

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opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.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. 24

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte STANLEY R. SHANFIELD, BHARAT PATEL and HERMANN STATZ

Appeal No. 95-0926
Application 08/026,222¹

ON BRIEF

Before HAIRSTON, KRASS and BARRETT, Administrative Patent Judges.
KRASS, Administrative Patent Judge.

DECISION ON APPEAL

¹ Application for patent filed February 23, 1993. According to appellants, the application is a continuation of Application 07/825,795 filed January 21, 1992, now abandoned and a continuation of Application 07/629,317 filed December 18, 1990, now abandoned.

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This is a decision on appeal from the final rejection of claims 9, 10 and 12 through 18, all of the claims pending in the application.

The invention is directed to a semiconductor device. More particularly, a negative surface potential is provided on an exposed surface of the semiconductor between the gate electrode and the source and/or drain. The surface is then covered with a passivating layer. It is disclosed that by incorporating an electro-negative species into the semiconductor surface, the negative charge in the surface can be maintained after passivation, thus minimizing reductions in reverse breakdown voltage.

Representative independent claim 9 is reproduced as follows:

9. A field effect transistor comprising:

a substrate supporting an active layer comprising a Group III-V material having a dopant concentration with a source electrode and a drain electrode disposed thereover and with a gate electrode disposed between said source and drain electrodes in Schottky barrier contact to said active layer;

a surface layer portion of said active layer having anions to provide a negatively charged surface potential disposed between said drain and gate electrodes comprised of said Group III-V material and oxygen having a thickness in the range of 250 to 350 Å; and

a layer of passivation material disposed at least on said surface layer portion of said active layer.

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The examiner relies on the following references:

Liles	4,688,062	Aug. 18, 1987
Kirchner et al. (Kirchner)	4,843,450	Jun. 27, 1989

Claims 9, 10 and 12 through 18 stand rejected under 35 U.S.C. 103 as unpatentable over Liles in view of Kirchner.

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

OPINION

At the outset, we note that while appellants state, at page 11 of the brief, that all claims stand or fall together, appellants separately argue [at pages 14-15 of the brief] the limitations of dependent claims 16, 17 and 18, apart from the other claims.

Regarding appellants' argument, at pages 12-13 of the brief, that the instant invention will maintain a reverse breakdown voltage, this argument is not persuasive since the maintenance of a reverse breakdown voltage forms no part of the claims.

Further, appellants' argument that Kirchner teaches away from the instant claimed invention, because Kirchner is interested in an anion free oxide on the surface of the

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semiconductor, is also not persuasive because while this appears to be Kirchner's preferred embodiment in order to eliminate Fermi level pinning, Kirchner clearly teaches, throughout the patent specification, that there are times that one wishes to introduce anionic species in a selective pattern, e.g., see column 5, lines 37-41 of Kirchner. Thus, Kirchner does not teach away from appellants' claimed invention in this regard.

At page 14 of the brief, appellants argue that

[n]one of the figures show a gate metal electrode in Schottky barrier contact with the active layer.

This, too, is not persuasive of patentability because, while Kirchner may not show such a gate metal electrode, the examiner relied on Liles for such a teaching and appellants have failed to address the combination of references as applied by the examiner. In fact, appellants have not addressed Liles at all in their brief.

Nevertheless, we will not sustain the rejection of claims 9, 10 and 12 through 18 under 35 U.S.C. 103 because neither of the references or a combination of them discloses a surface layer portion of the active layer having anions to provide a negatively charged surface potential that is disposed between the drain (and source, as per claim 15) and gate

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electrodes, as claimed. Liles is not directed to an active layer having anions at all. Kirchner does show, in Figure 9, an oxide with anions for local pinning located underneath gate 16 but this is not a layer situated between the drain (or source) and the gate electrodes, as claimed. Further, while Kirchner discloses that anionic species may be introduced in selective patterns, we find nothing in the reference which would have suggested the placement of such anions in a surface portion of the active layer in the specific locations claimed. Moreover, the surface layer portion of the active layer having anions to provide a negatively charged surface potential disposed between the drain and gate electrodes is not an immaterial limitation as it is this limitation that is disclosed as providing the maintenance of the reverse breakdown voltage which would normally be reduced during the deposition of the passivation layer. Yet, the examiner never comes to grips with this specific claim limitation.

Accordingly, because the examiner has failed to establish a prima facie case of obviousness with regard to the claimed subject matter, the examiner's decision rejecting claims 9, 10 and 12 through 18 under 35 U.S.C. 103 is reversed.

REVERSED

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KENNETH W. HAIRSTON)	
Administrative Patent Judge)	
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ERROL A. KRASS)	BOARD OF PATENT
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