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(54) Title: METHODS AND SYSTEMS FOR MANUFACTURING THIN-FILM SOLAR CELLS

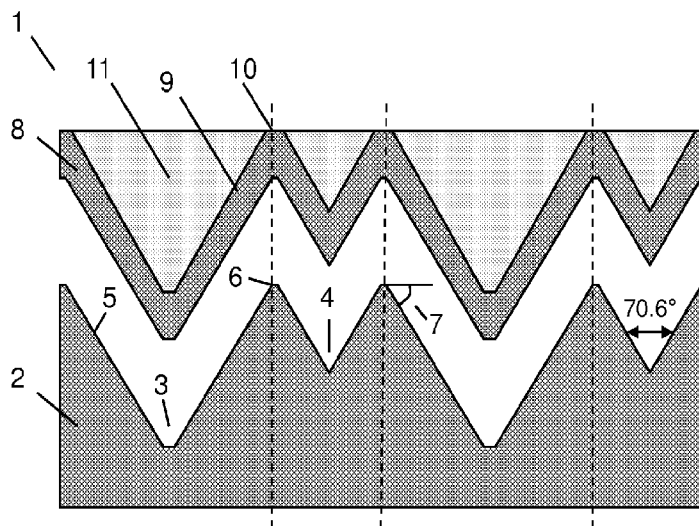


FIG. 2

(57) Abstract: Methods and systems for manufacturing thin-film solar cells utilizing a template having inverted pyramidal cavities defined by a plurality of walls aligned along a (111) crystallographic orientation plane and methods for manufacturing the template. Methods and systems for manufacturing thin-film solar cells utilizing a 3-D TFSS having a plurality of ridges on the surface of the semiconductor substrate defining a base opening of an inverted pyramidal cavity and walls defining an inverted pyramidal cavity and methods for manufacturing the 3-D TFSS. A 3-D TFSC comprising a semiconductor substrate with an inverted pyramidal cavity, emitter metallization regions on ridges on the surface of the semiconductor substrate which define an opening of the inverted pyramidal cavity, and base metallization regions on a region which form the apex of the inverted pyramidal cavity and methods for manufacturing the 3-D TFSC.



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<p>A. CLASSIFICATION OF SUBJECT MATTER IPC(8) - H01L 31/0368 (2010.01) USPC - 136/255; 257/458; 257/465 According to International Patent Classification (IPC) or to both national classification and IPC</p>																			
<p>B. FIELDS SEARCHED</p> <p>Minimum documentation searched (classification system followed by classification symbols) IPC(8): H01L 31/0368 (2010.01) USPC: 136/255; 257/458; 257/465</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched IPC(8): H01L 31/0368 (2010.01) USPC: 136/255; 257/458; 257/465 Non-patent Literature; Patents (key word limited; terms below)</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) PubWEST (PGPB, USPT, EPAB, JPAB); Google (Google Scholar, Google Patents) Search Terms Used: semiconductor silicon template substrate three dimensional 3-D inverted pyramid pyramidal crystallographic orientation plane 100 111 solar cell photovoltaic etching passivation metallizing doping cavity trench groove v-shaped emitter</p>																			
<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p> <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>US 2008/0210294 A1 (MOSLEHI) 04 September 2008 (04.09.2008), para [0002], [0015], [0017], [0022], [0027], [0033], [0044], [0065], [0071], [0080]-[0081], [0089], [0091], [0097]-[0099], [0105], [0109]-[0110], [0146], [0149], [0151]-[0152], [0154], [0158], [0160], [0164], [0167], [0173], [0177], [0179], [0182], [0191]-[0193], [0195], [0201]; fig 1, 6, 8, 39-40, 42, 44-45, 47, 50, 71, 73</td> <td>21-23, 25, 26, 28, 30, 41-43, 45-50</td> </tr> <tr> <td>Y</td> <td>US 6,127,623 A (NAKAMURA et al.) 03 October 2000 (03.10.2000), col 3, ln 8-15, 17-22; col 5, ln 2-8; col 6, ln 1-6, 10-13; col 7, ln 32-38, 63-65; col 8, ln 4-12; col 9, ln 26-28, 31-35, 59-65; col 10, ln 35-50, 57-63; fig 3c-3d, 5a, 5e; clm 2, 4</td> <td>1-20, 24, 27, 29, 31-40, 44, 51-60</td> </tr> <tr> <td>Y</td> <td>US 6,096,229 A (SHAHID) 01 August 200 (01.08.2000), col 2, ln 5-7; col 4, ln 47-52, 54-57; fig 1</td> <td>1-20, 24, 31, 35-40, 44, 51-54</td> </tr> <tr> <td>Y</td> <td>US 2008/0264477 A1 (MOSLEHI) 30 October 2008 (30.10.2008), para [0002], [0135], [0144], [0197], [0200]</td> <td>7, 12-14, 27, 29, 32-34</td> </tr> <tr> <td></td> <td></td> <td>55-60</td> </tr> </tbody> </table>		Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	US 2008/0210294 A1 (MOSLEHI) 04 September 2008 (04.09.2008), para [0002], [0015], [0017], [0022], [0027], [0033], [0044], [0065], [0071], [0080]-[0081], [0089], [0091], [0097]-[0099], [0105], [0109]-[0110], [0146], [0149], [0151]-[0152], [0154], [0158], [0160], [0164], [0167], [0173], [0177], [0179], [0182], [0191]-[0193], [0195], [0201]; fig 1, 6, 8, 39-40, 42, 44-45, 47, 50, 71, 73	21-23, 25, 26, 28, 30, 41-43, 45-50	Y	US 6,127,623 A (NAKAMURA et al.) 03 October 2000 (03.10.2000), col 3, ln 8-15, 17-22; col 5, ln 2-8; col 6, ln 1-6, 10-13; col 7, ln 32-38, 63-65; col 8, ln 4-12; col 9, ln 26-28, 31-35, 59-65; col 10, ln 35-50, 57-63; fig 3c-3d, 5a, 5e; clm 2, 4	1-20, 24, 27, 29, 31-40, 44, 51-60	Y	US 6,096,229 A (SHAHID) 01 August 200 (01.08.2000), col 2, ln 5-7; col 4, ln 47-52, 54-57; fig 1	1-20, 24, 31, 35-40, 44, 51-54	Y	US 2008/0264477 A1 (MOSLEHI) 30 October 2008 (30.10.2008), para [0002], [0135], [0144], [0197], [0200]	7, 12-14, 27, 29, 32-34			55-60
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<p>Date of the actual completion of the international search</p> <p>11 April 2010 (11.04.2010)</p>	<p>Date of mailing of the international search report</p> <p align="center">26 APR 2010</p>																		
<p>Name and mailing address of the ISA/US</p> <p>Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201</p>	<p>Authorized officer:</p> <p align="right">Lee W. Young</p> <p>PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774</p>																		