

The opinion in support of the decision being entered today was not written for publication in a law journal and is not binding precedent of the Board.

Paper No. 15

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte CHIA-SHIUN TSAI, CHAO-CHENG CHEN
and HUN-JAN TOO

Appeal No. 2000-1810
Application No. 09/148,556

ON BRIEF

Before KIMLIN, OWENS and TIMM, Administrative Patent Judges.

KIMLIN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 1-15, all the claims in the present application. Claim 1 is illustrative:

1. A method for forming a patterned oxygen containing plasma etchable layer comprising:

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providing a substrate;

forming upon the substrate a blanket oxygen containing plasma etchable layer;

forming upon the blanket oxygen containing plasma etchable layer a blanket hard mask layer;

forming upon the blanket hard mask layer a patterned photoresist layer;

etching, while employing a first plasma etch method in conjunction with the patterned photoresist layer as a first etch mask layer, the blanket hard mask layer to form a patterned hard mask layer; and

etching, while employing a second plasma etch method in conjunction with at least the patterned hard mask layer as a second etch mask layer, the blanket oxygen containing plasma etchable layer to form a patterned oxygen containing plasma etchable layer, the second plasma etch method employing a second etchant gas composition comprising:

an oxygen containing etchant gas which upon plasma activation provides an active oxygen etching species; and

boron trichloride.

The examiner relies upon the following references as evidence of obviousness:

Cote et al. (Cote)	4,786,360	Nov. 22, 1988
Huang et al. (Huang)	5,635,423	Jun. 3, 1997

Appellants' claimed invention is directed to a method for patterning a layer underlying a patterned hard mask layer which comprises utilizing an etchant gas composition

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comprising an oxygen containing gas and boron trichloride.
The method finds utility in preparing microelectronic
fabrications.

Appealed claims 1-15 stand rejected under 35 U.S.C. § 103
as being unpatentable over Huang in view of Cote.

Upon careful consideration of the opposing arguments
presented on appeal, we concur with appellants that the
examiner has not established a prima facie case of obviousness
for the claimed method. Accordingly, we will not sustain the
examiner's rejection for essentially those reasons expressed
in the principal and reply briefs on appeal.

The examiner appreciates that although Huang discloses
the methodology of the claimed method, Huang is silent with
respect to the etchant compositions. Accordingly, the
examiner relies upon Cote for demonstrating that it was known
in the art to use a gaseous etchant comprising boron
trichloride. However, blanket plasma etchable layer 52 or 62
of Huang is a silicon oxide material, whereas the etchable
layer of Cote is tungsten or a tungsten alloy. Hence, even
assuming for the sake of argument that Cote discloses a
gaseous etchant comprising an oxygen containing gas and boron

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trichloride, the examiner has not established why one of ordinary skill in the art would have considered Cote's etchant composition for tungsten to be suitable for the silicon oxide etchable layer of Huang. Moreover, as emphasized by appellants, Cote actually teaches a plasma gas mixture comprising chlorine gas and oxygen as the etchant composition which provides "a combination of high tungsten etch rate, high etch selectivity to silicon oxide, and an anisotropic etch profile" (column 4, lines 66-68). Indeed, Cote gives no indication that an etchant comprising an oxygen containing gas and boron trichloride is even a non-preferred embodiment of the invention. While Cote teaches that chlorine-based plasmas reduce the non-uniformity problem and undercut problem of fluorine-based plasmas, the reference also discloses that "the other chlorine-based chemistries provided a fairly low tungsten to BPSG etch rate ratio . . . [and] the maximum tungsten etch rate achieved by these chlorine-based plasmas was on the order of 600 angstroms per minute" (column 5, lines 40-45). Consequently, we find that Cote fails to teach the use of the claimed etchant composition for tungsten, let alone the silicon oxide material of Huang. Moreover, Cote only

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exemplifies for comparison a composition comprising boron trichloride, hydrogen chloride and chlorine. As argued by appellant, Cote does not disclose the claimed gaseous etchant comprising boron trichloride and an oxygen containing compound.

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In conclusion, based on the foregoing, the examiner's
decision rejecting the appealed claims is reversed.

REVERSED

EDWARD C. KIMLIN)	
Administrative Patent Judge)	
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TERRY J. OWENS)	BOARD OF PATENT
Administrative Patent Judge)	APPEALS AND
)	INTERFERENCES
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CATHERINE TIMM)	
Administrative Patent Judge)	

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