

PATENT COOPERATION TREATY

TRANSLATION

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

Date of mailing (day/month/year)	08.08.2017
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Applicant's or agent's file reference SF-3113	FOR FURTHER ACTION See paragraph 2 below
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International application No. PCT/JP2017/020228	International filing date (day/month/year) 31.05.2017	Priority date (day/month/year) 28.07.2016
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International Patent Classification (IPC) or both national classification and IPC
C30B29/06 (2006.01) i, C30B11/08 (2006.01) i

Applicant
CRYSTAL SYSTEMS CORPORATION

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/JP	Date of completion of this opinion	Authorized officer
Facsimile No.		Telephone No.

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Box No. I Basis of this opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - the international application in the language in which it was filed
 - a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).
2. This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
 - a. forming part of the international application as filed:
 - in the form of an Annex C/ST.25 text file.
 - on paper or in the form of an image file.
 - b. furnished together with the international application under PCT Rule 13ter.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
 - c. furnished subsequent to the international filing date for the purposes of international search only:
 - in the form of an Annex C/ST.25 text file (Rule 13ter.1(a)).
 - on paper or in the form of an image file (Rule 13ter.1(b) and Administrative Instructions, Section 713).
4. In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Document 4: JP 2008-81398 A (HERAEUS SHIN-ETSU AMERICA, INC.) 10 April 2008, paragraph [0045], fig. 3, 4
& JP 2007-70221 A & JP 2013-14518 A
& US 2007/0051297 A1, paragraph [0053], fig. 3, 4
& US 2007/0051296 A1 & EP 1762549 A1
& KR 10-2008-0029863 A & TW 200815629 A
& KR 10-2013-0023316 A
& KR 10-2007-0029077 A & TW 200712018 A

Document 5: Microfilm of the specification and drawings annexed to the request of Japanese Utility Model Application No. 108550/1982 (Laid-open No. 15056/1984) (KONISHIROKU PHOTO INDUSTRY CO., LTD.) 30 January 1984, page 2, fig. 1 (Family: none)

Claims 1, 14-15, and 17-21

The invention as in claims 1, 14-15, and 17-21 lacks novelty and does not involve an inventive step in light of document 1 cited in the ISR.

Document 1 discloses a method for producing and growing single crystals while forming a melt zone upon a seed crystal, wherein: a ground substance and a ground starting material are supplied to the melt zone, and a ground substance supply pipe is provided (the claims); halogen lamps are provided, the lamps are partitioned off by a quartz plate, and a suitable atmosphere gas is filled into the partitioned space (paragraph [0021]); and a rotating shaft is lowered (paragraph [0027]).

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Claims 1-2, 12, and 14-21

The invention as in claims 1-2, 12, and 14-21 does not involve an inventive step in light of documents 1-3 cited in the ISR.

Document 1 discloses a method for producing and growing single crystals while forming a melt zone upon a seed crystal, wherein: a ground substance and a ground starting material are supplied to the melt zone, and a ground substance supply pipe is provided (the claims); halogen lamps are provided, the lamps are partitioned off by a quartz plate, and a suitable atmosphere gas is filled into the partitioned space (paragraph [0021]); and a rotating shaft is lowered (paragraph [0027]).

Document 2 indicates that: an infrared radiation method, or the like, can be used as the heating method for melting the top portion of a single crystal being grown (paragraph [0028]); granular crystals are guided to the interior of a barrier enclosure by a guide pipe and introduced into the melt zone (paragraph [0023] and figure 2(a)); the granular crystals are guided to a limited region of the surface (paragraph [0048]); necessary impurities are added to the starting material (paragraph [0017]); metal particles and the like are added to the granular crystals, and a branching guide pipe or a plurality of guide pipes are used (paragraph [0026]); and quartz, or the like, is used as the material of the barrier enclosure (paragraph [0056]).

Document 3 indicates that: single crystals are grown by obtaining a melt from irradiation with infrared light and solidifying the melt upon a seed crystal, and a crystal heating means is provided (the claims, paragraph [0114]); an infrared lamp is used as an infrared

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irradiation means, and it is possible to use an infrared lamp such as a halogen lamp or a xenon lamp as the infrared lamp (paragraphs [0071] and [0076]-[0094]); a sample chamber comprises a transparent quartz pipe (paragraph [0075]); it is possible to place the interior of the sample chamber in a vacuum state or pass an atmosphere gas therethrough (paragraph [0096]); it is also possible to use a laser oscillator as the infrared radiation means (paragraph [0141]); and support portions can be rotated and moved in a vertical direction (paragraph [0099]).

No particular difficulty is found in applying the configurations disclosed in documents 2 and 3 to the invention disclosed in document 1.

No particular difficulty is found in applying the configurations disclosed in documents 1 and 3 to the invention disclosed in document 2.

Claims 3-4, 6-12, and 14-21

The invention as in claims 3-4, 6-12, and 14-21 does not involve an inventive step in light of documents 1-5 cited in the ISR.

Document 1 discloses a method for producing and growing single crystals while forming a melt zone upon a seed crystal, wherein: a ground substance and a ground starting material are supplied to the melt zone, and a ground substance supply pipe is provided (the claims); halogen lamps are provided, the lamps are partitioned off by a quartz plate, and a suitable atmosphere gas is filled into the partitioned space (paragraph [0021]); and a rotating shaft is lowered (paragraph [0027]).

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Document 2 indicates that: an infrared radiation method, or the like, can be used as the heating method for melting the top portion of a single crystal being grown (paragraph [0028]); granular crystals are guided to the interior of a barrier enclosure by a guide pipe and introduced into the melt zone (paragraph [0023] and figure 2(a)); the granular crystals are guided to a limited region of the surface (paragraph [0048]); necessary impurities are added to the starting material (paragraph [0017]); metal particles and the like are added to the granular crystals, and a branching guide pipe or a plurality of guide pipes are used (paragraph [0026]); and quartz, or the like, is used as the material of the barrier enclosure (paragraph [0056]).

Document 3 indicates that: single crystals are grown by obtaining a melt from irradiation with infrared light and solidifying the melt upon a seed crystal, and a crystal heating means is provided (the claims, paragraph [0114]); an infrared lamp is used as an infrared irradiation means, and it is possible to use an infrared lamp such as a halogen lamp or a xenon lamp as the infrared lamp (paragraphs [0071] and [0076]-[0094]); a sample chamber comprises a transparent quartz pipe (paragraph [0075]); it is possible to place the interior of the sample chamber in a vacuum state or pass an atmosphere gas therethrough (paragraph [0096]); it is also possible to use a laser oscillator as the infrared radiation means (paragraph [0141]); and support portions can be rotated and moved in a vertical direction (paragraph [0099]).

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No particular difficulty is found in applying the configurations disclosed in documents 2 and 3 to the invention disclosed in document 1. In addition, the use of a hopper is well known (see paragraph [0045] and figures 3 and 4 of document 4, and page 2 and figure 1 of document 5).

No particular difficulty is found in applying the configurations disclosed in documents 1 and 3 to the invention disclosed in document 2. In addition, the use of a hopper is well known (see paragraph [0045] and figures 3 and 4 of document 4, and page 2 and figure 1 of document 5).

Claim 5

The invention as in claim 5 is not disclosed in any of the documents cited in the ISR, and is novel and involves an inventive step. In particular, none of the documents indicate that a supply adjusting unit is provided with...a supply position adjusting means.

Claim 13

The invention as in claim 13 is not disclosed in any of the documents cited in the ISR, and is novel and involves an inventive step. In particular, none of the documents indicate that the infrared irradiation means is configured so as to irradiate within 90%...with infrared light.