

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

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| Applicant's or agent's file reference IDK-1692-PCT | FOR FURTHER ACTION | | See item 4 below |
| International application No. PCT/JP2017/035939 | International filing date (<i>day/month/year</i>) 03 October 2017 (03.10.2017) | Priority date (<i>day/month/year</i>) 04 October 2016 (04.10.2016) | |
| International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237 | | | |
| Applicant IDEMITSU KOSAN CO.,LTD. | | | |

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|---|-------------------------------------|---|---------------------|--------------------------|------------|----------|--------------------------|-------------|--|--------------------------|------------|----------------------------|-------------------------------------|-----------|---|--------------------------|------------|-------------------------|--------------------------|-------------|--|--------------------------|--------------|---|
| <p>1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.</p> | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>3. This report contains indications relating to the following items:</p> <table> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. I</td> <td>Basis of the report</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. II</td> <td>Priority</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table> <p>4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).</p> | <input checked="" type="checkbox"/> | Box No. I | Basis of the report | <input type="checkbox"/> | Box No. II | Priority | <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability | <input type="checkbox"/> | Box No. IV | Lack of unity of invention | <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement | <input type="checkbox"/> | Box No. VI | Certain documents cited | <input type="checkbox"/> | Box No. VII | Certain defects in the international application | <input type="checkbox"/> | Box No. VIII | Certain observations on the international application |
| <input checked="" type="checkbox"/> | Box No. I | Basis of the report | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> | Box No. II | Priority | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> | Box No. IV | Lack of unity of invention | | | | | | | | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> | Box No. VI | Certain documents cited | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application | | | | | | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> | Box No. VIII | Certain observations on the international application | | | | | | | | | | | | | | | | | | | | | | |

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| <p align="center">The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No. +41 22 338 82 70</p> | <p>Date of issuance of this report 09 April 2019 (09.04.2019)</p> |
| | <p>Authorized officer</p> <p align="center">Yukari Nakamura</p> <p>e-mail: pct.team7@wipo.int</p> |

PATENT COOPERATION TREATY

TRANSLATION

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

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|-------------------------------------|-------------------|
| Date of mailing (day/month/year) | 07.11.2017 |
|-------------------------------------|-------------------|

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| Applicant's or agent's file reference IDK-1692-PCT | FOR FURTHER ACTION See paragraph 2 below |
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|---|---|---|
| International application No. PCT/JP2017/035939 | International filing date (day/month/year) 03.10.2017 | Priority date (day/month/year) 04.10.2016 |
|---|---|---|

International Patent Classification (IPC) or both national classification and IPC
C04B35/01 (2006.01) i, C23C14/08 (2006.01) i, C23C14/34 (2006.01) i, H01L29/786 (2006.01) i

Applicant
IDEMITSU KOSAN CO., LTD.

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. |

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2017/035939

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:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

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| International application No. PCT/JP2017/035939 |
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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 | | |
|------------------|---|-------------------------|-----|
| 1. Statement | | | |
| | Novelty (N) | Claims <u>2-4, 7-11</u> | YES |
| | | Claims <u>1, 5, 6</u> | NO |
| | Inventive step (IS) | Claims <u>2-4, 7-11</u> | YES |
| | | Claims <u>1, 5, 6</u> | NO |
| | Industrial applicability (IA) | Claims <u>1-11</u> | YES |
| | | Claims _____ | NO |

2. Citations and explanations:

Document 1: WO 2012/043570 A1 (TOSOH CORP.) 05 April 2012, claims 1-19, paragraphs [0001]-[0227] & US 2013/0276879 A1, claims 1-19, paragraphs [0001]-[0278] & EP 2623478 A1

Document 2: JP 2008-7340 A (FUJIFILM CORP.) 17 January 2008, entire specification & US 2008/0260613 A1, entire specification & EP 1873226 A2

Document 3: WO 2015/098060 A1 (IDEMITSU KOSAN CO., LTD.) 02 July 2015, entire specification & US 2016/0343554 A1, entire specification

Document 4: JP 9-67194 A (UBE INDUSTRIES, LTD.) 11 March 1997, entire specification & US 5902763 A, entire specification & EP 722919 A1

The invention as in claims 1, 5, and 6 lacks novelty and does not involve an inventive step in light of document 1 cited in the ISR.

Document 1 describes an oxide sintered compact configured from a bixbyite-type oxide phase and a

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2017/035939

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

perovskite-type oxide phase, a sputtering target comprising the oxide sintered compact, and a method for manufacturing an oxide transparent electroconductive film, the method including a step for sputtering using the sputtering target. Document 1 also discloses that the matter of the oxide sintered compact containing the bixbyite-type oxide phase can be confirmed through an X-ray diffraction test using Cu as the line source, and specifically, if the diffraction peak detected within a range of $2\theta = 20-60^\circ$ can be indexed to the peak pattern for indium oxide (In_2O_3) according to 6-416 of the Joint Committee for Powder Diffraction Standards (JCPDS), or to a peak pattern (shifted peak pattern) that is similar thereto, then the oxide sintered compact contains a bixbyite-type oxide phase (see particularly claim 1 and paragraph [0043], etc.).

The invention as in claims 2-4 and 7-11 is novel and involves an inventive step in relation to each of the documents cited in the ISR.

Documents 1-4 do not describe any of: an oxide sintered compact which contains a perovskite phase and a bixbyite phase expressed by In_2O_3 , the oxide sintered compact being an oxide for which the perovskite phase is expressed by the general formula LnAlO_3 (I) (wherein, Ln represents one or more metal elements selected from La, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, and Lu); a method for manufacturing a thin-film transistor, the method including a step for producing an oxide semiconductor thin film using a sputtering target that was fabricated using the oxide sintered compact; a method for manufacturing an electronic device, the method including:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2017/035939

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

a step for producing an oxide semiconductor thin film using the sputtering target, a step for producing a thin-film transistor containing the oxide semiconductor thin film, and a step for loading the thin-film transistor into an electronic device; an oxide semiconductor thin film that contains In, Al, and Ln, Ln being one or more types of metal elements selected from La, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, and Lu, and the molar ratio of the In, the Al, and the Ln being within a range such that $\text{In}/(\text{In} + \text{Al} + \text{Ln})$ is 0.64-0.98 inclusive, $\text{Al}/(\text{In} + \text{Al} + \text{Ln})$ is 0.01-0.18 inclusive, and $\text{Ln}/(\text{In} + \text{Al} + \text{Ln})$ is 0.01-0.18 inclusive; a thin-film transistor containing the oxide semiconductor thin film; and an electronic device containing the thin-film transistor. Moreover, said technical features would not be obvious to a person skilled in the art.