

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CERAMTEC GMBH,
Petitioner,

v.

CERAMEDIC, LLC,
Patent Owner.

IPR2015-00424
Patent 6,066,584

Before GRACE KARAFFA OBERMANN, KRISTINA M. KALAN, and
JEFFREY W. ABRAHAM, *Administrative Patent Judges*.

KALAN, *Administrative Patent Judge*.

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

I. INTRODUCTION

Petitioner CeramTec GmbH filed a Petition (Paper 2, “Pet.”) to institute an *inter partes* review of claims 14 and 26–29 of U.S. Patent No. 6,066,584 (Ex. 1101, “the ’584 patent”) pursuant to 35 U.S.C. §§ 311–319. Patent Owner CeraMedic LLC filed a Preliminary Response (Paper 6, “Prelim. Resp.”). We instituted an *inter partes* review of claims 14 and 26–29 on one of the grounds of unpatentability alleged in the Petition (Paper 9, “Dec.”). After institution of trial, Patent Owner filed a Patent Owner Response (Paper 15, “PO Resp.”) and Petitioner filed a Reply (Paper 17, “Reply”). An oral hearing was held on March 4, 2016. A transcript of the hearing has been entered into the record. Paper 28 (“Tr.”).

The Board has jurisdiction under 35 U.S.C. § 6(c). In this Final Written Decision, issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73, we determine that Petitioner has shown by a preponderance of the evidence that all claims for which trial was instituted, namely, claims 14 and 26–29, are unpatentable.

A. *Related Matters*

The parties indicate that the ’584 patent is the subject of the following district court proceeding, among others: *CeraMedic, LLC v. CeramTec GmbH*, Civil Action No. 3:14-cv-01969 (N.D. Ind.). Pet. 1; Paper 4, 1. The ’584 patent also is the subject of an *inter partes* review in IPR2015-00398. Pet. 1–2; Paper 4, 1.

B. *The ’584 Patent*

The ’584 patent, titled “Sintered Al₂O₃ Material, Process for its Production and Use of the Material,” issued on May 23, 2000. The ’584 patent describes “sintered Al₂O₃ compositions produced from corundum

powder and also methods for the use of the invented compositions as medical implants or tool material.” Ex. 1101, Abstract. An initially unsintered precursor having a relative density of $p \geq 55\%$ is produced from $\alpha\text{-Al}_2\text{O}_3$ powder having defined properties using at least two different dispersing methods, and this precursor is subsequently subjected to heat treatment and sintering. *Id.* The sintered material is characterized in part “by means of a dimensionless defect density,” or “DDD,” defined as the sum of the squares of the defect sizes per area analyzed. *Id.* at 4:16–20.

C. *Illustrative Claims*

Claims 14 and 26 of the '584 patent are reproduced below:

14. The sintered material produced according to claim 7,¹ wherein said sintered material comprises a mean grain size of $2.0\ \mu\text{m}$ or less, a density of no less than 98.5% of a theoretical density, a Vickers hardness greater than or equal to 1,750 at a test load from 10 to 100 N, and a flexural strength of 800 MPa

¹ Claim 7 provides: “A method, comprising the steps of: a) dispersing $\alpha\text{-Al}_2\text{O}_3$ powder having a particle size of d_{16} greater than $0.065\ \mu\text{m}$, d_{50} not less than $0.2\ \mu\text{m}$ and not greater than $0.4\ \mu\text{m}$, d_{84} not less than $0.45\ \mu\text{m}$ and not greater than $0.8\ \mu\text{m}$, and a chemical purity of $\geq 99.9\%$ $\alpha\text{-Al}_2\text{O}_3$, in an aqueous solution to create a mixture, said mixture effected through the application of at least two different dispersing methods; b) treating said mixture so as to create a shaped unsintered body having a relative density of $p \geq 55\%$; c) heating said unsintered body; and d) sintering said unsintered body so as to create a sintered material. Ex. 1101, 15:39–52. We note that claim 14 is a product-by-process claim. *See In re Thorpe*, 777 F.2d 695, 697 (Fed. Cir. 1985) (internal citations omitted) (noting that “even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in a product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process”).

or greater, said sintered material having a dimensionless defect density of less than 30×10^{-3} .

Ex. 1101, 16:1–7.

26. Sintered Al_2O_3 material comprising a mean grain size of $2.0 \mu\text{m}$ or less, and a density of no less than 98.8% of a theoretical density, a Vickers hardness greater than or equal to 1,750 at a test load from 10 to 100 N, and a flexural strength of 800 MPa or greater, said sintered material having a dimensionless defect density of less than 30×10^{-3} .

Ex. 1101, 16:66–17:4. Claims 27–29 depend from claim 26. Each challenged claim requires a specific DDD, ranging from less than 30×10^{-3} (claims 14 and 26) to 0.6×10^{-3} (claim 29).

D. Prior Art Reference Relied Upon by Petitioner

Petitioner relies on the following prior art reference in the instituted challenge: Japanese Patent Application Publication No. JP 1990255563, published October 16, 1990 (“Igarashi”) (Ex. 1103).²

E. Instituted Grounds of Unpatentability

We instituted *inter partes* review on the following ground of unpatentability asserted in the Petition: Claims 14 and 26–29 under 35 U.S.C. § 103(a) as unpatentable over Igarashi.

II. ANALYSIS

A. Claim Construction

The Board interprets claim terms in an unexpired patent according to the broadest reasonable construction in light of the specification of the patent

² Exhibit 1103 is a certified translation of the original Japanese Patent Application Publication; Exhibit 1113 is the original untranslated version.

in which they appear. *See In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1278–79 (Fed. Cir. 2015), *aff’d sub nom. Cuozzo Speed Techs., LLC v. Lee*, No. 15–446, 2016 WL 3369425, at *12 (U.S. June 20, 2016) (upholding the use of the broadest reasonable interpretation standard); 37 C.F.R. § 42.100(b). Under that standard, and absent any special definitions, we give claim terms their ordinary and customary meaning, as would be understood by one of ordinary skill in the art at the time of the invention. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Any special definitions for claim terms must be set forth with reasonable clarity, deliberateness, and precision. *See In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). Only those terms which are in controversy need to be construed, and only to the extent necessary to resolve the controversy. *See Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

Petitioner argues that “dimensionless defect density” should be construed to mean “the sum of the squares of the defect sizes per area analysed.” Pet. 12. The Specification expressly defines “dimensionless defect density” as “the sum of the squares of the defect sizes per area analysed.” Ex. 1101, 4:19–20. Regarding defect size, the Specification expressly states: “Here, the defect size employed is the maximum recognizable extent of the defect in any direction in the analysed plane.” *Id.* at 4:22–24. Thus, we construed the term “dimensionless defect density” to mean “the sum of the squares of the defect sizes per area analysed, wherein each defect’s size is the maximum recognizable extent of that defect in any direction in the analysed plane.” Dec. 5.

Neither party specifically addresses or contests this claim construction. We see no reason to modify it in light of the record developed

at trial. Accordingly, we maintain our construction of the term “dimensionless defect density” to mean “the sum of the squares of the defect sizes per area analysed, wherein each defect’s size is the maximum recognizable extent of that defect in any direction in the analysed plane.”

All other terms are accorded their ordinary and customary meaning as would be understood by one of ordinary skill at the time of the invention.

B. Obviousness Argument

In resolving the question of the obviousness of the claims, we consider the following underlying factual determinations: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) secondary considerations of nonobviousness. *See Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966). Petitioner bears the burden of establishing obviousness of the challenged claims by a preponderance of the evidence. 35 U.S.C. § 316(e).

i. Igarashi (Ex. 1103)

Igarashi discloses an alumina sintered body for tools, specifically, ceramic materials for cutting tools, abrasion-proof tools, and corrosion-proof tools. Ex. 1103, 2. Igarashi claims an alumina sintered body “comprising substantially pure alumina with 99.7 % – 99.99 % (by weight) of alumina,” wherein “the alumina sintered body has particle size: 0.5 μm – 2 μm ; density: 3.95 g/cm³ or more; Vickers hardness (10 kg load): 1,850 kgf/mm² – 2,000 kgf/mm²; transverse intensity: 700 MPa or higher.” *Id.* Igarashi notes that it is “important to increase critical strength whereat a crack will not occur,” making it “necessary to thoroughly eliminate pores, minute cracks, abnormal particles and foreign matters that will be strength defects” and “bring density of the sintered body close to theoretical density.” *Id.* at 4.

ii. Arguments

Petitioner asserts that claims 14 and 26–29 are unpatentable under 35 U.S.C. § 103 in view of Igarashi. Pet. 21–29. Petitioner’s contentions are supported by two Declarations of David R. Clarke, Ph.D. Ex. 1112; Ex. 1115. In opposition to Petitioner’s contentions, Patent Owner relies on the Declaration of Edward Lilley, Ph.D. Ex. 2114.

Petitioner argues, first, that Igarashi contains all the limitations of claim 14, apart from DDD. Pet. 22. Regarding DDD, Petitioner argues that it “would have been obvious to a person of ordinary skill in the art based on the teachings of Igarashi to create a material having a DDD less than 30×10^{-3} and meeting all the other requirements of claim 14.” *Id.* According to Petitioner, “it would have been obvious to create a material meeting this limitation because doing so would have required nothing more than routine optimization of a recognized result-effective variable.” *Id.* (citing *In re Boesch*, 617 F.2d 272, 276 (CCPA 1980)); Tr. 7:11–25.

Dr. Clarke opines that it was “well within the capabilities of a person of ordinary skill in the art to create a material that had a DDD less than 30×10^{-3} and that met the other requirements of claim 14.” Pet. 23 (citing Ex. 1112 ¶¶ 55–63). Petitioner also relies on Dr. Clarke’s analysis of different prior art disclosures that “describe sintered Al_2O_3 materials having density and grain size values within the claimed ranges and that also show defect-free micrographs.” *Id.* at 24 (citing Ex. 1112 ¶¶ 56–60). Because “Igarashi discloses a sintered Al_2O_3 material that expressly meets the density, grain size, hardness, and strength limitations of claim 14,” and because “[a]t most, DDD was simply a new way of putting a number on a parameter—namely, defect structure—that had long been recognized as affecting strength,”

Petitioner argues that the claimed materials “are not new or non-obvious simply by virtue of having had their defects quantified in a particular way.” *Id.* at 25–26.

Patent Owner argues that the claimed materials are not taught, suggested, or disclosed by Igarashi. PO Resp. 6. Specifically, Patent Owner argues, sintered materials with both the claimed DDD and other mechanical properties recited by the challenged claims were not known in the prior art, which “did not identify or suggest using dimensionless defect density as a parameter for characterizing ceramics.” *Id.* at 6, 9. Patent Owner also argues that DDD is “inventively different” from “the number and size of defects” and that developing ceramics with the specified DDD and other claimed mechanical properties would be anything but obvious. *Id.* at 10, 14. Merely reducing the number and size of defects, argues Patent Owner, would not necessarily optimize the DDD, and numerous parameters and process steps can affect a material’s DDD. *Id.* at 17–18. Similarly, numerous parameters and process steps can affect flexural strength, Vickers hardness, and average grain size, according to Patent Owner. *Id.* at 22. Patent Owner maintains that the ’584 patent “in no way is saying or admitting that . . . everyone knew about this DDD and you should optimize the DDD as the petitioner suggests.” Tr. 56:13–15.

Petitioner reiterates that optimization to reduce defects, as taught by Igarashi, reduces DDD. Reply 2. According to Petitioner, Igarashi provides specific guidance for minimizing defects. *Id.* at 8. Responding to Patent Owner’s arguments, Petitioner argues again that the claimed materials were not inventive, and persons of ordinary skill in the art could avoid defects

without compromising strength, hardness, grain size, or density. *Id.* at 12, 16; Tr. 70:21–71:4.

We are persuaded by Petitioner’s arguments and evidence that the factors that Igarashi seeks to optimize would lead to a lower DDD. *In re Applied Materials, Inc.*, 692 F.3d 1289, 1297 (Fed. Cir. 2012). Petitioner notes that Igarashi teaches the “well-known principle that the number and size of defects in a material affect strength and that it is, therefore, desirable to eliminate microstructural defects in sintered materials,” and that even the ’584 patent acknowledges the relationship between defect structure and strength of brittle solids. Pet. 22. Specifically, Igarashi discloses that, to increase critical strength and prevent cracking, “it is necessary to thoroughly eliminate pores, minute cracks, abnormal particles and foreign matters that will be strength defects.” Ex. 1103, 4. The ’584 patent states that “the relationship between defect structure and strength of brittle solids has been well known for a long time.” Ex. 1101, 2:3–5. As discussed by Dr. Clarke: “Before the filing date of the ’584 Patent, persons of ordinary skill in the art recognized that flexural strength is dependent on the number and size of defects, such as pores and voids, which is the variable that DDD attempts to quantify.” Ex. 1112 ¶ 54; *see also* Ex. 1114, 40:21–25, 67:19. In the present case, attempts to minimize defects, such as pores or voids, is optimization of a result-effective variable. The quantification of such an effort to minimize defects, whether by DDD or otherwise, does not by itself render nonobvious materials with a particular DDD measurement.

The record shows that, although DDD may have been known as early as 1987 (Ex. 1101, 4:15–23; Tr. 66:19–67:15), “DDD itself was not (and is not) accepted in the field as a standard for evaluating ceramic materials.”

Pet. 16. Accordingly, the fact that Igarashi does not specifically identify DDD as a result-effective variable is not fatal to Petitioner's case. "A recognition in the prior art that a property is affected by the variable is sufficient to find the variable result-effective." *In re Applied Materials*, 692 F.3d at 1297. The evidence of record demonstrates that the factors Igarashi seeks to optimize, including fewer pores, smaller cracks, and strength defects generally, would lead to a lower DDD. Patent Owner's and Petitioner's experts confirm that reducing the number and size of defects reduces DDD. Ex. 1115 ¶¶ 7–8; Ex. 1114, 32:12–23, 36:18–21. Theoretically, "thoroughly eliminating" defects as discussed in Igarashi would cause total defect size and DDD to be zero. Ex. 1115 ¶ 8. We also note that the material created by Igarashi has higher strength and higher relative density than the claimed materials. Pet. 14–16, Reply 15; Ex. 2116, 70:9–19 (stating that the low-defect material of Igarashi's Example 1 "might encourage [a person of ordinary skill in the art] to try and improve the properties even further"). As explained by Dr. Clarke in connection with Example 1 of Igarashi, a higher relative density would be a strong indicator of the desired DDD: "The higher density necessarily indicates that less of the material's volume was occupied by defects in the form of pores or other voids. This would help explain the higher strength. It would also contribute to a lower DDD" *See* Ex. 1112 ¶ 53.

We are persuaded that Igarashi's acknowledgment of the role of defects in a material's strength, Igarashi's focus on fewer and smaller defects, and Igarashi's instructions for making a strong, dense material would lead one of ordinary skill in the art to seek to minimize the number and size of defects, leading to a lower DDD. Given the disclosures of

Igarashi and the concept that one can achieve increased hardness and strength by minimizing the size and number of defects, it would have been well within the capabilities of one of ordinary skill to arrive, by routine experimentation, at the materials set forth in the challenged claims of the '584 patent.

Patent Owner takes the position that the inventors of the challenged patent “recognized and recharacterized a problem that they solved by developing sintered materials with the specified dimensionless defect densities.” PO Resp. 12. We disagree that others had failed to recognize the problem before the inventors of the challenged patent did. Generally, Patent Owner’s expert states, “eliminating defects is one of the basic goals of ceramics manufacturing.” Ex. 2114 ¶ 45. The problem of defect size and structure, including large or elongated defects, was already recognized in the prior art. Reply 6–7 (citing Ex. 1115 ¶ 10); Tr. 69:11–70:7. What remains is the recharacterization of the problem. But simply recharacterizing a property—here, measuring defects using DDD as a parameter—does not render the recharacterized property or material nonobvious.

Patent Owner argues that ceramics processing is a complicated, multi-factor process, with each factor playing a role in the ultimate defect density. PO Resp. 15–26 (discussing, *inter alia*, hot pressing, hot isostatic pressing, sintering time, sintering temperature, type of pressure applied during sintering, starting powder, and binders and plasticizers). Patent Owner also argues that Igarashi, at most, gives general guidance that it is desirable to reduce the number and size of defects. *Id.* at 15. Obviousness under 35 U.S.C. § 103, however, does not require absolute predictability. *In re Kronig*, 539 F.2d 1300 (CCPA 1976). It is sufficient here that Igarashi led

the way for one of ordinary skill in the art to arrive at the claimed materials. We are persuaded, on this point, by Petitioner's arguments that Igarashi gives specific guidance for minimizing defects, including choice of powder, milling process, and sintering process. Reply 9–10. We also note that both Petitioner's and Patent Owner's experts acknowledge that one of ordinary skill in the art would be familiar with strategies to avoid defects before the '584 patent's filing date. *Id.* at 18–19 (citing Ex. 1114, 67:23–68:5, 68:10–18, 69:2–12; Ex. 1115 ¶ 29). After consideration of the evidence before us, we are persuaded that a person of ordinary skill in the art would have been led to reduce defects (and thereby reduce DDD) without compromising other properties of the material. Reply 22.

Petitioner also notes that Patent Owner has not provided any evidence that the claimed DDD values are “critical or special in any way.” *Id.* at 11. The outcome of optimizing a result-effective variable may still be patentable if the claimed ranges are “critical” and “produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art.” *In re Aller*, 220 F.2d 454, 456 (CCPA 1955) (citation omitted); *In re Antonie*, 559 F.2d 618, 620 (CCPA 1977). There is no indication that obtaining the claimed DDD was beyond the capabilities of one of ordinary skill in the art, or led to a new and unexpected result different in kind from the prior art. Nor, as discussed in more detail below, is there sufficient information demonstrating the claimed DDD produced any unexpectedly beneficial properties, further supporting Petitioner's argument that optimization of DDD would have been obvious.

Claim 26 is independent, and claims 27–29 each depend directly from claim 26. Petitioner contends these claims are also unpatentable under 35

U.S.C. § 103 based on Igarashi. Pet. 26–29. The dependent claims require DDD values of 10×10^{-3} (claim 27), 4×10^{-3} (claim 28), and 0.6×10^{-3} (claim 29). All of these claims nevertheless also require the limitations of claim 26, including mean grain size, density, Vickers hardness, and flexural strength, which Petitioner has demonstrated to be present in Igarashi. As discussed above, we have found Petitioner’s arguments regarding DDD to be persuasive as to claim 14, and for the reasons given by Petitioner and for the reasons articulated herein, find the same to be persuasive for claims 26–29.

After review of the full record, we agree with Petitioner’s argument that the properties disclosed in Igarashi, as well as Igarashi’s focus on fewer and smaller defects, would lead one of ordinary skill in the art to seek to minimize the size and number of defects, leading to a lower DDD as disclosed in the challenged claims.

iii. Secondary Considerations

Patent Owner argues that secondary considerations compel a conclusion of nonobviousness. PO Resp. 26–33. We, therefore, consider this evidence along with the contentions of the parties in reaching our final determination as to the obviousness of claims 14 and 26–29.

Objective indicia of nonobviousness may include any of the following: long-felt but unsolved needs, failure of others, unexpected results, commercial success, copying, licensing, and praise. *Graham*, 383 U.S. at 17; *see also Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349–1355 (Fed. Cir. 2012). Patent Owner argues that copying of the claimed invention and unexpected results attributable to the claimed invention should be considered. PO Resp. 27.

All types of objective evidence of nonobviousness must be shown to have a nexus between the evidence and the claimed invention. *In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir. 1995). The stronger the showing of nexus, the greater the weight accorded the objective evidence of nonobviousness. *See Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 306 (Fed. Cir. 1985).

a. Copying

Patent Owner asserts that “[i]ndisputable evidence of copying exists.” PO Resp. 27. Patent Owner points to U.S. Patent No. 8,485,042 (Ex. 2109, “the ’042 patent”), which pertains to manufacturing sintered alumina “elastic deformation bodies,” arguing that claims 1 and 12 of the ’042 patent substantially mirror claims 14 and 26–29 of the ’584 patent. *Id.* at 27–28 (citing Ex. 2109). Patent Owner argues that the nexus “is self-evident” in that the owners of the ’042 patent “copied the limitations of Claims 14 and 26–29 of the ’584 Patent into the claims of the ’042 Patent.” *Id.* at 29.

Petitioner replies that Patent Owner has not established copying, in that Patent Owner has not presented evidence that the hardness limitation was copied, or that any actual product on the market—as opposed to a patent document—copied the claimed invention. Reply 23.

Copying, as objective evidence of nonobviousness, requires evidence of effort to replicate a specific product. *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1246 (Fed. Cir. 2010); *Iron Grip Barbell Co., Inc. v. USA Sports, Inc.*, 392 F.3d 1317, 1325 (Fed. Cir. 2004). Like other types of objective evidence, evidence of copying must be shown to have nexus. *Wm. Wrigley Jr. Co. v. Cadbury Adams USA LLC*, 683 F.3d 1356, 1364 (Fed. Cir. 2012).

The testimony presented by Patent Owner in support of its copying contention is devoid of any evidence from which we could infer that the mirroring of language in the '042 patent constitutes an effort to replicate a specific product. *See, e.g.*, Ex. 2114 ¶¶ 94–96 (asserting that the claims in the '042 patent copy or paraphrase the claims of the '584 patent). The allegation that the claims in the '042 patent are similar to those in the '584 patent fails to show that those claims were practiced in any way that would constitute copying of the actual materials covered by claims 14 and 26–29. Patent Owner has directed us to no legal authority supporting its argument that copying of claim language is sufficient to establish copying in the context of secondary considerations. Therefore, arguments that the alleged copying involves the language of the claims, rather than the product covered by the claims, fail to establish the nexus required to support an allegation of copying.

b. Unexpected Results

Patent Owner argues that the claimed subject matter of the '584 patent achieved at least two unexpected results. PO Resp. 29. First, Patent Owner argues, the '584 patent teaches that “it was extraordinarily surprising that sintered products having . . . a Vickers low-load hardness of ≥ 1750 and a flexural strength of ≥ 800 MPa could be specified and obtained by producing microstructures having a mean grain size of ≤ 1.5 μm or ≤ 2.0 μm and a relative sintered density of $\rho \geq 98.5\%$.” *Id.* at 30 (citing Ex. 1101, 9:9–16; Ex. 2114 ¶¶ 97–103). Second, Patent Owner argues, the '584 patent “also achieved unexpectedly superior mechanical properties via pressureless sintering in air.” *Id.* at 31.

Petitioner replies that Patent Owner has not established unexpected results, in that it would not have been surprising to a person of ordinary skill in the art to achieve a sintered product with the hardness, strength, grain size, and relative density of Patent Owner's sintered product. Reply 23. Specifically, Petitioner contends that Igarashi discloses a material having those properties. *Id.* Petitioner also argues that Igarashi achieved a hardness above 1900 using a process that included pressureless sintering in air, so use of that process is not surprising. *Id.* at 24. Finally, Petitioner argues that Patent Owner has failed to establish a nexus to the claims, because the claimed hardness values are not necessarily a product of pressureless sintering in air. *Id.* at 24–25.

As our reviewing court has explained, “any superior property must be *unexpected* to be considered as evidence of non-obviousness.” *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1371 (Fed. Cir. 2007). All types of objective evidence of nonobviousness must be shown to have nexus. *In re Kao*, 639 F.3d 1057, 1069 (Fed. Cir. 2011). The claims of the subject patent must be shown to be commensurate in scope with the asserted showing of unexpected results advanced by Patent Owner. *See In re Grasselli*, 713 F.2d 731, 743 (Fed. Cir. 1983); *In re Peterson*, 315 F.3d 1325, 1330 (Fed. Cir. 2003) (“the applicant’s showing of unexpected results must be commensurate in scope with the claimed range”); *In re Clemens*, 622 F.2d 1029, 1035 (CCPA 1980) (“In order to establish unexpected results for a claimed invention, objective evidence of non-obviousness must be commensurate in scope with the claims which the evidence is offered to support.”).

Regarding hardness and grain size, Dr. Lilley states that improving hardness at grain sizes below 3–4 μm was unexpected at the time of the '584 patent. Ex. 2114 ¶ 103. Dr. Clarke, however, states that these properties would not have been surprising to one of ordinary skill in the art in 1994 or 1995, given the properties of Igarashi's material in 1991. Ex. 1115 ¶ 30. Patent Owner directs us to the specification's statements regarding extraordinary surprise and unexpectedly superior properties; we agree with Petitioner, however, that in view of the evidence of record, those statements are subjective. Reply 24. Weighing the evidence presented, we are not persuaded that the improved hardness, strength, grain size, and relative density were unexpected.

Regarding pressureless sintering in air, Patent Owner does not direct us to evidence in the record explaining with specificity what processes were used to obtain the materials of claims 14 and 26–29, such that we may determine whether the challenged claims are made by the processes that Patent Owner alleges give rise to unexpected results. As Petitioner points out, the claims do not require pressureless sintering in air. Reply 24. Patent Owner's assertion that the Vickers hardnesses of the challenged claims "line up with the unexpected results that the inventors achieved by performing pressureless sintering in air" does not demonstrate a nexus between the claims and the asserted unexpected results. PO Resp. 32–33.

Accordingly, on the current record, Patent Owner has not established that the challenged claims of the '584 patent are commensurate in scope with the asserted showing of unexpected results advanced by Patent Owner. We are persuaded by Petitioner's argument that Patent Owner failed to show unexpected results. Reply 23–25. Accordingly, we do not find that the

proffered evidence of unexpected results supports Patent Owner's argument of nonobviousness.

iv. Testimony of Dr. Clarke

Patent Owner argues that the Board should not credit Dr. Clarke's testimony, because Petitioner's counsel did not properly instruct him on several key points of the law of obviousness. PO Resp. 33.

Regarding the testimony of Dr. Clarke, we can accord appropriate weight to an expert's testimony, taking into account the expert's understanding of the level of skill in the art at the time of the invention. *See, e.g., Yorkey v. Diab*, 601 F.3d 1279, 1284 (Fed. Cir. 2010) (holding the Board has discretion to give more weight to one item of evidence over another "unless no reasonable trier of fact could have done so"); *In re Am. Acad. of Sci. Tech Ctr.*, 367 F.3d 1359, 1368 (Fed. Cir. 2004) ("[T]he Board is entitled to weigh the declarations and conclude that the lack of factual corroboration warrants discounting the opinions expressed in the declarations."). We are not persuaded that Dr. Clarke's testimony should be given no weight due to Petitioner's counsel's alleged failure to instruct him on the law of obviousness. We accord the appropriate weight to Dr. Clarke's testimony as indicated in this Decision and for the reasons articulated in this Decision.

C. Conclusion

For the foregoing reasons, after considering the Petition, Patent Owner Response, Reply, and the evidence relied upon by Petitioner and Patent Owner, including evidence of secondary considerations, we are persuaded that Petitioner has shown by a preponderance of the evidence that claims 14 and 26–29 would have been obvious over Igarashi.

III. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 14 and 26–29 of the '584 patent are held unpatentable; and

FURTHER ORDERED that because this is a final written decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

IPR2015-00424
Patent 6,066,584

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