

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

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
16 September 2021 (16.09.2021)



(10) International Publication Number
WO 2021/183050 A1

(51) International Patent Classification:
C01B 32/05 (2017.01) *C01G 39/06* (2006.01)
C23C 16/26 (2006.01)

Materials, 21 Lower Kent Ridge Road, Singapore 119077 (SG).

(21) International Application Number:
PCT/SG2021/050118

(74) Agent: OWEN, Samuel Man Hon; Marks & Clerk Singapore LLP, Tanjong Pagar Post Office, P O Box 636, Singapore 910816 (SG).

(22) International Filing Date:
09 March 2021 (09.03.2021)

(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, IT, 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, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
10202002196X 10 March 2020 (10.03.2020) SG

(71) Applicant: NATIONAL UNIVERSITY OF SINGAPORE [SG/SG]; 21 Lower Kent Ridge Road, Singapore 119077 (SG).

(72) Inventors: OEZYILMAZ, Barbaros; c/o National University of Singapore, Centre for Advanced 2D Materials, 21 Lower Kent Ridge Road, Singapore 119077 (SG). TOH, Chee Tat; c/o National University of Singapore, Faculty of Science / Department of Physics, 21 Lower Kent Ridge Road, Singapore 119077 (SG). ABIDI, Irfan Haider; c/o National University of Singapore, Centre for Advanced 2D

(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, 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,

(54) Title: A SEED LAYER, A HETEROSTRUCTURE COMPRISING THE SEED LAYER AND A METHOD OF FORMING A LAYER OF MATERIAL USING THE SEED LAYER

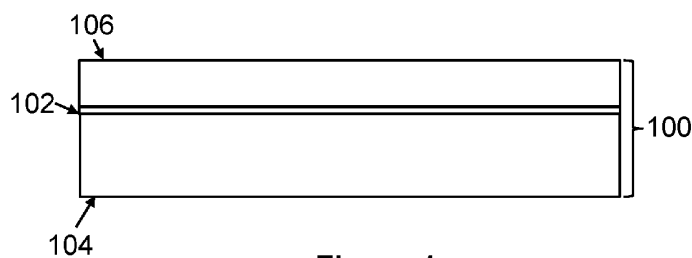


Figure 1

(57) Abstract: A seed layer (102) for inducing nucleation to form a layer of material (106) is described. In an embodiment, the seed layer (102) comprising a layer of two-dimensional (2D) monolayer amorphous material having a disordered atomic structure adapted to create localised electronic states to form electric potential wells for bonding adatoms to a surface of the seed layer (102) via van der Waals (vdW) interaction to form the layer of material, wherein each of the electric potential wells has a potential energy larger in magnitude than surrounding thermal energy to capture adatoms on the surface of the seed layer. Embodiments in relation to a method for forming the seed layer, a heterostructure 100 comprising the seed layer (102), a method (300) for forming the heterostructure comprising the seed layer, a device comprising the heterostructure and a method of enhancing vdW interaction between adatoms and a surface of the seed layer are also described. In a particular embodiment, the layer of 2D monolayer amorphous material is a 2D monolayer amorphous carbon.

WO 2021/183050 A1

[Continued on next page]

TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *of inventorship (Rule 4.17(iv))*

Published:

— *with international search report (Art. 21(3))*
— *in black and white; the international application as filed
contained color or greyscale and is available for download
from PATENTSCOPE*