

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(2) is not binding precedent of the Board.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 CHING-YING LEE

Appeal No. 1997-3489
Application 08/430,467

ON BRIEF

Before HAIRSTON, SMITH, JERRY and LALL, Administrative Patent Judges.

HAIRSTON, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection of claims
1 through 15.

The disclosed invention relates to a method for
inspecting a silicon substrate of a semiconductor device for
aluminum spiking.

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

1. A method for inspecting a silicon substrate for aluminum spiking comprising:
 - providing a silicon substrate having an aluminum containing metallization layer formed on a surface of the silicon substrate;
 - etching the aluminum containing metallization layer completely from the surface of the silicon substrate;
 - etching the surface of the silicon substrate through contacting the surface of the silicon substrate with a buffered aqueous etchant solution comprising about 1.5 to about 2 parts by volume 10:1 buffered oxide etchant and about 1 part by volume 98% acetic acid;
 - the etching of the surface of the silicon substrate being undertaken until the surface of the silicon substrate is gray in color; and
 - inspecting the surface of the silicon substrate.

The references relied on by the examiner are:

Payne et al. (Payne) 1978	4,120,744	Oct. 17,
Lowrey et al (Lowrey) 1991	4,999,160	Mar. 12,

Wolf et al. (Wolf), "Silicon Processing for the VLSI Era, Volume 1: Process Technology," Lattice Press, 1986, pages 532, 589 and 590 (hereinafter Wolf '86).

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Wolf, "Silicon Processing for the VLSI Era, Volume 2: Process Integration," Lattice Press, 1990, pages 101 and 102 (hereinafter Wolf '90).

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Claims 1, 4 through 6, 9, 10, 12, 14 and 15 stand rejected under 35 U.S.C. § 103 as being unpatentable over the admitted prior art in view of the Wolf publications, Lowrey and Payne.¹

Reference is made to the briefs and the answer for the respective positions of the appellant and the examiner.

OPINION

The obviousness rejection of claims 1, 4 through 6, 9, 10, 12, 14 and 15 is reversed.

We agree with the examiner (Answer, page 4) that Wolf '90 "teaches . . . forming a silicon dioxide layer with a contact hole between the metallization and silicon," but this teaching is merely redundant to the well-known conventional device described on pages 1 through 6 of appellant's specification. Stated differently, appellant is claiming a method of etching the layers from an already constructed device to inspect for aluminum spiking, and is not claiming the device.

¹ We assume that the obviousness rejections of claims 2, 3, 7, 8, 11 and 13 have been withdrawn because the rejections set forth in the final rejection have not been repeated in the answer, and the references to Wei and Hauck are not listed in the answer.

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Although Lowrey also recognizes the problem of aluminum spiking, and the use of a barrier layer to prevent aluminum migration (column 1, lines 50 through 55), Lowrey is only concerned with the use of an acid bath etch of a device to inspect for silicon precipitate from an aluminum-silicon alloy used in the device (column 1, lines 31 through 49; column 2, lines 56 through 68).

We agree with the examiner (Answer, page 5) that Payne uses hydrofluoric acid (HF) and acetic acid to selectively etch both silicon dioxide and silicon (column 3, line 67 through column 4, line 13). We likewise agree with the examiner (Answer, page 5) that Wolf '86 discloses (page 532) wet etching of silicon dioxide with HF at 25 degrees centigrade.

Appellant argues (Brief, page 10) that there is no motivation to combine the references, and that any combination of the teachings of the references would lack a teaching that "an etchant composition comprising a buffered oxide etchant (ie: ammonium fluoride and hydrofluoric acid) and acetic acid will etch a silicon substrate, in particular there is no teaching that the silicon substrate is etched to provide a

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surface having adequate contrast to view . . . the protruding ends of aluminum spikes from an aluminum containing metallization layer which has spiked into the silicon substrate."

Notwithstanding our agreement with the examiner concerning the individual teachings of the references, we, nevertheless, agree with appellant's arguments concerning the lack of motivation to combine the teachings of the references, and the lack of a teaching in the references to etch the surface of the silicon substrate until the surface turns gray in color to thereby observe aluminum spiking. There is no evidence in the record to support the examiner's conclusion (Answer, page 6) that "[u]pon removal of the silicon dioxide layer it would have been inherent that the color of the substrate turned gray when the oxide was removed since silicon is gray."

In summary, the obviousness rejection of claims 1, 4 through 6, 9, 10, 12, 14 and 15 is reversed because the examiner has not demonstrated the prima facie obviousness of the claimed invention.

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DECISION

The decision of the examiner rejecting claims 1, 4 through 6, 9, 10, 12, 14 and 15 under 35 U.S.C. § 103 is reversed.

REVERSED

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KENNETH W. HAIRSTON))
Administrative Patent Judge)	
)	
)	
)	BOARD OF PATENT
JERRY SMITH)	
Administrative Patent Judge)	APPEALS AND
)	
)	INTERFERENCES
)	
PARSHOTAM S. LALL)	
Administrative Patent Judge)	

KWH:hh

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