

**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>
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Applicant's or agent's file reference <b>PCT16-04</b>	<b>FOR FURTHER ACTION</b> See paragraph 2 below
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International application No. <b>PCT/KR2016/006836</b>	International filing date (day/month/year) <b>27.06.2016</b>	Priority date (day/month/year)
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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.

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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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<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)	<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;">1-10</td> <td style="width: 10%; text-align: right; 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="width: 10%; text-align: right; padding: 2px;">NO</td> </tr> </table>	Claims	1-10	YES	Claims	None	NO
Claims	1-10	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;">None</td> <td style="width: 10%; text-align: right; padding: 2px;">YES</td> </tr> <tr> <td style="padding: 2px;">Claims</td> <td style="border-bottom: 1px solid black; padding: 2px;">1-10</td> <td style="width: 10%; text-align: right; padding: 2px;">NO</td> </tr> </table>	Claims	None	YES	Claims	1-10	NO
Claims	None	YES					
Claims	1-10	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;">1-10</td> <td style="width: 10%; text-align: right; 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="width: 10%; text-align: right; padding: 2px;">NO</td> </tr> </table>	Claims	1-10	YES	Claims	None	NO
Claims	1-10	YES					
Claims	None	NO					
2. Citations and explanations:							
<p>Reference is made to the following documents:</p> <p>D1: JP 2010-245576 A (DOWA ELECTRONICS MATERIALS CO., LTD.) 28 October 2010</p> <p>D2: JP 2014-203932 A (TOSHIBA CORP.) 27 October 2014</p> <p>1. Novelty and Inventive Step</p> <p>1.1 Claims 1-3</p> <p>1.1.1 Independent Claim: Claim 1</p> <p>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</p>							

**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]).

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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)).

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**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).