UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte GUO-FU ZHOU, and
JOHANNES CORNELIS NORBERTUS RIJPERS

Appeal 2006-2650
Application 10/011,886
Technology Center 1700

Decided: April 24, 2007

Before, BRADLEY R. GARRIS, CHUNG K. PAK, and
LINDA M. GAUDETTE, *Administrative Patent Judges*.

GAUDETTE, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal from the Examiner's final rejection of claims 1-20, the only claims pending in this application. We have jurisdiction over the appeal pursuant to 35 U.S.C. § 6(b).

Appellants' invention relates to an optical information medium for erasable recording by a laser-light beam. An embodiment of the invention is illustrated in Figure 1 below:

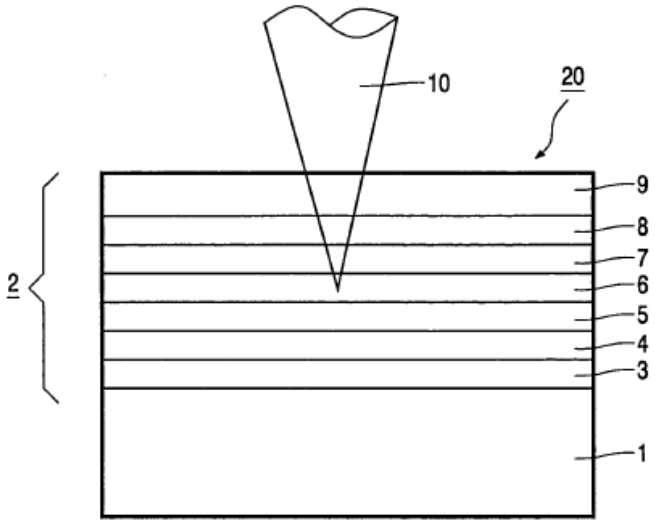

FIG 1

Figure 1 shows an optical information medium 20 for erasable recording by means of a laser-light beam 10 having a laser-light wavelength, the medium having a substrate 1 having a reflective layer 3 and a stack 2 of layers provided thereon, the stack comprising a first dielectric layer 5 and a second dielectric layer 7, and a recording layer 6 that is able to change between an amorphous and a crystalline state, arranged between the first dielectric layer 5 and the second dielectric layer 7, wherein the first dielectric layer 5 is formed on a first side of the recording layer near the substrate, and the second dielectric layer is formed on a second side of recording layer. (Br. 2-3) (citing Specification p. 7, ll. 19-27).

Independent Claim 1 is reproduced below:

1. An optical information medium for erasable recording by means of a laser-light beam having a laser-light wavelength, said medium having a substrate having a reflective layer and a stack of layers provided thereon, the stack comprising a first dielectric layer and a second dielectric layer, a recording layer that is able to change between an amorphous and a crystalline state, arranged between the first dielectric layer and the second dielectric layer, and a reflective layer [sic], wherein the first dielectric layer is formed on a first side of the recording layer near the substrate, and the second dielectric layer is formed on a second side of recording layer,

characterized in that

- the recording layer comprises a compound of the formula Ge_xTe_{100-x},

wherein: x is a fraction of Ge in at.% and $30 < x < 70$,
- the first dielectric layer has a thickness of at most 15nm and further comprises a compound selected from the group consisting of oxides of Ta and Si, nitrides of Si and Al and carbides of Si, and is present in contact with the recording layer.

The Examiner relies on the following prior art references to show unpatentability:

Tyan	US 4,797,871	Jan. 10, 1989
Kobayashi	JP 01-290135 A	Nov. 22, 1989
Kojima	EP 0 898 273 A2	Feb. 24, 1999
Zhou	US 6,040.066	Mar. 21, 2000
Kasami	US 6,312,780 B1	Nov. 6, 2001
Uno	US 6,477,135 B1	Nov. 5, 2002

The Examiner made the following rejections:

1. Claims 1-6, 9-16, and 19-20 under 35 U.S.C § 103(a) as unpatentable over Kasami in view of Tyan;

2. Claims 1-6, 9-16, and 19-20 under 35 U.S.C § 103(a) as unpatentable over Kasami in view of Tyan, and further in view of Uno; and

3. Claims 1-20 under 35 U.S.C § 103(a) as unpatentable over Kasami in view of Tyan and Uno, and further in view of Zhou.

ISSUES

The Examiner contends that it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Kasami's multilayer stack in view of the secondary references. Appellants contend that one of ordinary skill in the art would not have had a reasonable expectation of success in making the Examiner's proposed combinations. The issue before us is: Has the Examiner established motivation based on a reasonable expectation of success to make the proposed combinations/modifications within the meaning of 35 U.S.C § 103(a) and, if so, have Appellants overcome the Examiner's prima facie showing of obviousness by establishing that the prior art teaches away from the claimed invention?

RELEVANT FINDINGS OF FACT

Kasami

1) Kasami discloses a phase change optical recording medium, an embodiment thereof being shown in Figure 8 below:

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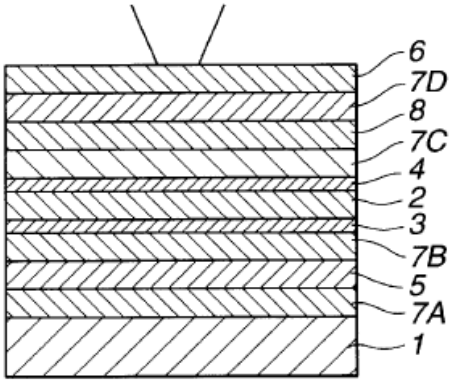

FIG.8

2) Kasami Figure 8 shows a multilayer structure having a substrate (1), a dielectric layer (7A), a reflective layer (5), a second dielectric layer (7B), a dielectric crystallization promotion layer (3), a phase change recording layer (2), a second dielectric crystallization promotion layer (4), a dielectric layer (7C) an absorption correction layer (8), a fourth dielectric layer (7D) and a polymeric protective layer (6).

3) Kasami includes several exemplary multilayer structures in which crystallization promoting layers adjacent the recording layer have a thickness of 4 nm. (*See, e.g.,* Examples 7 and 8).

4) Kasami teaches that GeTe and GeTeSb recording layers function by changing phase between an amorphous state and a crystalline state. (Col. 11, l. 65-col. 12, l. 7).

5) Kasami examples 5-11 use Al reflective layers, ZnS-SiO_2 dielectric layers, GeTeSb recording layers and 4 nm Si-C-0-H crystallization promoting layers. (*See* col. 18, l. 20 - col. 21, l. 22).

6) Kasami discloses that the reflective layer (5) may be any of various metals, metal alloys and the like, including Ag, Au, Al, W, etc, and alloys thereof in thicknesses of 5-200 nm. (Col. 12, ll. 35-37).

7) Kasami discloses that, when the reflective layer (5) is silver, an undesirable reaction may take place with the sulfur in an adjacent layer, such as ZnS-$Si0_2$. Therefore, the adjacent layer should not contain sulfur, or a non-corrosive Ag alloy should be used. (Col. 12, ll. 28-55 and col. 10, ll. 32-41).

8) Kasami discloses the use of various materials for the recording layer (2) including "Ge-Te . . . . with or without gaseous additions, such as nitrogen or oxygen." (Col. 12, ll. 1-10).

9) Kasami teaches that suitable materials for the dielectric crystallization promotion layers (3, 4) include carbides, nitrides and oxides of various metals and metalloids, such as Ta, Si, Al, and others, with Si-C, Si-0-C, Si-N, Si-0-N, Si-0, Si-0-C-N and Al-N being particularly preferred and may be at least 2 nm thick. (Col. 7, l. 49-col. 8, l. 61). The materials are dielectrics which inherently act as barrier layers.

10) Kasami teaches that "the crystallization promoting layers 3, 4 may be the same layer operating simultaneously as the dielectric layers. (Col. 7, ll. 49-51).

11) Kasami teaches that "[f]or recording and/or reproducing the optical recording medium, . . . , the short wavelength laser, with the wavelength of 380 nm to 420 nm, or a so-called blue laser or a blue purple laser, is used as the recording and/or reproducing laser. The light source for this recording and/or reproducing laser may be any suitable light source provided that it can emit the laser of the wavelength in question. Examples of the light source include a semiconductor laser and a gas laser." (Col. 15, ll. 15-24).

Tyan

12) Tyan teaches GeTe based optical recording media where the Ge content is 45-70%.

13) Tyan discloses that GeTe films have increased contrast, corrosion resistance, data stability and a high erasure rate (less than 1 microsecond). (Col. 2, ll. 22-40).

14) The reflectance change is sharpest for 49.9% Ge (Fig. 4), which also has high contrast (Fig. 3).

Uno

15) Uno teaches that crystallization enhancing layers protect the recording layer from oxidation, corrosion, distortion and the like.

16) Uno teaches that crystallization enhancing layers prevent migration of atoms from the protective layers into the recording layer, which is especially important when the protective layers contain sulfur or sulfides. (Col. 5, l. 44 – Col. 6, l. 25).

17) Uno discloses that crystallization acceleration layers may be various nitrides, oxide, oxynitrides or carbides, including SiN, AlN, SiO_2, Ta_20_5 and SiC. (Col. 7, ll. 9-30). The crystallization acceleration layers may be 1-40 nm thick. (Col. 10, ll. 61-65).

Kobayashi

18) Kobayashi discloses the addition of nitrogen to GeTe films in amounts of 5% as the average content of the film.

19) Kobayashi teaches that the addition of nitrogen, particularly when graded with increasing amounts of nitrogen in the middle of the film toward the protective layer, prevents oxidation of the medium and

provides improved recording and replay capability even after exposure to high temperature and humidity.

Kojima

20) Kojima teaches that the addition of nitrogen in amounts of 1.6 to 3.1% to GeTeSb recording media yields improvements in sensitivity (laser power), the carrier to noise ratio (CNR) and acceptable margin of error in erasure power. (P. 8, Table 3).

21) Kojima discloses an example wherein the recording layer contains GeTe crystallites. (page 7, ll. 35-36) and is used at 2000 RPM (-12.5mls, [0048])

22) Kojima discloses the use of an interface layer containing nitrides, including silicon and aluminum nitrides, for preventing micro-material flow occurring between the first light interference layer and recording layer due to repeated recording and erasing. [0035]. The thickness of the interface layer is preferably 5 to 30 nm, more preferably 10 nm. [0035].

23) Kojima teaches the importance of optimizing nitrogen content in the recording layer. [0029].

Zhou

24) Zhou discloses the use of oxygen in amounts of 0.01 to 3.5% in SbGeTe recording layers. (Col. 2, ll. 21-30; Figs. 2-8).

25) Zhou teaches that the addition of oxygen increases crystallization (erasure) speed. (Col. 3, ll. 36-38).

ANALYSIS AND CONCLUSIONS

We find that the facts and reasons set forth in the Examiner's Answer establish a prima facie case of obviousness as to claims 1-20. We further find that Appellants have failed to rebut the Examiner's prima facie showing of obviousness. Accordingly, we affirm as to all three grounds of rejection for essentially those reasons stated in the Examiner's Answer. We note that the Examiner has addressed, and persuasively demonstrated that each of the appealed claims is prima facie obvious, although we do not view Appellants' Brief as presenting separate arguments as to any individual claim. *See* 37 C.F.R. 41.37(c)(1)(vii) ("A statement which merely points out what a claim recites will not be considered an argument for separate patentability of the claim."). The discussion below emphasizes those arguments which are relevant to independent claim 1. (*See id)*.

An appellant may overcome a rejection by showing insufficient evidence of prima facie obviousness. *In re Kahn*, 441 F.3d 977, 985-86, 78 USPQ2d 1329, 1335 (Fed. Cir. 2006). Appellants argue that the Examiner failed to establish a prima facie showing of obviousness because there would be no expectation of success in modifying/combining the applied prior art for at least the following reasons: (1) Kasami's stack is intended for use with light having wavelengths of 380 to 420 nm while the GeTe layer in Tyan is intended for use with light having a wavelength of 830 or 860 nm (Br. 8) and (2) the benefits ascribed to the addition of oxygen and/or nitrogen pertain only to the specific multilayer structures of the cited references (Br. 23-25).

Contrary to Appellants, we find the Examiner has provided the requisite detailed analysis of the prior art and a reasoned basis for concluding that one of ordinary skill in the art would have possessed the knowledge and motivation to make the claimed invention. *See Kahn*, 441 F.3d at 988, 78 USPQ2d at 1336 (Fed. Cir. 2006). The Examiner notes that the references teach the chemical similarity of compositions containing Ge and Te. The Examiner points out that the references teach using a variety of wavelengths with GeTe based recording layers. (Answer 5). Therefore, one of ordinary skill in the art would have had a reasonable expectation that Tyan's GeTe recording layer would function with the short wavelength blue lasers (380-420 nm) taught by Kasami. *See In re Beattie*, 974 F.2d 1309, 1312, 24 USPQ2d 1040, 1042 (Fed. Cir. 1992) ("As long as some motivation or suggestion to combine the references is provided by the prior art taken as a whole, the law does not require that the references be combined for the reasons contemplated by the inventor."). Likewise one of ordinary skill in the art would have had a reasonable expectation of gaining the advantages taught by Zhou, Kojima or Kobayashi when adding oxygen or nitrogen to the multilayer stack of Kasami as modified by Tyan and Uno. *See In re Fritch*, 972 F.2d 1260, 1264-65, 23 USPQ2d 1780, 1782-83 (Fed. Cir. 1992) (A reference stands for all of the specific teachings thereof as well as the inferences one of ordinary skill in this art would have reasonably been expected to draw therefrom.). As pointed out by the Examiner, the burden is on Appellants to establish that the addition of nitrogen or oxygen in the manner set forth in the claims exhibits unobvious effects when used with the

recited GeTe compositions, as opposed to other, similar recording layers. (Answer 8-9).

A prima facie case of obviousness may be rebutted by evidence of unexpected results or a showing that the prior art teaches away from the claimed invention in any material respect. *In re Geisler*, 116 F.3d 1465, 1469-70, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997). *See In re Soni*, 54 F.3d 746, 749, 34 USPQ2d 1684, 1686 (Fed. Cir. 1995). Appellants argue that the applied prior art teaches away from the invention as claimed because: (1) the use of GeTeSb in Kasami's examples directs one of ordinary skill in the art away from the GeTe compositions of Tyan and (2) the use of SiC-O-H crystallization promotion layers in Kasami teaches away from oxides of Ta and Si, nitrides of Si and Al and carbides of Se, having a thickness of 15 nm or less present in contact with the recording layer. (Br. 6).

In our view, Appellants have failed to establish that one of ordinary skill in the art, upon reading the applied prior art, would have been discouraged from making the Examiner's proposed modifications/combinations to achieve the claimed invention. *See In re Gurley*, 27 F.3d 551, 553, 31 USPQ2d 1130, 1131 (Fed. Cir. 1994). *See also, In re Bozek*, 416 F.2d 1385, 1390, 163 USPQ 545, 549 (CCPA 1969) ("[A] reference disclosure must be evaluated for all that it fairly teaches and not only for what is indicated as preferred."). As pointed out by the Examiner, although Kasami may indicate a preference for a GeTeSb recording layer, Kasami specifically discloses the use of GeTe recording media and Tyan identifies the benefits of using GeTe recording layers. (Answer 5). *See In re Thrift,* 298 F.3d 1357, 1365, 63 USPQ2d 2002, 2007 (Fed. Cir. 2002) (When a secondary

reference identifies the benefits of adding a feature to the primary reference, an obviousness rejection is proper.) With respect to the crystallization enhancing layers, the Examiner points out that 7of Kasami's 16 preferred species are among the specific compounds recited in the appealed claims (Answer 9) and Kasami includes examples wherein the crystallization enhancing layers have a thickness of 4 nm (Answer 10). The Examiner further points out that these crystallization enhancement layers inherently act as barrier layers by preventing sulfur/sulfides from migrating into the recording layer and, therefore, are desirable for the secondary reason of preventing degradation of the recording layer by sulfur migrating into the recording layer from adjacent ZnS-SiO_2 dielectric layers. (Answer 7). The Examiner also directs us to Uno for a specific teaching of the ability of crystallization layers to prevent sulfur migration. (Answer 9)

ORDER

The rejection of claims 1-6, 9-16, and 19-20 under 35 U.S.C § 103(a) as unpatentable over Kasami in view of Tyan is affirmed.

The rejection of claims 1-6, 9-16, and 19-20 under 35 U.S.C § 103(a) as unpatentable over Kasami in view of Tyan, and further in view of Uno is affirmed.

The rejection of claims 1-20 under 35 U.S.C § 103(a) as unpatentable over Kasami in view of Tyan and Uno, and further in view of Zhou is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv) (2006).

AFFIRMED

tf/ls

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