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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
29 April 2021 (29.04.2021)

WIPO | PCT

(10) International Publication Number
WO 2021/081102 A1

(51) International Patent Classification:
*C09G 1/02* (2006.01) *H01L 21/306* (2006.01)
*C09K 3/14* (2006.01) *B24B 37/04* (2006.01)

(21) International Application Number:
PCT/US2020/056677

(22) International Filing Date:
21 October 2020 (21.10.2020)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
62/925,378 24 October 2019 (24.10.2019) US
109135360 13 October 2020 (13.10.2020) TW

(71) Applicant: **VERSUM MATERIALS US, LLC** [US/US]; 8555 South River Parkway, Tempe, Arizona 085284 (US).

(72) Inventors: **ROSE, Joseph D.**; c/o Versum Materials US, LLC, 8555 South River Parkway, Tempe, Arizona 85284 (US). **ZHOU, Hongjun**; c/o Versum Materials US, LLC, 8555 South River Parkway, Tempe, Arizona 85284 (US). **SHI, Xiaobo**; c/o Versum Materials US, LLC, 8555 South River Parkway, Tempe, Arizona 85284 (US). **MURELLA, Krishna P.**; c/o Versum Materials US, LLC, 8555 South River Parkway, Tempe, Arizona 85284 (US).

(74) Agent: **YANG, Lina**; Versum Materials US, LLC, 7350 Tilghman Street, Suite 104, Allentown, Pennsylvania 18106 (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,

WO 2021/081102 A1

(54) Title: HIGH OXIDE REMOVAL RATES SHALLOW TRENCH ISOLATION CHEMICAL MECHANICAL PLANARIZATION COMPOSITIONS

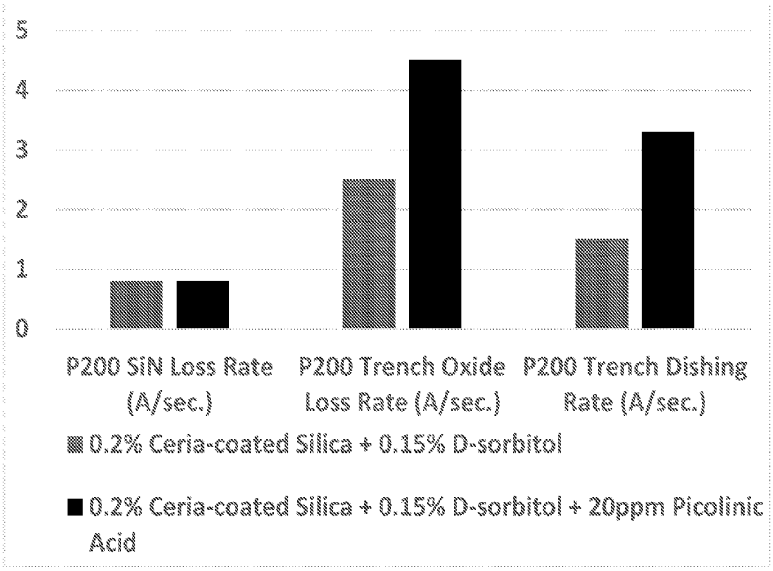


Figure 3.

(57) Abstract: Present invention provides Chemical Mechanical Planarization Polishing (CMP) compositions for Shallow Trench Isolation (STI) applications. The CMP compositions 5 contain ceria coated inorganic oxide particles as abrasives, such as ceria-coated silica particles; chemical additive selected from the group consisting of nitrogen containing organic aromatic or pyridine ring molecule with one carboxylic acid group, one carboxylate salt group, or one carboxylate ester group at position -2, -3, or -4 respectively; non-ionic organic molecule with multi hydroxyl functional groups; and 10 combinations thereof; water soluble solvent; and optionally biocide and pH adjuster; wherein the composition has a pH of 2 to 12, preferably 3 to 10, and more preferably 4 to 9.

*[Continued on next page]*

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))*

— *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))*