

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference S0381	FOR FURTHER ACTION		See item 4 below
International application No. PCT/CN2015/097539	International filing date (<i>day/month/year</i>) 16 December 2015 (16.12.2015)	Priority date (<i>day/month/year</i>) 05 March 2015 (05.03.2015)	
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237			
Applicant TIANJIN SANAN OPTOELECTRONICS CO., LTD.			

<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 8 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 border="0"> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. I</td> <td>Basis of the report</td> </tr> <tr> <td><input checked="" 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 checked="" 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 05 September 2017 (05.09.2017)</p>
	<p>Authorized officer</p> <p align="center">Lingfei Bai</p> <p>e-mail: pct.team2@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:

Date of mailing (day/month/year)	18.03.2016
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Applicant's or agent's file reference S0381	FOR FURTHER ACTION See paragraph 2 below
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International application No. PCT/CN2015/097539	International filing date (day/month/year) 16.12.2015	Priority date (day/month/year) 05.03.2015
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International Patent Classification (IPC) or both national classification and IPC
H01L 33/10 (2010.01) i; H01L 33/00 (2010.01) i

Applicant
TIANJIN SANAN OPTOELECTRONICS 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/CN	Date of completion of this opinion	Authorized officer
Facsimile No.		Telephone No.

WRITTEN OPINION OF THE
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International application 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 filed or furnished:
 - a. (means)
 - on paper
 - in electronic form
 - b. (time)
 - in the international application as filed
 - together with the international application in electronic form
 - subsequently to this Authority for the purposes of search
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 in 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. II

Priority

1. The validity of the priority claim has not been considered because the International Searching Authority does not have in its possession a copy of the earlier application whose priority has been claimed or, where required, a translation of that earlier application. This opinion has nevertheless been established on the assumption that the relevant date (Rules 43*bis*.1 and 64.1) is the claimed priority date.
2. This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43*bis*.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.
3. Additional observations, if necessary:

[1] Upon verification, the priority claim of claims 1-13
is valid.

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No. PCT/CN2015/097539
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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
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1. Statement									
Novelty (N)		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%; padding: 2px;">Claims</td> <td style="border-bottom: 1px solid black; padding: 2px;">1-13</td> <td style="width: 10%; padding: 2px;">YES</td> </tr> <tr> <td style="padding: 2px;">Claims</td> <td style="border-bottom: 1px solid black; padding: 2px;">None</td> <td style="padding: 2px;">NO</td> </tr> </table>	Claims	1-13	YES	Claims	None	NO	
Claims	1-13	YES							
Claims	None	NO							
Inventive step (IS)		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%; padding: 2px;">Claims</td> <td style="border-bottom: 1px solid black; padding: 2px;">5-7</td> <td style="width: 10%; padding: 2px;">YES</td> </tr> <tr> <td style="padding: 2px;">Claims</td> <td style="border-bottom: 1px solid black; padding: 2px;">1-4, 8-13</td> <td style="padding: 2px;">NO</td> </tr> </table>	Claims	5-7	YES	Claims	1-4, 8-13	NO	
Claims	5-7	YES							
Claims	1-4, 8-13	NO							
Industrial applicability (IA)		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%; padding: 2px;">Claims</td> <td style="border-bottom: 1px solid black; padding: 2px;">1-13</td> <td style="width: 10%; padding: 2px;">YES</td> </tr> <tr> <td style="padding: 2px;">Claims</td> <td style="border-bottom: 1px solid black; padding: 2px;">None</td> <td style="padding: 2px;">NO</td> </tr> </table>	Claims	1-13	YES	Claims	None	NO	
Claims	1-13	YES							
Claims	None	NO							

2. Citations and explanations:	
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[1] Cited documents:

[2] D1: CN 104300055 A (EPISTAR CORPORATION) 21 January 2015 (12.01.2015) (see description, paragraphs 0034 to 0040, and figure 2B)

[3] D2: CN 104134723 A (ENRAYTEK OPTOELECTRONICS CO., LTD.) 05 November 2014 (05.11.2014) (see description, paragraphs 0049 to 0058, and figures 4-12)

[4] 1. D1 is considered to be the prior art closest to the subject matter of claim 1. D1 discloses a light-emitting diode, and discloses the technical features (see description, paragraphs 0034 to 0040, and figure 2B): a light-emitting laminate 25 having a first surface and a second surface opposite to each other, comprising a first semi-conductor layer 251, a second semi-conductor layer 253, and an active layer 252; a non-oxide insulating layer 24 (equivalent to a transparent

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

dielectric layer) positioned on the second surface of the light-emitting laminate 25; a second conductive oxide layer 232 positioned on one side surface, far away from the light-emitting laminate 25, of the non-oxide insulating layer 24; a reflective structure 22 (equivalent to a metal reflective layer) positioned on one side surface, far away from the non-oxide insulating layer 24, of a second conductive oxide layer 232. Wherein, the refractive index of the non-oxide insulating layer 24 is less than that of the light-emitting laminate 25 and of the second conductive oxide layer 232, thereby increasing reflection probability of light and forming an enhanced reflection system. Claim 1 differs from D1 in that: the transparent dielectric layer is in direct contact with a luminous epitaxial stack, and has conductive through holes. Therefore, the subject matter of claim 1 is novel in the sense of PCT Article 33(2).

[5] However, the above distinguishing technical features are common general knowledge in the art. It would be obvious for a person skilled in the art to arrive at the subject matter of claim 1 by combining D1 and common general knowledge, and thus, the subject matter of claim 1 does not involve an inventive step in the sense of PCT Article 33(3).

[6] 2. Claims 2-12 are directly or indirectly dependent on claim 1, and thus, the subject matter

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Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

of claims 2-12 is novel in the sense of PCT Article 33(2).

[7] 3. The additional technical features of claims 2-4 and 8-12 are common general knowledge in the art. Thus, the subject matter of claims 2-4 and 8-12 does not involve an inventive step in the sense of PCT Article 33(3).

[8] 4. The additional technical features of claims 5-7 are non-obvious for a person skilled in the art, and can reduce the refractive index of the transparent dielectric layer. Therefore, the subject matter of claims 5-7 involves an inventive step in the sense of PCT Article 33(3).

[9] 5. D2 is considered to be the prior art closest to the subject matter of claim 13. D2 discloses an LED manufacturing method, and discloses the technical features (see description, paragraphs 0049 to 0058, and figures 4-12): a light-emitting laminate is grown on a substrate 100, containing a N-type layer 220, a luminous layer 230, and a P-type layer 240; a transparent conductive layer 300 is grown on the P-type layer 240; a metal reflective layer 500; a bonded substrate 700; and the substrate 100 is removed. The subject matter of claim 13 differs from D2 in respect of: forming ohmic contact by annealing; and the transparent conductive layer and the metal reflective layer grown on the surface of the N-type layer. The subject matter of claim 13 is novel in the sense

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Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

of PCT Article 33(2). However, the above distinguishing technical features are common general knowledge in the art. It would be obvious to arrive at the subject matter of claim 13 by combining D2 and common general knowledge, and thus, the subject matter of claim 13 does not involve an inventive step in the sense of PCT Article 33(3).

[10] 6. The technical solutions of claims 1-13 are all industrially applicable in the sense of PCT Article 33(4) because they can be made and used in industry.