

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
12 September 2003 (12.09.2003)

PCT

(10) International Publication Number
WO 2003/074974 A3

(51) International Patent Classification⁷: G01N 21/88

(21) International Application Number:
PCT/US2003/006379

(22) International Filing Date: 28 February 2003 (28.02.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10/090,262 1 March 2002 (01.03.2002) US

(71) Applicant: BOXER CROSS, INC. [US/US]; 125 Constitution Drive, Menlo Park, CA 94025 (US).

(72) Inventors: BORDEN, Peter, G.; 118 Seville Way, San Mateo, CA 94403-2833 (US). LI, Jiping; 466 Calistoga Circle, Fremont, CA 94536 (US).

(74) Agent: SURYADEVARA, Omkar; Silicon Valley Patent Group LLP, Suite 360, 2350 Mission College Boulevard, Santa Clara, CA 95054 (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, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW.

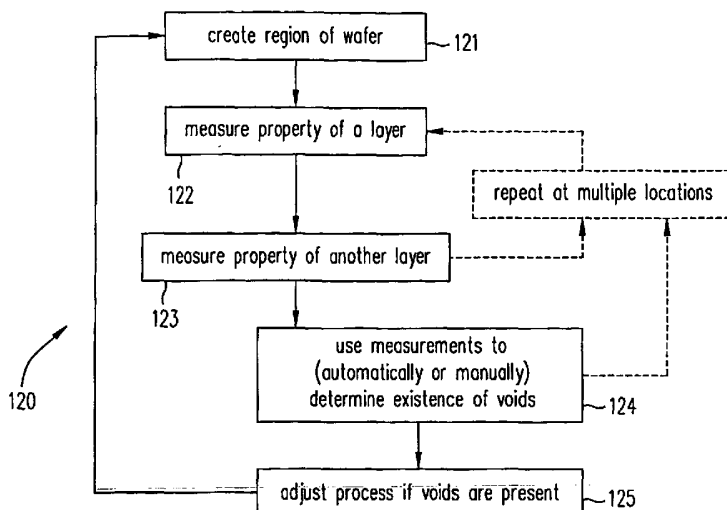
(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, 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:
4 March 2004

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.

(54) Title: EVALUATING A MULTI-LAYERED STRUCTURE FOR VOIDS



(57) Abstract: A method and apparatus measure properties of two layers of a damascene structure (e.g. a silicon wafer during fabrication), and use the two measurements to identify a location as having voids. The two measurements may be used in any manner, e.g. compared to one another, and voids are deemed to be present when the two measurements diverge from each other. Depending on the embodiment, any properties of the two layers that depend on the dimensions of the features in the wafer may be measured in acts (122) and (123) by any method well known in the art. In response to the detection of voids, a process parameter used in fabrication of the damascene structure may be changed, to reduce or eliminate voids in to-be-formed structures.

WO 2003/074974 A3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/06379

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G01N 21/88
 US CL : 356/237.2

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)
 U.S. : 356/237.1, 237.2-237.5, 369; 250/559.41, 252.1

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 practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,169,601 B1 (EREMIN et al) 02 January 2001 (02.01.2001), column 4, lines 3-43; column 6, lines 15-61; column 8 lines 1-3; Figures 1 and 11.	1-2, 4-6, 9-11
A	US 6,054,868 A (BORDEN et al) 25 April 2000 (25.04.2000), entire document.	18-21, 25-29, 30-42

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	"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
"E" earlier application or patent published on or after the international filing date	"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
"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)	"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
"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

11 May 2003 (11.05.2003)

Date of mailing of the international search report

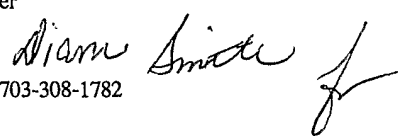
26 AUG 2003

Name and mailing address of the ISA/US

Mail Stop PCT, Attn: ISA/US
 Commissioner for Patents
 P.O. Box 1450
 Alexandria, Virginia 22313-1450

Facsimile No. (703)305-3230

Authorized officer

Frank G. Font 
 Telephone No. 703-308-1782