



(51) International Patent Classification:

H01L 31/0224 (2006.01) *H01L 31/0236* (2006.01)
H01L 31/18 (2006.01) *H01L 31/028* (2006.01)

(21) International Application Number:

PCT/US2012/020586

(22) International Filing Date:

9 January 2012 (09.01.2012)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

12/929,464 26 January 2011 (26.01.2011) US

(71) Applicant (for all designated States except US): **GUARD-
IAN INDUSTRIES CORP.** [US/US]; 2300 Harmon
Road, Auburn Hills, MI 48326-1714 (US).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **KRASNOV, Alexey**
[CA/US]; 42116 Carriage Cove Circle, Canton, MI 48187
(US).(74) Agent: **RHOA, Joseph, A.**; Nixon & Vanderhye P.C., 901
North Glebe Road, 11th Floor, Arlington, VA 22203-1808
(US).(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,

AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR,
KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME,
MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,
OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD,
SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR,
TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU,
TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE,
DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU,
LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,
SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments (Rule 48.2(h))

(88) Date of publication of the international search report:

21 March 2013

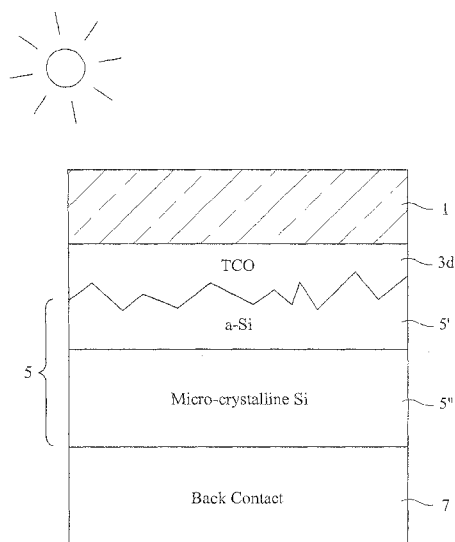
(54) Title: TEXTURED COATING WITH VARIOUS FEATURE SIZES MADE BY USING MULTIPLE-AGENT ETCHANT
FOR THIN-FILM SOLAR CELLS AND/OR METHODS OF MAKING THE SAME

FIGURE 10

(57) **Abstract:** Certain example embodiments of this invention relate to solar cell devices, and/or methods of making the same. More particularly, certain example embodiments relate to a front transparent conductive electrode for solar cell devices (e.g., micro-morph silicon thin-film solar cells), and/or methods of making the same. The electrode of certain example embodiments may include a textured transparent conductive oxide (TCO) layer. The textured layer and/or coating may include at least two feature sizes, wherein at least one type of feature is comparable in size to the wavelength of solar light absorbed by the amorphous portion of the micro-morph silicon solar cell, and the other feature size being comparable to that of micro-crystalline portion. Double-agent etchants may be used to produce such different features sizes. Using a textured TCO-based layer having different feature sizes may improve the efficiency of the solar cell.

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/020586

A. CLASSIFICATION OF SUBJECT MATTER

INV. H01L31/0224 H01L31/18 H01L31/0236
ADD. H01L31/028

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

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

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

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2009/194157 A1 (DEN BOER WILLEM [US] ET AL) 6 August 2009 (2009-08-06) paragraphs [0076] - [0083] -----	1-23



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 another 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

10 January 2013

Date of mailing of the international search report

18/01/2013

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Gélébart, Jacques

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2012/020586

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2009194157 A1	06-08-2009	EP 2329535 A2	08-06-2011
		US 2009194157 A1	06-08-2009
		WO 2010039341 A2	08-04-2010
