

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43bis.1)**

To:

see form PCT/ISA/220

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/US2017/017890

International filing date (day/month/year)
15.02.2017

Priority date (day/month/year)
29.02.2016

International Patent Classification (IPC) or both national classification and IPC
INV. H01L31/054 H01L31/042

Applicant
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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 and 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 usually 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:



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Date of completion of this opinion

see form
PCT/ISA/210

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Box No. I Basis of the 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:

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)	Yes: Claims	<u>1-10</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	<u>3, 6</u>
	No: Claims	<u>1, 2, 4, 5, 7-10</u>
Industrial applicability (IA)	Yes: Claims	<u>1-10</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

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:

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Reference is made to the following documents:

- D1** US 2013/048052 A1 (LAM SIO KUAN [HK] ET AL) 28 February 2013 (2013-02-28)
- D2** US 2009/025779 A1 (HSIAO BOR-YUAN [TW]) 29 January 2009 (2009-01-29)
- D3** US 2009/095340 A1 (HSIAO BOR-YUAN [TW] ET AL) 16 April 2009 (2009-04-16)

2 **Independent claim 1**

2.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim **1**, as far as it can be understood (see Item VIII), does not involve an **inventive step** in the sense of Article 33(3) PCT.

Document **D1** is regarded as being the **closest prior art** to the subject-matter of claim **1**, and discloses, see fig. 2:

- an upper solar panel (125);
- a lower solar panel (120);
- a cylindrical rod (110, see par. 17) having at least one convex lens (130) at one end.

The subject-matter of claim **1** **differs** from this known photovoltaic device from **D1** in that it comprises a plurality of cylindrical rods.

The mere repetition of a feature does not involve an inventive step in the sense of Article 33(3) PCT. There is no additional technical effect to be expected of the technical features of claim **1** as presently drafted compared to the disclosure of document **D1**.

2.2 Furthermore, it appears that the subject-matter of claim **1** is also not inventive in view of document **D3**, which discloses, see fig. 3:

-an upper (210) and a lower (130) solar panel;

-a plurality of optical cylindrical rods lenses (154), each having at least one lens (152) at one end.

The subject-matter of claim **1** differs from the device of **D3** in that the lens at the end of the rod lens is a convex lens. The technical effect of claim **1**, as far as it can be derived from the description, is to direct part of the radiation impinging on the upper solar panel towards the lower solar panel. The same effect is achieved by the device of **D3**. As presently drafted, it is not possible to establish an inventive step of the differing feature, since its interaction with the rest of the assembly is undefined.

3 **Dependent claims**

3.1 The following dependent claims do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of **inventive step** (Article 33(3) PCT), the reasons being as follows:

Regarding claim **2**, document **D3** further discloses, see fig. 3, superimposed upper (210) and lower (130) solar panels.

Regarding claim **8**, document **D1** further discloses a convex lens directing radiation towards the lower solar panel.

The subject-matter of claim **4, 5, 7, 9** and **10** appear to be obvious in view of the prior art and the general knowledge of the person skilled in the art.

3.2 The subject-matter of claims **3** and **6** is not hinted by the cited prior art and it appears to have the technical effect to distribute the incoming solar radiation over a larger area than the device of document **D3**. However, as presently drafted, its scope is still unclear.

4 **Industrial applicability**

The application meets the requirements of Article 33(4) PCT and finds its use in the technical field of photovoltaics.

Re Item VII

Certain defects in the international application

Independent claims should be drafted in the **two-part form** in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art being placed in the preamble (Rule 6.3(b)(i) PCT) and the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

Furthermore, the features of the claims should be provided with **reference signs** placed in parentheses (Rule 6.2(b) PCT).

Re Item VIII

Certain observations on the international application

The present application does not meet the requirements of Article 6 PCT because the subject-matter of the claims is not clear:

-claim **1** does not include any spatial or functional relationship between said cylindrical rods and the solar panels. The scope therefore extends to embodiments in which the optical rods and the solar panels do not interact at all, which is clearly not supported by the description;

-claim **1** furthermore refers to cylindrical rods having at least one convex lens at one end. The scope of this feature is also broader than what is supported by the description, since the convex lens is undefined in its function or geometry. It is clear from the description and the drawings that the convex lens has a specific function and that not all convex lenses would result in the sought technical effect;

-it appears that claim **6** refers to the features of claim **3** and therefore should be dependent on claim **3** instead of claim **5**;

-claim **10** refers to cylindrical rods having two opposed flat surfaces. It is assumed that the opposed flat surfaces are the ends of the rod, since any other option would not be compatible with the term rod (circular or oval cross-section). However, two opposed flat surfaces at the ends of the rod also appear to be incompatible with the feature one convex lens at the end of the rod lens, as featured in claim **1**.