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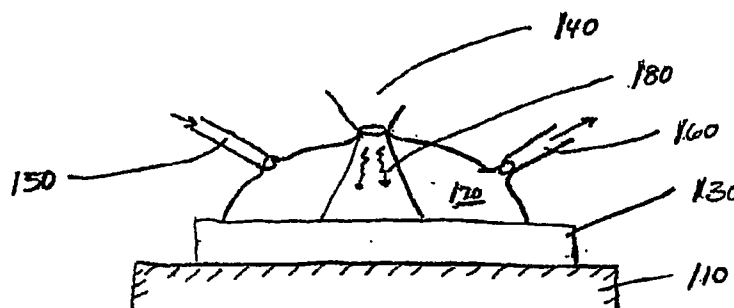
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(54) Title: IMMERSION FLUIDS FOR LITHOGRAPHY



(57) Abstract: Compositions for use as immersion fluids are described. In general, the immersion fluids can be utilized to perform lithography at short wavelengths (e.g., in a range from about 120 nm to about 260 nm). Some embodiments can be used in a range of actinic radiation between about 140 nm and about 160 nm (e.g., about 157 nm). Immersion fluids can exhibit any number of advantageous features including a relatively high index of refraction (e.g., greater than about 1, or greater than about 1.3, or about greater than about 1.4) and/or a relatively low absorbance (e.g., lower than about $2 \mu\text{m}^{-1}$, or lower than about $1 \mu\text{m}^{-1}$, or lower than about $0.5 \mu\text{m}^{-1}$). Some immersion fluids can include silicon-containing compounds and/or germanium containing compounds. Such compounds can include at least one Ge-O bond or at least one Si-O bond. Such compounds can also include one or more fluorinated moieties.



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INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
 INV. G03F7/20 C07F7/18 C07F7/30

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)
 G03F C07F

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

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
 EPO-Internal, INSPEC, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2005/117074 A (TOKYO OHKA KOGYO CO LTD [JP]; HIRAYAMA TAKU [JP]; WAKIYA KAZUMASA [JP]) 8 December 2005 (2005-12-08)	1,2, 4-12,14, 15,33-38
Y	paragraph [0030] - paragraph [0033]; claims 1,4,9-13	3,13, 16-32
	paragraph [0179] - paragraph [0180]	
	paragraph [0206] - paragraph [0207]	
X	IRISAWA J ET AL: "The modeling of immersion liquid by using quantum chemical calculation" PROCEEDINGS OF THE SPIE - THE INTERNATIONAL SOCIETY FOR OPTICAL ENGINEERING SPIE-INT. SOC. OPT. ENG USA, vol. 5754, no. 1, 2004, pages 1040-1048, XP002464298 ISSN: 0277-786X	1,2, 6-12,14, 15
Y	page 1043, paragraph 3.2 - page 1044	3,13
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Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents :

<p>*A* document defining the general state of the art which is not considered to be of particular relevance</p> <p>*E* earlier document but published on or after the international filing date</p> <p>*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>*O* document referring to an oral disclosure, use, exhibition or other means</p> <p>*P* document published prior to the international filing date but later than the priority date claimed</p>	<p>*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</p> <p>*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</p> <p>*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.</p> <p>*Z* document member of the same patent family</p>
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Date of the actual completion of the international search 12 February 2008	Date of mailing of the international search report 16/07/2008
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/029180 A1 (KIMISAWA TOSHIHIDE [JP] ET AL) 10 February 2005 (2005-02-10) claims 1,6,8 -----	1
X	US 2005/186513 A1 (LETZ MARTIN [DE] ET AL) 25 August 2005 (2005-08-25) paragraph [0016] - paragraph [0017] -----	1
X	US 2005/161644 A1 (ZHANG PENG [US] ET AL) 28 July 2005 (2005-07-28) page 3, column 2, line 13 -----	1
A	US 4 108 794 A (YONEKUBO KEN) 22 August 1978 (1978-08-22) -----	
Y	US 2005/024609 A1 (DE SMIT JOANNES THEODOOR [NL] ET AL) 3 February 2005 (2005-02-03) the whole document -----	3,13, 16-32

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2007/012648

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.:
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:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this international search report covers allsearchable claims.

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

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.:

see annex

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1(part)-8(part),9-38

process and composition for immersion lithography whereby silicon compounds are used as component in an index matching fluid having a specific refractive index, said compounds having particular siloxane structures.

2. claims: 1(part)-8(part),39-57

an immersion lithography process and compositions for use in immersion lithography below 260 nm, comprising a compound comprising at least a Ge-O bond and having specific refractive index .

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2007/012648

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