

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FUJIFILM CORPORATION,
Petitioner,

v.

SONY CORPORATION
Patent Owner.

Case IPR2017-01268
Patent 7,029,774 B1

Before JO-ANNE M. KOKOSKI, JON B. TORNQUIST,
and JEFFREY W. ABRAHAM, *Administrative Patent Judges*.

KOKOSKI, *Administrative Patent Judge*.

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

I. INTRODUCTION

We have jurisdiction to conduct this *inter partes* review under 35 U.S.C. § 6, and this Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we determine that Petitioner has shown by a preponderance of the evidence that claims 15 and 17 of U.S. Patent No. 7,029,774 B1 (“the ’774 patent,” Ex. 1001) are unpatentable, and has not shown by a preponderance of the evidence that claims 1–11, 16, and 18–20 of the ’774 patent are unpatentable.

A. *Procedural History*

FUJIFILM Corporation (“Petitioner”) filed a Petition (“Pet.”) to institute an *inter partes* review of claims 1–11 and 15–20 (“the challenged claims”) of the ’774 patent based on the following grounds: (1) whether claims 15 and 17 are unpatentable under 35 U.S.C. § 102 as being anticipated by Ishikawa¹, (2) whether claims 1–11 and 15–20 are unpatentable under 35 U.S.C. § 103 as being obvious over Aonuma², and (3) whether claims 1–11 and 15–20 are unpatentable under 35 U.S.C. § 103 as being obvious over the combined teachings of Aonuma and Abe³. Paper 1, 12. Sony Corporation (“Patent Owner”) did not file a Preliminary Response. Pursuant to 35 U.S.C. § 314(a), we instituted an *inter partes* review of

¹ U.S. Patent App. Pub. No. US 2003/0054203 A1, published March 20, 2003 (Ex. 1015).

² Japanese Patent App. Pub. No. P2003-36520A, published Feb. 7, 2003 (Ex. 1017). We refer to “Aonuma” as the English translation of the original reference.

³ European Patent App. Pub. No. 0 494 793 A1, published July 15, 1992 (Ex. 1013).

claims 1–11 and 15–20 based on our determination that the information presented in the Petition demonstrated a reasonable likelihood that Petitioner would prevail on its challenge that claims 1–11 and 15–20 are unpatentable with respect to all three grounds set forth in the Petition. Paper 11 (“Dec. on Inst.”), 17–18.

After institution of trial, Patent Owner filed a Patent Owner Response (“PO Resp.,” Paper 21), and Petitioner filed a Reply (“Reply,” Paper 27). Petitioner relies on the Declaration of Ryosuke Isobe⁴ (“the Isobe Declaration,” Ex. 1003), the Declaration of Norihito Kasada (“the Kasada Declaration,” Ex. 1019), the Declaration of Dr. Bart Raeymaekers (“the Raeymaekers Declaration,” Ex. 1018), and the Rebuttal Declaration of Dr. Bart Raeymaekers (“the Raeymaekers Rebuttal Declaration,” Ex. 1031). Patent Owner relies on the Declaration of Prof. Frank Talke (“the Talke Declaration,” Ex. 2026). Patent Owner also filed a Motion for Observations on Cross-Examination of Dr. Raeymaekers (Paper 38), and Petitioner filed a Response (Paper 39).

Petitioner filed a Motion to Exclude Exhibit 2040, and paragraphs 121–126 of the Talke Declaration. Paper 33. Patent Owner filed an Opposition (Paper 41), and Petitioner filed a Reply (Paper 42). Patent Owner filed a Motion to Exclude certain paragraphs of the Kasada Declaration, the Isobe Declaration, the Raeymaekers Declaration, and the Raeymaekers Rebuttal Declaration, and Exhibits 1037 and 1038. Paper 36.

⁴ With Board authorization (Paper 6), Patent Owner filed a Motion to Exclude and Disqualify Ryosuke Isobe as Petitioner’s Expert Witness (Paper 7), and Petitioner filed an Opposition (Paper 8). We denied Patent Owner’s Motion. Paper 9.

Petitioner filed an Opposition (Paper 40), and Patent Owner filed a Reply (Paper 43).

An oral hearing was held on July 31, 2018, and a transcript is included in the record. Paper 47 (“Tr.”).

B. Related Proceedings

Petitioner identifies *Sony Corp. v. FUJIFILM Holdings Corp.*, Case 1:16-cv-05988 (S.D.N.Y.) as a related matter. Pet. 64. Patent Owner identifies *Sony Corp. v. FUJIFILM Holdings Corp.*, No. 337-TA-1036 (ITC) and *Sony Corp. v. FUJIFILM Holdings Corp.*, No. 1:16-cv-25210 (S.D. Fla.) as related matters. Paper 5, 1. Additionally, the ’774 patent is the subject of IPR2017-01267, also filed by Petitioner. Pet. 64.

C. The ’774 Patent

The ’774 patent, titled “Magnetic Recording Medium with Backside to Decrease Recording Surface Embossment,” relates to “magnetic recording media, such as magnetic tapes, having a backside configured to decrease pitting or embossment” of a recording surface of the magnetic recording media. Ex. 1001, 1:7–12. The ’774 patent explains that the backside surface of a typical recording medium has bimodal roughness that defines a plurality of peaks and valleys, and that when the medium is wound such that the second winding extends on top of the first winding, the peaks on the backside of the second winding contact the front surface of the first winding. *Id.* at 2:5–12. This limits the contact between the first winding and the second winding, decreasing friction between the windings as well as between the medium and the read/write mechanism during use. *Id.* at 2:13–17. The interaction between the peaks on the second winding and the surface of the first winding can also cause the peaks to imprint upon the

front surface of the first winding, creating pits or embossments that can damage the recording characteristics of the magnetic recording medium. *Id.* at 2:17–23. Therefore, according to the '774 patent, “it is desirable to create a magnetic recording medium having a backside configured to improve the durability and frictional characteristics of the magnetic recording medium while decreasing embossment of the recording surfaces of the magnetic recording medium.” *Id.* at 2:24–28.

Figure 2 of the '774 patent is reproduced below.

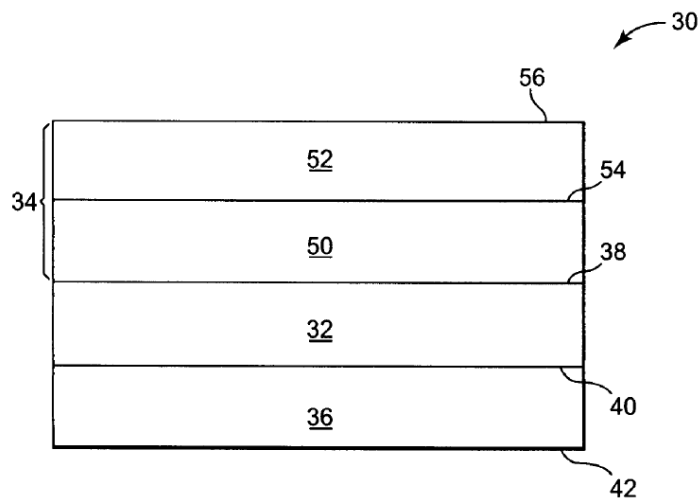


Fig. 2

Figure 2 is a schematic illustration of a cross-sectional view of one embodiment of the magnetic recording medium described in the '774 patent. Ex. 1001, 3:10–11. Magnetic recording medium 30 includes substrate 32, magnetic side 34, and backside 36. *Id.* at 3:36–37. Substrate 32 defines top surface 38 and bottom surface 40 opposite top surface 38, and magnetic side 34 (which provides the recordable material to magnetic recording medium 30) extends over and is bonded to top surface 38. *Id.* at 3:38–43. Magnetic side 34 includes support layer 50 and magnetic recording layer 52. *Id.* at 4:12–16. Support layer 50 extends over and is bonded to top surface 38, and

defines a top surface 54 opposite top surface 38. *Id.* at 4:16–19. Magnetic recording layer 52 extends over and is bonded to top surface 54 of support layer 50, defining recording surface 56 opposite support layer 50. *Id.* at 4:19–22. Backside 36 extends along and is bonded to bottom surface 40, and defines an outer surface 42 opposite substrate 32. *Id.* at 3:43–46.

According to the '774 patent, “magnetic recording medium 30 exhibits improved signal and error characteristics by decreasing pitting or embossment of the recording surface 56.” *Id.* at 3:53–55. Backside 36 “is configured to provide a relatively random backside surface 42 (e.g., a surface approaching a Gaussian surface) as compared to the typical bimodal backside surface” of the prior art. *Id.* at 5:18–21. The '774 patent describes an embodiment in which “backside 36 comprises carbon black particles combined with appropriate binder resins,” where the carbon black particles “are substantially uniform in size” and “are chosen from one or more groups having a primary particle or average particle size from about 10 nm to about 30 nm, more preferably, on the order of about 15 nm to about 25 nm.” *Id.* at 5:11–12, 21–27. The '774 patent states that, because “the large particles are generally not utilized in the backside 36, the backside surface 42 generally decreases the number and/or predominance of any pits or embossments formed in recording surface 56.” *Id.* at 5:30–38.

The '774 patent teaches that skew “measures the asymmetry of the surface profile about a mean plane of the surface being evaluated,” and that “[n]egative skew indicates a predominance of valleys, while positive skew indicates a predominance of peaks.” Ex. 1001, 8:13–17. According to the '774 patent, “[w]ith regard to magnetic recording medium 30, it is generally desirable to decrease positive skew by decreasing the

predominance of high peaks, and, consequently, decreasing the number and/or size of pits or embossments,” but that “it is also generally desirable to maintain at least a low level of positive skew to decrease excess frictional forces on the magnetic recording medium that can cause handling problems during use of the magnetic recording medium.” *Id.* at 8:20–27. The ’774 patent further teaches that kurtosis “is a measure of the distribution of spikes above and below the mean line of the backside surface 42 and generally indicates the randomness of the surface,” and “for relatively spiky surfaces, kurtosis is greater than three; for wavy surfaces, kurtosis is less than three; and for perfectly random surfaces, kurtosis is generally equal to three.” *Id.* at 8:65–67; 9:2–5. Because “it is desirable to have a surface roughness approximating a Gaussian surface as opposed to a bimodal surface of prior art[] magnetic recording mediums,” and “a truly Gaussian surface generally has a kurtosis value of three,” the ’774 patent describes an embodiment where “magnetic recording medium 30 has a kurtosis of less than or equal to about 4.0, more preferably of less than or equal to about 3.7.” *Id.* at 9:5–12.

Claims 1, 15, and 20 are the challenged independent claims. Claim 20 is representative, and is reproduced below.

20. A magnetic recording medium comprising:
 - a substrate defining a first surface and a second surface opposite the first surface;
 - a magnetic side coated on the first surface of the substrate and defining a recording surface; and
 - a backside coated on the second surface of the substrate and configured to decrease the embossment of the recording surface, wherein the backside defines a backside surface opposite the substrate, the backside surface having a skew less than about 0.5, a kurtosis less than about 4.0, a peak

height mean of less than about 200, and a peak-to-valley roughness less than about 325 nm.

Ex. 1001, 14:29–41.

II. ANALYSIS

A. *Level of Ordinary Skill in the Art*

Petitioner contends that a person having ordinary skill in the art (“POSITA”) at the time of the ’774 patent would have had “a bachelor’s degree in materials science, electrical engineering, mechanical engineering, chemistry, or a closely related field, and at least five years of experience” in industry or academic research relating to magnetic tape, or “a master’s degree or higher” in the same fields and at least three years of experience relating to magnetic tape. Pet. 13 (citing Ex. 1003 ¶ 65; Ex. 1018 ¶ 60). Patent Owner does not dispute Petitioner’s assessment in its Response, and Dr. Talke agrees that it “is reasonable.” Ex. 2026 ¶¶ 25–26.

Petitioner’s assessment appears consistent with the level of ordinary skill in the art at the time of the invention as reflected in the prior art in this proceeding. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (explaining that specific findings regarding ordinary skill level are not required “where the prior art itself reflects an appropriate level and a need for testimony is not shown” (quoting *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 163–64 (Fed. Cir. 1985))). Accordingly, we adopt Petitioner’s assessment of the level of ordinary skill in the art.

B. *Claim Interpretation*

We interpret claims of an unexpired patent using the “broadest reasonable construction in light of the specification of the patent in which [the claims] appear[.]” 37 C.F.R. § 42.100(b) (May 2, 2016); *see Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016). Consistent with

the broadest reasonable construction, claim terms are presumed to have their ordinary and customary meaning as understood by a person of ordinary skill in the art in the context of the entire patent disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). Only those terms in controversy need to be construed, and only to the extent necessary to resolve the controversy. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“we need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

For the purposes of the Decision on Institution, we determined that, based on the record at that time, no claim term required express construction (Dec. on Inst. 7), and we see no reason to modify that determination in light of the record developed during trial.

C. Principles of Law

To prevail on its challenges to the patentability of the claims, a petitioner must establish facts supporting its challenge by a preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). “In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden of persuasion never shifts to the patent owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378–

79 (Fed. Cir. 2015) (discussing the burdens of persuasion and production in *inter partes* review).

To establish anticipation, each and every element in a claim, arranged as recited in the claim, must be found in a single prior art reference. *Net MoneyIN, Inc. v. Verisign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008); *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1383 (Fed. Cir. 2001). Although the elements must be arranged in the same way as in the claim, “the reference need not satisfy an *ipsissimis verbis* test,” i.e., identity of terminology is not required. *In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009); *In re Bond*, 910 F.2d 831, 832 (Fed. Cir. 1990).

A claim is unpatentable under 35 U.S.C. § 103 if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious to a person having ordinary skill in the art to which the subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

D. Overview of the Prior Art

1. Ishikawa

Ishikawa generally “relates to magnetic tape having optical servo tracks on the side opposite to the magnetic recording side.” Ex. 1015 ¶ 1. Ishikawa describes “incorporating specific fine particles into the backcoating layer of the magnetic tape and forming specific voids in the backcoating

layer to make the backcoating layer capable of forming servo tracks.” *Id.*

¶ 8. Ishikawa further teaches that the backcoating “comprises a binder and fine particles having been dispersed in the binder and being capable of irreversible changing in color on oxidation reaction, and has a sufficient number of microvoids of sufficient size to supply sufficient oxygen to cause the oxidation reaction.” *Id.* ¶ 9.

Ishikawa teaches that, in order to provide a tape with satisfactory running properties, “it is preferred” that the backcoating layer “have a moderate surface roughness,” but that it is also preferred that the backcoating layer “be as smooth as possible to prevent the surface profile of the backcoating layer [] from being transferred to the magnetic layer while the tape is wound.” *Id.* ¶ 44. According to Ishikawa, taking both these requirements into consideration, the backcoating layer “preferably has an arithmetic mean roughness Ra of 7 to 50 nm, particularly 8 to 30 nm, and a 10 point mean roughness Rz of 40 to 250 nm, particularly 50 to 200 nm.”

Id. Ishikawa further teaches that, in order for the backcoating layer to achieve arithmetic mean roughness Ra and 10 point mean roughness Rz values within the preferred ranges, the backcoating layer preferably contains carbon black having a primary particle size of 15 to 80 nm, or, more preferably, 25 to 80 nm. *Id.* ¶ 51.

2. *Aonuma*

Aonuma generally relates “to a coated-type magnetic recording medium.” Ex. 1017 ¶ 1. In particular, Aonuma describes “[a] magnetic recording medium that comprises” layers “on at least one plane of a nonmagnetic substrate,” including “[a] magnetic layer containing a ferromagnetic powder and a binder,” “[a] nonmagnetic layer containing a

nonmagnetic powder and a binder as well as a magnetic layer containing a ferromagnetic powder and a binder in the order given,” and “[a] back-coat layer on the surface of the aforementioned the [sic] nonmagnetic substrate opposite the surface provided with the aforementioned magnetic layer or the aforementioned nonmagnetic layer and the aforementioned magnetic layer.”

Id. ¶ 9. According to Aonuma, “further smoothening of the magnetic layer surface and the optimization of protuberances” makes it possible “to achieve both low noise in terms of the medium noise and durability against running motions in the system that uses an MR head.” *Id.* ¶ 6.

Aonuma teaches that “[t]he back-coat layer primarily contains a carbon black or a conductive oxide powder,” and “it is preferable to use two types of the carbon black with different mean grain sizes,” such as “a fine-powder carbon black with a mean grain size of 10 to 30 nm but preferably 10 to 20 nm, and a coarse-powder carbon black with a mean grain size of 150 to 300 nm but preferably 230 to 300 nm.” *Id.* ¶ 86. Aonuma further teaches that “the fine-powder carbon black generally has a superior liquid-lubricant retention force and can therefore contribute to the reduction of frictional coefficient when used in combination with a lubricant,” and the coarse-powder carbon black “functions as a solid lubricant” that “forms minute projections on the surface of the back-coat layer, thereby reducing the contact surface area and contributing to the reduction of frictional coefficient.” *Id.* ¶ 87.

3. Abe

Abe “relates to magnetic recording media comprising improved backside coating layers, wherein the backside coating layers have excellent tracking, friction, and smoothness characteristics.” Ex. 1013, 2:4–6. Abe

recognizes that backside coating layers that are too smooth tend to trap air under the tape as it moves, making tracking difficult to control, and also have poor durability because the coefficient of friction is too high, and that backside coating layers that are too rough “tend[] to damage the smooth surface of the magnetic layer as the magnetic recording tape is wound and unwound.” *Id.* at 2:17–23.

Abe teaches that “excellent” tracking, friction, and smoothness characteristics “may be achieved by incorporating two kinds of carbon black particles in a backside coating layer, wherein each kind of carbon black particle has a particle size within a certain specified range.” *Id.* at 2:46–50. According to Abe, using “the two kinds of carbon black particles introduces a plurality of projections into an otherwise smooth surface,” wherein “the projections have a size and surface density such that the surface of the backside coating layer has a rough texture for minimizing air entrapment during tape transport, yet is smooth enough” that it “has less of a tendency to damage the magnetic layer relative to previously known backside coating layers comprising two different kinds of carbon black particles.” *Id.* at 2:51–56.

Specifically, Abe describes backside coating layers that have a centerline average roughness of 30 nm or less, wherein the surface density of the projections having a height of 30 nm or more is 2% or more, and the surface density of the projections having a height of 100 nm or more is 2% or less. *Id.* at 3:9–14. Abe teaches that “only the projections having a height of 30 nm or more contact the magnetic layer for the most part,” and, therefore, “the real contact between the backside coating layer and the magnetic layer is minimized,” providing a low friction coefficient. *Id.* at

3:17–19. Abe further teaches that, in order to provide a centerline average roughness of 30 nm or less, “it is preferred to use a relatively large amount of finely divided carbon black particles having a particle size in the range from 10 nm to 30 nm,” and, in order to provide a surface density of 2% or more of projections having a height of 30 nm or more, “it is preferred to use relatively small amounts of larger carbon black particles having a particle size in the range from 150 to 1000 nm.” *Id.* at 3:21–25. The surface density of 2% of projections having a particle size of 100 nm or more is preferably obtained when “the weight ratio of the finely divided carbon black particles to the larger carbon black particles is in the range of 99.9/0.1 to 70/30.” *Id.* at 3:25–28.

E. Anticipation by Ishikawa

Petitioner contends that the subject matter of claims 15 and 17 is unpatentable under 35 U.S.C. § 102 as anticipated by Ishikawa. Pet. 21–26; Reply 5–8. Petitioner relies on the Isobe Declaration and the Raeymaekers Declaration in support of its contentions. *Id.* Patent Owner disagrees with Petitioner’s assertions, and relies on the Talke Declaration. PO Resp. 66–73. The parties specifically focus their arguments on the “peak height mean less than about 200 [nm] and a peak-to-valley roughness less than about 325 nm” limitation of claim 15. As to the other elements of claims 15 and 17, we have reviewed the evidence and arguments presented in the Petition and find that Petitioner has shown sufficiently that those elements are disclosed and arranged as in the claims. Pet. 21–24.

Petitioner argues that “[t]he backcoating layer of Ishikawa’s magnetic tape ‘preferably has . . . a 10 point mean roughness Rz of 40 to 250 nm, particularly 50 to 200 nm.’” Pet. 24 (citing Ex. 1015 ¶ 44; Ex. 1003 ¶ 216).

Pointing to Table 1 in Ishikawa, Petitioner argues that “[a]ll examples of tape made according to Ishikawa’s teachings feature peak-to-valley roughness (Rz) less than 87 nm.” *Id.* (citing Ex. 1015, Table 1; Ex. 1003 ¶ 216). Therefore, according to Petitioner, “Ishikawa discloses several tapes (Examples 1–5) with a ‘peak-to-valley roughness of less than about 325 nm.’” *Id.* (citing Ex. 1003 ¶ 216).

Patent Owner responds that “Ishikawa did not properly measure peak-to-valley roughness (Rz),” and the actual peak-to-valley roughness “is likely to be far higher than reported in Ishikawa.” PO Resp. 68–69 (citing Ex. 2026 ¶ 91). Patent Owner contends that the stylus-type profilometer used to measure the reported peak-to-valley roughness values in Ishikawa “does not work well for magnetic tape” because when a stylus tip is pressed against the backcoat surface and dragged, “it digs into the surface, thereby underestimating the variations in height that exist on the surface.” *Id.* at 70 (citing Ex. 2026 ¶ 95). Patent Owner also contends that “the stylus would not have registered the microvoids in Ishikawa’s backcoat,” which “are a large percentage of the backcoat” and “are intended to permeate the entire thickness of the backcoat, and to be open at the surface.” *Id.* at 72 (citing Ex. 1015 ¶¶ 29, 146, Table 1; Ex. 2026 ¶¶ 96–98). Patent Owner further contends that “Ishikawa is not clear where its roughness measurements were taken” because it “does not specify whether its stylus-based roughness measurements were taken on the oxidized or unoxidized portions of the backcoat, or performed in some way which attempts to account for both.” *Id.* at 72–73 (citing Ex. 2026 ¶ 99).

Petitioner replies that Patent Owner admitted that the specification of the ’774 patent does not define peak-to-valley roughness by its measurement

method, and that “the claims recite the required characteristics, without specifying that a 2-D optical interferometer measurement must be included.” Reply 5 (quoting PO Resp. 22–23). Petitioner also argues that “several prior art references from leading tape companies in the 2004–2005 time period, including Ishikawa, used stylus-type measurements on magnetic tape.” *Id.* at 6 (citing Ex. 1015 ¶ 45; Ex. 1027, 7:28–40; Ex. 1028 ¶ 36). According to Petitioner, Patent Owner’s “speculative arguments against Ishikawa do not show that Ishikawa’s reported Rz values would be off by a factor of 3 or more, which is what would be required to push its results out of the claimed range.” *Id.* at 8 (citing Ex. 1015 ¶ 146).

We agree with Petitioner that Ishikawa teaches “peak-to-valley roughness less than about 325 nm” as recited in claim 15. Pet. 24–25; Reply 5–8; Ex. 1003 ¶ 216. In particular, Ishikawa teaches a backcoating layer of a magnetic tape that has a peak-to-valley roughness “Rz of 40 to 250 nm, particularly 50 to 200 nm.” Ex. 1015 ¶ 44. Ishikawa provides five example embodiments of its magnetic tape, and reports the measurements of a number of characteristics of the backcoat layer for each example, including peak-to-valley roughness Rz. *Id.* ¶¶ 120–134, Table 1. Ishikawa discloses that peak-to-valley roughness Rz was measured using a stylus-type profilometer under the following conditions:

Stylus:	diameter: 1.5 to 2.5 µm; curvature: 60°
Contact pressure:	50 to 300 µN
Cut-off length:	80 µm
Sampling length:	80 µm
Assessment length:	400 µm

Id. ¶¶ 45, 49. The reported peak-to-valley roughness Rz values for the five examples ranged from 58 to 87 nm, as shown in the annotated portion of Ishikawa Table 1 from the Petition, reproduced below:

TABLE 1

	Reproduction Output (dB)	Ra (nm)	Backcoating Layer					P/B Ratio
			Rz (nm)	Dynamic Friction Coefficient	Surface Resistivity ($\Omega/\square$)	Void Diameter (nm)	Void Volume (%)	
Ex. 1	+0.6	11	85	0.21	4.2×10^6	5.6	28	5.05
Ex. 2	+0.3	9.4	58	0.42	5.1×10^6	4.7	27	5.05
Ex. 3	+0.4	8.6	81	0.28	7.3×10^9	5.2	32	5.05
Ex. 4	+0.2	9.1	71	0.26	4.7×10^9	6.6	26	5.05
Ex. 5	+0.3	10	87	0.23	4.6×10^6	6.0	28	5.03

Pet. 24 (citing Ex. 1015, Table 1). The annotated portion of Ishikawa Table 1 shows the results for the measured characteristics of the backcoat layer of Examples 1–5, with the peak-to-valley roughness Rz values highlighted by a red box. *Id.* Because Ishikawa teaches that the backcoating layer of its magnetic tape should have a peak-to-valley roughness “Rz of 40 to 250 nm, particularly 50 to 200 nm,” and because Ishikawa presents examples of magnetic tape with backside surfaces having a peak-to-valley roughness of 87 nm or less, Ishikawa discloses “a peak-to-valley roughness less than about 325 nm” as recited in claim 15.

In light of these express disclosures in Ishikawa, Patent Owner does not provide sufficient objective evidence or analysis to support its contention that “Ishikawa did not properly measure the peak-to-valley roughness (Rz)” and the “actual peak-to-valley roughness is unknown, but is likely to be far higher than reported in Ishikawa.” PO Resp. 68–69 (citing Ex. 2026 ¶ 91). First, as Patent Owner admits, the ’774 patent specification “does not *define* the terms skew, kurtosis, peak-height mean and peak-to-valley roughness by the measurement method.” PO Resp. 23; *see also id.* at 22 (“[T]he claims recite the required characteristics, without specifying that a 2-D optical

interferometer measurement must be included.”). In that regard, the ’774 patent describes one embodiment where the backside surface “is analyzed to determine values for a plurality of surface measurement parameters” “using a Wyko® Optical Profiler manufactured by Veeco Instruments, Inc. of Tucson, Ariz., or other suitable device.” Ex. 1001, 8:2–7 (emphasis added). Moreover, there is no indication in the ’774 patent that a stylus-type profilometer like the one used in Ishikawa is not suitable for measuring the claimed surface measurement parameters.

Patent Owner next turns to the Talke Declaration, in which Dr. Talke testifies that Ishikawa’s backcoat is made with a polyurethane binder that “is soft compared to a profilometer tip” and, when the profilometer tip is “pressed against the coating surface and dragged,” it “is likely to dig in to the surface,” which will “reduce the apparent vertical change in the surface.” Ex. 2026 ¶ 95. Dr. Talke relies on Bhushan⁵ to support his testimony, particularly to Bhushan’s teaching that for “polymeric magnetic media, stylus instruments cannot be used because they scratch the surface (Fig. 2.16) and hence only an optical profiler can be used.” *Id.* (quoting Ex. 2039, 89). Bhushan further explains that “[t]he existence of scratches results in measurement errors and unacceptable damage,” and, with reference to a stylus trace on a magnetic tape, states that “the stylus digs into the surface and the results do not truly represent the microroughness.” Ex. 2039, 94. The magnetic tape stylus trace reported in Bhushan, however, was created using a stylus load of 1 mN (*id.* at 90, Fig. 2.16), which is

⁵ BHARAT BHUSHAN, TRIBOLOGY AND MECHANICS OF MAGNETIC STORAGE DEVICES 63–156 (2d ed. 1996) (Ex. 2039). The cited page numbers in Bhushan refer to the original pagination of the document.

considerably greater than Ishikawa's stylus load of 50–300 μN (Ex. 1015 ¶ 45). The Talke Declaration does not address this discrepancy, and Dr. Talke stated during his deposition that reducing the stylus load would reduce scratching of the magnetic tape surface. Ex. 1030, 108:14–19 (“Q: Would reducing the contact pressure for the stylus instrument reduce the scratching of the magnetic tape surface by the stylus? A: Yes, it would, but you have to remember the other problem is the diameter and size of the stylus.”).

Moreover, Petitioner provides evidence that it was not uncommon to use stylus-type profilometers to measure the properties of magnetic tape, even after Bhushan was published in 1996. *See* Reply 6. In particular, Petitioner points to Saliba,⁶ which describes using a stylus-type profilometer, under identical conditions to those used in Ishikawa, to measure the surface characteristics (including peak-to-valley roughness) of the backcoating of magnetic tape. Ex. 1027, 7:28–40, 57–60. Petitioner further points to Ohno,⁷ which also describes using “a stylus type 3D profilometer in accordance with JIS B0601” to measure the surface roughness characteristics of magnetic tape. Ex. 1028 ¶ 36; *see also* Ex. 1015 ¶ 45 (Ishikawa explaining that surface roughness characteristics were measured “in accordance with JIS-B0601-1994”); Ex. 1027, 7:28–39 (Saliba explaining that surface roughness characteristics were measured “in accordance with JIS-B0601-1994”). Accordingly, we are persuaded that the

⁶ US Patent No. 6,558,774 B1, issued May 6, 2003 (Ex. 1027).

⁷ U.S. Patent App. Pub. No. US 2005/0175866 A1, published Aug. 11, 2005 (Ex. 1028).

evidence establishes that a stylus-type profilometer is a suitable device for measuring the surface characteristics of magnetic tape.

Patent Owner also relies on Dr. Talke's testimony to support its contention that "the stylus would not have registered the microvoids in Ishikawa's backcoat." PO Resp. 72 (citing Ex. 2026 ¶¶ 96–98). Dr. Talke testifies that the tip diameter of the stylus-type profilometer used in Ishikawa "is much wider than the mean void diameter" such that "the side of the stylus tip [would] touch the side of a hole before the tip reaches the bottom of the hole," and "would not register valley depths descending as far as the thickness" of the backcoat layer. Ex. 2026 ¶ 98. Dr. Talke contends that, as a result, the peak-to-valley mean roughness would be underestimated "by a significant amount." *Id.* Dr. Talke does not quantify what would constitute a "significant amount." In that regard, Ishikawa reports a maximum measured peak-to-valley roughness of 87 nm, which is more than 200 nm less than the 325 nm upper limit of the claimed range. Ex. 1015, Table 1. Even if Ishikawa's peak-to-valley measurements were underestimated as Patent Owner contends, neither Patent Owner nor Dr. Talke provide sufficient argument or evidence that Ishikawa's peak-to-valley roughness is actually more than three times higher than the reported values.

Ishikawa teaches that the backcoating layer must be able to provide the magnetic tape with satisfactory running properties. Ex. 1015 ¶ 43. To do so, Ishikawa teaches that the backcoating layer preferably has a moderate surface roughness, but that it is also preferable for the backcoating layer "to be as smooth as possible to prevent the surface profile of the backcoating layer" from transferring to the magnetic layer when the tape is wound. *Id.* ¶ 44. Ishikawa strikes a balance between these competing requirements by

teaching a backcoating layer that has a peak-to-valley mean roughness R_z of 40 to 250 nm. *Id.* Because Ishikawa also teaches that the backcoating layer contains microvoids and may also be irradiated prior to use, Ishikawa's desired peak-to-valley roughness values must take those properties into account. *See id.* ¶¶ 19–21, 29–30, 125. Accordingly, we determine that Ishikawa discloses a backside surface having “a peak-to-valley roughness less than about 325 nm” as recited in claim 15.

With respect to the “peak height mean less than 200 [nm]” limitation of claim 15, Petitioner argues that “a peak height mean (which measures the average value of all peaks above a standard plane) must inherently be less than a peak-to-valley roughness, i.e., R_z (which is an average of the largest peak-to-valley separations).” Pet. 24–25 (citing Ex. 1003 ¶ 217). According to Petitioner, because “Ishikawa's back coating layer surface has a peak-to-valley roughness (R_z) of 87 nm or less, the backside surface must necessarily have a peak height mean (R_{pm}) of 87 nm or less, which is within the claimed range.” *Id.* at 25 (citing Ex. 1003 ¶ 217). Patent Owner responds that “[b]ecause Ishikawa did not accurately measure the peak-to-valley roughness,” “no conclusion can be drawn concerning the peak-height mean.” PO Resp. 73 (citing Ex. 2026 ¶ 100).

For the reasons set forth above, we are not convinced that Ishikawa's reported peak-to-valley roughness measurements are inaccurate or faulty. Moreover, neither Patent Owner nor Dr. Talke dispute Petitioner's premise that peak-height mean must be less than the peak-to-valley roughness. PO Resp. 73; Ex. 2026 ¶ 100. We credit Mr. Isobe's un rebutted testimony that “[a] peak-to-valley roughness accounts for both the height of peaks and the depths of valleys,” and “the peak height mean accounts for only the height

of peaks,” so “a surface with a peak-to-valley roughness (Rz) of less than 200 nm must necessarily have a peak height mean (Rpm) of less than 200 nm as well.” Ex. 1003 ¶ 217 (citing Ex. 1015 ¶¶ 49–50; Ex. 1001, 8:30–40). Consequently, we determine that Petitioner sufficiently establishes that Ishikawa inherently discloses a backside coating with a peak-height mean less than about 200 nm as recited in claim 15.

Claim 17 depends from claim 15, and further limits the peak-to-valley roughness to “less than about 300 nm.” Ex. 1001, 14:15–16. Petitioner argues, as it did with respect to claim 15, that Ishikawa Examples 1–5 disclose magnetic tapes with backcoat surface peak-to-valley roughness less than 87 nm, which is within the claimed range. Pet. 26. Patent Owner does not address claim 17 separately from claim 15. *See* PO Resp. 68–73. Therefore, for the same reasons set forth with respect to the peak-to-valley roughness limitation of claim 15, we determine that Petitioner sufficiently establishes that Ishikawa discloses a backcoat surface “wherein the peak-to-valley roughness is less than about 300 nm” as recited in claim 17.

After considering Petitioner’s and Patent Owner’s positions, as well as their supporting evidence, we determine that Petitioner has shown, by a preponderance of the evidence, that claims 15 and 17 are unpatentable under 35 U.S.C. § 102(b) as anticipated by Ishikawa.

F. Obviousness over Aonuma

Petitioner argues that Aonuma would have rendered the subject matter of claims 1–11 and 15–20 obvious to a POSITA. Pet. 26–49, Reply 9–26. Specifically, Petitioner argues that Aonuma discloses “manufacturing processes for tape with a bimodal backside coating having large and small carbon black particles,” and a “POSITA would have found it obvious to

produce tape based on Aonuma’s teachings with surface characteristics in the measurement ranges claimed by the ’774 Patent.” Pet. 26 (citing Ex. 1017 ¶ 19; Ex. 1003 ¶ 220). As support for this argument, Petitioner points to testing conducted by Dr. Raeymaekers on three tape samples produced by Mr. Kasada “following the back-coat layer formulation and process described in Aonuma.” Pet. 27 (citing Ex. 1019 ¶¶ 4–8; Ex. 1003 ¶ 22), 31 (citing Ex. 1019 ¶ 10; Ex. 1018 ¶¶ 80–82; Ex. 1003 ¶ 229); *see id.* at 33–40.

1. *Aonuma Replication*

Mr. Kasada testifies that, following the examples disclosed in Aonuma, he prepared three magnetic tape samples (Samples A, B, and C) at Petitioner’s facilities in February 2017 using available materials and equipment. Ex. 1019 ¶¶ 2–3. Mr. Kasada explains that the back-coating liquid layers for Samples A, B, and C were prepared using the following formulations:

Component	Weight by Part Sample A	Weight by Part Samples B and C
BP-800 Carbon black particles from Cabot Corp. (average particle diameter: 17 nm)	100	100
Thermal black carbon particles from Cancarb Ltd. (average particle diameter: 270 nm)	3	3
α -alumina HIT55 (HIT55/MR110/MEK – 5/1/4 parts individual dispersion)	0.5	0.5
Nitrocellulose resin	108	108
Polyurethane resin	15	15
Polyisocyanate	40	40
Polyester resin	5	5
Dispersing agent: copper oleate	4	4

Component	Weight by Part Sample A	Weight by Part Samples B and C
copper phthalocyanine	4	4
barium sulfate	5	5
Methyl Ethyl Ketone (MEK)	2200	865
Butyl Acetate	300	308
Toluene	600	469

Id. ¶¶ 4, 7–8; *see* Ex. 1017 ¶ 119.

With respect to Sample A, Mr. Kasada states that the back-coating liquid layer “was coated onto a sheet of aramid” having a thickness of 4.4 μm using an available coater and then dried, resulting in a back-coating layer that is 0.5 μm thick, but was not calendared “due to limitations of the available machinery.” Ex. 1019 ¶¶ 5–6.

Mr. Kasada further testifies that the amount of solvent used in the back-coating layer of Sample B is different than that used in Sample A, but that “the same substrate, magnetic layer, and non-magnetic layer were used.”

Id. ¶ 7. According to Mr. Kasada, the “changes were made so that the concentration of the back coating layer liquid (i.e. the ratio of solids to solvents) was more suitable for use with a small coater” that existed in 2004.

Id. Mr. Kasada also testifies that “Sample C has a backcoat layer created using the same formulation and methods as described for” Sample B, “using a small coater to coat the back coating layer liquid onto the substrate.” *Id.*

¶ 8. After coating and drying, Sample C “was calendared at a roll temperature of 90 °C and a linear pressure of 2940 N/cm,” “using 7 metal rolls, with the tape passing through 6 nips between the metal rolls.” *Id.*

Mr. Kasada testifies that he prepared Samples A, B, and C for shipment to Dr. Raeymaekers by cutting strips from each sample and then

mounting each strip on a glass slide “with the back coating layer facing up.” Ex. 1019 ¶¶ 9–10. Mr. Kasada explains that “[f]or purposes of labeling the samples, Tape Sample B was labeled ‘(1),’ Test Sample C was labeled ‘(2),’ and Test Sample A was labeled ‘(3).’” *Id.* ¶ 10.

2. *Surface Roughness Measurements*

Dr. Raeymaekers testifies that he “measured the surface parameters of each tape sample using a Zygo NewView 5000 5032 optical surface profiler.” Ex. 1018 ¶ 83. Dr. Raeymaekers explains that he took measurements “at multiple locations on the tape” using “an evaluation window of ($W = 340 \mu\text{m}$, $L = 450 \mu\text{m}$),” which “was a typical window size for evaluating tape of this sort.” *Id.* ¶ 85. Dr. Raeymaekers further explains:

A trace measurement of the surface topography across the middle of the window of the testing field, in the tape lengthwise direction, was determined from the optical profiler measurement. At each location, I used the Zygo to measure R_{sk} , R_{ku} , R_{pm} , and R_z , taking the number reported by the Zygo machine. I then calculated plateau ratio as $\frac{R_{pm}}{R_z}$ based on the R_{pm} and R_z at the measurement location.

Id.

Dr. Raeymaekers testifies that he “took measurements at up to 3 locations for each tape sample,” and the “particular surface characteristics are the same ones referred to by [the ’774 patent], including skew ($R_{[s]k}$), kurtosis (R_{ku}), peak height mean (R_{pm}), peak-to-valley roughness (R_z), and plateau ratio (R_{pm}/R_z).” *Id.* ¶ 86. Dr. Raeymaekers testifies that he obtained the measurements of Samples 1, 2, and 3 depicted in Table 1, reproduced below.

Table 1: Measurement Results

	Sample 1		Sample 2			Sample 3		
Location	1	2	1	2	3	1	2	3
Skew (R_{sk})	0.4	0.3	0.32	0.24	-0.03	4.44	0.42	5.59
Kurtosis (R_{ku})	2.91	3.39	3.3	3.51	2.52	72.07	3.46	70.89
Peak Height Mean (R_{pm}) (nm)	13	13	13	15	14	61	20	45
Peak-to-Valley Roughness (R_z) (nm)	25	26	25	28	25	106	34	59
Plateau Ratio (R_{pm}/R_z)	0.52	0.5	0.52	0.54	0.56	0.58	0.59	0.76

Id. Table 1 sets forth the skew, kurtosis, peak height mean, peak-to-valley roughness, and plateau ratio values obtained by Dr. Raeymaekers for Samples 1–3. According to Dr. Raeymaekers, the measurements show that the skew, kurtosis, peak height mean, peak-to-valley roughness, and plateau measurements “recited in the ’774 Patent claims are met by Tape Samples 1–3.” *Id.* ¶ 87.

3. Analysis

Petitioner argues that “Aonuma provides four independent reasons why a tape with the measurements claimed by the ’774 Patent would have been obvious.” Pet. 35 (citing Ex. 1003 ¶ 238). First, Petitioner argues that a “POSITA would have found it obvious based on Aonuma’s teachings to produce a tape such as Sample A, which satisfies the claimed measurements.” *Id.* at 36 (citing Ex. 1003 ¶¶ 232–237, 239). Second, Petitioner argues that even though Sample A was not calendered as taught by Aonuma, a POSITA would have understood that calendering “would have generally smoothed the back-coat layer by reducing the height of

protrusions” and “would generally result in smoother surface characteristics, i.e., lower skew, kurtosis, peak height mean, peak-to-valley roughness, and plateau ratio,” and, therefore, the measurements of Sample A nevertheless demonstrate that “Aonuma teaches a calendered magnetic tape that satisfies the claim elements for skew, kurtosis, peak height mean, peak-to-valley roughness, and plateau ratio.” *Id.* at 36–37 (citing Ex. 1003 ¶¶ 232–237, 240–241).

Third, Petitioner argues that “it would have been obvious to a POSITA to manufacture a tape such as Tape Sample B based on the formulation disclosed by Aonuma by changing the concentration of the solvents in the back-coat layer coating material.” Pet. 37 (citing Ex. 1019 ¶ 8; Ex. 1003 ¶ 242). According to Petitioner, varying the solvent ratio “was commonly performed in the magnetic tape industry to accommodate manufacturing choices and available equipment,” and “a POSITA would have been motivated to, and found it obvious to make the back-coat layer coating material concentration thicker by changing the solvent ratio because such changes could help optimize tape for equipment in the 2003–2005 time frame.” *Id.* at 38 (citing Ex. 1012 ¶ 1018; Ex. 1003 ¶ 243). Fourth, Petitioner argues that because “Sample C is merely a tape made using the same formulation as Sample B, but calendered according [to] the procedure taught by Aonuma,” a “POSITA would have been motivated to, and found it obvious to,” calender a tape such as Sample B as taught by Aonuma, “resulting in Sample C.” *Id.* at 40 (citing Ex. 1003 ¶¶ 227–228, 232–237, 246).

Petitioner relies solely on the measurements performed on Samples A, B, and C to meet the surface roughness limitations recited in the challenged

claims. *See, e.g.*, Pet. 43 (stating that Samples A, B, and C satisfy the “skew less than about 0.5 and a kurtosis less than about 4.0” limitation of independent claim 1), 45 (stating that Samples A, B, and C satisfy the “backside surface having a peak height mean less than about 200 [nm] and a peak-to-valley roughness less than about 325 nm” limitation of independent claim 15), 46 (stating that Samples A, B, and C meet the “backside surface having a skew less than about 0.5 and a kurtosis less than about 4.0, a peak height mean of less than about 200 [nm], and peak-to-valley roughness less than about 325 nm” limitations of independent claim 20). In that regard, Petitioner provides the following table that sets forth Dr. Raeymaekers’s measurements “paired with the corresponding original labels (Samples A–C) from Mr. Kasada’s declaration.”

Table 1

	Sample A			Sample B		Sample C		
Location	1	2	3	1	2	1	2	3
Skew (R_{sk})	4.44	0.42	5.59	0.4	0.3	0.32	0.24	-0.03
Kurtosis (R_{ku})	72.07	3.46	70.89	2.91	3.39	3.3	3.51	2.52
Peak Height Mean (R_{pm}) (nm)	61	20	45	13	13	13	15	14
Peak-to-Valley Roughness (R_z) (nm)	106	34	59	25	26	25	28	25
Plateau Ratio	0.58	0.59	0.76	0.52	0.5	0.52	0.54	0.56

Id. at 33 (citing Ex. 1018 ¶ 86; Ex. 1019 ¶¶ 4–8, 10; Ex. 1003 ¶ 231). The table reports the values for skew, kurtosis, peak height mean, peak-to-valley roughness, and plateau ratio obtained by Dr. Raeymaekers that correspond to the sample designations (Samples A–C) used in the Kasada Declaration.

Patent Owner challenges Petitioner’s showing that Samples A–C meet the claimed surface roughness characteristics. *See* PO Resp. 7–8, 26–62.

Specifically, Patent Owner argues that “[t]here is no solid evidence of what” Mr. Kasada made, “whether it reflected what was available in the prior art, or whether it was reliably tested.” *Id.* at 27. Patent Owner argues that the Kasada Declaration does not include detail sufficient to describe the process used to fabricate Samples A–C (*id.* at 31–32), and that there is no other evidence in the record that corroborates Mr. Kasada’s declaration (*id.* at 34–37). According to Patent Owner, “Mr. Kasada’s uncorroborated testimony lacks trustworthiness and should be given little if any weight,” and “is insufficient to meet [Petitioner’s] burden of proof.” *Id.* at 36–37.

An explanation of the experimental methods used to generate results is an essential part of experiment-based expert testimony. It forms part of the “underlying facts or data” on which the expert testimony should be based. *See* 37 C.F.R. § 42.65(a). Here, Petitioner relies on the surface roughness measurements of Samples A–C to show that Aonuma meets the surface roughness limitations of the challenged claims. Petitioner’s obviousness challenge, therefore, depends on whether Samples A–C accurately represent Aonuma’s disclosure and the allegedly obvious variations thereof on which Petitioner relies. Based on our review of the arguments and evidence of record, we determine that Petitioner does not establish adequately that Samples A–C were produced in a manner sufficiently reliable to prove unpatentability by a preponderance of the evidence.

The only evidence of record concerning how Samples A–C were produced is provided in the Kasada Declaration. In that regard, Mr. Kasada provides a general overview of the production process. Ex. 1019 ¶¶ 3–8. Mr. Kasada’s testimony includes the formulation used in the backcoating

liquid layer (with amounts indicated in parts by weight), explains that the coating process was performed using available coaters, and indicates whether (and how) the samples are calendered. *Id.*; *see supra* Section II.F.1. Mr. Kasada, however, does not explain the details of the production process, such as the absolute amount of each ingredient in the back-coating liquid layer, the identity of the machines used to produce the samples, or how the adjusted solvent amounts in Samples B and C were determined.

Mr. Kasada's deposition testimony does not fill in these gaps in the evidence. As an initial matter, Mr. Kasada revealed at his deposition that he directed the production of Samples A–C but did not perform any steps of the process. Ex. 2044, 25:21–28:4. In that regard, Mr. Kasada identified Mr. Takano, Mr. Matsuda, and Mr. Mandai as the individuals with whom he communicated regarding the sample production, but testified that he did not know whether they delegated tasks to other individuals. *Id.* at 25:21–26:14, 39:16–19, 50:25–51:9, 62:16–20. Mr. Kasada also testified that he does not remember observing any steps of the process as they were performed. *See, e.g., id.* at 39:5–9, 43:12–14, 51:14–17, 53:14–18, 60:2–19, 62:21–24, 63:25–64:3, 65:18–22, 80:16–18, 84:21–24.

Furthermore, as Patent Owner notes, neither Mr. Takano, Mr. Matsuda, nor Mr. Mandai kept written records of the work they performed, and they did not provide any written materials to Mr. Kasada with respect to the sample production process. PO Resp. 29–30 (citing Ex. 2044, 40:4–5); *see also* Ex. 2044, 98:14–99:3 (Mr. Kasada testifying that he does not recall “seeing anyone’s laboratory notebook” or taking any notes himself “regarding any aspect of the preparation of Samples A, B, and C”). Petitioner’s counsel also confirmed, in a conference call with the

Board, that there were no laboratory notebooks or other documents containing the protocols followed in preparing Samples A–C. Ex. 2007, 12:22–13:9.

Thus, the only evidence of record with respect to the production of Samples A–C comes from a witness that (1) did not participate in the production process, (2) cannot recall witnessing any of the steps first-hand, and (3) memorized, but did not record, any information that Mr. Takano, Mr. Matsuda, and Mr. Mandai reported to him about the production of Samples A–C. *See, e.g.*, Ex. 2044, 60:20–61:11 (Mr. Kasada confirming that he memorized the amounts of solvent that Mr. Matsuda used with respect to Sample B, and he “did not write them down”). Coupled with the fact that Mr. Kasada testified at his deposition that he did not know or could not recall numerous aspects of the sample production process, we are unable to determine that Samples A–C are accurate representations of Aonuma’s disclosures or allegedly obvious variations thereof. *See* PO Resp. 31–32 (identifying aspects of the production process that Mr. Kasada testified that he could not recall or did not know).

We also are not persuaded by Petitioner’s argument that any differences that might exist between the materials and machines used in the production of Samples A–C and those available in the prior art are speculative, and Patent Owner does not show that those differences would materially affect surface roughness. *See* Pet. 13–14. In any event, Petitioner argues, “Mr. Kasada explained that the materials were chosen to replicate the disclosed Aonuma formulation as closely as possible,” and that “Mr. Kasada also testified that ‘appropriate raw materials’ were selected based on the Aonuma reference.” Reply 13 (citing Ex. 2004, 26:24–27:3,

31:19–32:11). As set forth above, however, Petitioner and Mr. Kasada do not provide sufficient evidence to establish what materials and machines were used in the production of Samples A–C, let alone whether they would have materially affected the surface roughness characteristics of the samples. We cannot evaluate whether Mr. Kasada used “appropriate raw materials” or that the materials chosen replicated the Aonuma formulation as Petitioner contends because those details are not in evidence. Moreover, it is not Patent Owner’s burden to prove that Samples A–C do not accurately replicate Aonuma; it is Petitioner’s burden to prove that they do. See *Dynamic Drinkware*, 800 F.3d at 1378–79 (explaining that the burden of persuasion is on the petitioner to prove unpatentability, and that burden never shifts to the patentee).

Because Petitioner has not sufficiently established that Samples A–C are accurate representations of Aonuma or variations thereof, we likewise determine that the surface roughness characteristics of Samples A–C are not sufficient to establish that Aonuma teaches or suggests the surface roughness limitations of the challenged claims. Accordingly, we conclude that Petitioner has not established by a preponderance of the evidence that claims 1–11 and 15–20 of the ’774 patent would have been obvious over Aonuma.

G. Obviousness over Aonuma and Abe

Petitioner contends that the subject matter of claims 1–11 and 15–20 would have been obvious over the combined teachings of Aonuma and Abe. Pet. 49–64. Petitioner relies on the surface roughness measurements of Samples A, B, and C to establish that the combination discloses a backside surface having (a) “a skew less than about 0.5 and a kurtosis less than about

4.0” as recited in independent claim 1 (*id.* at 56–57); (b) “a peak height mean less than about 200 [nm] and a peak-to-valley roughness less than about 325 nm” as recited in independent claim 15 (*id.* at 58–59); and (c) “a skew less than about 0.5, a kurtosis less than about 4.0, a peak height mean less than about 200 [nm], and a peak-to-valley roughness less than about 325 nm” as recited in independent claim 20 (*id.* at 59–60). We determined above that Petitioner has not established by a preponderance of the evidence that Aonuma discloses the surface roughness characteristics of the challenged claims. *See supra* Section II.F. Because Petitioner does not rely on Abe to cure this deficiency, we are not persuaded that Petitioner has established by a preponderance of the evidence that independent claims 1, 15, and 20 would have been obvious over the combined teachings of Aonuma and Abe. Claims 2–11 depend, directly or indirectly, from claim 1, and claims 16–19 depend directly from claim 15. Accordingly, for the same reasons, we find that Petitioner also has not demonstrated that claims 2–11 and 16–19 would have been obvious over the combined teachings of Aonuma and Abe.

III. PETITIONER’S MOTION TO EXCLUDE

Petitioner moves to exclude Exhibit 2040 and paragraphs 121–126 of the Talke Declaration (Ex. 2026). Paper 33, 1. We do not reach the merits of Petitioner’s Motion to Exclude because our Decision does not rely on Exhibit 2040 or paragraphs 121–126 of the Talke Declaration. Accordingly, we dismiss Petitioner’s Motion to Exclude as moot.

IV. PATENT OWNER’S MOTION TO EXCLUDE

Patent Owner moves to exclude (1) paragraphs 1–8 and 10 of the Kasada Declaration (Ex. 1019); (2) paragraphs 220–297 of the Isobe Declaration (Ex. 1003); (3) paragraphs 80–93 of the Raeymaekers

Declaration (Ex. 1018); (4) paragraphs 65–77 of the Raeymaekers Rebuttal Declaration (Ex. 1031); and (5) Exhibits 1037 and 1038. Paper 36, 3. We do not consider the merits of Patent Owner’s Motion to Exclude because our Decision does not rely on Exhibits 1037, 1038, or the identified paragraphs of the Isobe Declaration, the Raeymaekers Declaration, or the Raeymaekers Rebuttal Declaration, and, as explained above, even if the disputed evidence in the Kasada Declaration is considered, Petitioner has not shown by a preponderance of the evidence that claims 1–11 and 15–20 of the ’774 patent are unpatentable. Accordingly, we dismiss Patent Owner’s Motion to Exclude as moot.

V. CONCLUSION

After reviewing the record and weighing the evidence offered by both parties, we determine that Petitioner has demonstrated, by a preponderance of the evidence, that claims 15 and 17 of the ’774 patent are unpatentable as anticipated by Ishikawa, but has not demonstrated that claims 1–11 and 15–20 of the ’774 patent are unpatentable as obvious over Aonuma or the combined teachings of Aonuma and Abe.

VI. ORDER

In consideration of the foregoing, it is

ORDERED that claims 15 and 17 of the ’774 patent are determined to be *unpatentable*;

FURTHER ORDERED that Petitioner has not shown by a preponderance of the evidence that claims 1–11, 16, and 18–20 of the ’774 patent are unpatentable;

FURTHER ORDERED that Petitioner’s Motion to Exclude (Paper 33) is *dismissed*;

FURTHER ORDERED that Patent Owner's Motion to Exclude (Paper 36) is *dismissed*; 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.

IPR2017-01268
Patent 7,029,774 B1

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