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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
28 June 2012 (28.06.2012)

WIPO | PCT

(10) International Publication Number
WO 2012/087748 A2

(51) International Patent Classification:
H01L 29/78 (2006.01) *H01L 21/336* (2006.01)

(21) International Application Number:
PCT/US2011/065193

(22) International Filing Date:
15 December 2011 (15.12.2011)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
12/976,126 22 December 2010 (22.12.2010) US

(71) Applicant *(for all designated States except US)*: **INTEL CORPORATION** [US/US]; 2200 Mission College Boulevard, MS: RNB-4-150, Santa Clara, California 95052 (US).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **RACHMADY, Willy** [ID/US]; 10945 SW Nutcracker Ct, Beaverton, Oregon 97007 (US). **PILLARISETTY, Ravi** [US/US]; 925 NW Hoyt St, APT 226, Portland, Oregon 97209 (US). **LE, Van H.** [US/US]; 2453 NW Rogue Valley Terrace, Beaverton, Oregon 97006 (US).

(74) Agents: **VINCENT, Lester J.** et al.; Blakely Sokoloff Taylor & Zafman, 1279 Oakmead Parkway, Sunnyvale, California 94085 (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, DE, 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, QA, RO, RS, RU, RW, 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, RW, 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, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

(54) **Title**: UNIAXIALLY STRAINED QUANTUM WELL DEVICE AND METHOD OF MAKING SAME

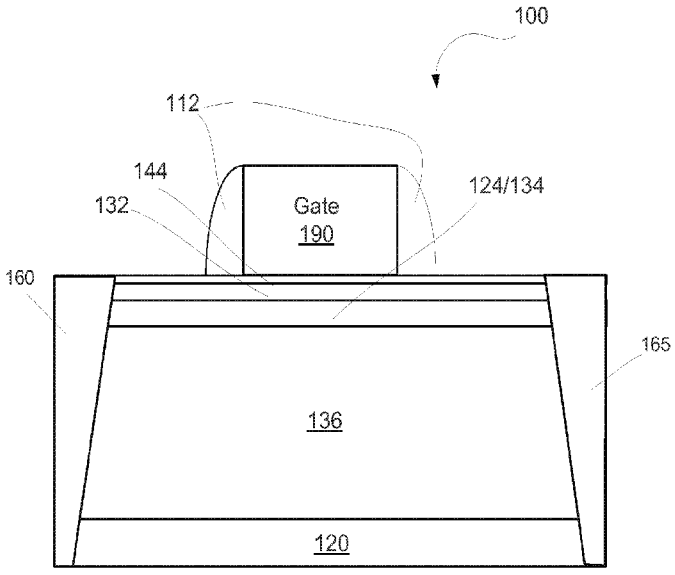


Figure 1

(57) **Abstract**: A planar or non-planar quantum well device and a method of forming the quantum well device. The device includes: a buffer region comprising a large band gap material; a uniaxially strained quantum well channel region on the buffer region; an upper barrier region comprising a large band gap material on the quantum well channel region; a gate dielectric on the quantum well channel region; a gate electrode on the gate dielectric; and recessed source and drain regions at respective sides of the gate electrode, the source and drain regions including a junction material having a lattice constant different from a lattice constant of a material of the buffer region. Preferably, the buffer region comprises a $Si_{1-x}Ge_x$ material, and the junction material comprises one of a $Si_{1-y}Ge_y$ material where y is larger than x, or pure germanium, or tin germanium.

WO 2012/087748 A2