

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ANDY C. WEI, DERICK J. WRISTERS, and
MARK B. FUSELIER

Appeal 2008-4265
Application 11/072,661
Technology Center 2800

Decided: January 15, 2009

Before MAHSHID D. SAADAT, JOHN A. JEFFERY, and KEVIN F. TURNER, *Administrative Patent Judges*.

TURNER, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134 from the Final Rejection of claims 31-36. We have jurisdiction under 35 U.S.C. § 6(b).

We REVERSE.

Appellants' claimed invention relates to semiconductor device fabrication technology and methods of making a silicon-on-insulator (SOI)

Appeal 2008-4265
Application 11/072,661

device having enhanced, self-aligned dielectric regions in the bulk substrate.
(Spec. 1:6-9).

Independent claim 31 is illustrative of the invention and reads as follows:

31. A semiconductor device, comprising:

a gate electrode formed above an SOI structure comprised of a bulk substrate, a buried insulation layer formed above the bulk substrate, and an active layer formed above the buried insulation layer; and

a plurality of dielectric regions comprised of silicon dioxide formed in said bulk substrate, said dielectric regions being self-aligned with respect to said gate electrode.

(App. Br. 10, Claims Appendix)

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

Teo	US 6,103,569	Aug. 15, 2000
Wu	US 6,441,436 B1	Aug. 27, 2002

Appellants' Prior Art Figure 1 (APAF1).

Claims 31-35 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Appellants' Prior Art Figure 1 (APAF1) and Wu.

Claim 36 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over APAF1, Wu, and Teo.

Claims 24-36 are pending in the application, where claims 24-30 have been allowed. (Final Office Action 6). We refer to the Examiner's Answer (mailed Sep. 11, 2007) and to Appellants' Appeal Brief (filed May 31, 2007) and Reply Brief (filed Nov. 12, 2007) for their respective arguments.

Appellants argue that Wu only provides motivation for forming a self-aligned oxide in a layer above the active region of the device and not in the bulk substrate. (App. Br. 5-8; Reply Br. 2). The Examiner responds that the combination of APAF1 and Wu suggests all of the elements of claim 31 and that Wu cures the deficiencies of APAF1. (Ans. 6-9). Appellants also traverse the rejection of claim 36 solely on the basis that Teo fails to cure the alleged deficiencies of the rejection of independent claim 31. (App. Br. 9). We take claim 31 to be representative of the claims argued. 37 C.F.R. § 41.37(c)(1)(vii).

Rather than reiterate all of the arguments of Appellants and the Examiner, reference is made to the Briefs and Answer for the respective details. Only those arguments actually made by Appellants have been considered in this decision. Arguments which Appellants could have made but chose not to make in the Briefs have not been considered and are deemed to be waived. *See* 37 C.F.R. § 41.37(c)(1)(vii).

ISSUE

Under 35 U.S.C. § 103(a), with respect to appealed claim 31, would one of ordinary skill in the art at the time of the invention have modified APAF1, in view of Wu, to form an dielectric regions comprised of silicon oxide in the bulk substrate?

FINDINGS OF FACT

1. Independent claim 31 recites, in part, an “a plurality of dielectric regions comprised of silicon dioxide formed in said bulk substrate.”

2. Appellants' disclosure provides an illustrative example of a transistor fabricated on a silicon-on-insulator (SOI) substrate in Fig. 1, which is reproduced below:

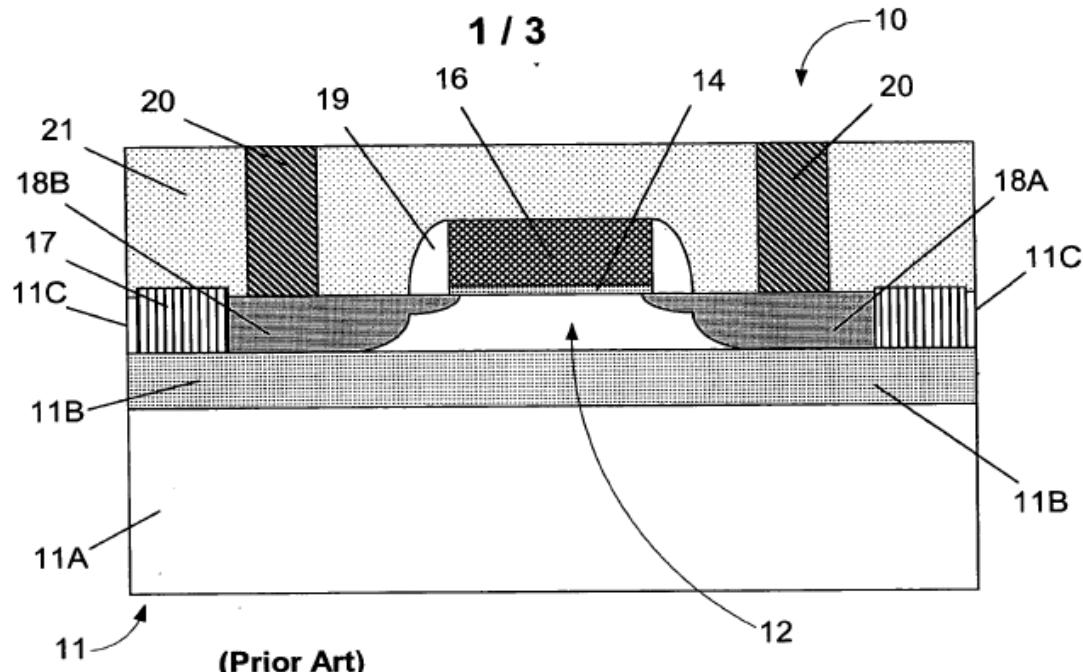


Figure 1

Fig. 1 of Appellants' Specification illustrates a transistor fabricated on a silicon-on-insulator substrate.

3. Fig. 1 illustrates a substrate (11) having a bulk section (11A), a buried insulation layer section (11B), and an active layer section (11C). A channel region (12) exists between the source (18B) and the drain (18A), where a gate insulation layer (14) and a gate electrode (16) are formed on the channel region between the source and drain. (Spec. 3:9-24).

4. Wu is directed to methods of forming an SOI Dynamic Random Access Memory (DRAM) having a Metal-Oxide-Semiconductor (MOS) transistor and an improved SOI substrate with back-gate control. (Abstract).

5. The rejection of claim 31 (Ans. 3-4) relies on Fig. 9 of Wu reproduced below:

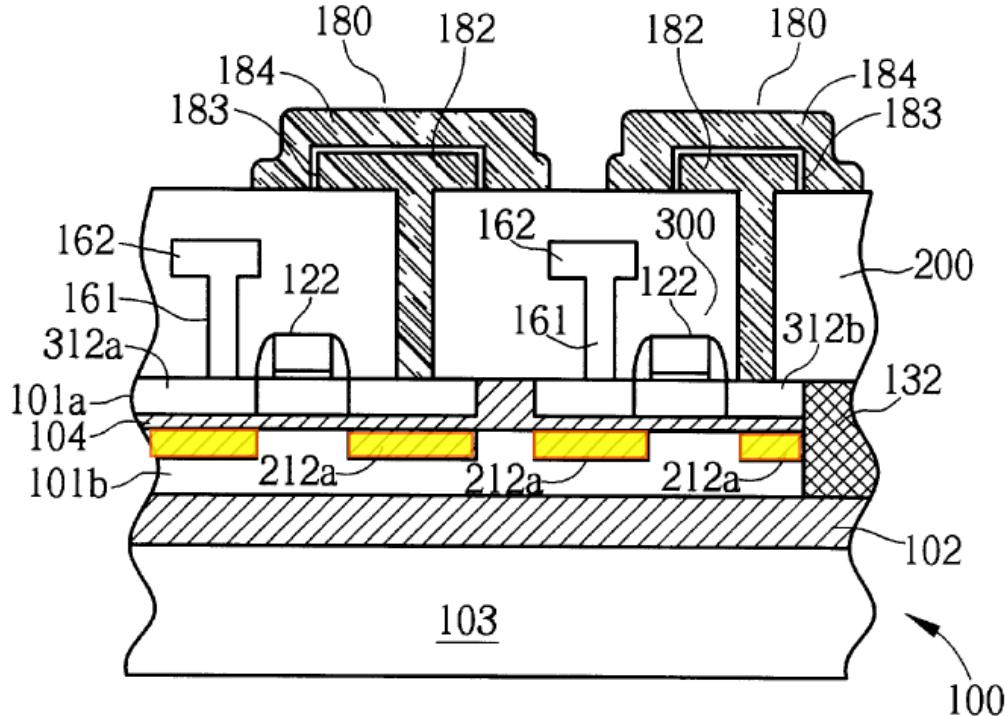


Fig. 9

Fig. 9 of Wu illustrates a DRAM structure, where oxidation regions (212 a) have been shaded for greater clarity.

6. Wu's Fig. 9 illustrates a DRAM structure with a silicon substrate (103), a buried oxide layer (102), first and second silicon layers (101a & 101b), where the second silicon layer (101b) serves as a back-gate electrode. Within the silicon layers is a thin buried oxide layer (104) and oxidation regions (212a), where the oxidation regions have been shaded in the reproduced figure for greater clarity. (Col. 4, ll. 30-64).

7. Wu discloses that an oxygen implantation process is used to form the silicon dioxide layer (104) in the P-type silicon layer (101), where the formed oxide layer has a preferred thickness of 300Å. (Col. 3, ll. 7-16).

PRINCIPLES OF LAW

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 (Fed. Cir. 1988).

[T]here must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness . . . [H]owever, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.

KSR Int'l Co. v. Teleflex Inc., 127 S. Ct. 1727, 1741 (2007) (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

There is a “heavy presumption” that the terms used in claims “mean what they say and have the ordinary meaning that would be attributed to those words by persons skilled in the relevant art.” *SuperGuide Corp. v. DirecTV Enterprises*, 358 F.3d 870, 874-875 (Fed. Cir. 2004) (quoting *Tex. Digital Sys., Inc. v. Telegenix, Inc.*, 308 F.3d 1193, 1202 (Fed. Cir. 2002)).

ANALYSIS

Appellants argue that APAF1 and Wu fail to teach or suggest self-aligned silicon dioxide regions formed in the bulk substrate. (App. Br. 6). Appellants argue that Wu discloses the formation of silicon dioxide layers in the active layers and not in the bulk substrate, as recited in claim 31. (App. Br. 6). The Examiner finds that Wu “looks like an SOI formed on an SOI,” and that the “top” SOI teaches the formation of self-aligned dielectric

regions that can be applied to APAF1. (Ans. 7). We cannot agree with the Examiner.

While the Examiner finds the “top” structure in the Examiner’s purported stacked SOI structures to be equivalent to an SOI structure, we can find no support for such a position. The buried oxide layer (104) is Wu is very thin, (FF. 7), and we can find no support that one of ordinary skill in the art would find such a layer equivalent to a buried insulator layer that is found in known SOI structures. We find this especially true given that Wu already provides a buried oxide layer (102) that is equivalent to a buried insulator layer that is found in known SOI structures. Given that Wu does not provide for any such equivalence in structure, we have only the Examiner’s pronouncements that one of ordinary skill in the art would see the dissimilar structures as similar.

Wu provides no support for the position taken by the Examiner of the equivalence of the “top” and “bottom” structures. Even if we were to accept the Examiner’s notion that the problems and solutions associated with Wu are the same as or similar to those discussed in Appellants’ Specification, (Ans. 8-9), that does not support the Examiner’s contention that one of ordinary skill in the art would have made similar changes to apparently dissimilar structures. As such, we cannot accept that one of ordinary skill in the art would have modified APAF1 in the manner suggested by the Examiner in the rejection of claim 31. Therefore, we find the Examiner erred in rejecting claim 31 as being unpatentable over APAF1 and Wu.

In a similar vein, claims 32-36 all depend from independent claim 31, and their rejection is reversed as well. We concur with Appellants that the

Appeal 2008-4265
Application 11/072,661

addition of Teo, in the rejection of claim 36, fails to cure the defects in the rejection of claim 31. (App. Br. 9).

CONCLUSION

The decision of the Examiner rejecting claims 31-35 under 35 U.S.C. § 103(a) as being unpatentable over APAF1 and Wu and claim 36 under 35 U.S.C. § 103(a) as being unpatentable over APAF1, Wu, and Teo, is reversed.

DECISION

The Examiner's rejections of claims 31-36 before us on appeal are reversed.

REVERSED

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