



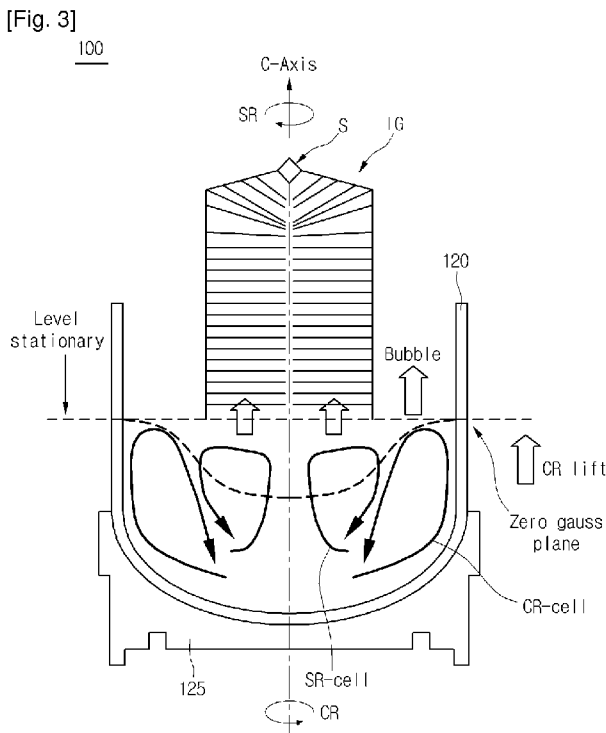
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C30B 29/20 (2006.01)
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10-2011-0005339 19 January 2011 (19.01.2011) KR
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- (81) **Designated States (unless otherwise indicated, for every kind of national protection available):** AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, 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, 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, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, 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, SZ, TZ,

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(54) **Title:** RESISTANCE HEATED SAPPHIRE SINGLE CRYSTAL INGOT GROWER, METHOD OF MANUFACTURING RESISTANCE HEATED SAPPHIRE SNGLE CRYSTAL INGOT, SAPPHIRE SNGLE CRYSTAL INGOT, AND SAPPHIRE WAFER



(57) **Abstract:** Provided are a resistance heated sapphire single crystal ingot grower, a method of manufacturing a resistance heated sapphire single crystal ingot, a sapphire single crystal ingot, and a sapphire wafer. The resistance heated sapphire single crystal ingot grower comprises according to an embodiment includes a chamber, a crucible included in the chamber and containing an alumina melt, and a resistance heating heater included inside the chamber and heating the crucible.

WO 2012/099343 A3

UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, 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, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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22 November 2012

A. CLASSIFICATION OF SUBJECT MATTER*C30B 15/18(2006.01)i, C30B 29/20(2006.01)i, H01L 21/02(2006.01)i*

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

C30B 15/18; C30B 15/00; C30B 29/20; C30B 15/14

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: sapphire, single crystal ingot, resistance heating heater

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2010-120831 A (SUMITOMO METAL MINING CO LTD) 03 June 2010 See the abstract, paragraph [16]-[30]	1-20
A	JP 2010-150052 A (SUMITOMO METAL MINING CO LTD) 08 July 2010 See the abstract, paragraph [17]-[39]	1-20
A	KR 10-0573525 B1 (MONOCERAPIA CO LTD) 26 April 2006 See the whole document	1-20

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

31 AUGUST 2012 (31.08.2012)

Date of mailing of the international search report

03 SEPTEMBER 2012 (03.09.2012)

Name and mailing address of the ISA/KR

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Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

I. Claims [1-11] are directed to a resistance heated sapphire single crystal ingot grower and method of manufacturing a resistance heated sapphire single crystal ingot.

II. Claims [12-20] are directed to a sapphire ingot having a diameter of about 150 mm or more and sapphire wafer having a diameter of about 150 mm or more manufactured from a sapphire ingot.

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2011/009962

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2010-120831 A	03.06.2010	None	
JP 2010-150052 A	08.07.2010	None	
KR 10-0573525 B1	26.04.2006	None	