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13/440,564 5 April 2012 (05.04.2012) US(71) Applicant (for all designated States except US): **APPLIED MATERIALS, INC.** [US/US]; 3050 Bowers Avenue, Santa Clara, California 95054 (US).

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(54) Title: OPTICAL ENDPOINT DETECTION SYSTEM

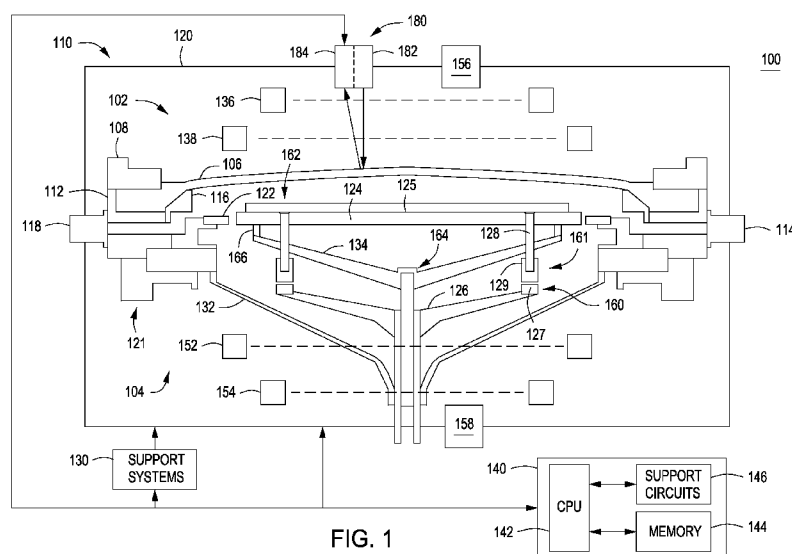


FIG. 1

(57) Abstract: Methods and apparatus for determining an endpoint of a process chamber cleaning process are provided. In some embodiments, a processing system having an endpoint detection system may include a process chamber having internal surfaces requiring periodic cleaning due to processes performed in the process chamber; and an endpoint detection system that includes a light detector positioned to detect light reflected off of a first internal surface of the process chamber; and a controller coupled to the light detector and configured to determine an endpoint of a cleaning process based upon the detected reflected light.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/035469**A. CLASSIFICATION OF SUBJECT MATTER****HOIL 21/66(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)

HOIL 21/66; HOIL 21/205; HOIL 21/20; GOIN 21/49; C23C 16/50; C25F 1/00

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

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) & Keywords: chamber, cleaning, endpoint, detection, light, detector

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 11-140655 A (SONY CORP) 25 May 1999 See abstract ; figure 4; paragraphs [0008H0010] , [0012] , [0017]	1-14
A	US 6737666 B1 (ITO; NATSUKO et al.) 18 May 2004 See abstract ; figure 1; column 4 line 54 - column 5 line 67	1-14
A	US 2004-0011379 A1 (SUNIL G. ANAOKAR et al.) 22 January 2004 See abstract ; figure 7A; paragraphs [0098] -[0099]	1-14
A	KR 10-2004-0055344 A (ANAM SEMICONDUCTOR., LTD.) 26 June 2004 See figure 3; pages 2-3	1-14

☐ 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

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of 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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Name and mailing address of the ISA/KR

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2012/035469

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.: 15
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.

PCT/US2012/035469

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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KR 10-2004-0055344 A	26 .06 .2004	None	