

The opinion in support of the decision being entered today was not written for publication in a law journal and is not binding precedent of the Board.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. 17

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JAE HEE HA, DONG HYEN YI
and MYUNG HO YIM

Appeal No. 2000-1848
Application No. 08/810,920

ON BRIEF

Before KIMLIN, KRATZ and PAWLIKOWSKI, Administrative Patent Judges.

KIMLIN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 1-4, 6-18 and 20, all the claims remaining in the present application. Claim 1 is illustrative:

1. A method of etching a photoresist layer, comprising the steps of:

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sequentially forming a layer to be etched and first photoresist layer on a semiconductor substrate;

sequentially forming an intermediate barrier layer and second photoresist layer on the first photoresist layer;

patterning the second photoresist layer, and etching the intermediate barrier layer using the second photoresist layer patterned as a mask; and

etching the first photoresist layer with a helicon-type etching apparatus, using only nitrogen gas, using the patterned intermediate barrier layer as a mask.

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

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| Higashikawa et al. (Higashikawa) | 4,473,437 | Sep. 25, 1984 |
| Katz et al. (Katz) | 5,508,144 | Apr. 16, 1996 |

Appellants' claimed invention is directed to a method of patterning, via etching, a first photoresist layer through a patterned intermediate barrier layer. The barrier layer is patterned by use of a second photoresist layer. Claim 1 recites that the first photoresist layer is etched using only nitrogen gas with a helicon-type apparatus, whereas claim 11 specifies that the first photoresist layer is patterned by reactive ion etching in a nitrogen gas atmosphere.

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Appealed claims 1-4, 6-18 and 20 stand rejected under 35 U.S.C. § 103 as being unpatentable over Higashikawa in view of Katz.

Upon careful consideration of the opposing arguments presented on appeal, we are in agreement with appellants that the examiner has failed to establish a prima facie case of obviousness for the claimed subject matter. Accordingly, we will not sustain the examiner's rejection.

There is no dispute that Higashikawa discloses a method of etching a first photoresist layer much like the claimed method with the exception that Higashikawa does not disclose the use of a helicon-type etching apparatus for etching with the nitrogen gas. Since Katz discloses the use of a helicon-type etching apparatus for patterning a photoresist, the examiner concludes that it would have been obvious for one of ordinary skill in the art to use the helicon-type apparatus disclosed by Katz in the method of Higashikawa.

The flaw in the examiner's reasoning in support of the legal conclusion of obviousness can be found in the statement at page 5 of the Answer: "The apparatus of Katz is functionally equivalent to the apparatus of Higashikawa in

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that both produce a plasma of a gas to etch a substrate." As urged by appellants, the reactive ion etching process disclosed in Katz is different than the dry etching process utilized by Higashikawa. For instance, the reactive ion etching of Katz is conducted at a low pressure (1-3 mTorr), whereas the dry etching process of Higashikawa is performed at relatively high pressures (0.3 Torr). Hence, since the apparatus and processes of Higashikawa and Katz are considerably different, it is incumbent upon the examiner to factually establish that it was known in the art to employ a helicon-type etching apparatus, or reactive ion etching, in a process of the type disclosed by Higashikawa which etches the photoresist in nitrogen gas. This the examiner has not done. Furthermore, as pointed out by appellants, Katz provides no teaching or suggestion that the helicon-type etching apparatus, or reactive ion etching, can be used with an etching atmosphere of nitrogen. Katz only discloses the use of oxygen gas as the etching atmosphere. We find no response by the examiner to appellants' cogent argument that "there is no suggestion in either reference to use Nitrogen plasma in a Helicon apparatus to etch a layer, or to use Nitrogen plasma

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in a reactive ion etching process to etch a layer" (page 3 of
Reply Brief, last paragraph).

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In conclusion, based on the foregoing, we are constrained
to reverse the examiner's rejection.

REVERSED

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| EDWARD C. KIMLIN |) | |
| Administrative Patent Judge |) | |
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| PETER F. KRATZ |) | BOARD OF PATENT |
| Administrative Patent Judge |) | APPEALS AND |
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| BEVERLY PAWLIKOWSKI |) | |
| Administrative Patent Judge |) | |

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