UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte DONG-HYUK JU, WILLIAM G.EN
SRINATH KRISHNAN and XILIN JUDY AN

Appeal No. 2006-1763
Application No. 09/850,393

ON BRIEF

Before KRASS, JERRY SMITH, and BARRY, Administrative Patent Judges.

KRASS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the final rejection of claims 1-8 and 18-22.

The invention is directed to a semiconductor-on-insulator (SOI) device. In particular, a buried insulation layer includes an oxide trap region disposed at an upper surface of the buried insulation layer, with the oxide trap region having a plurality of oxide traps to promote carrier recombination.

Representative independent claim 1 is reproduced as follows:

1. A semiconductor-on-insulator (SOI) device, comprising:
an SOI wafer including an active layer, a substrate and a buried insulation layer disposed therebetween, the active layer having isolation regions defining an active region, and a source region, a drain region and a body region disposed therebetween being formed in the active region;
a gate disposed on the semiconductor layer above the body region, the gate being operatively arranged with the source, drain and body regions to form a transistor; and
wherein the buried insulation layer includes an oxide trap region disposed at an upper surface of the buried insulation layer, the oxide trap region having a plurality of oxide traps to promote carrier recombination.

The examiner relies on the following reference:

Hughes et al (Hughes) 6,071,791 Jun. 6, 2000

In addition, the examiner relies on admitted prior art (APA) described at page 1, lines 6-25, of the instant specification.

Reference is made to the briefs and answer for the respective positions of appellants and the examiner.

OPINION

We REVERSE.

In rejecting claims under 35 U.S.C. §103, it is incumbent upon the examiner to establish a factual basis to support the legal conclusion of obviousness. See In re Fine, 837 F.2d 1071, 1073, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In so doing, the examiner is expected to make the factual determinations set forth in Graham v, John Deere Co.,

383 U.S. 1, 17, 148 USPQ 459, 467 (1966). The examiner must articulate reasons for the examiner's decision. In re Lee, 277 F.3d 1338, 1342, 61 USPQ2d 1430, 1434 (Fed. Cir. 2002). In particular, the examiner must show that there is a teaching, motivation, or suggestion of a motivation to combine references relied on as evidence of obviousness. Id. at 1343. The examiner cannot simply reach conclusions based on the examiner's own understanding or experience – or on his or her assessment of what would be basic knowledge or common sense. Rather, the examiner must point to some concrete evidence in the record in support of these findings. In re Zurko, 258 F.3d 1379, 1386, 59 USPQ2d 1693, 1697 (Fed. Cir. 2001). Thus the examiner must not only assure that the requisite findings are made, based on evidence of record, but must also explain the reasoning by which the findings are deemed to support the examiner's conclusion. However, a suggestion, teaching, or motivation to combine the relevant prior art teachings does not have to be found explicitly in the prior art, as the teaching, motivation, or suggestion may be implicit from the prior art as a whole, rather than expressly stated in the references. The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art. In re Kahn, 977 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006) citing In re Kotzab, 217 F.3d 1365, 1370, 55 USPQ2d 1313 (Fed. Cir. 2000). See also In re Thrift, 298 F.3d 1357, 1363, 63 USPQ2d 2002, 2008 (Fed. Cir. 2002). These showings by the examiner are an essential part of complying with the burden of presenting a prima facie case of obviousness. Note In re Oetiker, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992). If that burden is met, the burden then shifts to the applicant to overcome the

prima facie case with argument and/or evidence. Obviousness is then determined on the basis of the evidence as a whole and the relative persuasiveness of the arguments. See Id.; In re Hedges, 783 F.2d 1038, 1040, 228 USPQ 685, 687 (Fed. Cir. 1986); In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984); and In re Rinehart, 531 F.2d 1048, 1051, 189 USPQ 143, 146-147 (CCPA 1976).

In the instant case, the examiner did a fine job of finding relevant art, in Hughes' implantation to create electron traps/recombination centers in the oxide layer of a SOI device, and establishing the requisite motivation for combining this teaching with the conventional SOI device.

The issue before us is whether the disclosure, in Hughes, of the oxide trap region being disposed "near" an upper surface of the buried insulation layer meets the claim limitation of the oxide trap region being disposed "at" an upper surface of the buried insulation layer.

The examiner presented a credible case as to why the oxide traps in Hughes should be considered "at" the interface between the active layer and the buried insulation layer of the SOI device, because they are "near" the interface. However, upon consideration of all the evidence, and taking into special account the entire disclosure of Hughes, as well as the arguments of appellants and the examiner, we conclude that the term "near" in Hughes is not synonymous with "at" recited in instant claim 1. We also conclude that while the examiner makes a reasonable case as to making the combination

of Hughes and APA, the combination would not result in the instant claimed subject matter.

Initially, we note that while the instant specification specifically permits the oxide traps to be "at or near" (page 5, line 8) the upper surface of the buried insulation layer, appellants have made a clear choice, as per the language of claim 1, to claim only the embodiment wherein the oxide traps are "at" the surface. The alternative language of the specification makes it clear that appellants made a distinction being oxide traps being "at" and oxide traps being "near" the surface of the buried oxide layer.

These two terms have a clear distinction. As aptly explained by appellants at page 6 of the principal brief, to stay "at" a hotel is much different than staying "near" that same hotel. Thus, while "at" may refer, selectively, to any of "in," "on," or "near," appellants' specification does make a clear distinction between "at" and "near." Accordingly, we agree with appellants that "near" should not be read into the claim term "at" under the present circumstances.

Moreover, upon reading the disclosure of Hughes as a whole, it is clear that Hughes is concerned with implanting or creating the electron traps "deep" (see, for example, column 2, lines 10 and 50) in order to prevent the needed electrons from escaping the buried insulation layer. Taking this disclosure together with Hughes' disclosure of implanting the dopant ion "at a depth near the interface" of the active and buried insulation layers (column 2, lines 45-47), it appears that Hughes does not want the

electron traps "at" or "on" the surface of the buried oxide layer. That is, Hughes wants the electron traps at some distance, or depth, away from the interface of the active and buried insulation layers. Of course, when dealing with dimensions of angstroms, the electron traps can be "deep," relatively speaking, and still be "near" the interface, as desired by Hughes. But it does seem clear that Hughes wants his electron traps at a distance from the interface of the active and buried insulation layers.

Thus, when combining a conventional structure of a SOI device with the teachings of Hughes as per electron traps and their placement in that structure, the result would be a structure having electron traps placed at some depth or distance away from the interface of the active and buried insulation layers. This contrasts with the subject matter of instant claim 1 that requires the electron traps to be "at" this interface, or the upper surface of the buried insulation layer.

Perhaps one might make an argument that the disclosure of Hughes would somehow have suggested alternatively placing the electron traps at the claimed position, but there is no evidence of record that the examiner is making such an argument or that the examiner would be able to bolster such an argument with a convincing rationale. The examiner's position is merely that Hughes' disclosure of the electron traps being "near" the surface of the buried insulation layer is a disclosure of the electron traps being "at" the surface of the buried insulation layer. We disagree for the reasons supra.

Accordingly, we will not sustain the rejection of claim 1, or of claims 2-8, 18, and 21, dependent thereon, under 35 U.S.C. §103.

Turning to independent claim 19, this claim does not contain the "at" language of claim 1. However, the claim does refer to the oxide trap region being "disposed along an upper surface" of the buried insulation layer. The claim further indicates how the oxide trap region is formed, i.e., by implanting ions through the active layer such that the ions impinge upon and "damage the upper surface of the buried insulation layer."

Thus, it is clear to us that, again, in claim 19, the oxide trap region must be "at" the upper surface of the buried insulation layer since it is "disposed along an upper surface of the buried insulation layer." But, to the extent one might reasonably argue that "disposed along an upper surface" includes being "near" the surface, as in Hughes, the further requirement of claim 19 that the impinging ions "damage the upper surface of the buried insulation layer" reinforces the idea that the oxide traps, which are formed by this "damage," are at the upper surface of the buried insulation layer.

One may argue that in Hughes, the impinging ions being implanted in the buried insulation layer also must be implanted through the surface of that layer and thus "damage" the surface. However, we have no evidence of record to support any such finding and it may very well be that the specific energy at which implantation takes place dictates that no damage is done to the surface of the insulation layer but only to the area in the insulation layer at which the ions are actually implanted. We simply do not know

and have no evidence to support such an argument one way or the other. We base our findings only on the evidence before us and, accordingly, find that Hughes does not teach or suggest an oxide trap region "disposed along an upper surface of the buried insulation layer" wherein "ions impinge upon and damage the upper surface of the buried insulation layer," as claimed.

We find it difficult to sustain the rejection of claims requiring an oxide trap region at, or disposed along, the surface of a buried insulation layer when the principal reference suggests that such an oxide trap region should be "implanted sufficiently deep into the" buried insulation layer (column 2, line 50).

Thus, we also will not sustain the rejection of claims 19, 20, and 22 under 35 U.S.C. §103.

The examiner's decision is reversed.

REVERSED

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Errol A. Krass	)
Administrative Patent Judge	)
	)
	) BOARD OF PATENT
Jerry Smith	)
Administrative Patent Judge	) APPEALS AND
	)
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