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[Continued on next page]

(54) Title: PROTECTIVE LAYER FOR IMPLANT PHOTORESIST

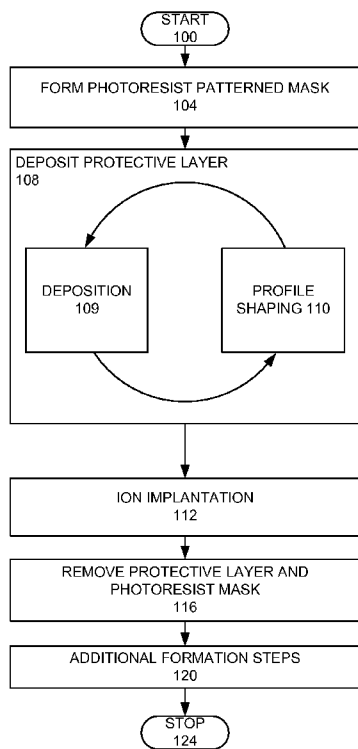


FIG. 1

(57) Abstract: A method for implanting a dopant in a substrate is provided. A patterned photoresist mask is formed over the substrate, wherein the patterned photoresist mask has patterned photoresist mask features. A protective layer is deposited on the patterned photoresist mask by performing a cyclical deposition, wherein each cycle, comprises a depositing phase for depositing a deposition layer over surfaces of the patterned mask of photoresist material and a profile shaping phase for providing vertical sidewalls. A dopant is implanted into the substrate using an ion beam. The protective layer and photoresist mask are removed.

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(BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

Declarations under Rule 4.17:

— as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

(88) Date of publication of the international search report:
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— with international search report (Art. 21(3))

A. CLASSIFICATION OF SUBJECT MATTER***H01L 21/027(2006.01)i, H01L 21/265(2006.01)i***

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: H01L 21/027, H01L 21/336, H01L 21/302, H01L 21/265

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

Korean Utility models and applications for Utility models since 1975

Japanese Utility models and applications for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & keywords: photoresist, mask, sidewall, implant

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 7241683 B2 (HUDSON, E. et al.) 10 July 2007 See figs. 1, 2C, and 5, column 3 rows 1-39, claims 1-9	1-3, 11-26
Y	US 6348384 B1 (LIN, S. L.) 19 February 2002 See fig. 4(c), claims 1-6	1-3, 11-26
Y	US 2007-0264830 A (HUANG, Z. et al.) 15 November 2007 See figs. 2E and 3, claims 1-3	1-3, 11-26
Y	JP 06-151349 A (NEC CORP.) 31 May 1994 See abstract, fig. 1, claim 1	1-3, 11-26

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2008/086825

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 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.: 4-10
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

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

- 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.:

- Remark on Protest**
- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
 - The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
 - No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 7241683 B2	10.07.2007	CN 101171666 A	30.04.2008
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JP 06-151349 A	31.05.1994	None	