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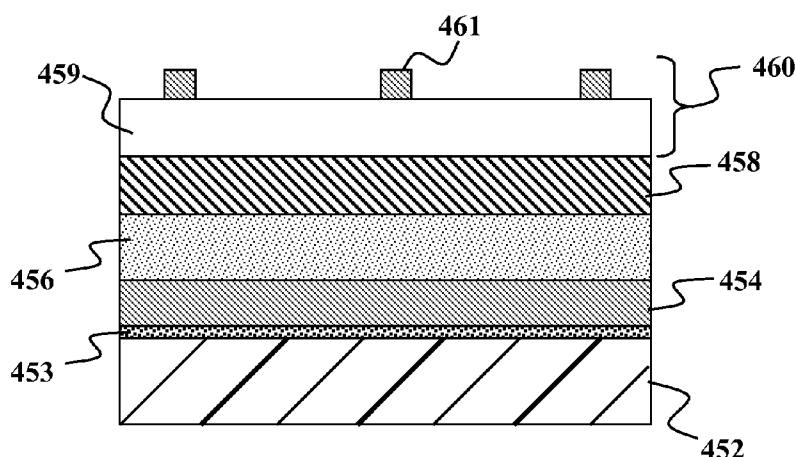
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(54) Title: THIN-FILM DEVICES FORMED FROM SOLID PARTICLES

450



(57) Abstract: Methods and devices are provided for forming thin-films from solid group IIIA-based particles. In one embodiment of the present invention, a method is described comprising of providing a first material comprising an alloy of a) a group IIIA-based material and b) at least one other material. The material may be included in an amount sufficient so that no liquid phase of the alloy is present within the first material in a temperature range between room temperature and a deposition or pre-deposition temperature higher than room temperature, wherein the group IIIA-based material is otherwise liquid in that temperature range. The other material may be a group IA material. A precursor material may be formulated comprising a) particles of the first material and b) particles containing at least one element from the group consisting of: group IB, IIIA, VIA element, alloys containing any of the foregoing elements, or combinations thereof. The temperature range described above may be between about 200C and about 2000C. It should be understood that the alloy may have a higher melting temperature than a melting temperature of the IIIA-based material in elemental form.

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## INTERNATIONAL SEARCH REPORT

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## A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - H01L 31/00 (2007.10)

USPC - 136/265

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)

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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)

Electronic Databases Searched: USPTO WEST (PGPUB, EPAB, JPAB, USPT), Google patents, Google Scholar. Search Terms Used: precursor layer, wet chemical, nanoparticle?, spray-pyrolysis or laser pyrolysis or a bottom-up, photov\$ or solar or cell or particle, alloy or Cu or copper, aluminum or sodium or sulfur, carrier liquid

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,985,691 A (Basol et al.) 16 November 1999 (16.11.1999)	1-3, 5-60, 62-126, 128-133, 135-166-175, and 176-180
—	entire document especially abstract; figure 1-2 and 4D-E; col 5, ln 51 to col 6, ln 05; col 11, ln 33-65; example 6; col 7, ln 46; col 3, ln 55-64; col 15, ln 58-61; col 10, ln 63 to col 11, ln 01; col 7, ln 03-12; col 7, ln 37-47; col 8, ln 14; col 8, ln 34-46; col 9, ln 03-16; col 9, ln 36-48; col 11, ln 48-67; col 6, ln 60-67; col 5, ln 54; col 10, ln 36	4, 61, 127, 134, and 181-230
Y	US 2002/0006470 A1 (Eberspacher et al.) 17 January 2002 (17.01.2002)	4, 61, 127, 134 and 181-225
	entire document especially para [0020]; [0042]; [0050]; [0051]-[0057]; [0091]	
Y	US 5,728,231 A (Negami et al.) 17 March 1998 (17.03.1998)	199-200 and 226-230
	entire document especially col 8, ln 62 to col 9, ln 64	
Y	US 4,547,621 A (Hack et al.) 15 October 1985 (15.10.1985)	185-186 and 194-197
	entire document especially col 3, ln 11-15; col 16, ln 26-27; col 16, ln 26-27	187-188
Y	US 6,534,704 B2 (Hashimoto et al.) 18 March 2003 (18.03.2003)	1-230
	especially col 4, ln 20 to col 5, ln 31	
A	US 6,127,202 A (Kapur et al.) 03 October 2000 (03.10.2000)	1-230
	entire document	
A	US 5,674,555 A (Birkmire et al.) 07 October 1997 (07.10.1997)	
	entire document	

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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

"&amp;" document member of the same patent family

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