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Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

[Continued on next page]

(54) **Title:** TECHNIQUE FOR IMPROVING THE PERFORMANCE AND EXTENDING THE LIFETIME OF AN ION SOURCE WITH GAS DILUTION

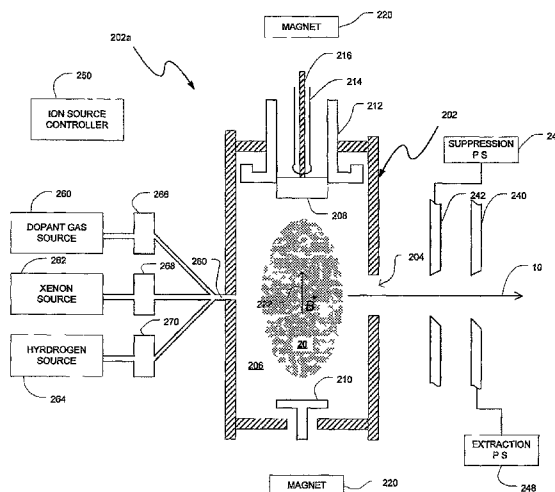


Fig. 3A

(57) **Abstract:** A technique improving the performance and extending the lifetime of an ion source (202a) with gas dilution is disclosed. In one particular exemplary- embodiment, the technique may be realized as a method for improving performance and extending lifetime of an ion source in an ion implanter with gas dilution. The method may comprise releasing a predetermined amount of dopant gas into an ion source chamber (202), and releasing a predetermined amount of dilutant gas into the ion source chamber. The dilutant gas may- comprise a mixture of a xenon-containing gas and a hydrogen-containing gas for diluting the dopant gas to improve the performance and extend the lifetime of the ion source.

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A. CLASSIFICATION OF SUBJECT MATTER

INV. H01J37/08 H01J37/317 H01027/00 H01J37/32 H01L21/265

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)

H01J H01L C23C

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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document with indication, where appropriate, of the relevant passages	Relevant to claim No
Y	JP 11 354068 A (SEIKO EPSON CORP) 24 December 1999 (1999-12-24)	1,4,5, 7-9
X	abstract; figures 1-3,5 paragraph [0030] -----	10, 11, 13-23
X	US 2005/181621 A1 (BORLAND JOHN O [US] ET AL) 18 August 2005 (2005-08-18) paragraph [0041]; claim 8 -----	1,4,5, 10, 11, 13-23
X	US 2004/107909 A1 (COLLINS KENNETH S [US] ET AL) 10 June 2004 (2004-06-10) paragraphs [0248], [0249]; figures 85,87 -----	1,2,6, 10, 11, 13-23
Y	CA 1 227 289 A1 (ATOMIC ENERGY OF CANADA LTD) 22 September 1987 (1987-09-22) page 13, lines 2-4 -----	1,4, 5, 7-9

D

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 document but published on or after the International filing date

"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)

"O" document referring to an oral disclosure, use, exhibition or other means

"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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FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box II.1

Claims Nos. : 3,12

From the passage in the description, a "halogen containing gas such as argon (Ar), xenon (Xe) etc.", it is ambiguous whether the term "halogen containing" in the present application is indeed intended to refer to halogens or rather to noble gases. As the actual intended meaning cannot be derived from the application, a meaningful search with regard to claims 3 and 12 is not possible.

Continuation of Box II.2

Claims Nos. : 3,12

From the passage in the description, a "halogen containing gas such as argon (Ar), xenon (Xe) etc.", it is ambiguous whether the term "halogen containing" in the present application is indeed intended to refer to halogens or rather to noble gases. As the actual intended meaning cannot be derived from the application, a meaningful search with regard to claims 3 and 12 is not possible.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.2), should the problems which led to the Article 17(2)PCT declaration be overcome.

INTERNATIONAL SEARCH REPORT

International application No.
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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.: 3, 12
because they relate to subject matter not required to be searched by this Authority, namely:
see FURTHER INFORMATION sheet PCT/ISA/210
2. ☒ Claims Nos.: 3, 12
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:
see FURTHER INFORMATION sheet PCT/ISA/210
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:

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.:

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

PCT/US2008/050471

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