Title: SOURCE/DRAIN-ON-INSULATOR (S/DIO) FIELD EFFECT TRANSISTOR USING SILICON NITRIDE AND SILICON OXIDE AND METHOD OF FABRICATION

Abstract: Source (7) and drain (6) regions of field effect transistors are fabricated with an electrically insulating layer (8, 9) formed thereunder so as to reduce junction capacitance between each and a semiconductor body (3) in which the regions are formed. One method of fabrication of the source and drain regions is to form an isolating isolation region (5) around active areas in which a transistor is to be formed in a semiconductor body. Trenches separated by portions of the body are then formed in the active areas in which transistors are to be formed. On bottom surfaces of the trenches are formed an electrically insulating layer. The trenches are then filled with semiconductor material of a conductivity type opposite that of the semiconductor body. The semiconductor filled portion of each trench then serves as a drain and/or source (6, 7) of a field effect transistor.
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC 7 H01L29/06 H01L21/336

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database consulted during the international search (name of database and where practical, search terms used)

WPI Data, PAJ, EPO-Internal, INSPEC, IBM-TDB

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

<table>
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<tr>
<th>Category</th>
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<td>X</td>
<td>DE 197 49 378 A (SIEMENS AG) 20 May 1999 (1999-05-20) column 2, line 16 -column 6, line 10; figures 1-11</td>
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<td>US 5 943 575 A (CHUNG SHIN YOUNG) 24 August 1999 (1999-08-24) the whole document</td>
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Further documents are listed in the continuation of box C. Patents family members are listed in annex.

**Date of the actual completion of the international search**

22 February 2001

**Date of mailing of the international search report**

07.06.01

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentienda 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx 31 651 epo nl, Fax: (+31-70) 340-3016

Authorized officer

Berthold, K

Form PCT/ISA/210 (second sheet) (July 1992)

page 1 of 2
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| X        | DE 198 12 643 C (SIEMENS AG)  
8 July 1999 (1999-07-08)  
column 3, line 31 -column 5, line 18;  
figures 1-8 | 1-6 |
column 4, line 11 -column 6, line 34;  
figure 3 | 1 |
| A        | US 4 862 232 A (LEE HAN-SHENG)  
29 August 1989 (1989-08-29)  
the whole document | 1-6 |
| A        | US 5 891 763 A (WANLASS FRANK M)  
6 April 1999 (1999-04-06)  
abstract; figures 6,7 | 3-6 |
| A        | US 5 043 778 A (TANG THOMAS E ET AL)  
column 8, line 56 - line 59 | 3 |
INTERNATIONAL SEARCH REPORT

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.☐ Claims Nos.:
   because they relate to subject matter not required to be searched by this Authority, namely:

2.☐ Claims Nos.:
   because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3.☐ Claims Nos.:
   because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1.☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2.☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3.☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4.☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

   1-6

Remark on Protest
☐ The additional search fees were accompanied by the applicant’s protest.
☐ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet (1)) (July 1998)
This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-6

   Source and drain regions of an insulated gate field effect transistor electrically isolated from the body by a dielectric isolation region and a composite layer except for a surface of each which is located below the gate region and is in electrical contact with the body.

2. Claims: 7-9

   Method of forming a plurality of drain and source regions partially electrically isolated from a semiconductor body and removing the conformal layer from the sidewalls of trenches and depositing a silicon layer.
<table>
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<tr>
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<th>Patent family member(s)</th>
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<tr>
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<td>JP 3094293 B</td>
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<td>DE 19812643 C</td>
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