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(72) Inventors; and

(71) Applicants : SAJJAD, Basha, S. [US/US]; 6434 Calle Esperanza, Pleasanton, California 94566 (US). EREZ, Shmuel [US/US]; 3310 Olsen Drive, San Jose, California 95117 (US). MILLER, S. Daniel [US/US]; 1177 Branham Lane, PMB 247, San Jose, California 95118 (US). CHIDAMBARAM, Mahendran T. [IN/US]; 14058 Abdulla Way, Saratoga, California 95070 (US). VELLANKI, Ravi [IN/US]; 818 Chagall Road, San Jose, California 95138 (US). SCHOCK, Gerald [US/US]; 535 W. Hacienda Avenue #308, Campbell, California 95008 (US).

(74) Agent: FAHMI, Tarek N.; Sonnenschein Nath & Rosenthal LLP, 1530 Page Mill Road, Suite 200, Palo Alto, CA 94304-1125 (US).

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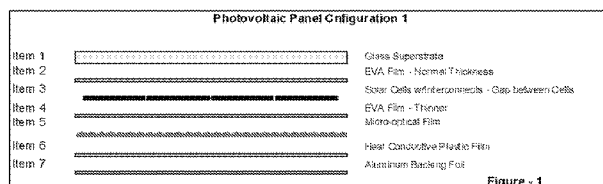
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Published:

— with international search report (Art. 21(3))

(88) Date of publication of the international search report:
27 January 2011

(54) Title: PHOTOVOLTAIC MODULE CONFIGURATION



(57) Abstract: Improvements for a photovoltaic module (PVM) include the use of a micro-embossed, reflective optical film located in areas of the PVM not covered by the solar cells. The optical film is configured to reflect light incident upon the PVM onto the solar cells and may be formed from a polymeric material. Further enhancements include the use of a compliant heat conducting polymeric film on back sides of the solar cells and a heat conductive polymeric film deposited on an aluminum foil to form a composite film, which effects heat transfer from the solar cell junctions and improves cell efficiency. A top glass with selective frequency and anti-reflective coatings may also be used. Further, improved interconnects for the solar cells eliminate sharp edges, helping to avoid any potential for encapsulant tearing or tab "push-through" and resultant shorting during lamination.

A. CLASSIFICATION OF SUBJECT MATTER***H01L 31/042(2006.01)i***

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

H01L 31/042; H01L 31/04; G02B 5/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: micro-embossed, reflective film, polymeric, textured, interconnect tab, curvilinear, cross-section

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2000-277772 A (MITSUBISHI ELECTRIC CORP.) 06 October 2000 See abstract, paragraphs [0012]-[0014], figures 1-5, claims 1-4.	1-7, 12
X	JP 62-281377 A (KYOCERA CORP.) 07 December 1987 See abstract, page 2, bottom left line 7 - bottom right line 16.	8-11
X	JP 2000-031515 A (BRIDGESTONE CORP.) 28 January 2000 See abstract, paragraphs [0008]-[0020], figures 1-2, claims 1-4.	14
X	JP 2004-200515 A (KYOCERA CORP.) 15 July 2004 See abstract, paragraphs [0016]-[0029], figures 2-4, claim 1.	15
X	JP 06-196743 A (CANON INC.) 15 July 1994 See abstract, paragraphs [0025]-[0031],[0132]-[0133], figures 20 and 21.	16



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

08 OCTOBER 2010 (08.10.2010)

Date of mailing of the international search report

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Name and mailing address of the ISA/KR

Korean Intellectual Property Office
Government Complex-Daejeon, 139 Seonsa-ro, Seo-gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

OH, Je Uk

Telephone No. 82-42-481-8222



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2010/024799**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 13
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

Claim 13 is so unclear that no opinion could be formulated as to novelty or inventive step. The major problem is that the expression "a modified EVA encapsulant film" cannot be regarded as a clear technical feature.
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

Group 1, claims 1-7 and 12, drawn to a photovoltaic module (PVM) comprising solar cells and a micro-embossed, reflective optical film and a method of laminating the PVM.

Group 2, claims 8-11, drawn to a photovoltaic module comprising solar cells and a compliant, heat conducting polymeric film.

Group 3, claim 13, drawn to a photovoltaic module comprising one of a doped Ethylene Vinyl Acetate (EVA) film or a modified EVA encapsulant film.

Group 4, claim 14, drawn to a photovoltaic module comprising a textured crown glass coated with selective frequency coatings.

Group 5, claims 15 and 16, drawn to a photovoltaic module comprising solar cells interconnected by interconnect tabs.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2010/024799

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 2000-277772 A	06.10.2000	None	
JP 62-281377 A	07.12.1987	JP 7083131 B	06.09.1995
JP 2000-031515 A	28.01.2000	None	
JP 2004-200515 A	15.07.2004	JP 4153785 B2	24.09.2008
JP 06-196743 A	15.07.1994	JP 2939075 B2	25.08.1999