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PATENT
PD-92654

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of
J. J. Bendik *et al.*
Serial No. 006,120
Filed: 01-19-93
FOR: *METHOD OF FABRICATING A MICROELECTRONICS DEVICE*

Date: 3 June 1994

Group Art Unit: 1107

Examiner: D. Graybill

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AMENDMENT
WITH PETITION FOR 3 MONTHS EXTENSION OF TIME

Commissioner of Patents and Trademarks
Washington DC 20231

Sir:

In response to the Office Action dated December 10, 1993, please enter the following amendments and consider the remarks herein:

IN THE CLAIMS:

Please amend claims 1, 12 and 15 as follows:

"I HEREBY CERTIFY THAT THIS CORRESPONDENCE IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE AS FIRST CLASS MAIL IN AN ENVELOPE ADDRESSED TO COMMISSIONER OF PATENTS AND TRADEMARKS, WASHINGTON DC 20231, ON 3 JUNE 1994.

W. C. Schubert — 3 June 1994
N. C. SCHUBERT — DATE OF SIGNATURE

SC13049 06/17/94 08006120
08/006120 130 117 040.00CH

1. (Amended) A method of fabricating a microelectronic device, comprising the steps of:

furnishing a first substrate having an etchable layer, an etch-stop layer overlying the etchable layer, and a wafer overlying the etch-stop layer;

forming a microelectronic circuit element in the exposed side of the wafer of the first substrate opposite to the side overlying the etch-stop layer;

attaching the wafer of the first substrate to a second substrate; and

etching away the etchable layer of the first substrate down to the etch-stop layer.

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~~12.~~ (Amended) A method of fabricating a microelectronic device, comprising the steps of:

furnishing a first substrate having an etchable layer, an etch-stop layer overlying the etchable layer, and a wafer overlying the etch-stop layer;

forming a microelectronic circuit element in the exposed side of the wafer of the first substrate opposite the side overlying the etch-stop layer;

attaching the wafer of the first substrate to a second substrate, the second substrate having a second microelectronic circuit element therein;

making an electrical contact from the microelectronic circuit element in the wafer of the first substrate to the second microelectronic circuit element on the second substrate; and

etching away the etchable layer of the first substrate down to the etch-stop layer; and

forming an electrical connection to the microelectronic circuit element in the wafer of the first substrate through the etch-stop layer.

A2 cont'd.

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~~15.~~ (Amended) A method of fabricating a microelectronic device, comprising the steps of:

A3

furnishing a first substrate having a silicon etchable layer, a silicon dioxide etch-stop layer overlying the silicon layer, and a single-crystal silicon wafer overlying the etch-stop layer, the wafer having a front surface not contacting the silicon dioxide layer;

forming a microelectronic circuit element in the front surface of the single-crystal silicon wafer;

attaching the front surface of the single-crystal silicon wafer to a first side of a second substrate; and

etching away the silicon etchable layer down to the silicon dioxide etch-stop layer using an etchant that attacks the silicon layer but not the silicon dioxide layer.

Please cancel claims 11, 14 and 21.

REMARKS

Claims 1-10, 12, 13 and 15-20 remain in this case after the cancellation of claims 11, 14 and 21 in this amendment. This amendment also amends claims 1, 12 and 15.

Claims 1-7, 10-18 and 21 were rejected under 35 U.S.C. §103 as being unpatentable over Riseman in combination with Yasumoto.

Riseman, U. S. Patent No. 4,169,000, differs from the present invention in a very fundamental aspect. In the present invention, the microelectronic circuit is initially formed on the first substrate which has an etchable layer, an etch-stop layer and a wafer, the microelectronic circuit being formed more specifically in the exposed side of the wafer, that is, the side of the wafer opposite to the side which overlies the etch-stop layer. In contrast, in Riseman, the microelectronic circuit is formed in a substrate 10 which does not have the construction specified in the present invention, i.e., the etchable layer, an etch-stop layer and a wafer overlying the etch-stop layer. Afterwards, a second substrate 21 which does not have a microelectronic circuit in it nor does it have a wafer overlying an etch-stop layer in which a microelectronic circuit element could be formed, is placed on top of the microelectronic circuit element of the first substrate. While the second substrate 21 in Riseman may be etched away because of the presence of layer 20 or 22 being resistant to etchants, the first substrate may not be etched away since there is no etch-stop layer and the

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