

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SONY CORPORATION,
Petitioner,

v.

FUJIFILM CORPORATION,
Patent Owner.

Case IPR2018-01752
Patent 6,835,451 B2

Before JO-ANNE M. KOKOSKI, JEFFREY W. ABRAHAM, and
MICHELLE N. ANKENBRAND, *Administrative Patent Judges*.

KOKOSKI, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314(a)

I. INTRODUCTION

Sony Corporation (“Petitioner”) filed a Petition to institute an *inter partes* review of claims 1–14 of U.S. Patent No. 6,835,451 B2 (“the ’451 patent,” Ex. 1001). Paper 2 (“Pet.”). Fujifilm Corporation (“Patent Owner”) filed a Preliminary Response. Paper 7 (“Prelim. Resp.”). With Board authorization, Petitioner filed a Reply (“Reply,” Paper 12), and Patent Owner filed a Sur-Reply (“Sur-Reply,” Paper 13).

Institution of an *inter partes* review is authorized by statute when “the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314; see 37 C.F.R. § 42.4. Upon consideration of the briefing and the evidence of record, we determine that Petitioner has not established a reasonable likelihood of prevailing with respect to the unpatentability of any of claims 1–14 of the ’451 patent. Accordingly, we deny the Petition and do not institute an *inter partes* review.

A. *Related Proceedings*

The parties identify the following related proceedings involving the ’451 patent: (1) *Fujifilm Corp. v. Sony Corp.*, 1-17-cv-01309 (D. Del. 2017); and (2) *Certain Magnetic Data Storage Tapes and Cartridges Containing the Same*, 337-TA-1076 (USITC Sept. 19, 2017). Pet. 6; Paper 3, 1.

B. *The ’451 Patent*

The ’451 patent, titled “Magnetic Recording Medium,” is directed “to a magnetic recording medium capable of high-density recording.” Ex. 1001, 1:5–6. The ’451 patent explains that “the use of high-sensitivity

magnetoresistive heads (referred to hereinafter as “MR heads”) in reproduction has been proposed and put into practice” because “the trend [in magnetic recording media] has been toward high densification accompanied by narrowing of the track width and shortening of the recording wavelength.” *Id.* at 1:14–19. The ’451 patent further explains that “[w]hen employing MR heads, characteristics different from those of conventional inductive head media are required,” including adding nonmagnetic powder “to the magnetic layer to achieve a volume packing density of 15 to 35 percent in the magnetic layer in an attempt to achieve both saturation and low noise.” *Id.* at 1:20–38. However, “nonmagnetic powder and magnetic powder aggregate, resulting in nonuniform distribution,” which is “problematic in that uniform distribution of magnetic particles in the magnetic layer, required to reduce noise, is not achieved.” *Id.* at 1:45–49. According to the ’451 patent, “[t]he present inventors conducted extensive research into medium noise, resulting in the discovery of the structural parameters of the magnetic layer that are required to reduce noise from the perspective of micromagnetics,” and “also discovered that by controlling these structural parameters, it was possible to achieve reduction in noise to an unprecedented level.” *Id.* at 2:4–10.

In that regard, the ’451 patent discloses that “in MR heads, it is known that high residual magnetization is not necessarily associated with improved performance,” and, therefore, “the residual magnetization Φ_r of the magnetic layer is made 5 to 50 mA based on the element thickness and saturation of the MR head employed, thereby preventing saturation of the head.” *Id.* at 2:40–46. The ’451 patent further discloses that, “particularly when microparticles are employed [in the magnetic layer], there are problems in

that the magnetic particles aggregate, generating a portion behaving just like a large magnetic material and diminishing the S/N [signal to noise] ratio.”

Id. at 2:67–3:3. Because “magnetic blocks (referred to hereinafter as ‘magnetic clusters’”) measured by magnetic force microscopy (MFM) were related to medium noise, changing with aggregation and magnetostatic bonding of magnetic particles,” a good S/N ratio is achieved when “the ratio (S_{dc}/S_{ac}) of the average area S_{dc} of magnetic clusters under DC magnetized condition to the average area S_{ac} of magnetic clusters under AC erased condition” falls within a range of 0.8 to 2.0. *Id.* at 3:4–14.

C. Challenged Claims

Petitioner challenges claims 1–14 (“the challenged claims”) of the ’451 patent. Claim 1, the only independent claim, is reproduced below.

1. A magnetic recording medium comprising a magnetic layer comprising a ferromagnetic powder and a binder on a nonmagnetic support, wherein

the magnetic layer has a residual magnetization Φ_r ranging from 5 to 50 mA, and

ratio (S_{dc}/S_{ac}) of average area S_{dc} of magnetic clusters under DC magnetized condition to average area S_{ac} of magnetic clusters under AC erased condition ranges from 0.8 to 2.0.

Ex. 1001, 14:14–22.

D. The Asserted Ground of Unpatentability

Petitioner challenges the patentability of claims 1–14 of the ’451 patent under 35 U.S.C. § 102 as being anticipated by Doushita.¹ Petitioner relies on the Declaration of Kevin Coffey, Ph.D. (Ex. 1004) in support of its

¹ U.S. Patent No. 6,641,891 B2, issued Nov. 4, 2003 (Ex. 1010).

contentions. Patent Owner relies on the Declaration of Jian-Gang (Jimmy) Zhu, Ph.D. (Ex. 2001) in support of its Preliminary Response.

II. ANALYSIS

A. *Level of Ordinary Skill in the Art*

Petitioner argues that a person having ordinary skill in the art (“POSA”) at the time of the ’451 patent “would have had a bachelor’s degree in chemical engineering, physics, materials science, or a related field, plus several years of experience with magnetic storage systems, magnetic materials and/or magnetic properties or similar advanced post-graduate education.” Pet. 8 (citing Ex. 1004 ¶¶ 10–14). Patent Owner responds that a POSA would have had “a bachelor’s degree in materials science, physics, electrical engineering, mechanical engineering, chemistry, or a closely related field, and a least five years of experience in the field of magnetic recordings,” or a Master’s degree or higher in the same fields “with an emphasis in magnetic recording, and at least two years of experience in the field of magnetic recording.” Prelim. Resp. 12 (citing Ex. 2001 ¶ 16). The parties agree that the level of skill is high, and Patent Owner further states that under either Petitioner’s or Patent Owner’s proposed level of skill, “the Challenged Claims are not invalid in view of the art cited by Petitioner.” *Id.* at 13.

We agree with the parties that a POSA would have had a background in engineering, chemistry, physics, material science, or a closely related field, and would have had experience with magnetic recording, which is 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))). Although we do not fully adopt either party’s definition of the POSA, our determination regarding Petitioner’s challenge does not turn on the differences between Petitioner’s and Patent Owner’s definitions, and we note that our conclusions would be the same under either assessment.

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) (2017).² 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) (“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the

² The Office recently changed the claim construction standard applicable to an *inter partes* review. *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018). The rule changing the claim construction standard, however, does not apply to this proceeding because Petitioner filed its Petition before the effective date of the final rule, i.e., November 13, 2018. *Id.* at 51,340 (rule effective date and applicability date), 51,344 (explaining how the Office will implement the rule).

controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

Petitioner proposes constructions for the terms “residual magnetization Φ_r ,” “average area [S_{dc} or S_{ac}] of magnetic clusters,” and “ratio (S_{dc}/S_{ac}) of average area S_{dc} of magnetic clusters under DC magnetized condition to average area S_{ac} of magnetic clusters under AC erased condition.” Pet. 33–35. Patent Owner responds to Petitioner’s proposed constructions, and does not argue that we should construe any other claim terms. Prelim. Resp. 14–19. For purposes of this Decision, based on the record before us, we determine that no claim term requires explicit construction.

C. *Anticipation by Doushita*

Petitioner contends that claims 1–14 are unpatentable under 35 U.S.C. § 102(b) as anticipated by Doushita. Pet. 35–68.

1. *Overview of Doushita*

Doushita is directed to particulate magnetic recording media “wherein by controlling the magnetic clusters that appear due to recording at short wavelengths and thinning of the magnetic layer, good high-density characteristics are achieved in combination with MR heads.” Ex. 1010, at [57]. Doushita describes “a magnetic recording medium comprising an essentially nonmagnetic lower layer and a magnetic layer comprising a ferromagnetic powder and a binder. *Id.* at 3:44–47. Doushita teaches that the ferromagnetic particles in the ferromagnetic powder “have a size less than $\frac{1}{2}$ of the minimum recording wavelength,” and “advantageously have a size less than about 0.25 μm , 0.15 μm or even less than about 0.1 μm .” *Id.* at 3:51–52, 3:55–58. Doushita further teaches that the shape of the particles

“may be acicular, rice-particle shaped, or spindle-shaped so long as the above-stated characteristics of particle size are satisfied.” *Id.* at 6:55–57.

Doushita also teaches that, “[w]hen the magnetic clusters increase in size, medium noise also increases, which is not suitable for achieving high density,” but “when the magnetic particles are dispersed to where the magnetic clusters are eliminated, electromagnetic characteristics deteriorate due to excessive dispersion.” *Id.* at 4:44–50. “Accordingly, a small magnetic cluster size is preferred.” *Id.* at 4:46–47. To that end, Doushita discloses that, “[i]n the magnetic recording medium of the present invention, the average size of magnetic clusters during DC erasure is equal to or higher than $0.5 \times 10^4 \text{ nm}^2$ and less than $5.5 \times 10^4 \text{ nm}^2$.” *Id.* at 4:41–44.

According to Doushita, “[t]o keep the mean size of the magnetic clusters within the range of” $0.5 \times 10^4 \text{ nm}^2$ to $5.5 \times 10^4 \text{ nm}^2$, “it is important to reduce the particle size of the magnetic material and improve dispersion properties to reduce aggregation of magnetic material.” *Id.* at 4:53–56. In that regard, Doushita teaches that “methods of improving dispersion include lengthening the dispersion period, increasing the amount of binder relative to the magnetic material, and improving dispersibility by using a binder in the form of a polyurethane resin or the like having a large inertial radius.” *Id.* at 4:57–61.

2. *Analysis*

Petitioner contends that “Doushita teaches a magnetic recording medium that explicitly or implicitly possesses every limitation of the ’451 patent—including the absolute Sdc cluster sizes of claims 9–11—except for the ratio Sdc/Sac and the Sac magnetic cluster sizes.” Pet. 37. Petitioner further contends that Doushita necessarily includes a ratio Sdc/Sac within

the claimed range of 0.8 to 2.0 “for either or both of the following reasons: (1) Embodiments 5, 7, and 14 necessarily include a ratio S_{dc}/S_{ac} within the range of ’451 patent claims 1, 7, and 8; or (2) Doushita [o]ptimizes S_{dc} , which naturally and necessarily yields a ratio S_{dc}/S_{ac} within the range of 0.8 to 2.0.” *Id.* at 44.

Petitioner contends that “ S_{ac} is strongly correlated with the size of the particles comprising the ferromagnetic powder,” which is “expressly confirmed in the ’451 patent.” *Id.* (citing Ex. 1004 ¶ 237). In that regard, Petitioner points to the tapes in Embodiments 1, 2, and 4 and Comparative Example 3 in the ’451 patent, all of which include metal particles having a diameter of 45 nm. *Id.* at 45. Petitioner contends that the S_{ac} measurements for these four tapes have a mean value of 17,875 nm², with a standard deviation of 545 nm². *Id.* (citing Ex. 1004 ¶ 250). Based on these measurements in the ’451 patent and Dr. Coffey’s calculations, Petitioner contends that “a tape made with a 45 nm metal particle will have a S_{ac} in the range of 17,330–18,420 nm² (i.e., 17,875 nm² ± 545 nm²).” *Id.* (citing Ex. 1004 ¶ 239).

Petitioner then points to Embodiments 7 and 14 in Doushita, which also use metal particles having a diameter 45 nm, and contends that “[b]ased on the measurements disclosed in the ’451 patent, Doushita Embodiments 7 and 14 have an S_{ac} that would fall between 17,330–18,420 nm².” Pet. 46 (citing Ex. 1004 ¶¶ 236–239). Petitioner further contends that Doushita Embodiments 7 and 14 “necessarily possess” the claimed S_{dc}/S_{ac} ratio limitation of claims 1 (0.8 to 2.0) and 7 (0.8 to 1.8) because Embodiment 7 has an S_{dc} of 29,000 nm², Embodiment 14 has an S_{dc} of 27,000 nm², and, based on the measurements in the ’451 patent, the value of S_{ac} for each

embodiment is between 17,330–18,420 nm². *Id.* at 46–47 (citing Ex. 1004 ¶¶ 234–240, 252). Petitioner further contends that “Doushita’s Embodiment 14 would have an Sdc/Sac ratio satisfying the ranges recited by claims 1, 7, and 8 even if the measured Sac value were as high as 36,250 nm²” or “as low as 14,500 nm².” *Id.* at 47 (citing Ex. 1004 ¶ 241). Petitioner also contends that Doushita teaches that Embodiment 7 has a “good” S/N ratio, and Embodiment 14 has a “good” C/N ratio, “which according to the ’451 patent is only possible if the Sdc/Sac ratio is between 0.8 and 2.0.” *Id.* at 48 (citing Ex. 1010, 29:53–58, 30:35–50).

Patent Owner responds that “Petitioner fails to reliably demonstrate that the assumed Sac used in its calculations is necessarily present in Doushita beyond mere ‘probabilities or possibilities.’” Prelim. Resp. 26 (citing Ex. 2001 ¶¶ 105–112). In particular, Patent Owner argues that “there is not a direct a correlation between Sac and magnetic particle size.” *Id.* at 29. Patent Owner notes that, in the ’451 patent, “Embodiment 3 describes a particle size of 60 nm, and a Sac of 28,000 nm², whereas Comparative Example 1 describes a larger particle size of 80 nm, but a smaller Sac of 26,000 nm².” *Id.* (citing Ex. 2001 ¶ 106). Patent Owner also points to Additional Comparative Example 5 in the file history of the Japanese counterpart application that “describes a particle size of 60 nm, but a much larger Sac—55,000 nm².” *Id.* (citing Ex. 1003, 53). As a result, Patent Owner argues that “[t]he data evidences not only that Sac can vary for a given particle size (for 60 nm it can be 28,000–55,000 nm²), but also that larger particle size does not necessarily equate to larger Sac (for 80 nm it can be 26,000 nm²).” *Id.* (citing Ex. 2001 ¶ 106).

Patent Owner further argues that statements made during the prosecution of the Japanese counterpart application that Petitioner relies upon as evidence that Sac is correlated to particle size “only state that Sac ‘is proportional to the average size of the primary particle’ and that Sac ‘shows a near constant value regardless of a dispersed state.’” Prelim. Resp. 31 (quoting Ex. 1003, 78–79). Patent Owner argues that “[t]hese statements do not establish that Sac is solely determined by particle size, but rather that Sac can be affected by particle size.” *Id.* (citing Ex. 2001 ¶ 107). Patent Owner also argues that Hokkyo³ “teaches that AC magnetic clusters can be attributable to more than just the magnetic particle size” and “indicates that both the presence of particles and magnetostatic interactions between the particles affect the magnetic layer in the AC erased condition.” *Id.* at 32 (citing Ex. 2001 ¶ 108).

We agree with Patent Owner that Petitioner has not demonstrated that Doushita inherently discloses a ratio Sdc/Sac within the claimed ranges. Petitioner’s argument is premised on its contention that Sac is “strongly correlated” with the size of the ferromagnetic particles, such that Sac values for a given particle size can be assumed from measurements of Sac for any ferromagnetic powder having the same particle size. *See* Pet. 44–48; Ex. 1004 ¶¶ 237–243. In that regard, Dr. Coffey testifies that:

In the AC erased state, particles are less likely to exhibit magnetic coupling because each particle is magnetized in a random direction. Under ideal conditions, no clusters form by magnetic coupling in the AC erased state, so that the source of

³ *Theory of Particulate Recording Medium Noise and Estimation of Noise Sources*, JOURNAL OF THE MAGNETIC SOCIETY OF JAPAN, Vol. 21, no. 4–1 (1997) 149–159 (Ex. 1007). Our references to “Hokkyo” are to the English translation of the original reference.

noise in the AC erased state is that of the primary particles alone. For example, Hokkyo explains that “[n]oise arising from a medium that had undergone alternating-current erasure (AC-erased noise) is caused by the medium having magnetic discontinuities consisting of magnetic particles.”

Ex. 1004 ¶ 39 (quoting Ex. 1007, 149). Dr. Coffey, however, does not provide adequate explanation or objective evidence to support this contention. Although Dr. Coffey cites to a number of publications that he characterizes as “us[ing] the AC erased state because it is a measure of particle size,” none of the publications explicitly state that Sac (or the AC erased state) is a measure of particle size. *Id.* ¶¶ 38–39. At best, the evidence establishes that particle size can affect Sac, not that Sac is solely determined by particle size. *See* Ex. 1027, 17 (stating that “[i]n an erased state the noise will be determined by the intrinsic particulate nature of the medium such as particle size, shape, and interaction type”). Indeed, the publications Dr. Coffey cites appear to focus on the effect that magnetic cluster formation has on noise, not on whether particle size correlates to magnetic cluster size. *See, e.g.*, Ex. 1018, 1595 (“From this result, it is obvious that formation of aggregation of particles increases the noise due to finite concentration of particles by the number of particles forming an aggregation, N_c .”); Ex. 1026, 84 (“Depending on the dispersion and coating technique the cluster structure appears to vary. The ac-noise power is described by a mechanism of negative and positive interactions which occur simultaneously.”), 89 (“The structure of the particulate coating plays a dominant part in tape noise. These structures can be quantified by means of the dc-noise power spectrum.”); Ex. 1035, 1977 (“We assume we are investigating single domain particles (described by the Stoner-Wohlfarth Theory), randomly distributed with no interactions. (Only in dc and ac noise

is the effect of the particle interactions introduced.).”). Accordingly, we are not persuaded that Sac is a measurement of particle size, as Petitioner contends.

We are also not persuaded that the ferromagnetic powder used in Doushita’s Embodiments 7 and 14 is the same as the ferromagnetic powder used in Embodiments 1, 3, and 4 and Comparative Example 3 of the ’451 patent simply because the powders are made from particles having the same diameter. Pet. 44–48; Ex. 1004 ¶ 237. The ’451 patent identifies the ferromagnetic powder used in its embodiments and comparative examples as being composed of 80/20 Fe/Co with an Hc of 182 KA/m. Ex. 1001, 11:30–32. Tables 2 and 3 of Doushita show that Embodiments 7 and 14 in Doushita were made using a ferromagnetic metal powder labeled “J.” Ex. 1010, col. 28. Table 1 of Doushita shows that its powder J is a barium ferrite powder that has an Hc of 171 kA/m. *Id.* at 22:39–55. Dr. Coffey characterizes the powders as “the same ferromagnetic material (having the same particle size),” but does not address the differences between them, in particular, that the ’451 patent uses a ferrite cobalt (Fe/Co) powder, and Doushita uses a barium ferrite powder. Ex. 1004 ¶ 237. Dr. Coffey also asserts that, because the ferromagnetic powders are the “same” in the ’451 patent and in Doushita’s Embodiments 7 and 14, “a POSA would have understood that, if measured, Embodiments 7 and 14’s Sac would be similar, with the only variation in measurement resulting from undesirable errors in the measurement techniques.” *Id.* Dr. Coffey, however, does not offer any evidence supporting this conclusion. See 37 C.F.R. § 42.65(a) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”).

For all the foregoing reasons, we find that Petitioner fails to demonstrate that Doushita's magnetic recording medium made using powder J (i.e., the powder used in Embodiments 7 and 14) would necessarily have the same Sac as the magnetic recording medium made using the Fe/Co powder disclosed in the '451 patent. Therefore, on this record, Petitioner has not established sufficiently that Doushita expressly or inherently discloses every element of independent claim 1, or claims 2–14 that depend therefrom, and we determine that Petitioner does not show a reasonable likelihood of prevailing on its assertion that Doushita anticipates claims 1–14 of the '451 patent.

D. Patent Owner's Arguments Under 35 U.S.C. §§ 314(a) and 325(d)

Patent Owner argues that “the Board should exercise its discretion to deny institution” pursuant to 35 U.S.C. § 314(a) because similar issues were adjudicated in the related proceeding before the International Trade Commission. Prelim. Resp. 3. Patent Owner further argues that “the Board should deny institution of this IPR because the Petition relies on substantially the same art that was considered during prosecution.” *Id.* at 47 (citing 35 U.S.C. § 325(d)). Having already determined that Petitioner has not established a reasonable likelihood of prevailing on its challenge, we do not reach the merits of Patent Owner's arguments.

III. CONCLUSION

Based on the arguments in the briefing, and the evidence of record, we determine that Petitioner does not show a reasonable likelihood of prevailing on its assertion that Doushita anticipates claims 1–14 of the '451 patent.

IV. ORDER

In consideration of the foregoing, it is hereby
ORDERED that the Petition is *denied*.

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