surrounding tissue—the

importance of which is disclosed in *Otani*. *See supra* Sections VIII.B and VIII.C.1.iii, Ex. 1008 at 2:63-3:2; Ex. 1002 at ¶ 80.

vii. "wherein the porous metal structure of the bone fixation body emulates a porous structure of natural human bone."

As discussed above in connection with claim 15, the porous metal structure of the porous layer emulates a porous structure of natural human bone. *See supra* Section VIII.C.11; *see also* Ex .1002 at ¶ 81.

16. Claim 21

i. "The dental implant of claim 20, wherein the porous body has a structure that emulates a structure of natural human bone."

As discussed above in connection with claim 15, the porous metal structure of the porous layer emulates a porous structure of natural human bone. *See supra* Section VIII.C.11; *see also supra* fn.2, Ex .1002 at ¶ 82.

17. Claim 22

i. "The dental implant of claim 20, wherein the coronal body is fabricated independently from the bone fixation body and is subsequently fused to the bone fixation body."

Otani teaches that the core material can be formed of a solid metal such as "platinum, titanium, tantalum, or tungsten." *See* Ex. 1008 at 2:57-58. *Otani* in view of *Kaplan* teaches a porous layer formed as open cell metal structure. *See supra* Section VIII.C.15.iii. In one embodiment, *Otani* explains that a porous layer

may be "formed on the surface of the core material." Ex. 1008 at 2:51-53. As further discussed above in connection with claim 7, *Otani* also teaches that where both the porous layer and the core are made of metal, they could be separately formed and attached. *See supra* Section VIII.C.5. In particular, *Otani* teaches attaching the separately formed components by fusing the porous layer to the core material. *See* Ex. 1008 at 1:44-48 ("For the bonding of the core material and the porous layer in such an artificial tooth material, it has been proposed to employ welding in the case where both materials are made of metal . . . ."). In light of the knowledge of one of ordinary skill in the art and the teachings of *Otani*, it would have been obvious to one of skill to fabricate the metal components separately and attach them together by fusing the metal components together. *See supra* Section VIII.C.5; *see also* Ex. 1002 at ¶ 83.

18. Claim 23

i. "The dental implant of claim 20, wherein the elongated protrusion has a polygonal shape and increases an interface between the coronal body and the bone fixation body."

As discussed above in connection with claims 1 and 2, base portion 13 can have a polygon shape, and increases an interface between the core material and the porous layer. *See supra* Sections VIII.C.1.v and VIII.C.2; *see also* Ex. 1002 at ¶ 84.

19. Claim 25

i. "A method, comprising:"

Otani and *Kaplan* teach the claimed method. *See e.g.*, 1008 at 1:44-47, 2:63–3:14, 6:23-66; *see also* Ex. 1002 at ¶ 85, *infra* Section VIII.C.19.ii-v.

ii. "machining a coronal body of a dental implant that is formed of solid metal to include a proximal end with a connection shaped to receive a dental component and a distal end surface with an elongated protrusion that extends outwardly therefrom;"

Otani discloses machining a core material formed of "platinum, titanium, tantalum or tungsten," that includes a neck portion 14 with a hexagonal hole to receive a dental component and a base portion 13. *See e.g.*, Ex. 1008 at 2:57-58, 6:23-36, Figs. 11 and 13; *see also* Ex. 1002 at ¶ 86. As shown in Figs. 11 and 13, base portion 13 extends from a distal end surface of neck portion 14. *See* Ex. 1008 at Figs. 10 and 13.

iii. "fabricating, separately from the coronal body, a porous body of the dental implant having an elongated cylindrical shape with a uniform porous metal structure that extends throughout the porous body and with a central opening at a proximal end of the porous body; and"

Otani discloses fabricating a porous layer having an elongated cylindrical shape. *See* Ex. 1008 at 2:63–3:14, Fig. 13. As shown in Fig. 13, the porous layer has an opening at a proximal end of the structure. *See id* at Fig. 13. As discussed in connection with claim 1, *Otani* and *Kaplan* teach that the porous layer is a completely porous body or structure, satisfying Patent Owner's broad construction

of the uniform porosity features. *See supra* Sections VIII.B and VIII.C.1.iii; *see also* Ex. 1002 at ¶ 87.

As also discussed in connection with claim 1, *Otani* in view of *Kaplan* discloses a porous body with a uniform porous structure formed of metal. *See supra* Section VIII.C.1.iii. In light of the knowledge of one of ordinary skill in the art and the teachings of *Otani* and *Kaplan*, it would have been obvious to one of ordinary skill in the art to use *Kaplan's* open cell metal structure for the porous layer of *Otani's* dental implant to form a high strength dental implant with a structure similar to natural cancellous bone. *See supra* Sections VIII.B and VIII.C.1.iii; *see also* Ex. 1002 at ¶ 88.

In addition, *Otani* and *Kaplan* teach the uniform porosity features under Petitioner's construction. *See supra* Sections VIII.B and VIII.C.1.iii. In light of the knowledge of one of ordinary skill in the art and the teachings of *Otani* and *Kaplan*, it would have been obvious to one of ordinary skill in the art to use *Kaplan's* uniform, open cell metal structure for the porous layer of *Otani's* dental implant to provide a high strength structure similar to natural cancellous bone that encourages bone growth on the surface of the implant to firmly secure the implant to the surrounding tissue—the importance of which is disclosed in *Otani*. *See supra* Sections VIII.B and VIII.C.1.iii,Ex. 1008 at 2:63-3:2; *see also* Ex. 1002 at ¶ 89.

In one embodiment, *Otani* explains that a porous layer may be "formed on the surface of the core material." Ex. 1008 at 2:51-53. However, as discussed above in connection with claim 7, *Otani* also teaches that where both the porous layer and the core are made of metal, they could be separately formed and attached via welding. *See supra* Section VIII.C.5. In light of the knowledge of one of ordinary skill in the art and the teachings of *Otani*, it would have been obvious to one of skill to fabricate the metal components separately and attach them together by a number of known techniques including soldering, brazing, or welding. *See supra* Section VIII.C.5; *see also* Ex. 1002 at ¶ 90.

iv. "attaching, after the porous body is separately fabricated from the coronal body, the porous body to the coronal body to create the dental implant with an elongated cylindrical shape such that the elongated protrusion of the coronal body extends into the central opening of the porous body,"

Otani teaches fabricating the metallic core material and porous metal structure forming the porous layer separately, and then attaching the porous layer to the core material to create the dental implant, as discussed above in connection with claim 7. *See* Ex. 1008 at 1:44-47 (discussing welding metallic components of an implant together), *id*. at Fig. 13 (showing that the porous layer is attached to the core material at the interface and the exterior surface of base portion 13); *see supra* Sections VIII.C.5 and VIII.C.19.iii; *see also* Ex. 1002 at ¶ 91. As shown in Fig. 13, the dental implant has an elongated cylindrical shape when the porous layer is

positioned about base portion 13 with base portion 13 extending into the central opening of the porous layer. *See id.* at Fig. 13.

v. "wherein the distal end surface of the coronal body has a circular shape, the proximal end of the porous body has a circular shape, and the solid metal of the circular shape of the coronal body interfaces with the porous metal structure of the circular shape of the porous body when the elongated protrusion of the coronal body extends into the opening of the porous body."

As discussed above in connection with claim 1, *Otani* teaches that the distal end surface of neck portion 14 has a circular shape, the proximal end of the porous layer has a circular shape, and that the solid metal of the circular shape of the neck portion 14 interfaces with the circular shape of the porous layer 8 at the interface. *See supra* Section VIII.C.1.iv; *see also* Ex. 1002 at ¶ 92.

20. Claim 26

i. "The method of claim 25 further comprising: fusing the porous body to the coronal body after the porous body is separately fabricated from the coronal body."

Otani teaches that the core material can be formed of a solid metal such as "platinum, titanium, tantalum, or tungsten." *See* Ex. 1008 at 2:57-58. *Otani* in view of *Kaplan* teaches fabricating a porous layer formed as open cell metal structure. *See supra* Section VIII.C.19.iii. As discussed above in connection with claim 7, *Otani* discloses that where both the porous layer and the core material are made of metal, they could be separately formed and attached. *See supra* Section

VIII.C.5. In particular, *Otani* teaches attaching the separately formed components by fusing the porous layer to the core material. *See* Ex. 1008 at 1:44-47 ("For the bonding of the core material and the porous layer in such an artificial tooth material, it has been proposed to employ welding in the case where both materials are made of metal . . . ."). In light of the knowledge of one of ordinary skill in the art and the teachings of *Otani*, it would have been obvious to one of skill to fabricate the metal components separately and attach them together by fusing the metal components together. *See supra* Section VIII.C.5; *see also* Ex. 1002 at ¶ 93.

21. Claim 27

i. "A method, comprising:"

Otani and *Kaplan* teach the claimed method. *See supra* Section VIII.C.19.i; *see also* Ex. 1002 at ¶ 94, *infra* Sections VII.B.21.ii-v.

ii. "forming a coronal body of a dental implant from solid metal with a proximal end having a connection that engages a dental component and with a distal end surface having an elongated male protrusion that extends outwardly therefrom;"

As discussed in connection with claim 25, *Otani* discloses forming from a core material a neck portion 14 from solid metal with a proximal end having a connection that engages a dental component (e.g., crown base) and with a distal end surface having a base portion 13 that extends outwardly therefrom. *See supra* Section VIII.C.19.ii; *see also* Ex. 1002 at ¶ 95.

iii. "forming, separately from the coronal body, a porous body of the dental implant having a uniform porous metal structure and having a non-tapering cylindrical shape with a central opening at a proximal end; and"

As discussed in connection with claims 1 and 25, *Otani* discloses forming, separately from a core material, a porous body of a dental implant having a uniform porous metal structure. *See supra* Section VIII.C.19.iii. In light of the knowledge of one of ordinary skill in the art and the teachings of *Otani* and *Kaplan*, it would have been obvious to one of ordinary skill in the art to use *Kaplan's* open cell metal structure for the porous layer of *Otani's* dental implant to form a high strength dental implant with a structure similar to natural cancellous bone. *See supra* Sections VIII.B, VIII.C.1.iii, and VIII.C.19.iii; *see also* Ex. 1002 at ¶ 96. Further, it would have been obvious to one of skill to fabricate the metal components separately and attach them together by a number of known techniques including soldering, brazing, or welding. *See supra* Section VIII.C.5; *see also* Ex. 1002 at ¶ 96. *Otani* discloses that the porous layer has an elongated cylindrical shape. *See* Ex. 1008 at 2:63–3:14, Fig. 13. As shown in Fig. 13, the porous layer has an opening at a proximal end of the structure. *See id* at Fig. 13.

iv. "engaging, after the coronal body and the porous body are separately formed from each other, the porous body to the coronal body to form the dental implant with an elongated cylindrical shape such that the elongated male protrusion of the coronal body extends into the central opening of the porous body and forms a core for the porous body,"

As discussed in connection with claim 25, *Otani* discloses engaging the porous layer with the core material to form the dental implant with an elongated cylindrical shape such that base portion 13 extends into the central opening of the porous layer. *See supra* Section VIII.C.19.iv; *see also* Ex. 1002 at ¶ 97.

v. "wherein the elongated male protrusion of the coronal body has a cylindrical shape with a polygonal external surface that extends into the central opening of the porous body such that the porous metal structure surrounds and engages the polygonal external surface that extends into the porous body."

Otani teaches that base portion 13 can be generally rod shaped and have a non-circular external surface to limit rotation of the core material relative to the porous layer 8. *See e.g.*, Ex. 1008 at 2:53-54; 3:40-43. As shown in Fig. 13, the porous metal structure of the porous layer surrounds and engages base portion 13. *See id.* at Fig. 13; *see also* Ex. 1002 at ¶ 98. In one embodiment, *Otani* teaches that base portion 13 has a hexagonal shape. *See* Ex. 1008 at Fig. 7.

D. Ground 2: *Otani* in View of *Kaplan* and *Wagner* Renders Obvious Claims 3, 12, and 24

Claim 3 recites that "the coronal body includes an exterior surface that is microtextured and an exterior surface that is smooth," claim 12 recites that "an exterior surface of the coronal body includes a first region with a smooth outer surface and a second region with a microtextured surface that is contiguous and adjacent the first region," and claim 24 includes similar recitations and recites that

"the second region is non-porous and micro-textured." *See* Ex. 1001 at 14:12-15, 14:64-67, 16:20-23. The combination of *Otani*, *Kaplan*, and *Wagner* renders these claims obvious. As discussed above, *Otani* and *Kaplan* render obvious claims 1, 8, and 20, from which claims 3, 8, and 24 depend respectively. Further, *Wagner* discloses the features of claims 3, 8, and 24, and one of ordinary skill would have combined the teachings of *Wagner* with *Otani* and *Kaplan*. Ex. 1002 at ¶ 99.

Specifically, *Otani* discloses that core material can have a portion of the exterior surface that is microtextured. *See* Ex. 1008 at 3:58-62 ("[m]ore preferably, in addition to the non-circular cross section, a surface roughness with the maximum height (Rmax) of at least 10 μm is provided on the surface of the core material by e.g. blast treatment."). *Otani* does not explicitly disclose also having a portion of the exterior surface that is smooth and contiguous and adjacent to a microtextured portion. However, it would have been obvious to one of ordinary skill in the art to have a portion of the exterior surface of the core material that is smooth in view of the teachings of *Wagner*. Ex. 1002 at ¶ 100.

Wagner discloses a dental implant to be positioned in the jaw bone. *See* Ex. 1008 at Abstract. The disclosed implant has "a bone-engaging surface including a first surface region . . . [that] is sufficient porous to permit ingrowth of bone therein . . . a second surface region . . . [that] is non-porous . . .and is sufficiently rough . . .[and] a third surface region in which the bone-engaging surface is non-

porous . . . and is substantially smooth." *See* Ex. 1009 at 2:52-62. In the embodiment shown in Figs. 8 and 9, *Wagner* discloses that the implant can have a coronal end that includes a region 100 that is non-porous and smooth that is contiguous and adjacent to a region 102 that is non-porous and microtextured. *See Id.* at 7:15-20, Figs. 8 and 9. *See also* Ex. 1002 at ¶ 101.

It would have been obvious to a person of ordinary skill in the art to modify the teachings of *Otani* and *Kaplan*. Specifically, one of ordinary skill would have modified the core material of *Otani* to have a portion of the external surface that is non-porous and smooth. Ex. 1002 at ¶ 102. A person of ordinary skill in the art at the time of the invention would have been motivated to modify *Otani* in order to provide, among other things, "a coronal surface designed for optimum hygiene[]." *Id.*; *see also* Ex. 1009 at 2:41-42. Modifying the core material of *Otani* to include the smooth surface region as taught by *Wagner* would have amounted to nothing more than applying known techniques to a known method to yield predictable results. Ex. 1002 at ¶ 102; *see KSR*, 550 U.S. at 417.

IX. STATEMENT REGARDING OTHER PETITION

As noted, Petitioner is filing another petition concurrently with this petition. This petition presents grounds based on non-intervening prior art, i.e., *Otani*, *Kaplan*, and *Wagner*, even if the Board finds that the challenged claims are entitled to the earlier priority date. The other petition presents grounds based on

intervening prior art, i.e., U.S. Patent Application Publication No. 2001/0123951 to Lomicka (Ex. 1006) and/or U.S. Patent Application Publication No. 2002/0106611 to Bhaduri et al. (Ex. 1007).

The Board should institute review based on both petitions. Petitioner has attempted to streamline the petitions by raising only one primary reference in each petition. This achieves the goal of "just, speedy and inexpensive resolution" consistent with 37 C.F.R. § 42.1(b). In addition, the two petitions present independent, distinctive, and non-redundant grounds because the grounds are based on whether the claims are entitled to the earlier priority date and rely on different references.

X. CONCLUSION

For the reasons given above, Petitioner requests *inter partes* review and cancellation of claims 1-3, 5-10, 12-15, and 17-27 of the '734 patent.

Respectfully submitted,

Dated: April 16, 2015

By: /Naveen Modi/
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CERTIFICATE OF SERVICE

I hereby certify that on April 16, 2015, a copy of the foregoing **Petition for *Inter Partes* Review of U.S. Patent No. 8,684,734** was served by express mail on the Patent Owner at the following correspondence address of record for the patent-at-issue and at the following correspondence address for Patent Owner's litigation counsel:

Philip S. Lyren, PC
289 Woodland Avenue
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