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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
29 January 2009 (29.01.2009)

PCT

(10) International Publication Number
WO 2009/015337 A1

(51) International Patent Classification:
H01L 21/20 (2006.01)

(21) International Application Number:
PCT/US2008/071199

(22) International Filing Date: 25 July 2008 (25.07.2008)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/952,131 26 July 2007 (26.07.2007) US
61/017,216 28 December 2007 (28.12.2007) US

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(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, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, 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, 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, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, 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*

(54) **Title:** METHODS FOR PRODUCING IMPROVED EPITAXIAL MATERIALS

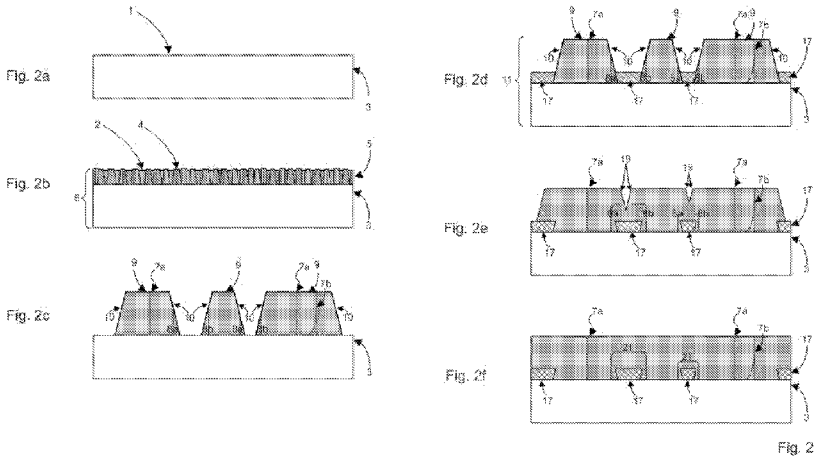


Fig. 2

(57) **Abstract:** This invention provides methods for fabricating substantially continuous layers of group III nitride semiconductor materials having low defect densities. The methods include epitaxial growth of nucleation layers on a base substrate, thermally treatment of said nucleation layer and epitaxial growth of a discontinuous masking layer. The methods outlined promote defect reduction through masking, annihilation and coalescence, therefore producing semiconductor structures with low defect densities. The invention can be applied to a wide range of semiconductor materials, both elemental semiconductors, e.g., combinations of Si (silicon) with strained Si (sSi) and/or Ge (germanium), and compound semiconductors, e.g., group II-VI and group III-V compound semiconductor materials.

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