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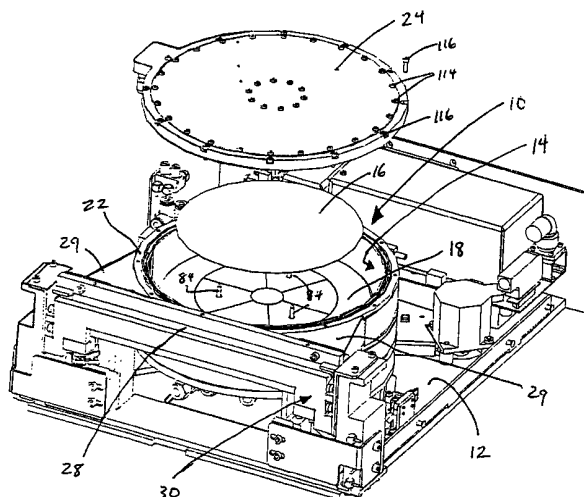
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(54) Title: THERMAL PROCESSING CHAMBER FOR HEATING AND COOLING WAFER-LIKE OBJECTS



(57) Abstract: A processing chamber and methods for employing this processing chamber to thermally treat wafer-like objects. The chamber comprises a double walled shell, a pedestal style heater, internal passages for the transport of cooling gases and removal of exhaust gases, independently variable gas introduction patterns, and a movable door for sealing the chamber. The chamber is designed to permit in situ cooling of wafer-like objects and to provide means for precise optimization of this cooling. The methods provide for the processing of the wafer-like object in an environment where the temperature, rate of change of the temperature, composition of gases and the relative timings of changes to these variables may be controlled to achieve the desired material properties in the wafer-like object or in films contained on this wafer-like object.



For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/18902

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 H01L21/00

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

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 843 347 A (APPLIED MATERIALS) 20 May 1998 (1998-05-20) abstract; figures 3,7A,7B,9 page 16, line 24-44 page 21, line 11-24	1-4,6,7, 14,15, 19,20
Y		5,8,16, 21,22,29
A		10-12, 18,23, 25,27,28
X	US 5 620 560 A (AKIMOTO ET AL.) 15 April 1997 (1997-04-15) abstract; figures 15,16 column 8, line 43 -column 9, line 8	13,30
Y		31-34
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Further documents are listed in the continuation of box C.



Patent family members are listed in 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

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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

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Z 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/US 00/18902

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 5 884 009 A (OKASE) 16 March 1999 (1999-03-16) abstract; figure 1 column 9, line 30-63 column 10, line 56 -column 11, line 10	23
Y	column Y	5,8,16, 21,22, 29,31-34
A		1,14,20, 30
A	--- PATENT ABSTRACTS OF JAPAN vol. 018, no. 141 (E-1520), 9 March 1994 (1994-03-09) -& JP 05 326453 A (SUMITOMO METAL IND LTD), 10 December 1993 (1993-12-10) abstract	1-3,14, 19,20, 22,23,29
A	--- PATENT ABSTRACTS OF JAPAN vol. 1997, no. 03, 31 March 1997 (1997-03-31) -& JP 08 310896 A (FURUKAWA ELECTRIC CO LTD:THE), 26 November 1996 (1996-11-26) abstract	1,9,14, 17,20, 23,24
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 00/18902

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.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ 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: 1-12,14-29

Removable exhaust plate in a thermal processing chamber

2. Claims: 13,30-35

Process for heating and cooling a wafer

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 00/18902

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