

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
6 December 2007 (06.12.2007)

PCT

(10) International Publication Number
WO 2007/140376 A3

(51) International Patent Classification:

H01L 21/469 (2006.01)

(21) International Application Number:

PCT/US2007/069897

(22) International Filing Date: 29 May 2007 (29.05.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

60/803,489 30 May 2006 (30.05.2006) US

11/753,918 25 May 2007 (25.05.2007) US

(71) Applicant (for all designated States except US): **APPLIED MATERIALS, INC.** [US/US]; P.O. Box 450A, Santa Clara, CA 95052 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **MUNRO, Jeffrey, C.** [US/US]; 1640 Hope Drive, #1035, Santa Clara, CA 95054 (US). **NEMANI, Srinivas, D.** [IN/US]; 504 Fan Ridge Court, Sunnyvale, CA 94087 (US).

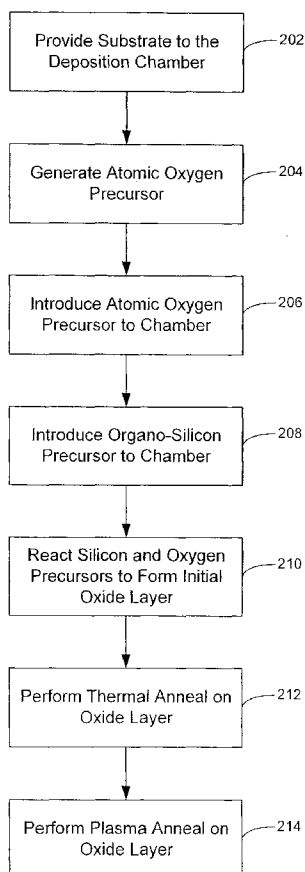
(74) Agents: **BERNARD, Eugene** et al.; Townsend and Townsend and Crew LLP, Two Embarcadero Center, Eighth Floor, San Francisco, CA 94111-3834 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL,

[Continued on next page]

(54) Title: A METHOD FOR DEPOSITING AND CURING LOW-K FILMS FOR GAPFILL AND CONFORMAL FILM APPLICATIONS



(57) Abstract: Methods of making a silicon oxide layer on a substrate are described. The methods may include forming the silicon oxide layer on the substrate in a reaction chamber by reacting an atomic oxygen precursor and a silicon precursor and depositing reaction products on the substrate. The atomic oxygen precursor is generated outside the reaction chamber. The methods also include heating the silicon oxide layer at a temperature of about 600°C or less, and exposing the silicon oxide layer to an induced coupled plasma. Additional methods are described where the deposited silicon oxide layer is cured by exposing the layer to ultra-violet light, and also exposing the layer to an induced coupled plasma.

WO 2007/140376 A3



PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM,
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(88) Date of publication of the international search report:
24 January 2008

Published:

— with international search report

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.