

(19) World Intellectual Property Organization
International Bureau



G00002

(43) International Publication Date
24 January 2002 (24.01.2002)

PCT

(10) International Publication Number
WO 02/06897 A3

(51) International Patent Classification⁷: **G03F 7/004**,
1/08, G03C 1/705

(71) Applicant (for all designated States except US): **CREO SRL** [CA/CA]; c/o Creo Products Inc., 3700 Gilmore Way, Burnaby, British Columbia V5G 4M1 (CA).

(21) International Application Number: PCT/CA01/01045

(22) International Filing Date: 17 July 2001 (17.07.2001)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/618,065 17 July 2000 (17.07.2000) US

(72) Inventors; and

(75) Inventors/Applicants (for US only): **CHAPMAN, Glenn, Harrison** [CA/CA]; 637 Ebert Avenue, Coquitlam, British Columbia V3J 2L1 (CA). **SARUNIC, Marinko, Venci** [CA/CA]; 699 Porter Street, Coquitlam, British Columbia V3J 5B3 (CA). **TU, Yugiang** [CN/CA]; 808 - 7351 Halifax Street, Burnaby, British Columbia V5A 4H2 (CA).

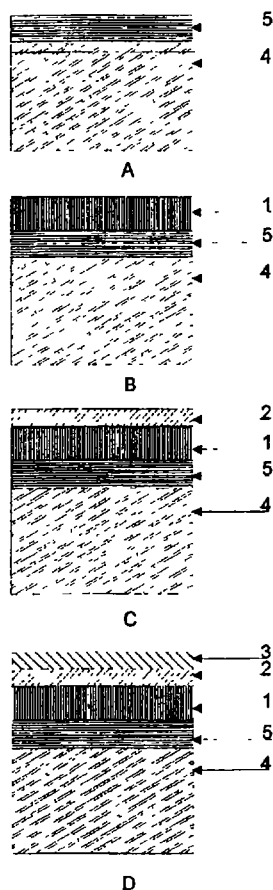
(63) Related by continuation (CON) or continuation-in-part (CIP) to earlier application:
US 09/618,065 (CON)
Filed on 17 July 2000 (17.07.2000)

(74) Agent: **MANNING, Gavin, N.**; OYEN WIGGS GREEN & MUTALA, 480 - 601 West Cordova Street, Vancouver, British Columbia V6B 1G1 (CA)

(81) Designated States (national): AE, AG, AL, AM, AT, AT (utility model), AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, CZ (utility model), DE, DE

[Continued on next page]

(54) Title: DRY MULTILAYER INORGANIC ALLOY THERMAL RESIST FILM FOR LITHOGRAPHIC PROCESSING AND IMAGE CREATION



(57) Abstract: A thermal inorganic resist useful for lithographic processes and image creation is created by depositing on a substrate at least two layers of materials which are typically metals. The materials form a mixed alloy with a eutectic. One embodiment has a 15 nm Bi layer overlying a 15 nm In layer. Upon exposure to a optical light pulse of sufficient intensity, optical absorption heats the layers above the eutectic melting point (110° C for BiIn) and the resist forms an alloy in the exposed area. By selectively heating parts of the resist a desired pattern can be created in the resist. Optical characteristics of the alloyed layers are typically different from those of the unexposed layers. In BiIn resists the alloyed areas are visually transparent compared to the unexposed sections. The exposed pattern provides a viewable image useful for exposure control. In a negative resist the alloy material is resistant to development etches which remove the unexposed areas but only slowly etch the alloyed areas creating a lithographic structure. This resist structure can be used to pattern layers below it in additional etches. The resist layer can then be stripped, leaving the pattern layer on the substrate. In resists showing significant optical differences (such as BiIn) after exposure this same material can be used to create images for data storage, and, when transparent, photomasks for optical lithography.



(utility model), DK, DK (utility model), DM, DZ, EC, EE, EE (utility model), ES, FI, FI (utility model), 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, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW

- (84) **Designated States (regional):** ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- as to the identity of the inventor (Rule 4 17(i)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, 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, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

- as to applicant's entitlement to apply for and be granted a patent (Rule 4 17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, 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, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4 17(iii)) for all designations
- of inventorship (Rule 4 17(iv)) for US only

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

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

4 April 2002

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