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(54) Title: GROUP IV NANOPARTICLE JUNCTIONS AND DEVICES THEREFROM

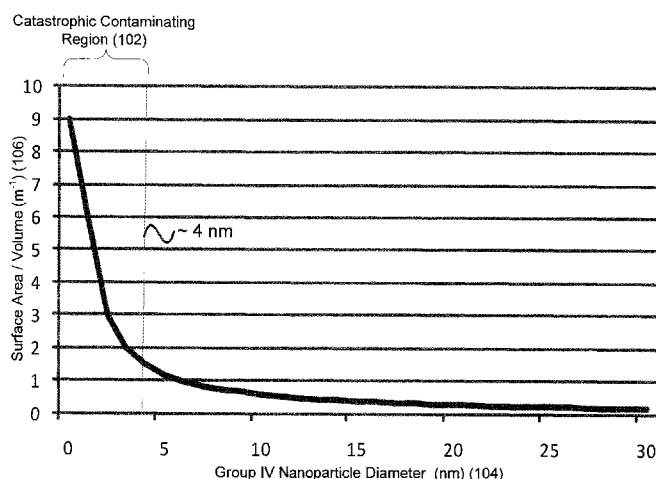


FIG. 1

(57) Abstract: A device for generating electricity from solar radiation is disclosed. The device includes a wafer doped with a first dopant, the wafer including a front-side and a back-side, wherein the front-side is configured to be exposed to the solar radiation. The device also includes a fused Group IV nanoparticle thin film deposited on the front-side, wherein the nanoparticle thin film includes a second dopant, wherein the second dopant is a counter dopant. The device further includes a first electrode deposited on the nanoparticle thin film, and a second electrode deposited on the back-side, wherein when solar radiation is applied to the front-side, an electrical current is produced.



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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, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2004/055909 A (SAMWHA ELECTRONICS CO LTD [KR]; LEE HONG-JAE [KR]; OTSUKI ETSUO [KR]) 1 July 2004 (2004-07-01) abstract; figure 1	1-43
A	US 2007/175507 A1 (DUTTA ACHYUT K [US]) 2 August 2007 (2007-08-02) the whole document	1-43
A	DE 42 35 376 A1 (HAHN MEITNER KERNFORSCH [DE]) 22 April 1993 (1993-04-22) the whole document	1-43
A	WO 2006/063893 A (DEGUSSA [DE]; SCHORMANN ANDREAS [DE]) 22 June 2006 (2006-06-22) abstract	1-43
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☒ See patent family annex.

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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A	WO 2004/093202 A (CENTRE NAT RECH SCIENT [FR]; UNIV POITIERS [FR]; STRABONI ALAIN [FR]) 28 October 2004 (2004-10-28) abstract -----	1-43

INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2004055909 A	01-07-2004	AU 2003302960 A1	09-07-2004
US 2007175507 A1	02-08-2007	NONE	
DE 4235376 A1	22-04-1993	NONE	
WO 2006063893 A	22-06-2006	DE 102004060737 A1	06-07-2006
		EP 1825523 A1	29-08-2007
WO 2004093202 A	28-10-2004	EP 1618612 A1	25-01-2006
		JP 2006523021 T	05-10-2006
		US 2007178675 A1	02-08-2007