

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TDK CORPORATION,
Petitioner,

v.

LAMBETH MAGNETIC STRUCTURES LLC,
Patent Owner.

Case IPR2016-00013
Patent 7,128,988

Before SALLY C. MEDLEY, BRIAN MURPHY, and
KIMBERLY McGRAW, *Administrative Patent Judges*.

McGRAW, *Administrative Patent Judge*.

DECISION

Denying Institution of *Inter Partes* Review
37 C.F.R. § 42.108

I. INTRODUCTION

Petitioner, TDK Corporation, filed a Petition requesting an *inter partes* review of claims 1–3, 6–19, 21–31, 34, 38, and 39 of U.S. Patent No. 7,128,988 B2 (Ex. 1001, “the ’988 patent”). Paper 2 (“Pet.”). Patent Owner, Lambeth Magnetic Structures, LLC filed a Preliminary Response.

Paper 6 (“Prelim. Resp.”). We have jurisdiction under 35 U.S.C. § 314(a), which provides that an *inter partes* review may not be instituted “unless . . . the information presented in the petition . . . 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.”

Upon consideration of the Petition and the Preliminary Response, we conclude the information presented does not show there is a reasonable likelihood that Petitioner would prevail in establishing the unpatentability of claims 1–3, 6–19, 21–31, 34, 38, and 39. Accordingly, we do not authorize an *inter partes* review.

A. Related Proceedings

According to Patent Owner, the ’988 patent is involved in the following lawsuits:

(1) *Lambeth Magnetic Structures, LLC v. Toshiba Corp.*, Civil Action No. 2:14-cv-01526-CB (W.D. Pa.) (“Pennsylvania Action”). Pet. 1; Paper 5, 2-3. On October 12, 2015, Patent Owner filed a motion seeking leave to amend its complaint to add TDK Corporation, TDK U.S.A. Corporation (“TDK USA”), TDK Corporation of America, Headway, Husko, Inc. (“Husko”), and SAE Magnetics (H.K.) Ltd. (“SAE”) as defendants in this action. Paper 5, 2-3.

(2) *Headway Technologies, Inc. v. Lambeth Magnetic Structures, LLC*, Civil Action No. 2:15-cv-07987-DSF (C.D. Cal.). *Id.*

B. The ’988 Patent (Ex. 1001)

The ’988 patent, titled “Magnetic Material Structures, Devices and Methods” is directed to improving the magnetic properties in magnetic films

and related devices by using a template to achieve a desired atomic structure for a magnetic film layer that exhibits uniaxial magnetic properties. *See* Ex. 1001, Abstract. The '988 patent explains that carefully controlling the epitaxial growth conditions of (110) crystalline textured bcc or bcc derivative ("bcc-d") thin film materials on highly oriented (111) hexagonal atomic templates results in six crystalline variants with special orientational relationships. *Id.* at 14:48–52. The selection and growth of an exchange coupled subset of these variants results in a bcc-d layer forming a symmetry broken structure. *Id.* at 14:52–55. A subset of these bcc-d symmetry broken structures exhibit uniaxial behavior. *See, e.g., id.* at 20:14–23.

C. Illustrative Claims

Petitioner challenges claims 1–3, 6–19, 21–31, 34, 38, and 39. Claims 1 and 27 are independent and reproduced below:

1. A magnetic material structure comprising:
 - a substrate;
 - at least one bcc-d layer which is magnetic, forming a uniaxial symmetry broken structure; and
 - at least one layer providing a (111) textured hexagonal atomic template disposed between said substrate and said bcc-d layer.

27. A magnetic device having incorporated therein a magnetic material structure comprising:
 - a substrate;
 - at least one bcc-d layer which is magnetic, forming a uniaxial symmetry broken structure; and

at least one layer providing a (111) textured hexagonal atomic template disposed between said substrate and said bcc-d layer.

D. Claim Construction

Petitioner argues, and Patent Owner does not dispute, that one skilled in the art would have understood the ordinary meaning of a “symmetry broken” structure is a “structure with unequal volumes of crystallographic variants in either a three or six variant system.” Pet. 14 (citing Ex. 1006, ¶ 37); see Prelim. Resp. 28–32, 51–52. This construction is consistent with the Specification which states that a “symmetry broken” structure exists in the three variant system shown in FIG. 3 “[w]hen the volumes of the three variants are not equal” (Ex. 1001, 16:34–36) and in six variant systems that “do not contain an equal amount of all six of the (110) textured bcc-d variants” (*id.*, 23:37–41). Accordingly, for purposes of this decision, we construe “symmetry broken” structure as a “structure with unequal volumes of crystallographic variants in either a three or six variant system.”

E. Asserted Grounds of Unpatentability

Petitioner argues the challenged claims are unpatentable based upon the following grounds:

References	Basis	Challenged Claims
Shen ¹ and Dill ²	§ 103	1 and 27
Dill and Shen	§ 103	1, 3, 6–11, 13, 14, 17–19, 22, 24, 27–30, 34, and 38

¹ J. Shen *et al.*, *Structural and magnetic phase transitions of Fe on stepped Cu (111)*, 56 Phys. Rev. B 134–43 (1997) (Ex. 1011, “Shen”).

² U.S. Patent No. 6,023,395, issued Feb. 8, 2000 (Ex. 1009, “Dill”).

References	Basis	Challenged Claims
Dill, Shen, and Heim ³	§ 103	12, 15, 16, 21, and 23
Dill, Shen, and Lambeth I ⁴	§ 103	2, 25, 26, and 31
Dill, Shen, and Noguchi ⁵	§ 103	39

Pet. 15.

II. ANALYSIS

Obviousness Claims 1 and 27

Petitioner contends that independent claims 1 and 27 are unpatentable under 35 U.S.C. § 103 over the combination of Shen and Dill. Pet. 16–25 (Ground 1: Shen in View of Dill); Pet. 25–33 (Ground 2: Dill in View of Shen). To support its contention, Petitioner provides explanations as to how the prior art allegedly meets each claim limitation of the challenged claims. *Id.* Petitioner also relies upon a Declaration of Dr. Robert Sinclair, who has been retained as an expert witness by Petitioner for the instant proceeding. Ex. 1006.

A dispositive issue is whether the Petitioner has sufficiently established the cited art teaches or suggests a magnetic bcc-d layer forming a uniaxial “*symmetry broken structure*” recited in independent claims 1 and 27.

³ U.S. Patent No. 5,465,185, issued Nov. 7, 1995 (Ex. 1012, “Heim”).

⁴ D.N. Lambeth, et al., *Magnetic Media Performance: Control Methods for Crystalline Texture and Orientation*, 517 Material Res. Soc’y Symp. Proc., 181–192 (1998) (Ex. 1013, Lambeth I).

⁵ U.S. Patent No. 5,862,022, issued Jan. 19, 1999 (Ex. 1014, “Noguchi”).

Petitioner relies solely upon Shen as teaching the bcc-d layer having a symmetry broken structure.⁶ Petitioner asserts Shen teaches crystallographic variants in a six variant system as Shen describes the Fe(110)(bcc) film as having “bcc (110) domains in the Kurdjumov-Sach (KS) orientation” and that these KS domains “reflect the six kinds of atomic relationship between the bcc(110) and fcc(111) structure[s] as shown in the bottom of Fig. 4.” Pet. 20 (citing Shen, Ex. 1011, p. 137⁷, ¶ 1, FIG. 4).

Petitioner contends Shen discloses breaking the symmetry of the six KS variants, arguing Shen’s method of growing the Fe layer on the “steps” of the hexagonal Cu(111) layer results in “favoring two” of the six crystallographic KS variants. See Pet. 20, 28. Specifically, Petitioner explains that Shen states “growing the Fe layer [1b] on ‘steps’ of the hexagonal Cu(111) layer [1e] creates a ‘dominance of the two particular KS domains’ out of the ‘six kinds of atomic relationship between the bcc(100) and fcc(111).’” Pet. 20 (citing Ex. 1011, p. 137, ¶ 1); *see also id.* (citing FIG. 4, p. 136, ¶ 1, FIG. 2); Ex. 1006, ¶ 52 (citing Ex. 1011, p. 137 ¶ 1, FIG. 4). Petitioner asserts that this happens because the two allegedly dominant (110) textured bcc variants of Fe are aligned with the two <011> directions corresponding to the steps on the Cu(111) layer. *Id.* at 20 (citing Ex. 1011, p. 137, ¶ 1, Fig. 2, p. 136, ¶ 1); *see also* Ex. 1006 (citing Ex. 1011, p. 137, ¶1, FIG. 4). Petitioner’s expert, Dr. Sinclair, states “symmetry is broken

⁶ Petitioner admits that Dill does not explicitly disclose a symmetry broken structure (Pet. 28, 34) and relies upon Shen for teaching this limitation (Pet. 20, 28).

⁷ Petitioner cites to the original page numbers of Ex. 1011. For consistency, we will use the same pagination as Petitioner.

because of a preference for two of the (bcc) ferromagnetic layer's six possible variants.” Ex. 1006, ¶ 52.

Petitioner's arguments and evidence do not sufficiently establish that a person of ordinary skill in the art would have understood that the Fe films of Shen exhibit a broken structure. Rather, Shen merely hypothesizes that the “two domain configurations which are parallel to the steps *should be* more favored as compared to the other domains” and that the dominance of two particular KS domains *should*, in principle, result in satellite spots on the LEED having different intensity. Ex. 1011, p. 137, ¶ 1 (emphasis added). However, Shen admits that the LEED data is inconclusive and does not show that this asymmetric growth has in fact occurred. *Id.* Specifically, Shen states:

The dominance of the two particular KS domains *should*, in principle, make the corresponding satellite spots have different intensity as compared to the rest [of the] satellite spots. However, as a result of the limited resolution and the rather rough surface, it is difficult to conclude this from our LEED data.

Id. (emphasis added).

A review of the LEED pattern of the 2.7 ML film at a beam energy of 90 eV of Shen appears to show six satellite spots reflecting all six of the six KS variants. Ex. 1011, p. 137 (describing upper left image of Fig. 4 and stating the “six satellite spots reflect the six kinds of atomic relationship between the bcc(110) and fcc(111) structure as shown in the bottom picture of Fig. 4”). Thus, the descriptions in Shen to which Petitioner and Dr. Sinclair direct attention, are not sufficient to indicate that the Fe layers do in

fact exhibit a dominance of two of the KS domains or a symmetry broken structure.

Petitioner also contends that the Fe films of Shen exhibit dramatically higher magnetization when they have the asserted symmetry broken (bcc) structure than they do with the (fcc) structure. Pet. 16 (citing Ex. 1001, p. 134, ¶ 4 (5) and Ex. 1006, ¶ 52). Petitioner explains the symmetry breaking that occurs during the (fcc) to (bcc) transition causes a “four to five times’ increase in magnetization of the Fe films.” Pet. 20 (citing Ex. 1011, p. 134, ¶ 4(5)).

However, Petitioner has not provided sufficient evidence to show that the described increase in magnetization in Shen is the result of symmetry breaking as opposed to the transition from an (fcc) structure to a (bcc) structure. For example, Petitioner has not identified where in Shen there is a description that an increase in magnetization of the Fe films is due to symmetry breaking. Rather paragraph 4 (5) on page 134 cited by Petitioner generally states that the magnetization of the Fe films sharply increase “in the fcc to bcc transformation regime” and that the increase in magnetization of the transformed bcc films is four to five times larger than the values extrapolated from the low thickness fcc Fe films. Similarly, Petitioner’s expert, Dr. Sinclair, merely states that the “structural transition includes symmetry breaking and causes ‘[t]he magnetization of the transformed bcc Fe films [to sharply increase by] about four to five times larger than the extrapolated value from the low thickness fcc Fe films.’” Ex. 1006, ¶ 52. Dr. Sinclair’s testimony is conclusory and does not present a factual basis for us to conclude that Shen’s increase in magnetization is due to symmetry breaking. Thus, Petitioner has not shown sufficiently whether the increase

in magnetization is due to symmetry breaking or a transition from an fcc to a bcc structure.

In connection with Petitioner's arguments for Ground 2, Petitioner also asserts that Shen teaches that the symmetry breaking of the "(111)(fcc)(bcc) structure" of Shen "increases the magnetic field required to saturate the layer and contributes to the (bcc) layer's uniaxial anisotropy." Pet. 28 (citing Ex. 1011, p. 139; Ex. 1006, ¶¶ 48, 104). Petitioner's claim chart cites to page 139, left column, which states: "With increasing thickness, the saturation field increases from 400 Oe for the 2.0-ML film to 850 Oe for the 2.5-ML film." Pet. 32. However, Petitioner does not explain how Shen's teaching of increasing the saturation field from 400 Oe for the 2.0-ML film to 850 Oe for the 2.5-ML film, or any other teaching on page 139, teaches a bcc-d layer forming a uniaxial symmetry broken structure as required by claims 1 and 27.

It is the Petitioner's burden to explain how Shen allegedly teaches a bcc-d layer forming a uniaxial "symmetry broken structure." Petitioner did not carry this burden. Accordingly, the record before us does not establish a reasonable likelihood that Petitioner would prevail in establishing that claims 1 and 27 would have been obvious over Shen and Dill.

Obviousness Grounds for Dependent Claims Based on Dill and Shen or Dill and Shen combined with Heim, Lambeth or Noguchi

Petitioner contends that claims 3, 6–11, 13, 14, 17–19, 22, 24, 28–30, 34, 38, and 39, which depend directly or indirectly from either claim 1 or 27 are unpatentable for obviousness over Dill and Shen. Pet. 33–43. Petitioner also contends that claims 12, 15, 16, 21, and 23 are unpatentable over Dill, Shen, and Heim; claims 2, 25, 26, and 31 are unpatentable over Dill, Shen,

and Lambeth I; and claim 39 is unpatentable over Dill, Shen, and Noguchi. Pet. Pet. 43–59. As discussed above, Petitioner has not sufficiently shown that Shen or Dill, alone or in combination, teaches a magnetic bcc-d layer forming a uniaxial “*symmetry broken structure*” as required by the independent claims. Petitioner does not present any arguments that Heim, Lambeth I, or Noguchi teach the symmetry broken structure limitation, relying on the additional references only for the additional limitations recited in the dependent claims. See Pet. 43–59. Therefore, on this record, the information presented does not show a reasonable likelihood that Petitioner would prevail in establishing that claims 3, 6–11, 13, 14, 17–19, 22, 24, 28–30, 34, and 38 are unpatentable for obviousness over the combinations of references that include Dill and Shen.

III. CONCLUSION

For the foregoing reasons, we conclude that there is not a reasonable likelihood that Petitioner would prevail in challenging claims 1–3, 6–19, 21–31, 34, 38, and 39 of the ’988 patent.⁸

IV. ORDER

Accordingly, it is:

ORDERED that the Petition is *denied* and no trial is instituted.

⁸ Because we determine that Petitioner has not demonstrated a reasonable likelihood of prevailing in challenging claims 1–3, 6–19, 21–31, 34, 38, and 39 of the ’988 patent for the reasons set forth above, we need not address Patent Owner’s remaining arguments.

IPR 2016-00013
Patent 7,128,988 B2

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