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[Continued on next page]

(54) **Title**: METHOD FOR MANUFACTURING A SOLAR CELL WITH A TWO-STAGE DOPING

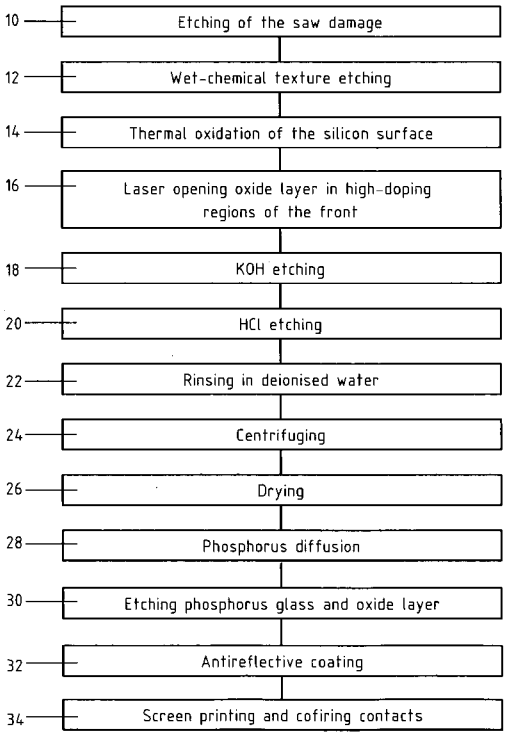

Fig. 1

(57) **Abstract**: Method for manufacturing a solar cell with a two-stage doping (88, 89) including the following method steps of forming (14, 48) an oxide layer (82), which can be penetrated by a first dopant, on at least one part of the surface of a solar cell substrate (80), of forming (16; 50) an opening in the oxide layer (82) in at least one high-doping region (88) by removing (16; 50) the oxide layer (82) in this high-doping region (88), of diffusing (28) the first dopant into the at least one high- doping region (88) of the solar cell substrate (80) through the opening and of diffusing (28) the first dopant into the solar cell substrate (80) through the oxide layer (82), wherein the diffusing-in (28) through the openings and through the oxide layer (82) takes place at the same time in a common diffusion step and the solar cell substrate (80) is diffused (28) in the common diffusion step (28) in an at least partially hydrophilic state.

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SG, SK, SL, SM, ST, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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A. CLASSIFICATION OF SUBJECT MATTER
INV. H01L31/18 H01L31/068
ADD.

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 practical, 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 4 152 824 A (GONSIORAWSKI RONALD) 8 May 1979 (1979-05-08)	1,7,8, 12,13, 19-21
Y	column 2, lines 62-68 column 3, lines 28-52 column 4, lines 35-39 column 5, line 1 - column 6, line 63; figures 1-8	2-6,14, 22

X	DE 10 2006 003283 A1 (GP SOLAR GMBH [DE]) 26 July 2007 (2007-07-26) paragraphs [0003], [0004], [0007] - [0010], [0016] - [0018], [0024] - [0037]; figures 1-2	1,7,8, 20,21

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[X] Further documents are listed in the continuation of Box C.

[X] 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 document but published on or after the international filing date

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"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

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"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	Date of mailing of the international search report
28 February 2012	06/03/2012

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Pantelidis, D

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2009/007380

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	LAMPERT I: "INFLUENCE OF THE CLEANING METHOD ON THE CHEMICAL BEHAVIOR OF HYDROPHILIC SILICON SURFACES", EXTENDED ABSTRACTS, ELECTROCHEMICAL SOCIETY. PRINCETON, NEW JERSEY, US, vol. 87-01, no. 1, 21 March 1987 (1987-03-21), page 381/382, XP000838891, ISSN: 0160-4619 page 301, column 1	2,4
Y	US 5 229 334 A (KATO JURI [JP]) 20 July 1993 (1993-07-20) column 1, lines 54-60 column 2 - lines 17-30	3,5,6
A	US 5 904 574 A (NISHIJIMA TATSUMI [JP]) 18 May 1999 (1999-05-18) column 1, lines 13-52 column 1, line 64 - column 2, line 20 column 3, lines 20-65	1-6
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A	DE WOLF S ET AL: "Low-cost rear side floating junction solar-cell issues on mc-Si", SOLAR ENERGY MATERIALS AND SOLAR CELLS, ELSEVIER SCIENCE PUBLISHERS, AMSTERDAM, NL, vol. 90, no. 18-19, 23 November 2006 (2006-11-23), pages 3431-3437, XP025142954, ISSN: 0927-0248, DOI: 10.1016/J.SOLMAT.2006.02.035 [retrieved on 2006-11-23] page 3432; figure 1	14,22

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INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2009/007380

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DAUWE S ET AL: "Low-temperature rear surface passivation schemes for >20% efficient silicon solar cells", PROCEEDINGS OF THE 3RD WORLD CONFERENCE ON PHOTOVOLTAIC ENERGY CONVERSION : JOINT CONFERENCE OF 13TH PV SCIENCE & ENGINEERING CONFERENCE, 30TH IEEE PV SPECIALISTS CONFERENCE, 18TH EUROPEAN PV SOLAR ENERGY CONFERENCE; OSAKA INTERNATIONAL CONGRESS CENT, 18 May 2003 (2003-05-18), pages 1395-1398, XP031988036, ISBN: 978-4-9901816-0-4 page 1396, right-hand column; figure 2 -----	14,22

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
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FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-8, 12, 13, 19-21

   Complementing the method as defined in claim 1 to allow cleaning of the solar cell substrate before the high-temperature diffusion step, without negatively affecting the quality of the oxide layer.

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2. claims: 9-11

   Complementing the method as defined in claim 1 to allow better control of the simultaneous diffusion process.

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3. claims: 14, 22

   Complementing a method as defined in claim 1 to improve passivation of a back surface of the solar cell substrate, and defining a solar cell device with improved back surface passivation.

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4. claims: 15-18

   Complementing a method as defined in claim 1 to enable a point-contacted back surface configuration for the solar cell substrate.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2009/007380

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.:
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:

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:

see additional sheet

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 fees, this Authority did not invite payment of additional fees.

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.:

1-8, 12-14, 19-22

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.