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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
7 May 2009 (07.05.2009)

PCT

(10) International Publication Number
WO 2009/057667 A1

(51) International Patent Classification:
H01L 21/02 (2006.01) *H01L 27/12* (2006.01)
H01L 21/336 (2006.01) *H01L 29/786* (2006.01)

(21) International Application Number:
PCT/JP2008/069705

(22) International Filing Date: 23 October 2008 (23.10.2008)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
2007-280115 29 October 2007 (29.10.2007) JP

(71) Applicant *(for all designated States except US)*: **SEMICONDUCTOR ENERGY LABORATORY CO., LTD.** [JP/JP]; 398, Hase, Atsugi-shi, Kanagawa 2430036 (JP).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **TANAKA, Koichiro** [JP/JP]; c/o SEMICONDUCTOR ENERGY LABORATORY CO., LTD., 398, Hase, Atsugi-shi, Kanagawa, 2430036 (JP). **OKAMOTO, Satoru.**

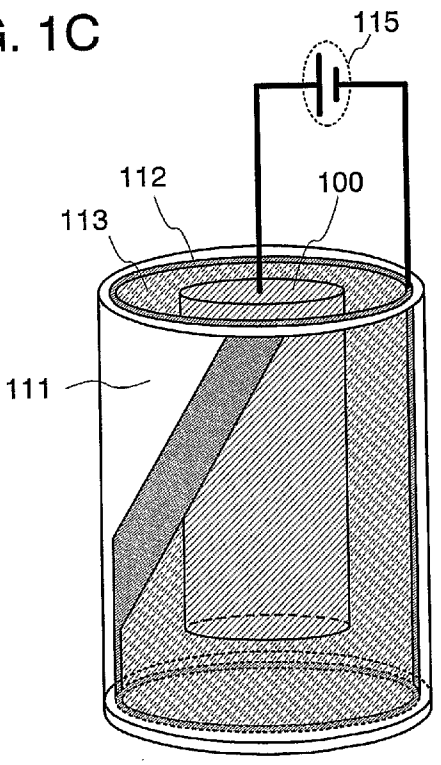
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, KE, KG, KM, KN, 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*

(54) **Title:** FORMATION METHOD OF SINGLE CRYSTAL SEMICONDUCTOR LAYER, FORMATION METHOD OF CRYSTALLINE SEMICONDUCTOR LAYER, FORMATION METHOD OF POLYCRYSTALLINE LAYER, AND METHOD FOR MANUFACTURING SEMICONDUCTOR DEVICE

FIG. 1C



(57) **Abstract:** A method for forming a single crystal semiconductor layer in which a first porous layer and a second porous layer are formed over a single crystal semiconductor ingot, a groove is formed in a part of the second porous layer and a single crystal semiconductor layer is formed over the second porous layer, the single crystal semiconductor ingot is attached onto a large insulating substrate, water jet is directed to the interface between the first porous layer and the second porous layer, and the single crystal semiconductor layer is attached to the large insulating substrate, or a method for forming a crystalline semiconductor layer in which a crystalline semiconductor ingot is irradiated with hydrogen ions to form a hydrogen ion irradiation region in the crystalline semiconductor ingot, the crystalline semiconductor ingot is rolled over the large insulating substrate while being heated, the crystalline semiconductor layer is separated from the hydrogen ion irradiation region, and the crystalline semiconductor layer is attached to the large insulating substrate.

WO 2009/057667 A1