

**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 <b>PCT16-04</b>	<b>FOR FURTHER ACTION</b>		See item 4 below
International application No. <b>PCT/KR2016/006836</b>	International filing date ( <i>day/month/year</i> ) <b>27 June 2016 (27.06.2016)</b>	Priority date ( <i>day/month/year</i> )	
International Patent Classification (8th edition unless older edition indicated) <b>See relevant information in Form PCT/ISA/237</b>			
Applicant <b>LIGHTIZER KOREA CO., LTD</b>			

<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> <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 checked="" 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 checked="" 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 checked="" type="checkbox"/>	Box No. VIII	Certain observations on the international application																						

<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 <b>01 January 2019 (01.01.2019)</b></p>
	<p>Authorized officer</p> <p align="center"><b>Kihwan Moon</b></p> <p>e-mail: pct.team1@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)	<b>17.03.2017</b>
-------------------------------------	-------------------

Applicant's or agent's file reference <b>PCT16-04</b>	<b>FOR FURTHER ACTION</b> See paragraph 2 below
--	--

International application No. <b>PCT/KR2016/006836</b>	International filing date (day/month/year) <b>27.06.2016</b>	Priority date (day/month/year)
---	---	--------------------------------

International Patent Classification (IPC) or both national classification and IPC  
**H01L33/48 (2010.01) i, H01L33/50 (2010.01) i**

Applicant  
**LIGHTIZER KOREA 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/KR	Date of completion of this opinion	Authorized officer
Facsimile No.		Telephone No.

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/KR2016/006836

Box No. I	Basis of this opinion
1.	<p>With regard to the <b>language</b>, this opinion has been established on the basis of:</p> <p><input checked="" type="checkbox"/> the international application in the language in which it was filed</p> <p><input type="checkbox"/> 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)).</p>
2.	<p><input type="checkbox"/> This opinion has been established taking into account the <b>rectification of an obvious mistake</b> authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))</p>
3.	<p><input type="checkbox"/> With regard to any <b>nucleotide and/or amino acid sequence</b> disclosed in the international application, this opinion has been established on the basis of a sequence listing:</p> <p>a. <input type="checkbox"/> forming part of the international application as filed:</p> <p style="padding-left: 20px;"><input type="checkbox"/> in the form of an Annex C/ST.25 text file.</p> <p style="padding-left: 20px;"><input type="checkbox"/> on paper or in the form of an image file.</p> <p>b. <input type="checkbox"/> 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.</p> <p>c. <input type="checkbox"/> furnished subsequent to the international filing date for the purposes of international search only:</p> <p style="padding-left: 20px;"><input type="checkbox"/> in the form of an Annex C/ST.25 text file (Rule 13ter.1(a)).</p> <p style="padding-left: 20px;"><input type="checkbox"/> on paper or in the form of an image file (Rule 13ter.1(b) and Administrative Instructions, Section 713).</p>
4.	<p><input type="checkbox"/> 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.</p>
5.	<p>Additional comments:</p>

**WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY**

International application No. PCT/KR2016/006836
--

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

1. Statement			
Novelty (N)	Claims	1-10	YES
	Claims	None	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-10	NO
Industrial applicability (IA)	Claims	1-10	YES
	Claims	None	NO

2. Citations and explanations:	
--------------------------------	--

Reference is made to the following documents:

D1: JP 2010-245576 A (DOWA ELECTRONICS MATERIALS CO., LTD.) 28 October 2010

D2: JP 2014-203932 A (TOSHIBA CORP.) 27 October 2014

1. Novelty and Inventive Step

1.1 Claims 1-3

1.1.1 Independent Claim: Claim 1

Document D1 is the closest document to the invention as set forth in claim 1 and presents an LED light-emitting element (5) emitting ultraviolet light, and also indicates that the light-emitting element (5) is arranged on a substrate (2) using solder or conductive paste, that a phosphor layer (10) has the structure in which three phosphor forming layers (10a-10c) are orderly stacked from the bottom on the top surface and the side surface of the light-emitting element (5), and that a phosphor layer (11) has the structure in which three phosphor forming layers (11a-11c) are orderly stacked from the

**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

bottom on the phosphor layer (10) (see paragraphs [0022]-[0024] and [0033] and figures 1 and 3). The invention as set forth in claim 1 differs from document D1 in that the latter does not expressly disclose that the side part and the top part of a first phosphor layer and a second phosphor layer have an even thickness, but the feature could be easily derived by a person skilled in the art from the features in document D1 of controlling unevenness in the thickness of a phosphor layer and evening the distribution of a phosphor (see paragraph [0047]). Therefore, the invention as set forth in claim 1 would be obvious to a person skilled in the art from the invention presented in document D1 and thus lacks an inventive step (PCT Article 33(3)).

#### 1.1.2 Dependent Claims: Claims 2 and 3

The additional technical features in claim 2 are substantially the same as the features in document D1 wherein a phosphor layer (10) comprises a phosphor (20) emitting red light, and a phosphor layer (11) comprises a phosphor (25) emitting green light (see paragraph [0031]).

The additional technical features in claim 3 could be easily derived, by a design change according to a specific circumstance, from the features in document D1 wherein a phosphor layer (10) comprises a phosphor (20) emitting red light, and a phosphor layer (11) comprises a phosphor (25) emitting green light (see paragraph [0031]).

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/KR2016/006836

**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**

Therefore, the invention as set forth in claims 2 and 3 would be obvious to a person skilled in the art from the invention disclosed in document D1 and thus lacks an inventive step (PCT Article 33(3)).

1.2 Claims 4-10

1.2.1 Independent Claim: Claim 4

Document D1 is the closest document to the invention as set forth in claim 4 and presents an LED light-emitting element (5) emitting ultraviolet light, and also indicates that the light-emitting element (5) is arranged on a substrate (2) using solder or conductive paste, that a phosphor layer (10) has the structure in which three phosphor forming layers (10a-10c) are orderly stacked from the bottom on the top surface and the side surface of the light-emitting element (5), that a phosphor layer (11) has the structure in which three phosphor forming layers (11a-11c) are orderly stacked from the bottom on the phosphor layer (10), and that a phosphor layer (12) has the structure in which three phosphor forming layers (12a-12c) are orderly stacked from the bottom on the phosphor layer (11) (see paragraphs [0022]-[0024] and [0033] and figures 1 and 3). The invention as set forth in claim 4 differs from document D1 in that the latter does not expressly disclose that the side part and the top part of a first phosphor layer, a second phosphor layer, and a third phosphor layer have an even thickness, but the feature could be easily derived by a person skilled in the art from the features in document D1 of controlling unevenness in the thickness of the phosphor layer and evening the distribution of a phosphor (see

**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

paragraph [0047]). Therefore, the invention as set forth in claim 4 would be obvious to a person skilled in the art from the invention presented in document D1 and thus lacks an inventive step (PCT Article 33(3)).

#### 1.2.2 Dependent Claims: Claims 5-10

The additional technical features in claims 5-10 could be easily derived, by design changes according to specific circumstances, from the features in document D2 wherein a first phosphor layer comprises a red phosphor, a second phosphor layer comprises a yellow phosphor, and a third phosphor layer comprises a green phosphor (see paragraph [0017]-[0022] and figure 1). Therefore, the invention as set forth in claims 5-10 would be obvious to a person skilled in the art from a combination of documents D1 and D2 and thus lacks an inventive step (PCT Article 33(3)).

#### 2. Industrial Applicability

The invention as set forth in claims 1-10 is industrially applicable (PCT Article 33(4)).

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/KR2016/006836

**Box No. VIII**      **Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claims 1 and 4 relate to "a light-emitting diode package", but claims 2 and 3 which cite claim 1 and claims 5-10 which cite claim 4 relate to "a light-emitting element package". Therefore, claims 2, 3, and 5-10 do not clearly disclose the invention for which protection is sought (PCT Article 6).