

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 26

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JOHN E. CRONIN
and
ANTHONY K. STAMPER

Appeal No. 2002-0508
Application No. 09/225,116

ON BRIEF

Before PAK, DELMENDO, and JEFFREY T. SMITH, Administrative Patent Judges.

DELMENDO, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on an appeal under 35 U.S.C. § 134 (2002) from the examiner's final rejection of claims 1 through 7, 10, 11, 13 through 19, and 23 (final Office action mailed Feb. 1, 2001, paper 17) in the above-identified application. Claims 8, 9, and 20 through 22, which are the only other pending claims, stand withdrawn pursuant to 37 CFR § 1.142(b) (1959).

The subject matter on appeal relates to an integrated circuit device (claims 1-7, 10, 11, and 23) and to a semiconductor device comprising at least one microcavity within a layer of the device (claims 13-19). Further details of this appealed subject matter are recited in representative claims 1 and 13 (the only independent claims on appeal) as well as representative claims 2 and 3 reproduced below:

1. An integrated circuit device comprising:
 - a substrate layer;
 - a plurality of raised features on said substrate layer, said raised features having an aspect ratio;
 - a microcavity layer on said substrate layer, said microcavity layer containing at least one microcavity, said microcavity defined by said raised features and surrounded by said microcavity layer;
 - a pinning layer on said microcavity layer, said pinning layer covering the microcavity layer and the at least one microcavity.
2. The integrated circuit device of claim 1, wherein the microcavity has a frustoconical bottom portion.
3. The integrated circuit device of claim 1, wherein the microcavity has a cylindrical upper portion.
13. A semiconductor device comprising at least one microcavity within a layer of the device, said microcavity having a portion characterized by non-parallel side walls.

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The examiner relies on the following prior art references as evidence of unpatentability:

Chou	5,308,415	May 3, 1994
Yoshimori et al. (Yoshimori)	5,468,684	Nov. 21, 1995
Jost et al. (Jost)	5,705,838 (effective filing date Feb. 22, 1995)	Jan. 6, 1998
Jeng et al. (Jeng)	5,814,558 (effective filing date Aug. 31, 1994)	Sep. 29, 1998

The examiner has maintained the following grounds of rejection:

I. claims 2 and 3 under 35 U.S.C. § 112, first paragraph, "as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention" (examiner's answer mailed Oct. 16, 2001, paper 23, pages 3-4);

II. claims 1 and 23 under 35 U.S.C. § 102(e) as anticipated by Jeng (id. at pages 4-5);

III. claims 1, 2, 4 through 7, 13, 14, and 16 through 19 under 35 U.S.C. § 102(b) as anticipated by Yoshimori (id. at page 5);

IV. claims 1, 3, 4, 10, 11, and 13 through 16 under 35 U.S.C. § 102(e) as anticipated by Jost (id. at pages 5-6); and

V. claims 1, 3, 4, 10, 11, 13, 14, and 16 under 35 U.S.C. § 102(b) as anticipated by Chou (id. at page 6).

We reverse: rejection II; rejection III as it applies to claims 1, 2, and 4 through 7; rejection IV as it applies to claims 1, 3, 4, 10, and 11; and rejection V as it applies to claims 1, 3, 4, 10, and 11. However, we affirm: rejection I; rejection III as it applies to claims 13, 14, and 16 through 19; rejection IV as it applies to claims 13 through 16; and rejection V as it applies to claims 13, 14, and 16.¹

I. Claims 2 and 3 under 35 U.S.C. § 112, ¶1

Claim 2, as originally filed, read: "The integrated circuit device of claim 1, wherein the contact via has a frustoconical bottom portion." Claim 3, as originally filed, read: "The integrated circuit device of claim 1, wherein the contact via has a cylindrical upper portion." Subsequently, however, claims 2 and 3 were amended to recite "the microcavity has a frustoconical bottom portion" and "the microcavity has a

¹ The appellants submit: "Claims 1-7, 10, 11, 13-19, and 23 do not stand or fall together." (Appeal brief filed Jul. 30, 2001, paper 22, p. 3.) Accordingly, we will consider the claims separately for each ground of rejection to the extent that they have been separately argued pursuant to 37 CFR § 1.192(c)(7) (1995).

cylindrical upper portion," respectively. (Amendment filed Nov. 15, 2000, paper 16.)

The examiner's position regarding amended claims 2 and 3 is as follows (answer, pages 3-4):

The specification does not disclose the microcavity has a frustoconical bottom portion, as recited in claim 2, or has a cylindrical upper portion, as recited in claim 3. Note that independent claim 1 requires a pinning layer to cover the microcavity layer and at least one microcavity which is not shown in the final structure of Figure 2. Only the intermediate structure of Figure 1 has a pinning layer covering the microcavity.

The appellants, on the other hand, argue that the subject matter of amended claims 2 and 3 is adequately described in the specification at page 10, lines 8-9 and Figures 2 and 5a-5c. (Appeal brief, pages 3-4.)

We agree with the examiner on this issue. The cited portions of the specification relate to the contact vias, not the microcavity prior to the annealing step as described on page 8 of the specification.

For this reason, we uphold the examiner's rejection on this ground.

II. Claims 1 and 23 under 35 U.S.C. § 102(e) over Jeng

"To anticipate a claim, a prior art reference must disclose every limitation of the claimed invention, either explicitly or inherently." In re Schreiber, 128 F.3d 1473, 1477, 44 USPQ2d

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1429, 1431 (Fed. Cir. 1997); accord Glaxo Inc. v. Novopharm Ltd., 52 F.3d 1043, 1047, 34 USPQ2d 1565, 1567 (Fed. Cir. 1995).

Also, it is well settled that, in proceedings before the United States Patent and Trademark Office (PTO), claims in an application must be given their broadest reasonable interpretation, taking into account the written description found in the specification. In re Morris, 127 F.3d 1048, 1054, 44 USPQ2d 1023, 1027 (Fed. Cir. 1997); In re Zletz, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989). That is, "[w]hen the applicants state the meaning that the claim terms are intended to have, the claims are examined with that meaning..." Zletz, 893 F.2d 321, 13 USPQ2d at 1322.

Here, appealed claim 1 recites the term "pinning layer." According to the specification, "[t]he pinning layer 16 changes the shape of the void." (Page 8, lines 12-13.) In addition, the specification enlightens one skilled in the relevant art as follows (id. at lines 14-21):

The layer 16 is formed from a relatively high density material such as silicon dioxide (SiO₂), phosphorus doped SiO₂, boron phosphorus doped SiO₂, or any material which would shrink less than the layer 14 during the anneal, adheres well to the layer 14, and is fairly rigid such that it does not expand or shrink during the anneal relative to layer 14. Such materials include sputtered silicon, silicon nitride, CVD or sputtered metal.

These descriptions are the only characteristics of the "pinning layer" disclosed in the specification. Under these circumstances, we must interpret the term "pinning layer" to mean those layers that change the shape of the microcavity or void, adheres well to the microcavity layer, and is fairly rigid such that it does not expand or shrink during the anneal relative to the microcavity layer.

The examiner argues that Jeng's element 126 is a "pinning layer" and element 118 is a "microcavity layer." (Answer, page 4.) The examiner, however, has not identified any evidence establishing that Jeng's element 126 is a "pinning layer" as required by the appealed claims. Specifically, the examiner has not established that Jeng's element 126 is capable of changing the shape of the microcavity, adheres well to the microcavity layer, and is fairly rigid such that it does not expand or shrink during the anneal relative to the microcavity layer.

Because the examiner has not established that Jeng describes each and every limitation of the invention recited in the appealed claims, we cannot affirm.

III. Claims 1, 2, 4-7, 13, 14, and 16-19 under
35 U.S.C. § 102(b) over Yoshimori

With respect to claims 1, 2, and 4 through 7, the examiner argues that Yoshimori's elements 95 or 195 constitutes a

"pinning layer" and elements 77 or 86 constitutes a "microcavity layer." (Answer, page 5.) The examiner, however, has not identified any evidence establishing that Yoshimori's element 95 or 195 is a "pinning layer" as required by the appealed claims. Specifically, the examiner has not established that Yoshimori's element 95 or 195 is capable of changing the shape of the microcavity, adheres well to the microcavity layer, and is fairly rigid such that it does not expand or shrink during the anneal relative to the microcavity layer.

Accordingly, we cannot affirm the examiner's rejection on this ground as to claims 1, 2, and 4 through 7.

The rejection as it applies to claims 13, 14, and 16 through 19 stands on different footing. As pointed out by the examiner (answer, page 10), Yoshimori discloses a semiconductor device comprising at least one microcavity (105, 106, 107, 108) within a layer (77, 86) of the device. (Figures 11-18.)

The appellants argue that "contact holes 105 and 106 (Fig. 13) extend through a plurality of layers, rather than being enclosed in a single layer." (Appeal brief, page 9.) This argument lacks merit, because appealed claims 13, 14, and 16 through 19 do not recite this feature. In re Self, 671 F.2d 1344, 1348, 213 USPQ 1, 5 (CCPA 1982) ("Many of appellant's arguments fail from the outset because, as the solicitor has

pointed out, they are not based on limitations appearing in the claims.”).

Regarding claims 16 through 19, the examiner has adequately addressed the limitations of these claims. (Answer, pages 13-14.)

We therefore uphold this ground of rejection as it applies to claims 13, 14, and 16 through 19.

IV. Claims 1, 3, 4, 10, 11, 13, 15 and 16
under 35 U.S.C. § 102(e) over Jost

As to claims 1, 3, 4, 10, and 11, the examiner argues that Jost's element 46 is a “pinning layer” and elements 18, 20, and 28 constitute a “microcavity layer.” (Answer, page 6.) The examiner, however, has not identified any evidence establishing that Jost's element 46 is a “pinning layer” within the construct of the appealed claims. Specifically, the examiner has not established that Jost's element 46 is capable of changing the shape of the microcavity, adheres well to the microcavity layer, and is fairly rigid such that it does not expand or shrink during the anneal relative to the microcavity layer.

Accordingly, we cannot affirm the examiner's rejection on this ground as to claims 1, 3, 4, 10, and 11.

Turning to the rejection as it applies to claims 13, 15, and 16, the examiner correctly points out (answer, page 10) that

Jost discloses a semiconductor device comprising at least one microcavity (34) within a layer (18, 20, and 28) of the device. (Figures 1-5.)

The appellants argue that Jost's contact openings 32 and 34 extend through a plurality of layers rather than being "enclosed in a single layer." (Appeal brief, page 10.) We note, however, the argued feature is not recited in the appealed claims.

Regarding claims 15 and 16, the examiner has adequately addressed the limitations of these claims. (Answer, pages 13-14.)

We therefore uphold this ground of rejection as it applies to claims 13, 15, and 16.

V. Claims 1, 3, 4, 10, 11, 13, 14, and 16
under 35 U.S.C. § 102(b) over Chou

As to claims 1, 3, 4, 10, and 11, the examiner argues that Chou's elements 34, 36, and 38 constitute a "pinning layer" and elements 14 and 15 constitute a "microcavity layer." (Answer, pages 11-12.) The examiner, however, has not identified any evidence establishing that Chou's element 34, 36, or 38 is a "pinning layer" within the construct of the appealed claims. Specifically, the examiner has not established that Chou's element 34, 36, or 38 is capable of changing the shape of the microcavity, adheres well to the microcavity layer, and is

fairly rigid such that it does not expand or shrink during the anneal relative to the microcavity layer.

Accordingly, we cannot affirm the examiner's rejection on this ground as to claims 1, 3, 4, 10, and 11.

Regarding the rejection as it applies to claims 13, 14, and 16, the examiner correctly points out (answer, page 10) that Chou discloses a semiconductor device comprising at least one microcavity (17) within a layer (14, 15) of the device.

(Figures 1-5.)

The appellants urge that Chou's opening 17 extends through a plurality of layers rather than "being enclosed in a single layer." Again, this argued feature is not recited in the claims.

As to claims 14 and 16, the examiner has adequately addressed the limitations of these claims. (Answer, pages 13-14.)

We therefore uphold this ground of rejection as it applies to claims 13, 14, and 16.

Summary

In summary, our disposition of this appeal is as follows:

I. The rejection under 35 U.S.C. § 112, first paragraph, of appealed claims 2 and 3 "as containing subject matter which was not described in the specification in such a way as to

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reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention" is affirmed.

II. The rejection under 35 U.S.C. § 102(e) of appealed claims 1 and 23 as anticipated by Jeng is reversed.

III. The rejection under 35 U.S.C. § 102(b) of appealed claims 1, 2, and 4 through 7 as anticipated by Yoshimori is reversed, but the rejection on this same ground of appealed claims 13, 14, and 16 through 19 is affirmed;

IV. The rejection under 35 U.S.C. § 102(e) of appealed claims 1, 3, 4, 10, and 11 as anticipated by Jost is reversed, but the rejection on this same ground of appealed claims 13 through 16 is affirmed; and

V. The rejection under 35 U.S.C. § 102(b) of appealed claims 1, 3, 4, 10, and 11 as anticipated by Chou is reversed, but the rejection on this same ground of appealed claims 13, 14, and 16 is affirmed.

The decision of the examiner to reject the appealed claims is affirmed in part.

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No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED IN PART

Chung K. Pak)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
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