

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FUJIFILM CORPORATION,
Petitioner,

v.

SONY CORPORATION
Patent Owner.

Case IPR2017-01267
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 not shown by a preponderance of the evidence that claims 1–13 and 15–20 of U.S. Patent No. 7,029,774 B1 (“the ’774 patent,” Ex. 1001) are unpatentable.

A. *Procedural History*

FUJIFILM Corporation (“Petitioner”) filed a Petition (“Pet.”) to institute an *inter partes* review of claims 1–13 and 15–20 of the ’774 patent based on the following grounds: (1) whether claims 1–12 and 15–20 are unpatentable under 35 U.S.C. § 102 as being anticipated by Law¹, and (2) whether claims 1–13 and 15–20 are unpatentable under 35 U.S.C. § 103 as being obvious over the combined teachings of Law and Sasaki². Paper 1, 5. 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 claims 1–13 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 1–13 and 15–20 are unpatentable under 35 U.S.C. § 103 as obvious over the combined teachings of Law and Sasaki.³ Paper 11 (“Dec. on Inst.” or “Institution Decision”), 16.

¹ U.S. Patent No. 5,507,747, issued March 4, 1997 (Ex. 1004).

² Japanese Patent App. Pub. No. P2003-317228A, published Nov. 7, 2003 (Ex. 1005). We refer to the English translation of the original reference as “Sasaki.”

³ We subsequently modified our Institution Decision to include review of “all challenged claims and all of the grounds presented in the Petition”

After institution of trial, Patent Owner filed a Patent Owner Response (“PO Resp.,” Paper 18), and Petitioner filed a Reply (“Reply,” Paper 25). Petitioner relies on the Declaration of Ryosuke Isobe⁴ (“the Isobe Declaration,” Ex. 1003), and the Rebuttal Declaration of Dr. Bart Raeymaekers (“the Raeymaekers 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 37), and Petitioner filed a Response (Paper 38). An oral hearing was held on July 31, 2018, and a transcript is included in the record. Paper 42 (“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. 63. 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. The ’774 patent currently is the subject of IPR2017-01268, also filed by Petitioner. Pet. 63.

(Paper 21, 2), then granted (Paper 29) the parties’ Joint Motion to Limit the Petition (Paper 28), limiting this proceeding to the originally instituted ground, namely, obviousness of claims 1–13 and 15–20 based on the combined teachings of Law and Sasaki.

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.

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.

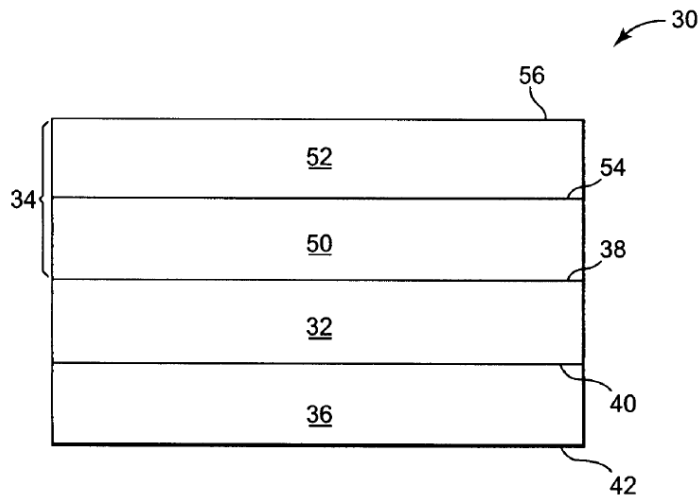


Fig. 2

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 “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 is a measure of “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 the 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 the 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 formed over 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 embossment of the recording surface, the backside defining 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 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. 17–18 (citing Ex. 1003 ¶ 65). 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 (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 Institution Decision, 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).

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. Law

Law “relates to magnetic recording media, and in particular, to a backside coating of magnetic recording media wherein the backside coating includes a particulate filler.” Ex. 1004, 1:8–11. Law states that, although “[t]he prior art provides the skilled artisan with various particles which may be included in the backside coating of a magnetic recording media to improve the running properties of the media,” many of the particles “are so hard they can be too abrasive and can cause excessive wear to mechanisms within a recording/playback device,” and “[t]he use of softer particles can result in different problems, for instance, higher coefficients of friction and a lack of durability of the backside coating.” *Id.* at 2:20–28. Law, therefore, teaches incorporating “multicomponent, nonmagnetic particles which combine the characteristics of both softer and harder compounds, but which attain running properties superior to media without such multicomponent particles” into the backside coating of a magnetic recording medium. *Id.* at 2:29–33.

Specifically, Law teaches that the backside coating includes nonmagnetic particles dispersed in a binder, wherein a first component of the particles has a Mohs hardness equal to or less than 7, and a second component of the particles has a Mohs hardness greater than 7. *Id.* at 2:51–

56. Law explains that relatively harder particles, which can be “excessively abrasive,” “are known to reduce friction between the backside and guide pins, and are considered stable over time,” and relatively softer particles are less abrasive, “but may not be effective in reducing friction, and may actually increase friction,” and “are also considered to provide a less stable backside coating.” *Id.* at 3:47–57. Therefore, according to Law, “combining these various harder and softer components into a single particle creates the synergistic effect of improving frictional properties, while at the same time reducing the abrasiveness of the backside coating.” *Id.* at 3:57–61.

Law further teaches that “the size of the particles in a backside coating, the roughness of the backside, and/or the ratio of particle size to backside coating caliper may affect the running properties of a magnetic recording medium.” *Id.* at 5:29–33. Law teaches that particles “may be any size which, when included in the backside coating of a magnetic recording medium, will improve the running properties of that magnetic recording medium,” and “generally have a mean particle size in the range from about 0.1 to 4 μm , with in the range from about 0.4 to 1.2 μm being preferred, and the range from about 0.95 to 1.05 μm being most preferred.” *Id.* at 5:40–48. Because roughness is “a major factor in affecting the frictional and running properties of a magnetic recording medium,” Law states that “[a] moderately rough backside is preferred.” *Id.* at 5:49–52. If the backside is too rough, however, it “might cause defects in the magnetic side of the medium due to embossing.” *Id.* at 5:57–59. In that regard, Law describes an embodiment for use in digital video recording media where the roughness of the backside coating “is preferably in the range from about 0.1 to 0.22 microns, most

preferably within the range from about 0.1065 to 0.15,” and another embodiment for use in computer cartridge tape where “the roughness value is preferably in the range from about 0.05 to 0.6 microns, most preferably in the range from about 0.2 to 0.4 microns.” *Id.* at 6:9–16.

2. *Sasaki*

Sasaki “seeks to provide highly reliable magnetic recording mediums by increasing the medium’s durability through preventing damage to the magnetic layers caused by the non-magnetic back coat on the opposite surface of the non-magnetic substrate.” Ex. 1005 ¶ 17. Sasaki teaches a magnetic recording medium “consisting of a non-magnetic substrate with a magnetic layer of magnetic powder and binder applied over a non-magnetic layer of non-magnetic powder and binder on one surface, with a non-magnetic back coat applied to the opposite side,” wherein the “back coat surface has protrusion sizes and distribution” as follows: (1) protrusions of 20–40 nm—1.2 protrusions per μm^2 ; (2) protrusions of 40–80 nm—0.4 protrusions per μm^2 ; (3) protrusions of 80–100 nm—0.02 protrusions per μm^2 ; and (4) protrusions over 100 nm—none. *Id.* ¶¶ 19–20. The back coat “is comprised of a binder and non-magnetic powder,” and “[t]he non-magnetic powder consists of carbon black with a mean particle diameter of 10–50 nm, and carbon black with a mean particle diameter of 60–100 nm.” *Id.* ¶ 21. According to Sasaki, when the back coat meets these specifications, “the damage that occurs to the magnetic layer surface during repeated operations” is reduced, and “the amount of structural imprints of the protrusions from the back coat imprinted onto the magnetic layer when wound by methods such as tape reels for long-term storage” is minimized. *Id.* ¶ 22.

E. Obviousness over Law and Sasaki

Petitioner contends that claims 1–13 and 15–20 are unpatentable under 35 U.S.C. § 103(a) as obvious over the combined teachings of Law and Sasaki. Pet. 37–63; Reply 14–27. 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. 7–69.

1. Claims 1 and 20

Independent claims 1 and 20 require that the backside surface of the claimed magnetic recording medium have “a skew less than about 0.5” and “a kurtosis less than about 4.0.” Ex. 1001, 12:59–61, 14:38–40. Petitioner’s obviousness challenge is predicated on the inherency of the skew and kurtosis values of the backside surface of Law’s magnetic tape, when it is modified in light of the teachings in Sasaki. *See* Tr. 18:19–25 (“JUDGE KOKOSKI: So then, are you relying on the inherency argument that they would meet the claimed—that the combination would meet the claimed skew and kurtosis values in claim 1? MR. WILLIAMS: So, with respect to Ground 2, we don’t have any reported skew kurtosis, right. So the question is: would the making of that tape have inherently included the skew and kurtosis? I think the answer is yes, it would have.”). In particular, Petitioner argues that skew and kurtosis values within the claimed range would naturally result from reducing the size and prevalence of protrusions in Law’s backcoat. *See* Pet. 45 (“[A] reduction of protrusions would have naturally led to a backside surface having a skew less than about 0.5 and a kurtosis less than about 4.0 . . .”), 46 (“By reducing the number of peaks, the overall surface may become closer to a Gaussian distribution, which by

definition has a skew of 0.”), 47 (“[T]he claimed kurtosis measurement is merely the result of removing large protrusions from the backside surface.”), 48 (“[A] reduction of backside protrusions would naturally result in a kurtosis of less than 4.0.”), 49 (“As the frequency of large protrusions is reduced, the skew of the backcoat surface approaches 0 and the kurtosis becomes closer to 3.”); Reply 23 (“Skew and kurtosis are inherent roughness properties of a surface. The reduction in skew and kurtosis to approach Gaussian values of 0 and 3.0 are natural consequences of removing large protrusions on a surface while leaving the smaller protrusions.”). Patent Owner argues that there is “no reason to expect that the combination of Law and Sasaki would inherently meet” the claimed roughness parameters. PO Resp. 47 (citing Ex. 2026 ¶¶ 75–83).

The Federal Circuit has explained that the concept of inherency in the patentability analysis was originally rooted in anticipation and “must be limited when applied to obviousness.” *PAR Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1195 (Fed. Cir. 2014); *see also Honeywell Int’l Inc. v. Mexichem Amanco Holdings S.A. de C.V.*, 865 F.3d 1348, 1354–55 (Fed. Cir. 2017) (cautioning that “the use of inherency in the context of obviousness must be carefully circumscribed.”). The Federal Circuit has further explained that:

A party must . . . meet a high standard in order to rely on inherency to establish the existence of a claim limitation in the prior art in an obviousness analysis—the limitation at issue must necessarily be present, or the natural result of the combination of elements explicitly disclosed by the prior art.

PAR Pharm., 773 F.3d at 1195–96. Thus, inherency “may not be established by probabilities or possibilities.” *Id.* at 1195 (quoting *In re Oelrich*, 666 F.2d 578, 581 (CCPA 1981)). “The mere fact that a certain thing may

result from a given set of circumstances is not sufficient’ to render the result inherent.” *Millennium Pharms., Inc. v. Sandoz Inc.*, 862 F.3d 1356, 1367 (Fed. Cir. 2017) (quoting *Oelrich*, 666 F.2d at 581).

To support its contention that reducing the protrusions on the backcoat of Law’s magnetic tape, as taught by Sasaki, would result in a backside surface that necessarily has “a skew less than about 0.5 and a kurtosis less than about 4.0,” Petitioner first directs us to Law’s magnetic tape, which Petitioner characterizes as having “the same structure that the ’774 Patent alleges to result in the claimed properties.” Pet. 37–38. In particular, Petitioner points to Law’s Sample 5, and argues that it produces a magnetic tape “with a structure and composition that is substantially identical to” the magnetic tapes described in Examples 1 and 2 in the ’774 patent. *Id.* at 22–25. As we noted in the Institution Decision, however, there are several differences between Examples 1 and 2 in the ’774 patent and Sample 5 in Law. Dec. on Inst. 11–12. For example, Law’s Sample 5 does not include the same size carbon black in the same amounts as Examples 1 or 2 of the ’774 patent. *Compare* Ex. 1004, col. 9–10, Table 1, *with* Ex. 1001, 10:46–52. There are also “differences in amounts of ‘Filler,’ ‘Wear Particles,’ and ‘Hard Binder’ used in the ’774 examples and Law’s Sample 5.” Dec. on Inst. 12. We determined that these differences between Law’s Sample 5 and Examples 1 and 2 in the ’774 patent precluded a finding that Law’s magnetic tape inherently discloses the claimed skew and kurtosis values. *Id.* The record developed during trial does not change this conclusion.

Petitioner then directs us to Sasaki, which recognizes that to improve the quality of magnetic tape “it is necessary to create a back coat that reduces protrusions imprinting upon the magnetic layer during long-term

storage while preventing damage to the magnetic layer during repeated operations.” Ex. 1005 ¶ 16. Petitioner argues that Sasaki teaches “that the use of fine-grain, uniformly-sized carbon black particles in the backside coating would prevent embossment by removing the large backside particles that created protrusions on the surface.” Pet. 38 (citing Ex. 1005 ¶ 130; Ex. 1003 ¶ 157). Petitioner specifically identifies Sasaki’s Examples 1–4,

where the backing layer used a fine carbon black with a mean particle size of 20 to 70 nm, [and] the backing layer’s protrusion distribution was:

20 to 40nm – 1.2/ μm^2

40 to 80nm – 0.4/ μm^2

80 to 100nm – 0.2/ μm^2

Over 100nm – None.

In these samples, there was almost no sign of backing layer protrusions imprinting on to the magnetic layer after storage, and there was no observable damage after the run durability stress testing.

Ex. 1005 ¶ 130.

Petitioner also points to the following testimony from the Isobe Declaration:

As would have been understood by a person of ordinary skill in the art, a reduction of protrusions would have naturally led to a backside surface having a skew less than about 0.5 and kurtosis less than about 4.0, and a person of ordinary skill in the art would have found it obvious, when applying Sasaki’s teachings to Law, to create a tape with such measurements.

. . . .

As the frequency of large protrusions is reduced, the skew of the backcoat surface approaches 0 and the kurtosis becomes closer to 3. Thus, a person of ordinary skill in the art would have found

it obvious to create magnetic tape according to Law's formulation, and reducing the prevalence of backside peaks and embossment per Sasaki's teachings, resulting in a magnetic tape with a backside surface roughness with skew less than about 0.5 and a kurtosis less than about 4.0.

Ex. 1003 ¶¶ 170–174.

Petitioner's cited evidence establishes several facts. First, it establishes that Law discloses a process using 30 nm carbon black to produce the backside coating of the magnetic tape. Ex. 1004, col. 9–10, Table 1. Second, it establishes that Law teaches that protrusions in the backside surface can cause embossing on the magnetic tape's magnetic layer. *Id.* at 5:56–59, 6:31–39. Third, it establishes that Sasaki teaches that reducing the size and prevalence of protrusions in the backside surface prevents embossing on, and damage to, the magnetic layer of the magnetic tape. Ex. 1005 ¶¶ 15–16. Fourth, it establishes that Sasaki discloses a backside surface with a protrusion size distribution having the following specifications: 1.2 protrusions of 20 to 40 nm per μm^2 , 0.4 protrusions of 40 to 80 nm per μm^2 , 0.02 protrusions of 80 to 100 nm per μm^2 , and no protrusions over 100 nm. *Id.* ¶ 19. Fifth, it establishes that Sasaki discloses a backside coating made using 20 nm fine particle carbon black that matches these protrusion size distribution specifications. *Id.* ¶¶ 92, 129; *see also id.* ¶ 58 (“Carbon black may be a combination of fine particle carbon black with a mean particle size of 10 to 50nm, and medium particle carbon black with a mean particle size of 60 to 100nm, or preferably made up entirely of the fine particle carbon black.”).

The evidence, however, does not establish that a backside surface having a skew less than about 0.5 and a kurtosis less than about 4.0 necessarily results from reducing the size and prevalence of the protrusions

on the backside surface of Law's magnetic tape. As Petitioner agrees, Law and Sasaki do not discuss skew and kurtosis values. *See* Pet. 29 (stating that Law does not expressly disclose skew or kurtosis values); Reply 23 (recognizing that neither Law nor Sasaki contain express disclosures of skew and kurtosis); Tr. 18:22–23 (Petitioner's counsel noting that there are no reported skew and kurtosis values in Law or Sasaki). Thus, Petitioner relies on Mr. Isobe's testimony to establish that reducing the protrusions on Law's backside surface would result in a skew less than about 0.5 and a kurtosis less than about 4.0. *See* Pet. 45–49; Ex. 1003 ¶¶ 79–81, 170–174. In that regard, Mr. Isobe testified as follows:

The '774 Patent admits that skew and kurtosis are measures of the degree to which the prevalence of peaks on the backside surface are reduced. Ex. 1001 at 8:20–23 (“[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.”). The prevalence of peaks on the backside surface (and therefore skew) can be reduced using only uniformly-sized, fine carbon black particles. *Id.* at 5:22–38 (“since the largest 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.”). By reducing the number of peaks, the overall surface may become closer to a Gaussian distribution, which by definition has a skew of zero. *See, e.g.*, Ex. 1014 at 5:35–36; Fig. 2A[.]

Ex. 1003 ¶ 171. Mr. Isobe further stated that “[t]he '774 Patent admits that the claimed kurtosis measurement is merely the result of removing large protrusions from the backside surface,” and points to the '774 patent's description that “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.* ¶ 172 (quoting Ex. 1001, 9:2–5). According to Mr. Isobe, “[b]ecause a random surface would contain less extreme peaks and valleys, a surface approaching a ‘truly Gaussian surface’ is desired,” and, “[t]herefore, the ’774 Patent admits that a reduction of backside protrusions would naturally result in a kurtosis of less than 4.0.” *Id.* (citing Ex. 1001, 9:6–10; Ex. 1014, 4:17–32, 5:35–36).

Mr. Isobe’s testimony is insufficient to support a finding that reducing the protrusions in the Law backside coating necessarily results in a backside surface having a skew of less than about 0.5 and a kurtosis of less than about 4.0. First, Mr. Isobe mischaracterizes the disclosures of the ’774 patent. The ’774 patent does not teach that generally reducing protrusions on the backside surface results in the claimed skew and kurtosis values. Instead, the ’774 patent teaches configuring the backside surface to provide a larger number of peaks with relatively small and uniform heights, so that a large surface area of the backside surface contacts the recording surface of an adjacent winding, distributing the load over a larger area of the recording surface and decreasing the number of embossments formed in the recording surface. Ex. 1001, 5:52–6:25. The ’774 patent explains that this provides a “a relatively random backside surface” that approaches a Gaussian surface. *Id.* at 5:18–21. Although the ’774 patent explains that positive skew can be decreased by decreasing the predominance of high peaks, it does not follow that reducing the predominance of high peaks alone necessarily results in a skew of less than about 0.5. *Id.* at 8:20–23. Similarly, the ’774 patent explains that “relatively spiky surfaces” have a kurtosis greater than three, and “perfectly random surfaces” (e.g., Gaussian surfaces) have a kurtosis generally equal to three, but does not state that reducing the prevalence

and/or height of protrusions on a backside surface necessarily results in a kurtosis less than about 4.0. *Id.* at 9:2–10.

Mr. Isobe also relies on Bhushan⁵ to support the contention that reducing backside protrusions would naturally result in a skew less than about 0.5 and a kurtosis less than about 4.0. Ex. 1003 ¶¶ 171–172 (citing Ex. 1014, 4:17–32, 5:35–36, Fig. 2A). Bhushan is directed to “a non-gaussian surface with a positive skewness value of at least 3 or greater and preferably as high a kurtosis value as is possible to create.” Ex. 1014, 4:11–14. In particular, Mr. Isobe points to Bhushan’s teaching that:

Skewness is a surface parameter which represents a measurement of symmetry of a surface profile. In a skewed surface, the distribution gradually rises to a maximum of zero and then falls at a different rate. The difference between the mean and the mode, divided by the standard deviation, is referred to as skewness. Skewness is determined as the third moment of a probability density function of a modeled surface. Kurtosis (K) represents the peakedness (degree of pointedness or bluntness) of a surface distribution. A surface with low kurtosis has a relatively larger number of peaks than valleys at a certain height. A gaussian distribution has a skewness of zero and kurtosis of three. Kurtosis is measured as the fourth moment of a probability density function of a modeled surface.

Id. at 4:15–32; *see also id.* at 5:35–36 (“A gaussian distribution has a skewness of zero and a kurtosis of 3.”). The portions of Bhushan on which Mr. Isobe relies simply define skew and kurtosis, and provide the values of skew and kurtosis that define a Gaussian surface, but do not teach that reducing protrusions necessarily results in a skew of less than about 0.5 and a kurtosis less than about 4.0 as Mr. Isobe contends.

⁵ U.S. Patent No. 6,007,896, issued Dec. 28, 1999 (Ex. 1014).

At best, the evidence establishes that reducing protrusions in Law's backside coating **may** result in the surface **approaching** a Gaussian distribution (namely, a skew of 0 and a kurtosis of 3). *See* Ex. 1003 ¶ 171 ("By reducing the number of peaks the overall surface **may become closer** to a Gaussian distribution, which by definition has a skew of zero." (emphasis added)), ¶ 174 ("As the frequency of large protrusions is reduced, the skew of the backcoat surface **approaches** 0 and the kurtosis **becomes closer to 3.**" (emphases added)). There is no evidence of record, however, that establishes the skew and kurtosis values of Law's backside coating before reducing the protrusions as Petitioner proposes. While it is possible that reducing Law's protrusions could result in skew and kurtosis values within the claimed range, it is also possible that reducing the protrusions could result in a surface that approaches a Gaussian distribution but still has a skew above 0.5 and a kurtosis above 4.0. *See* Ex. 2026 ¶¶ 36–60, 77–83, 90; *see also* *PAR Pharm.*, 773 F.3d at 1195 (Inherency "may not be established by probabilities or possibilities."). Thus, even if reducing the protrusions on Law's backside coating caused the surface to approach a Gaussian distribution, that is not sufficient to establish that it necessarily results in a skew less than about 0.5 and a kurtosis less than about 4.0 as claimed.

The skew and kurtosis values recited in claims 1 and 20 are not simply properties possessed by any backside coating that otherwise satisfies the structural limitations. Instead, they are recited as limitations on which magnetic recording media fall within the scope of the claims. The evidence of record does not establish that reducing the protrusions in Law's backside coating, as taught by Sasaki, "would have naturally led to a backside surface

having a skew less than about 0.5 and a kurtosis less than about 4.0” as Petitioner contends. Pet. 45. Accordingly, on the record before us, we find that Petitioner has not established that claims 1 and 20 would have been obvious over the combined teachings of Law and Sasaki.

2. *Claims 2–13*

Claims 2–13 depend, directly or indirectly, from independent claim 1, and therefore incorporate the skew and kurtosis limitations recited therein. Ex. 1001, 12:62–13:36. For the reasons set forth above with respect to claim 1, we find that Petitioner also has not demonstrated the unpatentability of any of claims 2–13. *See In re Fritch*, 972 F.2d 1260, 1266 (Fed. Cir. 1992) (“[D]ependent claims are nonobvious if the independent claims from which they depend are nonobvious.”).

3. *Claims 15–19*

Independent claim 15 requires that the backside surface of the claimed magnetic recording medium has “a peak height mean less than about 200 [nm] and a peak-to-valley roughness less than about 325 nm.” Ex. 1001, 14:9–11. Petitioner argues that Law discloses these elements because it “teaches a backside surface configured to decrease the embossment of the recording surface.” Pet. 35, 59 (citing Ex. 1003 ¶ 144). In support of this contention, Mr. Isobe testified that:

While Law does not expressly disclose peak height mean or peak-to-valley roughness values for its backside surface roughness, Law discloses a substantially identical method as that of the ’774 Patent. *See supra* ¶¶ 124–128. Moreover, Law discloses that the structure is composed of the same material (small-sized carbon black particles) that provides the purportedly inventive property according to the ’774 Patent. *See id.* Therefore, Law provides a prima facie case for the inherent disclosure of a “backside surface having a peak height mean less

than about 200 [nm] and a peak-to-valley roughness less than about 325 nm.”

Ex. 1003 ¶ 145. As we noted in the Institution Decision, “Petitioner relies on the same arguments it made with respect to the skew and kurtosis limitations of claim 1 in contending that ‘Law provides a prima facie case for the inherent disclosure’” of the peak height mean and peak-to-valley roughness characteristics of claim 15. Dec. on Inst. 13 (citing Pet. 35, 37). Because we determined that the differences between Law’s Sample 5 and Examples 1 and 2 in the ’774 patent precluded a finding that Law’s magnetic tape inherently discloses the claimed skew and kurtosis values, we also determined that Law did not inherently disclose the limitations of claim 15. *Id.* As discussed above, the record developed during trial does not change this conclusion.

Petitioner also argues that “a POSITA would have found it obvious to create magnetic tape according to Law’s formulation, and to further reduce the prevalence of peaks on the backside per the teachings of Sasaki,” and that “[r]educing the size and frequency of peaks would reduce the peak height mean and peak-to-valley roughness of the backside surface.” Pet. 59 (citing Ex. 1003 ¶¶ 177–181, 195). In support of Petitioner’s contentions, Mr. Isobe testified as follows:

The claimed values for peak-to-valley roughness are further consequences of reducing the number of relatively large peaks. Peak-to-valley roughness describes the measure of the height difference between a peak and an adjacent valley. Ex. 1001 at 8:38–42. The ’774 Patent is clear that the claimed values of peak-to-valley roughness are a direct consequence of the smaller, less extreme peaks. Ex. 1001 at 8:47–51 (“Since peaks 64 defined by the magnetic recording medium 30 generally are smaller than prior art peaks, the magnetic recording medium

generally decreases the peak-to-valley roughness of the magnetic recording medium 30.”)

Id. ¶ 180. According to Mr. Isobe, because “[p]eak-to-valley roughness is a measure of the difference between a peak and an adjacent valley,” “[r]educing the height of peaks (protrusions)” on Law’s backside surface as taught by Sasaki “would reduce this characteristic.” *Id.* ¶ 181 (citing Ex. 1001, 8:46–51).

The ’774 patent defines peak-to-valley roughness as “an average maximum profile of the ten greatest peak-to-valley separations in the evaluation area.” Ex. 1001, 8:38–40. The ’774 patent explains that “[t]he peak-to-valley separations are determined by measuring the distance from the top of a peak to the bottom of an adjacent valley.” *Id.* at 8:40–42. Law and Sasaki do not discuss the peak-to-valley roughness characteristics of their described backside surfaces. *See* Exs. 1004, 1005. Nor are we directed to evidence in the record establishing the depth of the valleys in either Law’s or Sasaki’s backside surface. Although lowering peak height while leaving the depth of the valleys unchanged would generally decrease peak-to-valley roughness (Ex. 1001, 8:47–51), neither Petitioner nor Mr. Isobe provide sufficient evidence or explanation to establish that simply lowering the protrusions on Law’s backside coating as taught by Sasaki results in a peak-to-valley roughness less than about 325 nm as required by claim 15.

Assuming that the resulting backcoat surface has the protrusion height distribution described by Sasaki, without knowledge of the depth of the adjacent valleys, the value of the peak-to-valley roughness cannot be determined. *See* Ex. 2026 ¶¶ 75–78. It is possible that it could be within the claimed range, but it is also possible that reducing the protrusions could result in decreased peak-to-valley roughness with a value greater than 325

nm. *See id.* ¶¶ 79–83. Thus, even if reducing the protrusions on Law’s backside coating in accordance with Sasaki’s teachings caused the peak-to-valley roughness to decrease, that alone is not sufficient to establish that it results in a peak-to-valley roughness less than about 325 nm.

Accordingly, we determine that Petitioner did not carry its burden to demonstrate that claim 15 would have been obvious over the combined teachings of Law and Sasaki. Claims 16–19 depend directly from claim 15. For the same reasons, we find that Petitioner also has not demonstrated the unpatentability of dependent claims 16–19.

III. CONCLUSION

After reviewing the record and weighing the evidence offered by both parties, we determine that Petitioner has not demonstrated by a preponderance of the evidence that claims 1–13 and 15–20 of the ’774 patent are unpatentable.

IV. ORDER

In consideration of the foregoing, it is

ORDERED that Petitioner has not shown by a preponderance of the evidence that claims 1–13 and 15–20 of the ’774 patent are 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.

IPR2017-01267
Patent 7,029,774 B1

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