



- (51) **International Patent Classification:**
H01L 21/02 (2006.01) *H01L 21/285* (2006.01)
- (21) **International Application Number:**
PCT/US2024/021403
- (22) **International Filing Date:**
26 March 2024 (26.03.2024)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
63/456,137 31 March 2023 (31.03.2023) US
18/613,998 22 March 2024 (22.03.2024) US
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- (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, 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,

(54) **Title:** PROTECTIVE CAPPING LAYER FOR AREA SELECTIVE DEPOSITION

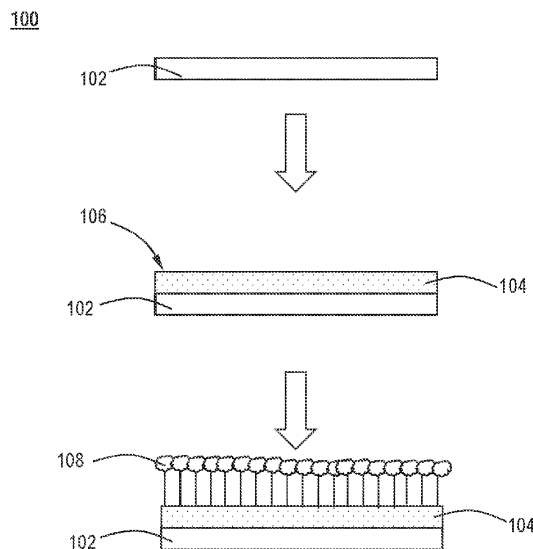


FIG. 2

(57) **Abstract:** Described are methods of forming a protective capping layer on a metal layer of a semiconductor substrate. A metal layer is deposited using a metal precursor and a reactant pulsed to form the metal layer having a reactive surface. The number of cycles can be in a range of from 1 to 10 cycles or from 2 to 5 cycles or from 2 to 100 cycles. The metal layer is then exposed to a long chain precursor (e.g., primary amines, alcohols, thiols, phosphines, selenols) and a metal precursor to form a protective capping layer on the metal layer. The number of cycles can be in a range of from 1 to 10 cycles or from 2 to 5 cycles, depending upon the desired thickness of the protective capping layer.

[Continued on next page]

WO 2024/206261 A1

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).

Published:

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