



(51) International Patent Classification:

H01L 21/02 (2006.01) C23C 16/56 (2006.01)
C23C 16/30 (2006.01)

(21) International Application Number:

PCT/US2022/012872

(22) International Filing Date:

19 January 2022 (19.01.2022)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

17/157,313 25 January 2021 (25.01.2021) US

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

(72) Inventors: **SHEN, Zeqing**; 3050 Bowers Avenue, Santa Clara, California 95054 (US). **QI, Bo**; 3050 Bowers Avenue, Santa Clara, California 95054 (US). **MALLICK, Abhijit Basu**; 3050 Bowers Avenue, Santa Clara, California 95054 (US). **INGLE, Nitin K.**; 3050 Bowers Avenue, Santa Clara, California 95054 (US).

(74) Agent: **MCCORMICK, Daniel K.** et al.; Kilpatrick Townsend & Stockton LLP, 1100 Peachtree Street NE, Suite 2800, Mailstop: IP Docketing - 22, Atlanta, Georgia 30309 (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, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available):

ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, 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, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: THERMAL DEPOSITION OF DOPED SILICON OXIDE

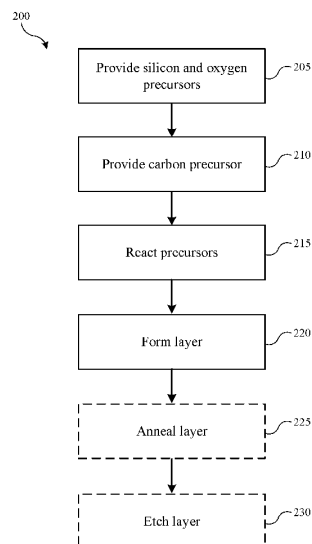


FIG. 2

(57) Abstract: Exemplary methods of semiconductor processing may include providing a silicon-containing precursor and an oxygen-containing precursor to a processing region of a semiconductor processing chamber. A substrate may be disposed within the processing region of the semiconductor processing chamber. The methods may include providing a carbon-containing precursor to the processing region of the semiconductor processing chamber. The carbon-containing precursor may be characterized by a carbon-carbon double bond or a carbon-carbon triple bond. The methods may include thermally reacting the silicon-containing precursor, the oxygen-containing precursor, and the carbon-containing precursor at a temperature below about 650 °C. The methods may include forming a silicon-and-oxygen-and-carbon-containing layer on the substrate.