

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opinion in support of the decision being entered today (1) was not written for publication in a law journal and (2) is not binding precedent of the Board.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

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JIN-YUAN LEE, CHUE-SAN YOO
and HSIEN W. CHIN

Appeal No. 96-2085
Application No. 08/301,536¹

ON BRIEF

Before KIMLIN, PAK and WALTZ, Administrative Patent Judges.

KIMLIN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 9-13, 15, 16 and 22-26. Claim 1-8 and 17-21, the other claims remaining in the present application, stand withdrawn from

¹ Application for patent filed September 6, 1994.

consideration. Claims 9 and 22, as amended after final rejection, are illustrative:

9. A method of fabricating a contamination resistant opening for a fuse link on a semiconductor substrate comprising:

forming a first insulating layer over portions of the substrate;

forming a fuse link on the first insulating layer;

forming a second insulating layer over the fuse link and the first insulating layer;

forming a third insulating layer overlying the second insulating layer;

forming a fourth insulating layer overlying the third insulating layer;

forming a first opening over the fuse with vertical sidewalls, the first opening extending through the second, third and fourth insulating layers; said first opening exposing a portion of said fuse;

forming a protective layer over the fourth insulating layer, over at least the sidewalls of the first opening, and the exposed portion of the fuse; said protective layer is formed of silicon nitride having a thickness in the range of 3000 to 20,000 angstroms; and

forming a second opening in the protective layer over the fuse thus exposing portions of said fuse.

22. A method of fabricating a contamination resistant opening for a fuse link on a semiconductor substrate comprising:

forming a first insulating layer over portions of the substrate;

forming a fuse link on the first insulating layer;

forming a second insulating layer over the fuse link and the first insulating layer;

Appeal No. 96-2085
Application No. 08/301,536

forming a third insulating layer overlying the second insulating layer;

forming a fourth insulating layer overlying the third insulating layer;

forming a first opening with vertical sidewalls over the fuse, the first opening extending through the third and fourth insulating layers and at least through a portion of the second insulating layer; said first opening exposing a portion of said second insulating layer over said fuse; said remaining portion of said second insulating layer having a thickness in the range of 100 to 15,000 angstroms;

forming a protective layer over the fourth insulating layer, over at least the sidewalls of the first opening, and the exposed portion of the second insulating layer on the bottom of the opening; said protective layer is formed of silicon nitride having a thickness in the range of 3000 to 20,000 angstroms; and

forming a second opening in the protective layer over the fuse thus exposing the remaining portion of said second insulating layer.

In addition to the admitted prior art found in appellants' specification, the examiner relies upon the following references as evidence of obviousness:

Takayama et al. (Takayama)	4,536,949	Aug. 27, 1985
Udo et al. (Udo)	4,628,590	Dec. 16, 1986
Motonami et al. (Motonami)	5,241,212	Aug. 31, 1993

Appellants' claimed invention is directed to a method of forming a silicon nitride protective layer over the sidewalls of a window in insulation layers and over a fuse before the fuse is cut by a laser. An opening is formed in the protective layer to allow the laser to cut the fuse. According to appellants, the

Appeal No. 96-2085
Application No. 08/301,536

nitride protective layer prevents contamination of the exposed sidewalls of the insulation layers in the window.

Appellants submit at page 7 of the Brief that the appealed claims do not stand or fall together, but claims 9-16 are drawn to a first embodiment of the invention whereas claims 22-27 are drawn to a second embodiment of the invention. Since appellants have not presented separate arguments for patentability for any of the dependent claims, and claims 14 and 27 have been canceled, claims 9-13, 15 and 16 stand or fall together, as a group, as does the group of claims 22-26.

Appealed claims 9-11, 12, 13, 15 and 16 stand rejected under 35 U.S.C. § 103 over the admitted prior art in view of Udo and Takayama. Claims 22-26 stand rejected under 35 U.S.C. § 103 as being unpatentable over the stated combination of references further in view of Motonami.

We will not sustain the examiner's rejection of claims 9-11, 12, 13, 15 and 16 over the admitted prior art in view of Udo and Takayama. We agree with appellants that the collective teachings of the references do not teach or suggest the claimed steps of providing the silicon nitride protective layer over the sidewalls of the fuse window and the exposed portion of the fuse before an opening is made in the protective layer over the fuse to allow the fuse to be cut with a laser. According to the examiner,

Udo teaches that if there is no particular reliability problem, the deposition of the first passivation layer may be omitted (column 6, lines 11-14), leaving the silicon nitride passivation layer as the sole protection layer which may be then be [sic] etched so that the fuse may be cut as previously done to the first passivation layer. [Page 9 of Answer].

However, the examiner has apparently misread Udo at column 6, lines 11-14. The relevant passage of Udo reads "[i]f there is no particular reliability problem even if cracks 26 or 33 in the bonding pad 20A or 30 are left exposed, only the fuses 4 need be covered with the passivation film 27." Contrary to the examiner's interpretation, there is no teaching here that first passivation film 22 may be omitted in favor of only second passivation film 27. Rather, the relevant passage relates that only fuses 4, and not bonding pad 20A or 30, need be covered with passivation film 27 if there is no reliability problem. As depicted in Figure 1H, passivation layers 22 and 27 are both present.

The examiner goes on to state that "[i]n either case, Udo does teach that both the first and final passivation films are etched (column 5, lines 26-34 and lines 44-60)" (page 9 of Answer). However, the disclosures of Udo referenced by the examiner teach etching the first and final passivation films in the proximity of the opening 24, and not in the proximity of the fuse. Indeed, Udo discloses that "[t]he fuses, whether or not

Appeal No. 96-2085
Application No. 08/301,536

they have been cut, are finally covered with the second final passivation film" (column 6, lines 48 and 49).

We will sustain the examiner's rejection of claims 22-26 under § 103 over the collective teachings of the admitted prior art, Udo, Takayama and Motonami. Claim 22 on appeal defines a method wherein the protective silicon nitride layer is formed on the exposed portion of the second insulating layer which covers the fuse link. However, Motonami evidences that it was known in the art to provide a protective silicon nitride layer over an insulating layer which, in turn, covers a fuse link. Motonami discloses that the silicon nitride protection film serves as a stopper when the fuse link and the covering insulating film is blown off by a laser beam. Although Motonami does not disclose the claimed step of forming a second opening in the protective layer over the fuse to allow for exposure to a laser, the paragraph bridging pages 4 and 5 of appellants' specification discloses that it was known in the art to expose the fuse to a laser through an intervening insulating film, but "it is conventional to have an opening 28 over the fuse in the area where the fuse will be heated" since overlying layers inhibit the laser. Accordingly, we find that it would have been obvious for one of ordinary skill in the art to provide an opening in

Appeal No. 96-2085
Application No. 08/301,536

protective film 6 of Motonami before exposing the fuse to a laser.

In conclusion, based on the foregoing, the examiner's rejection of claims 9-11, 12, 13, 15 and 16 under 35 U.S.C. § 103 is reversed. The examiner's rejection of claims 22-26 under § 103 is affirmed. Accordingly, the examiner's decision rejecting the appealed claims is affirmed-in-part.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED-IN-PART

EDWARD C. KIMLIN)	
Administrative Patent Judge)	
)	
)	
)	
CHUNG K. PAK)	BOARD OF PATENT
Administrative Patent Judge)	APPEALS AND
)	INTERFERENCES
)	
)	
THOMAS A. WALTZ)	
Administrative Patent Judge)	

George O. Saile
20 McIntosh Dr.
Poughkeepsie, NY 12603