

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. 16

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte FRANCOIS HEBERT

Appeal No. 1999-0848
Application No. 08/634,310

ON BRIEF

Before THOMAS, BARRETT, and RUGGIERO, Administrative Patent Judges.

RUGGIERO, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on the appeal from the final rejection of claims 2-6, 8-12, and 29-36. Claims 1, 7, and 13-28 were canceled earlier in the prosecution. In the Answer, in which the prior art rejection of claims 2-6, 8, and 10-12 is maintained, the Examiner at page 3 indicates the allowance of claims 9 and 29-36, as well as the withdrawal of the 35 U.S.C.

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§ 112, second paragraph, rejection of claims 9-12 and 29-36. Accordingly, only the final rejection of claims 2-6, 8, and 10-12 is before us on appeal.

The claimed invention relates to a semiconductor device having increased breakdown voltage in which a field oxide surrounds a device region formed in a surface region of a semiconductor body. The field oxide includes an etched recessed portion of reduced thickness in which a conductive plate is formed. The conductive plate is capacitively coupled to the semiconductor body to enhance the breakdown voltage of a p-n junction of a device formed within the device region.

Representative claim 8 is reproduced as follows:

8. A semiconductor device having increased breakdown voltage comprising:

a semiconductor body having a surface region of one conductive-type abutting a surface of said semiconductor body,

a device region formed in said surface region of opposite conductive-type, said device region abutting said surface,

a field oxide on said surface and surrounding said device region, said field oxide including a recessed portion of reduced thickness in the range of about 0.6-1.4 μ m adjacent to said device region,

a device within said device region having a p-n junction which terminates under said recessed portion of said field oxide, and

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a conductive plate on said recessed portion capacitively coupled to said semiconductor body for enhancing breakdown voltage of said p-n junction during device operation.

The Examiner relies on the following prior art:

Maeda et al. (Maeda)	5,442,226	Aug. 15, 1995
Jang	5,525,833	Jun. 11, 1996
		(filed Jun. 07, 1995)
Nakano et al. (Nakano)	56-035462	Apr. 08, 1981

(Published Japanese Patent Application)¹

Peter May and Frans C. Schiereck (May), "High-Speed Static Programmable Logic Array in LOCMOS," IEEE Journal of Solid-State Circuits, Vol. SC-11, No. 3, 365-68 (June 1976).

Appealed claims 2-6, 8, and 10-12 stand rejected under 35 U.S.C. § 102 as anticipated by, or, in the alternative, under 35 U.S.C. § 103 as being obvious over, each one of the Nakano, Maeda, Jang, and May references.

¹ A copy of a translation provided January 2001 by the U.S. Patent & Trademark Office is included with this decision.

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Rather than reiterate the arguments of Appellant and the Examiner, reference is made to the Brief (Paper No. 14) and Answer (Paper No. 15) for the respective details.

OPINION

We have carefully considered the subject matter on appeal, the rejections advanced by the Examiner, the arguments in support of the rejection and the evidence of anticipation and obviousness relied upon by the Examiner as support for the rejections. We have, likewise, reviewed and taken into consideration, in reaching our decision, Appellant's arguments set forth in the Brief along with the Examiner's rationale in support of the rejections and arguments in rebuttal set forth in the Examiner's Answer.

As correctly indicated by the Examiner (Answer, page 2), Appellant's Brief does not contain a statement that the rejected claims do not stand or fall together. See 37 CFR § 1.192(c)(7). Appellant's arguments in the Brief likewise do not assert reasons for separate patentability of the claims on appeal. Accordingly, all of the claims before us will stand or fall together and we will only consider the rejection against claim 8, the sole independent appealed claim, as representative of all

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the claims on appeal. Note In re King, 801 F.2d 1324, 1325, 231 USPQ 136, 137 (Fed. Cir. 1986); In re Sernaker, 702 F.2d 989, 991, 217 USPQ 1, 3 (Fed. Cir. 1983).

It is our view, after consideration of the record before us, that the Nakano and Maeda references do not fully meet the limitations of representative claim 8, but that the Jang and May references do anticipate the invention set forth in claim 8. We are also of the view that the evidence relied upon and the level of skill in the particular art would have suggested to one of ordinary skill in the art the obviousness of the invention as recited in the claims on appeal. Accordingly, we affirm.

The Nakano Reference

We consider first the rejection of representative claim 8 under 35 U.S.C. § 102(b) as being anticipated by Nakano. Anticipation is established only when a single prior art reference discloses, expressly or under the principles of inherency, each and every element of a claimed invention as well as disclosing structure which is capable of performing the recited functional limitations. RCA Corp. v. Applied Digital

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Data Systems, Inc., 730 F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir.); cert. dismissed, 468 U.S. 1228 (1984); W.L. Gore and Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 1554, 220 USPQ 303, 313 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984).

With respect to representative claim 8, the Examiner attempts to read the various limitations on the disclosure of Nakano, directing particular attention to the illustration in Figure 3(f) of Nakano. As part of the analysis at page 4 of the Answer, the Examiner, in addressing the claim language which requires "... a field oxide on said surface and surrounding said device region," admits that Nakano does not disclose a well region to define a device forming region on the surface of a semiconductor body. In attempting to correct such deficiency, the Examiner offers an obviousness rationale to supply the missing teaching.

After reviewing the statement of the Examiner's position in the Answer, it is apparent to us that, since the Examiner admitted that all claimed elements are not present in Nakano, a prima facie case of anticipation has not been established. Accordingly, since all of the limitations of claim 8 have not been shown to be expressly disclosed or inherent in the applied

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prior art, the Examiner's 35 U.S.C. § 102 rejection of representative claim 8 is not sustained.

Turning to a consideration of the Examiner's obviousness rejection of representative claim 8 we note that, while we found Appellant's arguments to be persuasive with respect to the lack of an anticipatory disclosure in Nakano, we reach the opposite conclusion as to the appropriateness of the Examiner's rejection under 35 U.S.C. § 103. In our view, the Examiner's has made a reasonable assertion that the skilled artisan would have been motivated and found it obvious to define a device region in Nakano by forming a well, thereby surrounding the device region with the field oxide 16, to effectively isolate devices from the underlying substrate. We further find to be a reasonable presumption the Examiner's assertion that, since conventional field oxide layers have a thickness of about 2 microns, a recessed portion of such field oxide as its thickness diminishes and approaches zero would inherently have a recessed portion within the thickness range of 0.6-1.4 microns as claimed.

In our opinion, the Examiner's analysis is sufficiently reasonable that we find that the Examiner has at least satisfied the burden of presenting a prima facie case of obviousness. The

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burden is, therefore, upon Appellant to come forward with evidence or arguments which persuasively rebut the Examiner's prima facie case of obviousness. Arguments which Appellant could have made but elected not to make in the Brief have not been considered in this decision (note 37 CFR § 1.192).

After reviewing Appellant's arguments in response, we find nothing more than bald assertions that a well region and a field oxide thickness in the claimed range are not disclosed in Nakano. These facts are not in dispute and, indeed, serve as the starting point for the Examiner's obviousness rejection as discussed supra. Since there is nothing in Appellant's response which could serve to persuade us of any error in the Examiner's reasoning, it is our opinion that Appellant has not met the burden of overcoming the Examiner's prima facie case of obviousness.

Appellant further argues (Brief, page 7) a lack of disclosure in Nakano of an etched recess portion in the field oxide layer as well as a lack of any teaching of the enhancing of breakdown voltage of a p-n junction. We find neither of these arguments to be persuasive. The fact that there is no disclosure that the recessed portion of the field oxide layer in

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Nakano is formed by etching is immaterial in a claim drawn to a product. The patentability of a product does not depend on its method of production. In re Pilkington, 411 F.2d 1345, 1348, 162 USPQ 145, 147 (CCPA 1969).

With regard to Appellant's argument related to the claimed enhancing of the breakdown voltage of a p-n junction, we note that the Examiner has made an unrebutted showing that the modified structure of Nakano is identical to that as set forth in appealed claim 8. We find nothing in Appellant's response that would convince us of any error in the Examiner's position (Answer, page 10) that "... similar structures behave similarly and therefore the structure of the prior art also behaves similar to the claimed invention by virtue of the fact that it is a similar structure to the claimed invention."

In view of the above discussion, it is our opinion that since the Examiner's prima facie case of obviousness has not been rebutted by any convincing arguments from Appellant, the Examiner's 35 U.S.C. § 103 rejection based on Nakano of representative claim 8 is sustained.

The Jang Reference

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In making the 35 U.S.C. § 102 rejection of claim 8 based on Jang, the Examiner points (Answer, page 6) to the illustration in Figure 12 [sic, 11] of Jang. In response, Appellant initially asserts that the recessed portion of the oxide layer in Jang, identified with the label BOX, is not part of the field oxide layer (identified with the label FOX). We do not find such argument to be persuasive. We agree with the Examiner (Answer, page 10) that the FOX and BOX oxide layers in Jang can reasonably be interpreted as constituting a composite isolation layer with the recessed BOX portion adjacent the device region.

We also find to be without merit Appellant's contention (Brief, page 8) that the p-n junction between the base and collector terminates under the maximum thickness of the field oxide, rather than under the recessed field oxide portion as claimed. The Examiner, in addressing this feature of claim 8, offers a differing interpretation of the disclosure of Jang. In the Examiner's view (Answer, page 10) the claim language "terminates" can be construed as not only including a lateral or horizontal relationship, as Appellant's arguments would imply, but also a vertical relationship. In other words, in the Examiner's interpretation, the p-n junction between layers 16

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and 24 in Jang "terminates" under the thinnest portion of the BOX oxide extension along the entire left to right horizontally extending p-n junction interface when viewed in cross section. In our opinion, this is a reasonable interpretation of the layer arrangement disclosed by Jang, an interpretation which Appellant has not shown by evidence and/or argument to be in error.

With respect to the claimed features of etched formation of the field oxide region, the particular field oxide reduced thickness range, and the enhanced breakdown voltage function, Appellant reiterates the arguments made previously with respect to Nakano. We find these arguments to be unpersuasive for all of the reasons discussed supra with regard to Nakano.

In view of the above discussion and analysis, it is our opinion that the Jang reference discloses all of the limitations of appealed representative claim 8. A disclosure that anticipates under 35 U.S.C. § 102 also renders the claim unpatentable under 35 U.S.C. § 103, for "anticipation is the epitome of obviousness." Jones v. Hardy, 727 F.2d 1524, 1529, 220 USPQ 1021, 1025 (Fed. Cir. 1984). See also In re Fracalossi, 681 F.2d 792, 794, 215 USPQ 569, 571 (CCPA 1982); In re Pearson, 494 F.2d 1399, 1402, 181 USPQ 641, 644 (CCPA 1974).

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Thus, we sustain the Examiner's 35 U.S.C. 102/103 rejection based on Jang of representative claim 8.

The May Reference

With regard to the Examiner's application of the May reference against representative claim 8, we sustain this 35 U.S.C. § § 102/103 rejection of the Examiner as well. A similar interpretation to that of Jang of the structure illustrated in May's Figure 1(b) is offered by the Examiner. We agree with the Examiner that, contrary to Appellant's contention, at least a portion of the lower horizontal interface of the p-n junction between the p-well and the n-substrate, when viewed in cross section, terminates along a recessed portion of the field oxide layer.

We also find Appellant's reiterated arguments with respect to the alleged lack in May of the claimed features of etched formation of the field oxide region, the particular field oxide reduced thickness range, and the enhanced breakdown voltage function to be unpersuasive for all of the reasons discussed previously with regard to Nakano.

The Maeda Reference

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In applying Maeda against the limitations of representative claim 8, the Examiner has recognized that, contrary to the claimed requirements, the conductive layer 32 in Maeda is not formed on the field oxide layer 20-1 but rather on an interlayer insulator 30. Nevertheless, the Examiner suggests (Answer, page 10) that "...both layers (20-1) and (30) are isolation layers and are also patterned similarly and thus can be considered as portions of a composite isolation layer." In our view, however, there is no support in the Answer for the position of the Examiner. No evidence has been presented that would support the assertion that Appellant's claimed device would function in the same manner with the addition of an intervening layer between the conductive plate and the field oxide. Accordingly, since all of the claimed limitations are not present in Maeda, the Examiner's 35 U.S.C. § 102 rejection of claim 8 is not sustained.

We also do not sustain the Examiner's alternative 35 U.S.C.

§ 103 rejection of claim 8 based on Maeda. We find nothing in the Examiner's reasoning which indicates how and in what manner

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the Maeda reference would be modified in order to overcome the deficiency discussed supra to support an obviousness rejection.

In summary, we have not sustained either the 35 U.S.C. § 102 or the 35 U.S.C. § 103 rejection of claim 8 based on Maeda. We have sustained the Examiner's 35 U.S.C. § 103 rejection of representative claim 8 based on Nakano, but have not sustained the rejection of claim 8 under 35 U.S.C. § 102 as anticipated by Nakano. We have sustained the 35 U.S.C. § 102 and the 35 U.S.C. § 103 rejections of claim 8 based on each one of Jang and May. Therefore, the decision of the Examiner rejecting independent claim 8, as well as dependent claims 2-6, 8, and 10-12, which fall together with claim 8, under 35 U.S.C. § 102, or, alternatively, under 35 U.S.C. § 103 is affirmed.

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

AFFIRMED

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JAMES D. THOMAS)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
LEE E. BARRETT)	APPEALS
Administrative Patent Judge)	AND
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DECISION: **AFFIRMED**

PREPARED: Sep 23, 2002

OB/HD

PALM

ACTS 2

DISK (FOIA)

REPORT

BOOK