

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.

Paper No. 16

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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Ex parte ROBERT D. NASBY

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Appeal No. 1996-3444  
Application No. 08/245,785<sup>1</sup>

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ON BRIEF

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Before HAIRSTON, FLEMING and RUGGIERO, Administrative Patent Judges.

RUGGIERO, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the final rejection of claims 1-21, which constitute all the claims pending in the present application.

The disclosed invention relates to a semiconductor diode switching device that, according to Appellant's specification,

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<sup>1</sup> Application for patent filed May 19, 1994.

can be used as a nonvolatile non-destructive-readout semiconductor memory element for information storage. More particularly, Appellant indicates at page 7 of the specification that the diode switching device is formed with a ferroelectric material film disposed above a rectifying junction. An electric field generated by the polarization of the ferroelectric material acts to modify the forward-bias effective turn-on voltage of the rectifying junction.

Claim 1 is illustrative of the invention and reads as follows:

1. A semiconductor apparatus comprising:
  - (a) a semiconductor substrate of a first conductivity type, the substrate having a device surface;
  - (b) a patterned insulating layer formed on the device surface having at least one region of access to the semiconductor substrate;
  - (c) a patterned electrically conductive material in contact with the semiconductor substrate in an access region, the electrically conductive material in combination with the semiconductor substrate forming a rectifying junction with a conduction characteristic;
  - (d) a pair of electrodes connected to opposite sides of the rectifying junction, with a first electrode being connected to the semiconductor substrate and a second electrode being connected to the patterned electrically conductive material; and

Appeal No. 1996-3444  
Application No. 08/245,785

(e) at least one electric field generating layer deposited over the patterned conductive material in the vicinity of the rectifying junction, the at least one electric field generating layer having a third electrode connected thereto.

Appeal No. 1996-3444  
Application No. 08/245,785

The Examiner relies on the following references:

Brown 1957	2,791,759	May 07,
Waters et al. (Waters) 1972	3,651,384	Mar. 21,
Takeshita et al. (Takeshita) 24, 1990	4,920,513	Apr.
Young (Canadian) 1959	583,199	Sep. 15,

Chang et al. (Chang), "Vertical Diode-Capacitor Memory Cells",  
IBM Technical Disclosure Bulletin, Vol. 15, No. 9, published  
February 1973, pp. 2887-2889.

Sze, Physics of Semiconductor Devices, Second Edition, John  
Wiley & Sons, published 1981, page 64.

The rejections of the appealed claims are set forth by  
the

Examiner as follows:

1. Claim 1 stands finally rejected under 35 U.S.C. §  
103 as being unpatentable over Chang in view of Takeshita and  
Waters.

2. Claim 2 stands finally rejected under 35 U.S.C. §  
103 as being unpatentable over Chang in view of Takeshita and  
Waters and further in view of Young.

3. Claims 3-21 stand finally rejected under 35 U.S.C.

Appeal No. 1996-3444  
Application No. 08/245,785

§ 103 as being unpatentable over Chang in view of Takeshita and Waters and further in view of Brown.

4. Claims 1, 3, and 8 stand finally rejected under 35 U.S.C. § 103 as being unpatentable over Brown in view of Sze.

Appeal No. 1996-3444  
Application No. 08/245,785

5. Claims 4-7 and 9-21 stand finally rejected under 35 U.S.C. § 103 as being unpatentable over Brown in view of Sze and Young.

Rather than reiterate the arguments of Appellant and the Examiner, reference is made to the Brief and Answer for the respective details.

#### OPINION

We have carefully considered the subject matter on appeal, the rejections advanced by the Examiner and the evidence of 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. It is our view, after consideration of the record before us, that the collective evidence relied upon and the level of skill in the particular art would not have suggested to one of ordinary skill in the

Appeal No. 1996-3444  
Application No. 08/245,785

art the obviousness of the invention as set forth in claims 1-21. Accordingly, 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), and to provide a reason why one having ordinary skill in the pertinent art would have been led to modify the prior art or to combine prior art references to arrive at the claimed invention. Such reason must stem from some teaching, suggestion or implication in the prior art as a whole or knowledge generally available to one having ordinary skill in the art. Uniroyal Inc. v. Rudkin-Wiley Corp., 837 F.2d 1044,

Appeal No. 1996-3444  
Application No. 08/245,785

1051, 5 USPQ2d 1434, 1438 (Fed. Cir.), cert. denied, 488 U.S.  
825

(1988); Ashland Oil, Inc. v. Delta Resins & Refractories,  
Inc.,

776 F.2d 281, 293, 227 USPQ 657, 664 (Fed. Cir. 1985), cert.  
denied, 475 U.S. 1017 (1986); ACS Hospital Systems, Inc. v.  
Montefiore Hospital, 732 F.2d 1572, 1577, 221 USPQ 929, 933  
(Fed.

Cir. 1984). 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).

Appeal No. 1996-3444  
Application No. 08/245,785

The rejection of claim 1 as unpatentable  
over Chang, Takeshita and Waters.

With respect to independent claim 1, the Examiner proposes to modify the diode-capacitor memory cell structure of Chang by relying on the reset electrode feature of Takeshita to supply the missing teaching of an electrode in contact with the patterned electrically conductive material as claimed. Waters is additionally added to the proposed combination as providing a teaching of a substrate comprised of only a single conductivity type. In the Examiner's view, one of ordinary skill would find it obvious to provide an electrode connection between the diode and capacitor in Chang for enabling a reset operation in view of the combined teachings of Takeshita and Waters.

In response, Appellant attacks the Examiner's proposed combination by asserting that Chang teaches away from any need for an additional reset electrode connection since a reset operation by diode avalanche breakdown is already taught by Chang. Appellant further argues the inappropriateness of the obviousness rejection since the Examiner's proposed

Appeal No. 1996-3444  
Application No. 08/245,785

modification would destroy the intent, purpose, or function of the Chang reference (Brief, page 5).

Upon careful review of the applied prior art in light of Appellant's arguments, we are in agreement with Appellant's position as stated in the Brief. In our view, Chang's existing provision for a reset function obviates any need for an external reset switch and accompanying electrode connection. Since the reset techniques of Chang and Takeshita are so opposed to each other, it is our opinion that the rationale for combining their teachings could only come from an improper hindsight reconstruction of the invention by the Examiner. Therefore, since we can find no basis in the applied prior art to combine their teachings in the manner proposed by the Examiner, the  
35 U.S.C. § 103 rejection of claim 1 is not sustained.

The rejection of claim 2 as unpatentable over Chang in view of Takeshita, Waters, and Young.

It is apparent from the Examiner's statement of the grounds of rejection at page 4 of the Answer that Young was applied solely to meet the ferroelectric material feature of dependent claim 2. As noted by the Examiner, Young teaches

Appeal No. 1996-3444  
Application No. 08/245,785

the property of non-volatility associated with a ferroelectric dielectric layer for a capacitor. Young, however, does not overcome the innate deficiencies of Chang, Takeshita, and Waters as discussed above with regard to independent claim 1, and, therefore, we do not sustain the obviousness rejection of claim 2.

The rejection of claims 3-21 as unpatentable over Chang in view of Takeshita, Waters, and Brown.

At the outset, we note that this grouping of claims includes independent claims 8 and 16 which have electrode configuration recitations similar to those of previously discussed independent claim 1. As with the Young reference discussed above in relation to the rejection of claim 2, Brown was applied by the Examiner for the limited purpose of supplying a teaching of utilizing a ferroelectric layer to generate a rectifying junction penetrating electric field. Since it is our view that the Examiner has not established a prima facie case of obviousness with respect to the proposed combination of Chang, Takeshita, and Waters, the addition of a ferroelectric material layer taught by Brown does not overcome the deficiencies of the applied prior art. Accordingly, we

Appeal No. 1996-3444  
Application No. 08/245,785

cannot sustain the 35 U.S.C. § 103 rejection of claims 3-7 dependent on claim 1 discussed above. Similarly, the U.S.C. § 103 rejection of independent claims 8 and 16 and claims 9-15 and 17-21 dependent thereon cannot be sustained.

The rejection of claims 1, 3, and 8 as unpatentable over Brown in view of Sze.

In a separate obviousness rejection, the Examiner seeks to modify the semiconductor structure of Brown by adding a patterned insulating layer taught by Sze. In response, Appellants argue (Brief, pages 10 and 11) that the Examiner has failed to establish proper motivation for making the suggested modification. We agree. The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. In re Fritsch, 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992). The Brown reference, as correctly pointed out by the Examiner, has a rectifying junction which extends across the entire device. Sze, on the other hand, discloses a semiconductor structure in which the rectifying junction is localized under an access region in a patterned insulating layer. In our

Appeal No. 1996-3444  
Application No. 08/245,785

view, these structural teachings are so opposite in approach that any motivation to combine them must have resulted from an improper attempt to reconstruct Appellant's invention in hindsight. Accordingly, the Examiner's obviousness rejection of claims 1, 3, and 8 is not sustained.

The rejection of claims 2, 4-7, and 9-21 as being unpatentable over Brown in view of Sze and Young.

To the proposed combination of Brown and Sze, the Examiner offers Young for the sole teaching of using barium titanate as a ferroelectric material. Young, however, has no disclosure which would overcome the deficiencies of the proposed combination of Brown and Sze discussed previously. Therefore, the 35 U.S.C.

§ 103 rejection of claims 2, 4-7, and 9-21 cannot be sustained.

In summary, we have not sustained any of the Examiner's obviousness rejections of the claims on appeal. Therefore, the decision of the Examiner rejecting claims 1-21 is reversed.

REVERSED

Appeal No. 1996-3444  
Application No. 08/245,785

KENNETH W. HAIRSTON	)	
Administrative Patent Judge	)	
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	)	BOARD OF PATENT
MICHAEL R. FLEMING	)	APPEALS
Administrative Patent Judge	)	AND
	)	INTERFERENCES
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	)	
JOSEPH F. RUGGIERO	)	
Administrative Patent Judge	)	

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Appeal No. 1996-3444  
Application No. 08/245,785

Richard E. Constant  
DOE/GC-42 (FORSTL) MS-6F-067  
1000 Independence Ave., S.W.  
Washington, D.C. 20585