

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

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
10 June 2021 (10.06.2021)



(10) International Publication Number
WO 2021/112932 A3

- (51) **International Patent Classification:**
C09K 13/08 (2006.01) *H01L 21/311* (2006.01)
H01L 21/02 (2006.01)
- (21) **International Application Number:**
PCT/US2020/047497
- (22) **International Filing Date:**
21 August 2020 (21.08.2020)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
62/889,956 21 August 2019 (21.08.2019) US
- (71) **Applicant:** **ENTEGRIS, INC.** [US/US]; 129 Concord Road, Billerica, Massachusetts 01821 (US).
- (72) **Inventors:** **WHITE, Daniela**; 1 Seth Low Mountain Road, Ridgefield, Connecticut 06877 (US). **KUIPER, David**; 8 Old Middle Road, Brookfield, Connecticut 06804 (US). **DIMEO, Susan**; 82 Hall Avenue, New City, New York 10956 (US).
- (74) **Agent:** **AMICI, Robert M.**; Entegris, Inc., 129 Concord Road, Billerica, Massachusetts 01821 (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).

(54) **Title:** IMPROVED FORMULATIONS FOR HIGH SELECTIVE SILICON NITRIDE ETCH

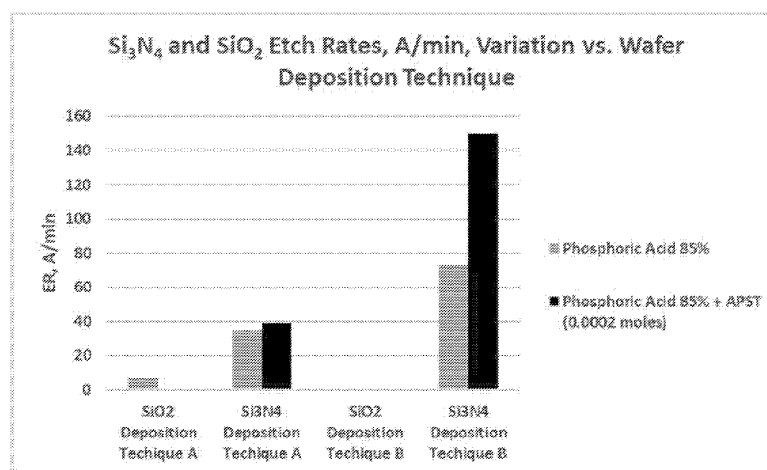


FIGURE 1

(57) **Abstract:** Compositions useful for the selective removal of silicon nitride materials relative to polysilicon, silicon oxide materials and/or silicide materials from a microelectronic device having same thereon are provided. The compositions of the invention are particularly useful in the etching of 3D NAND structures.

[Continued on next page]

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

Published:

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(88) Date of publication of the international search report:

12 August 2021 (12.08.2021)