(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
10 February 2011 (10.02.2011)

PCT

(10) International Publication Number
WO 2011/017598 A2

(51) International Patent Classification:
H01L 21/316 (2006.01) *H01L 21/205* (2006.01)

(21) International Application Number:
PCT/US2010/044680

(22) International Filing Date:
6 August 2010 (06.08.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/231,729 6 August 2009 (06.08.2009) US

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

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **LIANG, Jingmei** [CN/US]; 1256 Mountain Quail Circle, San Jose, California 95120 (US). **INGLE, Nitin, K.** [US/US]; 1435 Graywood Drive, San Jose, California 95129 (US). **VENKATARAMAN, Shankar** [US/US]; 5974 Thorntree Drive, San Jose, California 95120 (US).

(74) Agents: **BERNARD, Eugene, J.** et al.; Townsend and Townsend and Crew LLP, 1400 Wewatta St., Suite 600, Denver, Colorado 80202 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, 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, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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,

[Continued on next page]

(54) Title: FORMATION OF SILICON OXIDE USING NON-CARBON FLOWABLE CVD PROCESSES

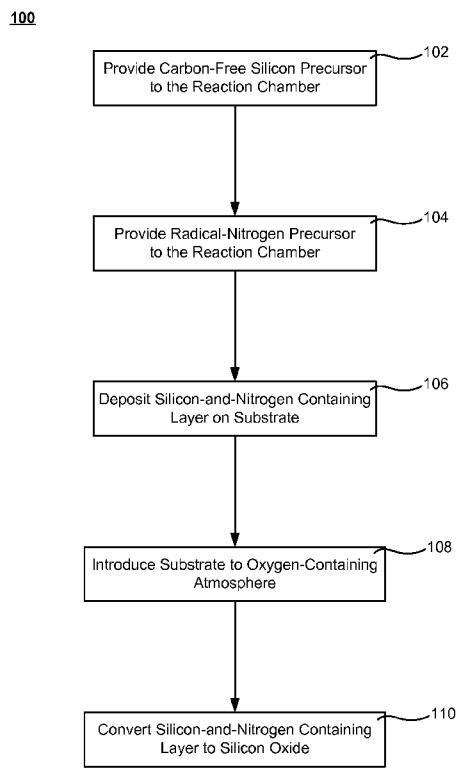


FIG. 1

(57) Abstract: A method of forming a silicon oxide layer is described. The method may include the steps of mixing a carbon-free silicon-and-nitrogen containing precursor with a radical precursor, and depositing a silicon-and-nitrogen containing layer on a substrate. The silicon-and-nitrogen containing layer is then converted to the silicon oxide layer.

WO 2011/017598 A2

GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*