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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
28 August 2025 (28.08.2025)

WIPO | PCT

(10) International Publication Number
WO 2025/178809 A1

(51) International Patent Classification:
H01L 21/02 (2006.01) *H01L 21/3065* (2006.01)
H01J 37/32 (2006.01) *H01L 21/311* (2006.01)

(21) International Application Number:
PCT/US2025/015695

(22) International Filing Date:
13 February 2025 (13.02.2025)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
18/584,540 22 February 2024 (22.02.2024) US

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

(72) Inventors: **MODI, Purvam Dineshbhai**; 3050 Bowers Avenue, Santa Clara, California 95054 (US). **CITLA, Bhargav S.**; 3050 Bowers Avenue, Santa Clara, California 95054 (US). **NEMANI, Srinivas D.**; 3050 Bowers Avenue, Santa Clara, California 95054 (US). **YIEH, Ellie Y.**; 3050 Bowers Avenue, Santa Clara, California 95054 (US).

(74) Agent: **CAMPBELL, Quinten M.** et al.; 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, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, MG, MK, MN, MU, 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, UY, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, CV, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SC, 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, ME, 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).

(54) Title: DIRECTIONAL SELECTIVE FILL USING HIGH DENSITY PLASMA

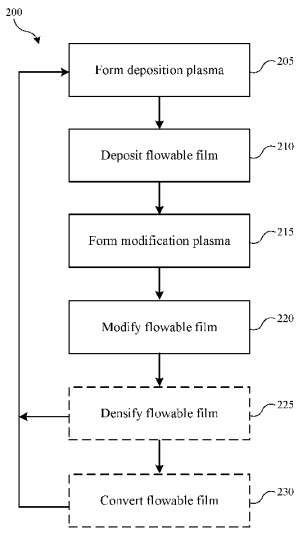


FIG. 2

(57) Abstract: Exemplary processing methods may include providing a silicon-containing precursor to a processing region of a semiconductor processing chamber. A substrate may be housed in the processing region. The substrate may define a feature. The methods may include forming plasma effluents of the silicon-containing precursor. The methods may include depositing a silicon-containing material on the substrate. The methods may include providing an oxygen-containing precursor to the processing region, forming plasma effluents of the oxygen-containing precursor, and contacting the silicon-containing material with the plasma effluents of the oxygen-containing precursor to form a silicon-and-oxygen-containing material. The methods may include providing a fluorine-containing precursor to the processing region, forming plasma effluents of the fluorine-containing precursor, and etching the silicon-and-oxygen-containing material from a top, a sidewall, or both of the feature with the plasma effluents of the fluorine-containing precursor.

WO 2025/178809 A1

[Continued on next page]

Published:
— *with international search report (Art. 21(3))*