

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 23

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte LAWRENCE A. KROPP, DAVID STANASOLOVICH,
MARC J. WEISS and DENNIS SEK-ON YEE

Appeal No. 1998-1211
Application No. 08/448,955

ON BRIEF

Before KIMLIN, OWENS and KRATZ, Administrative Patent Judges.
KIMLIN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 4-7, 12 and 15-27, all the claims remaining in the present application. Claims 4 and 7 are illustrative:

4. A method of fabricating a semiconductor device including the steps of

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depositing a layer of a predetermined material on a surface in the presence of a plasma,

periodically interrupting said plasma in the presence of at least one ambient material other than said predetermined material to form a periodic sequence of homogeneous markers within the bulk of said predetermined material,

etching said predetermined material by reactive ion etching while monitoring optical emissions from a second plasma produced during said reactive ion etching,

terminating said etching process based on changes in said optical emissions of said second plasma corresponding to said homogeneous markers, and

allowing at least one homogeneous marker of said homogeneous markers to remain within said predetermined material.

7. A method of determining an end point of a reactive ion etching process including the steps of

forming a periodic sequence of homogeneous markers within the bulk of a layer of a predetermined material during deposition of said predetermined material,

performing reactive ion etching of said predetermined material for producing a plasma,

terminating said reactive ion etching based on changes of optical emissions from said plasma corresponding to said homogeneous markers during said reactive ion etching, and

allowing at least one homogeneous marker of said homogeneous markers to remain within said predetermined material.

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

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Flamm et al. (Flamm)	4,918,031	Apr. 17, 1990
Fujii	3-241752	Oct. 28, 1991
(Japanese Kokai patent application)		

The present application is a division of U.S. Application No. 08/375,138, filed January 19, 1995. The parent and instant applications are presently before us on appeal. The claims of the parent application are directed to a homogeneous marker in a deposited layer that is used to control etching of the layer, whereas the claims in the instant application are directed to a method of making a semiconductor device by the reactive ion etching of a deposited layer that contains a homogeneous marker or a plurality of same.

Appealed claims 4-7, 12 and 15-27 stand rejected under 35 U.S.C. § 103 as being unpatentable over Flamm in view of Fujii.

Upon careful consideration of the opposing arguments presented on appeal, we will not sustain the examiner's rejection of claims 4-6 and 15-25 under 35 U.S.C. § 103. However, we will sustain the examiner's § 103 rejection of claims 7, 12, 26 and 27.

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We consider first the examiner's rejection of claims 4-6 and 15-25. These claims require the formation of a periodic sequence of homogeneous markers by periodically interrupting the deposition of the material to be etched in the presence of another material. While Fujii discloses forming a gaseous adsorption layer during an interruption in forming the first and second insulating layers to be etched, Fujii does not teach or suggest appellants' claimed step of periodically interrupting said plasma in the presence of at least one ambient or second material other than the material to be deposited to form a periodic sequence of homogeneous markers. That is, Fujii does not teach that the plasma deposition takes place in the presence of an ambient material which forms the marker. Rather, the English translation of Fujii states that "[a]fter the first interlayer insulating film (11) has been formed, a [illegible] formation device is leaked by using an adsorption gas" (page 7 of translation). Also, while Flamm discloses an interrupting pulsing of the plasma during deposition, Flamm does not teach that such pulsing results in the formation of an adsorption layer or marker, and the examiner has not established on this record that one of

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ordinary skill in the art would have understood that the pulsing deposition of Flamm would form such an adsorption layer. In addition, since Flamm is not directed to forming a marker for an etching process, one of ordinary skill in the art would not have been motivated by Flamm to modify the process of Fujii.

The examiner's rejection of claims 7, 12, 26 and 27 is another matter. Unlike claims 4 and 15, claim 7 does not require interrupting the deposition step, performed in the presence of a marker material, to allow the adsorption of the marker material. Claim 7 simply calls for "forming a periodic sequence of homogeneous markers within the bulk of a layer of a predetermined material during deposition of said predetermined material." As explained in our decision in the parent application (Appeal No. 1997-4031), decided concurrently herewith, Fujii discloses an interruption between the deposition of first and second insulating layers for forming a gaseous adsorption layer which serves as a marker during etching. Although Fujii does not expressly disclose forming a periodic sequence of such markers, we are of the view that it would have been obvious to one of ordinary skill

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in the art to form a plurality or sequence of such markers contingent upon the thickness of the layer being etched and the accuracy of the etch required in the ultimate product. We find that our conclusion of obviousness is only buttressed by appellants' acknowledgment in the present specification that it was known in the art to use multiple markers throughout the depth of a layer to be etched (see paragraph bridging pages 2 and 3 of specification). While appellants make the argument that Fujii employs some formation device to form the adsorption layer, appealed claims 7, 12, 26 and 27 do not preclude the use of any such formation device.

Appellants' arguments relating to the claimed "homogeneous markers" vis-à-vis the adsorption layer of Fujii have been addressed in our decision in appellants' parent application, which reasoning we incorporate herein. Also, appellants have advanced no argument based upon objective evidence of nonobviousness with respect to methods within the scope of claims 7, 12, 26 and 27.

In conclusion, based on the foregoing, the examiner's rejection of claims 4-6 and 15-25 is reversed. The examiner's rejection of claims 7, 12, 26 and 27 is affirmed.

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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)	
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TERRY J. OWENS)	BOARD OF PATENT
Administrative Patent Judge)	APPEALS AND
)	INTERFERENCES
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PETER F. KRATZ)	
Administrative Patent Judge)	

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Whitham, Curtis, Whitham and McGinn
Reston International Center
Suite 900
11800 Sunrise Valley Dr.
Reston, VA 20191