

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
6 April 2006 (06.04.2006)

PCT

(10) International Publication Number
WO 2006/036671 A1

(51) International Patent Classification:
H01L 21/8234 (2006.01) **H01L 21/336** (2006.01)
H01L 21/8238 (2006.01)

(74) Agents: **TROP, Timothy, N.** et al.; TROP, PRUNER & HU, P.C., 8554 Katy Freeway, Suite 100, Houston, TX 77024 (US).

(21) International Application Number:
PCT/US2005/033698

(22) International Filing Date:
16 September 2005 (16.09.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10/951,073 27 September 2004 (27.09.2004) US

(71) Applicant (for all designated States except US): **INTEL CORPORATION** [US/US]; 2200 Mission College Boulevard, Santa Clara, CA 95052 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **DOCZY, Mark** [US/US]; 2922 NW NORWALK PLACE, BEAVERTON, OR 97006 (US). **BRASK, Justin** [US/US]; 12748 NW BAYONNE LANE, Portland, OR 97229 (US). **KAVALLIEROS, Jack** [US/US]; 14260 NW BELLE COURT, Portland, OR 97229 (US). **BARNES, Chris** [US/US]; 685 NW 87TH TERRACE, PORTLAND, OR 97229 (US). **METZ, Matthew** [US/US]; 3136 NE 13TH AVE, HILLSBORO, OR 97124 (US). **DATTA, Suman** [IN/US]; 16659 NW TALKINGSTICK WAY, BEAVERTON, OR 97006 (US). **CHAU, Robert** [US/US]; 8875 SW 171ST AVENUE, BEAVERTON, OR 97007 (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, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

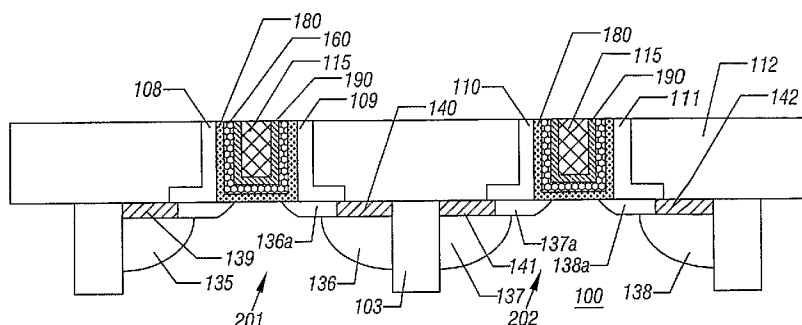
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, 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
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

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: A METAL GATE ELECTRODE SEMICONDUCTOR DEVICE



(57) Abstract: A complementary metal oxide semiconductor integrated circuit may be formed with NMOS and PMOS transistors that have high dielectric constant gate dielectric material over a semiconductor substrate. A metal barrier layer may be formed over the gate dielectric. A workfunction setting metal layer is formed over the metal barrier layer and a cap metal layer is formed over the workfunction setting metal layer.

WO 2006/036671 A1