

CORRECTED VERSION

(19) World Intellectual Property Organization
International Bureau



(10) International Publication Number
WO 2010/132319 A8

(43) International Publication Date
18 November 2010 (18.11.2010)

PCT

- (51) **International Patent Classification:**
H01L 21/8234 (2006.01) **H01L 21/28** (2006.01)
H01L 21/3115 (2006.01) **H01L 29/51** (2006.01)

(21) **International Application Number:**
PCT/US2010/034164

(22) **International Filing Date:**
10 May 2010 (10.05.2010)

(25) **Filing Language:** English

(26) **Publication Language:** English

(30) **Priority Data:**
102009021486.0 15 May 2009 (15.05.2009) DE
12/775,555 7 May 2010 (07.05.2010) US

(71) **Applicant** (*for all designated States except US*): **GLOB-AL FOUNDRIES INC.** [US/—]; Maple Corporate Services Limited, P.O. Box 309, Ugland House, Grand Cayman, KY 1-1104 (KY).

(72) **Inventors; and**

(75) **Inventors/Applicants** (*for US only*): **CARTER, Richard** [US/DE]; Theresienstrasse 13, D-01097 Dresden (DE). **TRENTZSCH, Martin** [DE/DE]; Naetherstrasse 6, D-01237 Dresden (DE). **BEYER, Sven** [DE/DE]; Louisenstr 75, D-01099 Dresden (DE). **PAL, Rohit** [IN/US]; 5 Greenhill Dr. 18 C, Fishkill, NY 12524 (US).

(74) **Agent:** **AMERSON, J., Mike;** Williams, Morgan & Amerson P.C., 10333 Richmond Ave., Suite 1100, Houston, TX 77042 (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, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, 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, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, 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, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report (Art. 21(3))*

Published:

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

(48) Date of publication of this corrected version:

11 August 2011

[Continued on next page]

(54) Title: ADJUSTING THRESHOLD VOLTAGE FOR SOPHISTICATED TRANSISTORS BY DIFFUSING A GATE DIELECTRIC CAP LAYER MATERIAL PRIOR TO GATE DIELECTRIC STABILIZATION

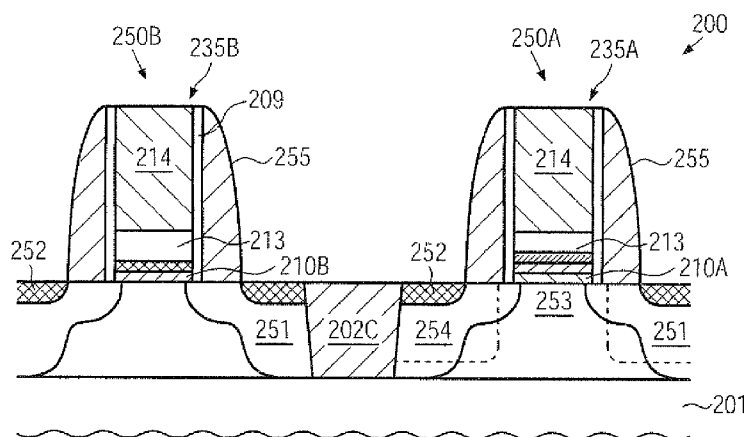


FIG. 2j

(57) Abstract: Sophisticated gate electrode structures may be formed by providing a cap layer (121) including a desired species that may diffuse into the gate dielectric material (110) prior to performing a treatment for stabilizing the sensitive gate dielectric material (110). In this manner, complex high-k metal gate electrode structures may be formed on the basis of reduced temperatures and doses for a threshold adjusting species compared to conventional strategies. Moreover, a single metal-containing electrode material may be deposited for both types of transistors.

WO 2010/132319 A8



(15) Information about Correction:
see Notice of 11 August 2011