

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

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
26 July 2018 (26.07.2018)



(10) International Publication Number
WO 2018/136278 A1

- (51) **International Patent Classification:**
C30B 29/40 (2006.01) *C30B 29/68* (2006.01)
- (21) **International Application Number:**
PCT/US2018/013206
- (22) **International Filing Date:**
10 January 2018 (10.01.2018)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
62/447,857 18 January 2017 (18.01.2017) US
62/591,016 27 November 2017 (27.11.2017) US
15/864,977 08 January 2018 (08.01.2018) US
- (71) **Applicant: QROMIS, INC.** [US/US]; 2306 Walsh Avenue, Santa Clara, California 95051 (US).
- (72) **Inventors: ODNOLYUDOV, Vladimir;** c/o Qromis, Inc., 2306 Walsh Avenue, Santa Clara, California 95032 (US). **LESTER, Steve;** c/o Qromis, Inc., 2306 Walsh Avenue, Santa Clara, California 95051 (US). **AKTAS, Ozgur;**
- (74) **Agent: LIU, Rong et al.;** Kilpatrick Townsend & Stockton LLP, Mailstop: IP Docketing-22, 1100 Peachtree Street, Suite 2800, Atlanta, Georgia 30309 (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, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, 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, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,

(54) **Title:** GALLIUM NITRIDE EXPITAXIAL STRUCTURES FOR POWER DEVICES

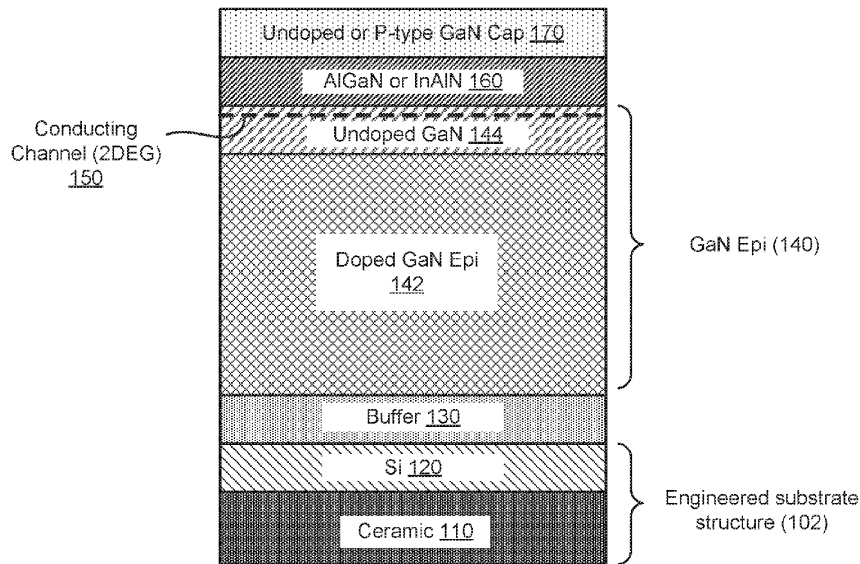


FIG. 1

(57) **Abstract:** A method for making a multilayered device on an engineered substrate having a substrate coefficient of thermal expansion includes growing a buffer layer on the engineered substrate, and growing a first epitaxial layer on the buffer layer. The first epitaxial layer is characterized by an epitaxial coefficient of thermal expansion substantially equal to the substrate coefficient of thermal expansion.

[Continued on next page]

WO 2018/136278 A1

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,
KM, ML, MR, NE, SN, TD, TG).

Published:

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