

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

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
14 April 2005 (14.04.2005)

PCT

(10) International Publication Number
WO 2005/034596 A3

(51) International Patent Classification⁷: **H05K 3/38**

(21) International Application Number:
PCT/US2004/031697

(22) International Filing Date:
27 September 2004 (27.09.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10/675,019 30 September 2003 (30.09.2003) US

(71) Applicant (for all designated States except US):
ATOTECH DEUTSCHLAND GMBH [DE/DE];
Erasmusstrasse 20, 10553 Berlin (DE).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **FUERHAUPTER,**
Harry [US/US]; 30 Penn View Lane, Norristown, PA

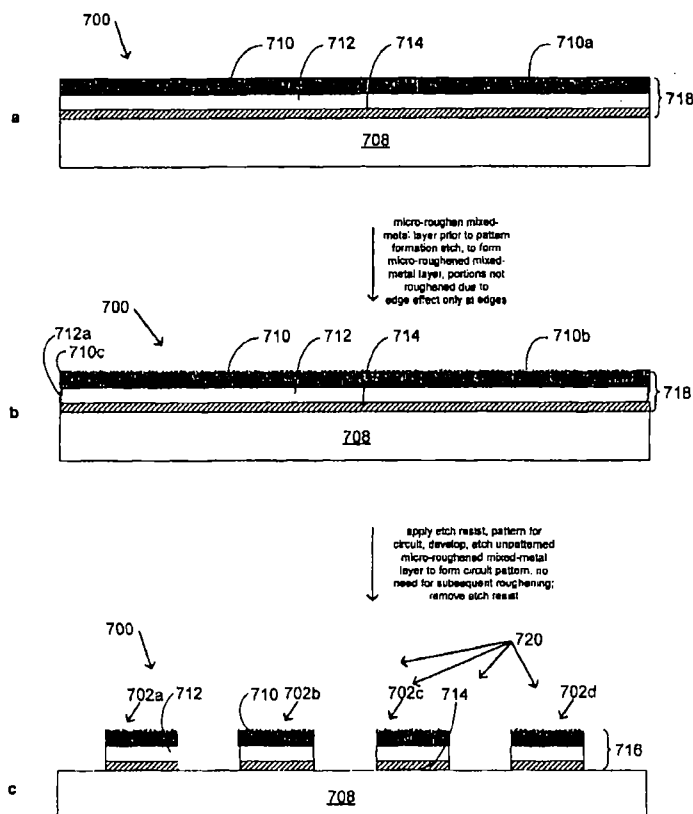
19403 (US). **BARON, David, Thomas** [GB/GB]; 19 Kingfisher Place, South Cerney Gloucestershire GL75TG (GB). **JOHAL, Kuldip, Singh** [GB/US]; 1808 Cavendale Drive, Rock Hill, SC 29732 (US). **BROOKS, Patrick, Paul** [US/DE]; Kaiserin-Augusta-Allee 86C, 10589 Berlin (DE).

(74) Agent: **ADAMS, Thomas, W.**; Renner, Otto, Boisselle & Sklar, LLP, 1621 Euclid Avenue, 19th Floor, Cleveland, OH 44115 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

[Continued on next page]

(54) Title: **IMPROVED METHOD FOR MICRO-ROUGHENING TREATMENT OF COPPER AND MIXED-METAL CIRCUITRY**



(57) Abstract: Process to improve adhesion of dielectric materials to a metal layer, including providing an unpatterned metal layer having a first major surface; micro-roughening the first major surface to form a micro-roughened surface; and etching the metal layer to form a circuit pattern in the metal layer, in which the micro-roughening is carried out prior to the etching.



162162



ACTION

(84) **Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

— with amended claims

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

16 June 2005

Date of publication of the amended claims:

15 September 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.