

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
21 February 2002 (21.02.2002)

PCT

(10) International Publication Number
WO 02/15222 A3

(51) International Patent Classification⁷: **H01J 37/32**

(21) International Application Number: PCT/US01/25742

(22) International Filing Date: 17 August 2001 (17.08.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/640,449 17 August 2000 (17.08.2000) US

(71) Applicant (for all designated States except US): **MICRON TECHNOLOGY, INC.** [US/US]; 8000 South Federal Way, Boise, ID 83707-0006 (US).

(72) Inventor: **DONOHUE, Kevin, G.**; 719 West Rigdeline Drive, Boise, ID 83702 (US).

(74) Agents: **DUZAN, James, R.** et al.; TraskBritt, 230 South 500 East, Suite 300, P.O. Box 2550, Salt Lake City, UT 84110 (US).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

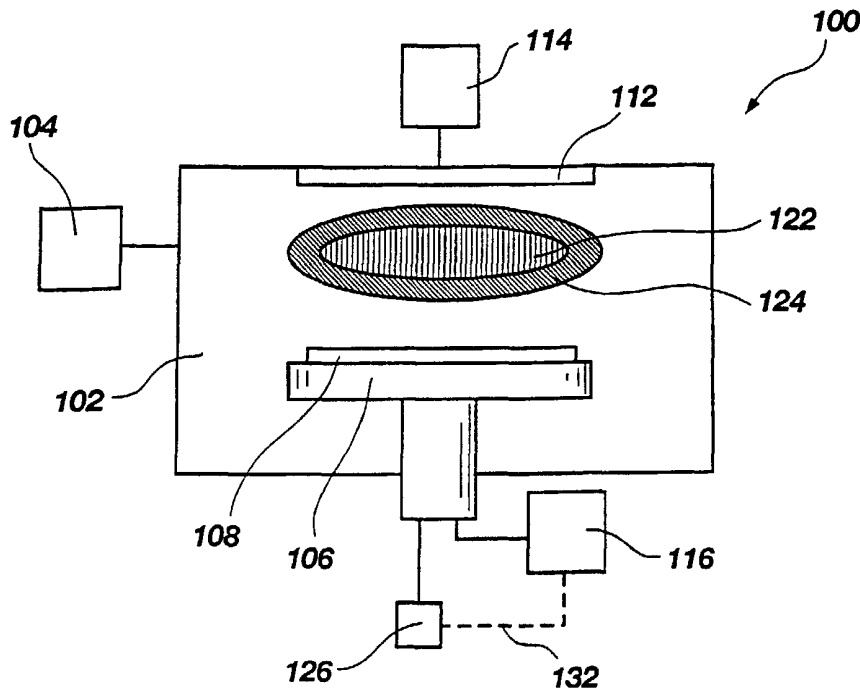
(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— with international search report

(88) Date of publication of the international search report:
13 June 2002

[Continued on next page]

(54) Title: USE OF PULSED VOLTAGE IN A PLASMA REACTOR



(57) Abstract: A method and apparatus for providing a positive voltage spike to a semiconductor substrate pedestal during a portion of a high voltage power bias oscillation cycle to reduce or eliminate the detrimental effects of feature charging during the operation of a plasma reactor.



WO 02/15222 A3



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

PC1/US 01/25742

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H01J37/32

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 H01J

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)

WPI Data, PAJ, EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|---|---|
| X | PATENT ABSTRACTS OF JAPAN vol. 1999, no. 01, 29 January 1999 (1999-01-29) & JP 10 270419 A (HITACHI LTD), 9 October 1998 (1998-10-09) | 1, 3, 5, 7 |
| Y | abstract | 2, 4, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43 |
| | --- | -/-- |

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
- *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

15 March 2002

Date of mailing of the international search report

28/03/2002

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Schaub, G

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 01/25742

| C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT | | |
|--|---|--|
| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
| Y | EP 0 734 046 A (APPLIED MATERIALS INC) 25 September 1996 (1996-09-25) abstract; figure 4 ---- | 2,4,9, 11,13, 15,17, 19,21, 23,25, 27,29, 31,33, 35,37, 39,41,43 |
| A | PATENT ABSTRACTS OF JAPAN vol. 1999, no. 13, 30 November 1999 (1999-11-30) & JP 11 224796 A (MATSUSHITA ELECTRON CORP), 17 August 1999 (1999-08-17) abstract ---- | 1-44 |
| P,X | US 6 201 208 B1 (WANG SHIANG-BAU ET AL) 13 March 2001 (2001-03-13) abstract; figures ---- | 1,3,5,7 |
| A | US 6 051 114 A (NGAN KENNY KING-TAI ET AL) 18 April 2000 (2000-04-18) abstract; figures ----- | 1,2,5,7 |

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 01/25742

| Patent document cited in search report | Publication date | Publication date | Patent family member(s) | Publication date |
|---|------------------|------------------|-------------------------|------------------|
| JP 10270419 | A | 09-10-1998 | NONE | |
| <hr style="border-top: 1px dashed black;"/> | | | | |
| EP 0734046 | A | 25-09-1996 | US 5614060 A | 25-03-1997 |
| | | | AT 191584 T | 15-04-2000 |
| | | | DE 69607509 D1 | 11-05-2000 |
| | | | DE 69607509 T2 | 10-08-2000 |
| | | | EP 0734046 A2 | 25-09-1996 |
| | | | JP 8339989 A | 24-12-1996 |
| <hr style="border-top: 1px dashed black;"/> | | | | |
| JP 11224796 | A | 17-08-1999 | NONE | |
| <hr style="border-top: 1px dashed black;"/> | | | | |
| US 6201208 | B1 | 13-03-2001 | NONE | |
| <hr style="border-top: 1px dashed black;"/> | | | | |
| US 6051114 | A | 18-04-2000 | EP 0996762 A2 | 03-05-2000 |
| | | | TW 396512 B | 01-07-2000 |
| | | | WO 9859087 A2 | 30-12-1998 |
| <hr style="border-top: 1px dashed black;"/> | | | | |