

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

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
25 July 2024 (25.07.2024)



(10) International Publication Number
WO 2024/155592 A1

(51) International Patent Classification:

C23C 18/38 (2006.01) C25D 7/12 (2006.01)
C25D 3/38 (2006.01) H01L 21/28 (2006.01)
C25D 5/18 (2006.01) H01L 21/768 (2006.01)

(21) International Application Number:

PCT/US2024/011616

(22) International Filing Date:

16 January 2024 (16.01.2024)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

63/439,657 18 January 2023 (18.01.2023) US

(71) Applicant: **MACDERMID ENTHONE INC.** [US/US];
245 Freight Street, Waterbury, CT 06702 (US).

(72) Inventors: **WHITTEN, Kyle, M.**; 570 Redstone Drive,
Cheshire, CT 06410 (US). **NAJJAR, Elie, H.**; 16 Talbot
Farm Road, Norwood, MA 02062 (US).

(74) Agent: **CALCAGNI, Jennifer, A.**; Carmody Torrance
Sandak & Hennessey LLP, 195 Church Street, P.O. Box
1950, New Haven, CT 06509-1950 (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, 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).

Published:

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

(54) Title: ELECTRODEPOSITION OF THIN COPPER FILMS ON CONDUCTIVE SUBSTRATES

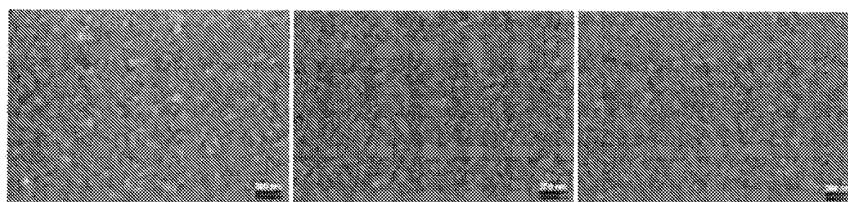


Fig. 1

(57) Abstract: A copper electrolyte comprising (a) a water soluble copper salt; (b) a complexant; (c) a leveler; (d) optionally a polar solvent; (e) optionally, a pH adjuster; and (f) balance water. The copper electrolyte has a pH in the range of about 8 to about 11, preferably about 8.2 to about 9.5. The copper electrolyte can be used to deposit an ultrathin copper layer on a conductive substrate that is free of pinholes and other defects and that suppresses metal dissolution.

WO 2024/155592 A1