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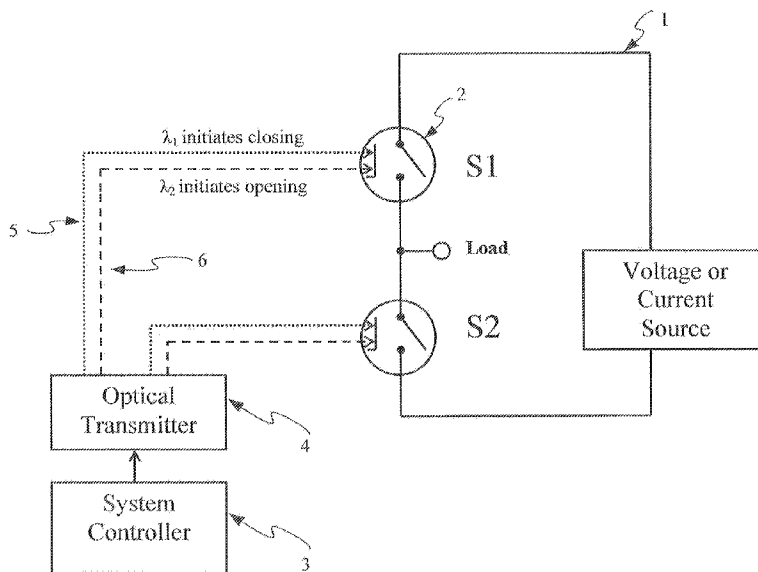
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(54) Title: OPTICALLY CONTROLLED SILICON CARBIDE AND RELATED WIDE-BANDGAP TRANSISTORS AND THYRISTORS



(57) Abstract: An optically active material is used to create power devices and circuits having significant performance advantages over conventional methods for affecting optical control of power electronics devices and circuits. A silicon-carbide optically active material is formed by compensating shallow donors with the boron related D-center. The resulting material can be n-type or p-type but it is distinguished from other materials by the ability to induce persistent photoconductivity in it when illuminated by electromagnetic radiation with a photon energy in excess of the threshold energy required to photoexcite electrons from the D-center to allowed states close to the conduction band edge, which varies from polytype to polytype.

WO 2007/149846 A3

INTERNATIONAL SEARCH REPORT

International application No.

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A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.

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US Cl. 257/77 257/222 257/401 257/428 438/141

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)

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)

DWPI: LIM H01L/IC

((SILICON CARBIDE) OR SIC) (S) (+CONDUCT+ OR TRANSMIT+ OR TRANSMISS+ OR +CLEAR OR TRANSPARENT) AND (((BORON OR ("P" (D) TYPE)) AND (DOP+ OR IMPLANT+)) OR ("D" (W) (CENTRE+ OR CENTER+))) AND ((+TRANSISTOR) OR PHOTOCONDUCT+ OR (+FET?) OR BJT? OR SIT? OR IGBT? OR THYRISTOR OR (POWER (W) DEVICE?)) AND ((OPTICAL+ (W) ACTIVE+) OR PHOTOCONDUCT+ OR PHOTOVOLT+ OR PHOTOELECTRIC+) AND (PHOTO+ AND ((+TRANSISTOR) OR (+FET?) OR BJT? OR SIT? OR IGBT? OR THYRISTOR OR (POWER (W) DEVICE))) AND ((PHOTO+ OR OPTI+ OR OPTO+) AND ((+TRANSISTOR) OR (+FET?) OR BJT? OR SIT? OR IGBT? OR THYRISTOR OR (POWER (W) DEVICE)))

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.

 Further documents are listed in the continuation of Box C See patent family annex

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

Date of the actual completion of the international search
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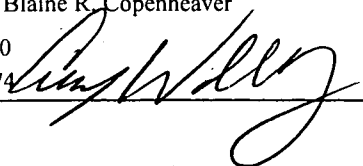
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 7009209 B2 (CASADY et al.) 07 March 2006 Column 4 lines 51-67 and further references quoted therein	21-22
Y	Abstract, Column 4 lines 51-67	1-5, 7-10, 23-26
X	JP 2006080560 A (KANSAI ELECTRIC POWER CO) 23 March 2006 Abstract, Figures 1, 2, 4-7,	21
Y	Abstract, Figure 7	1-5, 7-10, 23-26
X	US 2005/0051861 A1 (SHI et al.) 10 March 2005 Abstract, Figure 8	21
X	WO 2004/114422 A1 (POSTECH FOUNDATION) 29 December 2004 Page 4 lines 5-9	21
X	US 2002/0096684 A1 (BRANDES et al.) 25 July 2002 Abstract, paragraphs 8, 14	21
Y	US 5864166 A (STOUDT et al) 26 January 1999 Column 16 lines 43-53, Claim 1	6
Y	US 3946151 A (KAMIYAMA et al.) 23 March 1976 Abstract, Figure 7b	7, 23
Y	US 6046466 A (ISHIDA et al.) 04 April 2000 Abstract, Column 26 lines 54-55	8, 24
Y	US 6437538 B1 (TSURUMI et al.) 20 August 2002 Abstract, Figure 3	9, 25
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A	JP 56025743 A (MATSUSHITA ELECTRIC IND CO LTD) 12 March 1981 Figures	

INTERNATIONAL SEARCH REPORT

Information on patent family members

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This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. These particulars are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
US	7009209	AU	2002246934	EP	1358681	US	2002149021
		US	2006160316	WO	02054449		
JP	2006080560	NONE					
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US	6191458	US	5385855				
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		JP	58108544				
JP	56025743	NONE					
END OF ANNEX							