

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opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.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. 13

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte MARK J. LOBODA, and
KEITH W. MICHAEL

Appeal No. 97-4091
Application 08/382,701¹

ON BRIEF

Before JERRY SMITH, BARRETT and LEE, Administrative Patent Judges.

LEE, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the examiner's final rejection of claims 1-15. No claim has been allowed.

References relied on by the Examiner

Yonezawa et al. (Yonezawa)	4,224,636	Sep. 23, 1980
Yamazaki	4,559,552	Dec. 17, 1985

¹ Application for patent filed February 2, 1995.

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The Rejections on Appeal

Claims 1-15 stand finally rejected under 35 U.S.C. § 103 as being unpatentable over Yonezawa and Yamazaki. The appellants have grouped all claims 1-15 together for argument purposes in this appeal. (Br. at 3).

The Invention

This invention is directed to the use of an amorphous silicon carbide layer as a diffusion barrier in an integrated circuit or a wiring board. According to the specification (at 1, lines 3-6), the function of the amorphous silicon carbide layer is to stop the migration of metal atoms between conductors interconnecting an electrical circuit.

Independent claims 1 and 11 are drawn to an integrated circuit and independent claim 15 is drawn to a wiring board. All other claims depend directly or indirectly from either claim 1 or claim 11.

Claims 1 and 11 both require (1) a circuit subassembly comprising a semiconductor substrate having solid state device regions; (2) metal wiring deposited on the surface of the semiconductor substrate and interconnecting the solid state

device regions and having a resistivity less than about 2.5 microhm-centimeters; and (3) an amorphous silicon carbide layer covering the metal wiring.

Claim 15 recites a wiring board comprising a subassembly containing thereon metal wiring having a resistivity less than about 2.5 microhm-centimeters, and an amorphous silicon carbide layer covering the metal wiring.

Claims 1 and 15 further recite a dielectric layer covering the silicon carbide layer. Claim 11 adds a second layer of metal wiring formed on the amorphous silicon carbide layer and electrically connected to the first layer of metal wiring.

Claims 1, 11 and 15 are reproduced below:

1. An integrated circuit comprising:

A) a circuit subassembly comprising a semiconductor substrate having solid state device regions and, deposited on the surface of the semiconductor substrate, metal wiring interconnecting the solid state device regions, the metal wiring having a resistivity less than about 2.5 microhm-centimeters;

B) an amorphous silicon carbide layer covering at least the metal wiring; and

C) a dielectric layer covering at least the silicon carbide layer.

11. An integrated circuit comprising:

A) a circuit subassembly comprising a semiconductor substrate having solid state device regions and, deposited on the surface of the semiconductor substrate, metal wiring

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interconnecting the solid state device regions, the metal wiring having a resistivity less than about 2.5 microhm-centimeters;

B) an amorphous silicon carbide layer covering the metal wiring; and

C) a second layer of metal wiring formed on the layer of amorphous silicon carbide, wherein the second layer of metal wiring is electrically connected to the first layer of metal wiring.

15. A wiring board comprising:

A) a wiring board subassembly containing thereon metal wiring having a resistivity less than about 2.5 microhm-centimeters;

B) an amorphous silicon carbide layer covering the metal wiring; and

C) a dielectric layer covering the silicon carbide layer.

Opinion

We do not sustain the rejection of claims 1-15 under 35 U.S.C. § 103 as being unpatentable over Yonezawa and Yamazaki.

This decision is based solely on the rationale as articulated by the examiner. We offer no opinion on the patentability of any claim based on other grounds.

We begin our discussion with claim interpretation. All three independent claims specifically require that the amorphous silicon carbide layer be "covering" the metal wiring. The word "covering" appears in the original claims as filed and the

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appellants do not purport to use the term in any manner contrary to its usual and customary meaning. We note that claim terms are properly and reasonably construed not in a vacuum but always in light of the context of the specification.

The specification describes that the silicon carbide layer is applied over the metal wiring (spec. at 4, lines 9-10). The specification describes that the silicon carbide layer functions as a diffusion barrier which keeps metal atoms from migrating between adjacent conductors (spec. at 1, lines 3-6). The sole Figure illustrates that the silicon carbide layer is immediately adjacent to all surfaces of the metal wiring through which diffusion of metal atoms can take place, even when there are multiple layers of metal wiring. The specification describes at 8, lines 1-3, that a layer of silicon carbide should be deposited between the dielectric and the metal to prevent diffusion of the metal into the dielectric.

In the proper context of the appellants' specification, "cover" or "covering" does not mean merely a partial overlap in any direction, or even in a specific direction. In our view, that would be an unreasonable interpretation in light of the specification. Here, the broadest reasonable interpretation of "covering" in the context of these claims, would still require that there be sufficient coverage of amorphous silicon carbide

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around the metal wiring such that a diffusion barrier is formed to stop the migration of metal atoms from one conductor to another through the intermediate dielectric material.

It is apparent that the examiner has taken a much too broad interpretation of the term "covering" in the context of these claims. It appears that to the examiner, "covering" is met whenever any silicon carbide is found to be positioned above a metal electrode. That is too broad an interpretation and unreasonable in light of the appellants' specification.

According to the examiner, Yonezawa does not disclose that any metal wiring is covered by a silicon carbide layer. The examiner also states (answer at 6, line 2) that the following argument of the appellants (Br. page 5, line 20 to page 6, line 3) is substantially correct:

The aluminum mounting electrodes are contacted by the silicon carbide however, they are not covered by the silicon carbide. There is nothing in Yonezawa et al. to suggest applying another layer of silicon carbide over the aluminum mounting electrodes or to cover the aluminum mounting electrodes with the silicon carbide. (Emphasis in original.)

However, the examiner takes the position (answer at page 6, lines 3-7) that:

[I]t would have been obvious to duplicate the layers 14-17, together with the layers 19a" and 19b", thereby the aluminum electrodes are

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covered by the silicon carbide, and another layer of silicon carbide would be over the aluminum electrodes as the claimed invention.

Even assuming that it would have been obvious to one with ordinary skill in the art to duplicate Yonezawa's layers 14-17 together with the electrodes 19a" and 19b" on top of the already existing SiO₂ layer 17, no metal wiring would be "covered" by any silicon carbide layer in the sense that migration of metal atoms between adjacent electrodes through dielectric would be stopped. The examiner nowhere explained how this occurs and we do not find that it does. It is not enough to meet the claimed "covering" feature simply by having a remotely overlapping relationship between a silicon carbide layer and a metal electrode.

In any event, we are unpersuaded by the examiner's conclusory statement that it would have been obvious to one with ordinary skill in the art to duplicate Yonezawa's layers 14-17 on top of the already existing layers 14-17.

The examiner cited St. Regis Paper Co. v. Bermis Co., 549 F.2d 833, 838, 193 USPQ 8, 11 (7th Cir. 1977), for the proposition that mere duplication of the essential parts of a device involves only routine skill in the art. However, we do not read that case as setting forth any such per se rule. More

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importantly, there is no such per se rule under the precedents of the Court of Appeals for the Federal Circuit, our reviewing court.

There must be some reason to duplicate only those parts the examiner would have duplicated and the putting together of the duplicated parts as proposed by the examiner must be reasonably suggested by the prior art as well. 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 Fritch**, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1783-84 (Fed. Cir. 1992). It is also impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious. **In re Fritch**, **supra**. One also cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art. **In re Fine**, 837 F.2d 1071, 1075, 5 USPQ2d 1596, 1600 (Fed. Cir. 1988).

It is the burden of the examiner to establish why one having ordinary skill in the art would have been led to the claimed invention by the express teachings or suggestions found in the

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prior art, or by implications contained in such teachings or suggestions. In re Sernaker, 702 F.2d 989, 995, 217 USPQ 1, 6 (Fed. Cir. 1983). Here, the examiner has not explained why one with ordinary skill in the art would have wanted to replicate layers 14-17, together with electrodes 19a" and 19b", and to place the duplicated structure on top of the already existing SiO₂ layer 17.

The examiner relied on Yamazaki only for its suggestion of using silver as the material for metal wiring. That does not make up for the deficiencies of Yonezawa as discussed above.

For the foregoing reasons, we do not sustain the rejection of claims 1-15 as being unpatentable over Yonezawa and Yamazaki.

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Conclusion

The rejection of claims 1-15 under 35 U.S.C. § 103 as being unpatentable over Yonezawa and Yamazaki is **reversed**.

REVERSED

JERRY SMITH)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
LEE E. BARRETT)	
Administrative Patent Judge)	APPEALS AND
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