

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

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
27 January 2022 (27.01.2022)



(10) International Publication Number
WO 2022/020684 A1

(51) International Patent Classification:

C30B 15/20 (2006.01) C30B 29/06 (2006.01)
C30B 15/30 (2006.01) C30B 30/04 (2006.01)

(21) International Application Number:

PCT/US2021/042908

(22) International Filing Date:

23 July 2021 (23.07.2021)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

63/056,056 24 July 2020 (24.07.2020) US

(71) Applicant: **GLOBALWAFERS CO., LTD.** [CN/CN];
No. 8 Industrial East Road 2, Science-Based Industrial Park,
Hsinchu (CN).

(72) Inventors: **RYU, JaeWoo**; 501 Pearl Drive, St. Louis, Mis-
souri 63376 (US). **HUDSON, Carissima Marie**; 501 Pearl
Drive, St. Peters, Missouri 63376 (US). **Ji, JunHwan**; 501
Pearl Drive, St. Peters, Missouri 63376 (US). **YOON, Woo-
Jin**; 501 Pearl Drive, St. Peters, Missouri 63376 (US).

(74) Agent: **SCHUTH, Richard A.** et al.; ARMSTRONG
TEASDALE LLP, 7700 Forsyth Blvd., Suite 1800, St.
Louis, Missouri 63105 (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, 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.

(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: METHODS FOR PRODUCING A MONOCRYSTALLINE INGOT BY HORIZONTAL MAGNETIC FIELD
CZOCHEKRALSKI

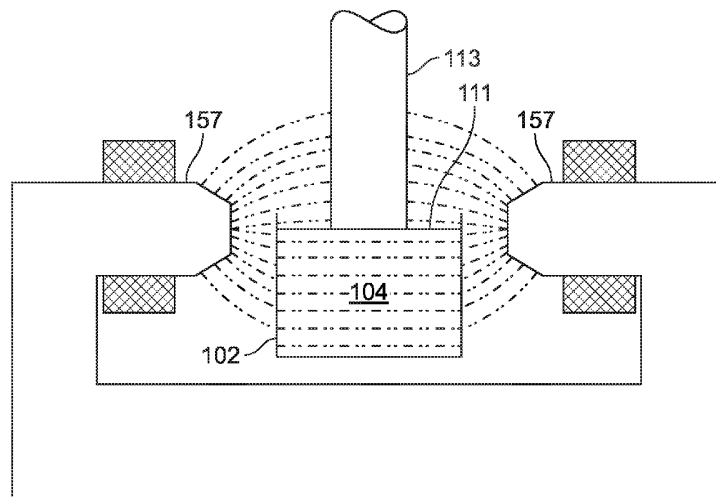


FIG. 6

(57) Abstract: Methods for producing monocrystalline silicon ingots by horizontal magnetic field Czochralski are disclosed. During growth of the neck and/or growth of at least a portion of the crown, a magnetic field is not applied to the neck and/or crown or a relatively weak magnetic field of 1500 gauss or less is applied. A horizontal magnetic field (e.g., greater than 1500 gauss) is applied during growth of the ingot main body.

[Continued on next page]

WO 2022/020684 A1

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))*