

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 FC15080PCDWK	FOR FURTHER ACTION		See item 4 below
International application No. PCT/KR2015/004498	International filing date (<i>day/month/year</i>) 06 May 2015 (06.05.2015)	Priority date (<i>day/month/year</i>) 12 May 2014 (12.05.2014)	
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237			
Applicant DONGWOO FINE-CHEM 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 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
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	Date of issuance of this report 15 November 2016 (15.11.2016)
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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)	20.07.2015
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Applicant's or agent's file reference FC15080PCDWK	FOR FURTHER ACTION See paragraph 2 below
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International application No. PCT/KR2015/004498	International filing date (day/month/year) 06.05.2015	Priority date (day/month/year) 12.05.2014
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International Patent Classification (IPC) or both national classification and IPC
G03F7/20 (2006.01) i, G02B5/20 (2006.01) i, G02F1/13 (2006.01) i, G06F3/041 (2006.01) i

Applicant
DONGWOO FINE-CHEM 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/KR2015/004498

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**

International application No. PCT/KR2015/004498
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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)	Claims	1-9	YES
	Claims	None	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-9	NO
Industrial applicability (IA)	Claims	1-9	YES
	Claims	None	NO

2. Citations and explanations:	
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Reference is made to the following document:

D1: KR 10-1997-0004421 B1 (HYUNDAI ELECTRONICS INDUSTRIES CO., LTD.) 27 March 1997

1. Novelty and Inventive Step

1.1 Claims 1-6

Document D1, which is the closest prior art to claim 1, discloses a semiconductor exposure device comprising: a fly eye lens focusing the light irradiated from a light source; an aperture passing the light, which has passed through the fly eye lens, only through a predetermined area such that the light is incident on an exposure mask; an exposure mask having a predetermined light shield film pattern such that light, which has passed through the aperture, forms an image; and a projection lens reducing the image of the light, which has passed through the exposure mask, at a predetermined ratio and transferring the image to a wafer, and the semiconductor exposure device comprises a reflection-type diffraction mask,

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/KR2015/004498

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

which is provided between the light source and the exposure mask, includes grooves of a predetermined shape provided on the portion expected by the pattern for the phase of a reflective light to be zero-order and first order on the upper part of a transparent substrate, and includes a reflective film on the lower part of the transparent substrate (see claim 1).

The exposure device in claim 1 of the invention of the present application differs from the exposure device in document D1 in that the former comprises a first reflection container and a second reflection container, and comprises a final mirror between the second reflection container and a photomask. However, it is considered that the design of reflective members configuring the exposure device so as to optimize a light path would be a simple design change to a person skilled in the art. In consideration of the diffraction mask of document D1, which corresponds to the final mirror of the present invention, being provided between the light source and the exposure mask (see claim 1), a person skilled in the art would select the proper position thereof without any special technical difficulty when configuring the exposure device, and it is not considered that there are any effects thus achieved. Therefore, claim 1 lacks an inventive step in view of document D1 under PCT Article 33(3).

It is considered that the vertical moving distance of the final mirror and the distance between the photomask and a sample, which are the additional technical features of claims 2 and 4, correspond to the technical feature the

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/KR2015/004498

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

optimal value of which could be selected by a person skilled in the art without any special technical difficulty for improving patterning accuracy. Therefore claims 2 and 4 lack an inventive step in view of document D1 under PCT Article 33(3).

The shots of the final mirror, which are the additional technical feature of claim 3, correspond to grooves of a predetermined shape provided on the reflection-type diffraction mask of document D1. Although document D1 does not disclose the number of shots, it is considered that the number of shots could be optimized or selected without any special technical difficulty by a person skilled in the art. Therefore claim 3 lacks an inventive step in view of document D1 under PCT Article 33(3).

The additional technical feature of claim 5 pertains to the use of the exposure device such as a TFT, a color filter (CF), an LCD, a touch sensor and the like. In consideration of the exposure device of document D1 being used in manufacturing a semiconductor in the same electronic industry, the feature is considered to be easily derived from document D1 (see page 1). Therefore claim 5 lacks an inventive step in view of document D1 under PCT Article 33(3).

Claim 6 sets forth the additional technical feature, wherein the total pitch error range of a sample including two or more patterns manufactured by being exposed by the exposure device of claim 1 is 0-3 μm . However, since the feature pertains to the result manufactured by the

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/KR2015/004498

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

exposure device and the error range of the result, and the exposure device of claim 1 could be derived from document D1, the result manufactured by the exposure device of claim 1 also could be derived from document D1. In addition, since the total pitch error range of the sample is considered to be predicted in accordance with control of the exposure device, claim 6 lacks an inventive step in view of document D1 under PCT Article 33(3).

1.2 Claims 7 and 8

Claims 7 and 8 pertain to an LCD and an OLED manufactured by being exposed by the large-area proximity exposure device of claim 1, and thus the feature of claims 7 and 8 is substantially the same as the technical feature of claim 1. As discussed in section 1.1, claims 1 lacks an inventive step in view of document D1. In consideration of the exposure device of document D1 being used in manufacturing a semiconductor in the same electronic industry, it is considered that a person skilled in the art could apply the exposure device of document D1 to the LCD and OLED fields without any special difficulty, and it is considered that each total pitch error range could be predicted according to the control of the exposure device, and thus claims 7 and 8 lack an inventive step in view of document D1 under PCT Article 33(3).

1.3 Claim 9

Claim 9 pertains to a pattern transfer method of transferring a transfer pattern of a photomask to a sample using the exposure device, which is characterized by performing exposure by the large-area proximity

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/KR2015/004498

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exposure device of claim 1. However, since the feature of claim 9 is substantially the same as the technical feature of claim 1, and as discussed in section 1.1, claim 1 lacks an inventive step in view of document D1, claim 9 also lacks an inventive step under PCT Article 33(3).

2. Industrial Applicability

Claims 1-9 are industrially applicable (PCT Article 33(4)).