



(43) International Publication Date
21 May 2004 (21.05.2004)

PCT

(10) International Publication Number
WO 2004/042104 A3

- (51) **International Patent Classification⁷:** C23C 14/34, B32B 15/10

(21) **International Application Number:** PCT/US2003/015545

(22) **International Filing Date:** 14 May 2003 (14.05.2003)

(25) **Filing Language:** English

(26) **Publication Language:** English

(30) **Priority Data:**
60/384,890 31 May 2002 (31.05.2002) US
10/436,724 12 May 2003 (12.05.2003) US

(71) **Applicant:** HONEYWELL INTERNATIONAL INC. [US/US]; Box 2245, 101 Columbia Road, Morristown, NJ 07962 (US).

(72) **Inventors:** GLASS, Howard, L.; 1212 E 33rd Avenue, Spokane, WA 99203 (US). FERRASSE, Stephane; 15821 E 4th, #F326, Veradale, WA 99037 (US). AL-FORD, Frank; 14408 E 16th, Veradale, WA 99037 (US).

(74) **Agent:** TAYLOR, Jennifer, J.; Wells St., John P.S., Suite 1300, 601 West First Avenue, Spokane, WA 99201 (US).

(81) **Designated States (national):** 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, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW.

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

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:** 19 May 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.

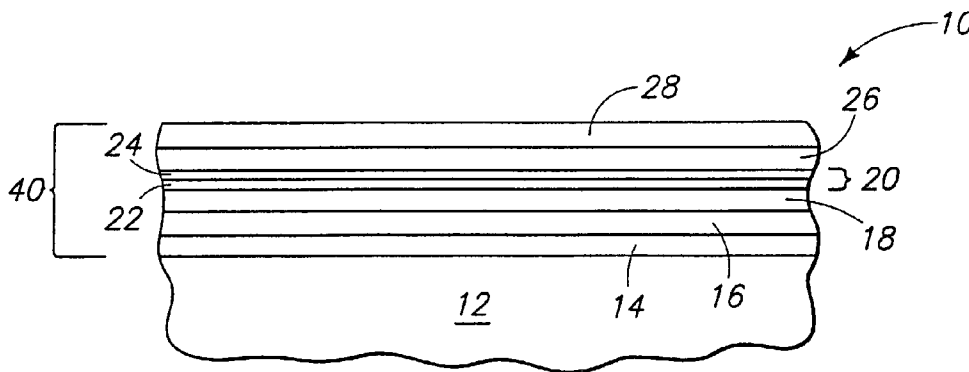
Published:

- 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:
19 May 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.

(54) Title: THIN FILMS AND METHODS FOR FORMING THIN FILMS UTILIZING ECAE-TARGETS



(57) Abstract: The invention includes methods of forming a barrier layer. Material is ablated from an ECAE target to form a layer having a thickness variance of less than or equal to 1 % of 1-sigma across a substrate surface. The invention includes a method of forming a tunnel junction (40). A thin film (20) is formed between first and second magnetic layers (18, 26). The thin film (20), the first magnetic layer (18), and/or the second magnetic layer (26) are formed by ablating material from an ECAE target to provide improved layer thickness uniformity relative to corresponding layers formed utilizing non-ECAE targets. The invention includes a physical vapor deposition target and a thin film formed using the target. The target contains an alloy of aluminum and at least one alloying element selected from Ga, Zr and In. The resulting film has a thickness variance across the thin film of less than 1.5 % of 1-sigma.

WO 2004/042104 A3