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(54) **Title:** METHODS AND DEVICES FOR PROCESSING A PRECURSOR LAYER IN A GROUP VIA ENVIRONMENT

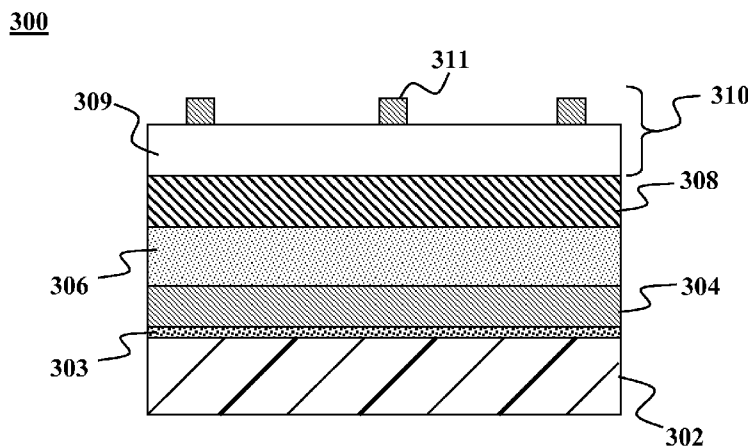


FIG. 3

(57) **Abstract:** Methods and devices for high-throughput printing of a precursor material for forming a film of a group IB-III A- chalcogenide compound are disclosed. In one embodiment, the method comprises forming a precursor layer on a substrate, the precursor is subsequently processed in one or more steps in a VIA environment.



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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 31/042; H01L 21/00; H01L 31/00; H01L 31/04; H01L 31/18

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models since 1975.
Japanese utility models and applications for utility models since 1975.

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2007-0163642 A1 (JEROEN K. J. VAN DUREN et al.) 19 July 2007 See abstract, claim 1 and figs 1A~1D.	1-20
A	US 6127202 A (KAPUR; VIJAY K. et al.) 03 October 2000 See abstract and fig 1.	1-20
A	US 5985691 A (BASOL; BULENT M. et al.) 16 November 1999 See abstract and figs 1~2.	1-20
A	US 2005-0266600 A1 (BULENT BASOL) 01 December 2005 See abstract and fig 1.	1-20

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

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2009/036083

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2007-0163642 A1	19.07.2007	CN 101061588 A	24.10.2007
		CN 101061588 A0	24.10.2007
		CN 101268608 A	17.09.2008
		CN 101268608 A0	17.09.2008
		CN 101336487 A	31.12.2008
		CN 101438416 A	20.05.2009
		CN 101443130 A	27.05.2009
		CN 101443892 A	27.05.2009
		CN 101443919 A	27.05.2009
		CN 101443921 A	27.05.2009
		EP 1723265 A2	22.11.2006
		EP 1723265 A4	24.12.2008
		EP 1747590 A2	31.01.2007
		EP 1805804 A1	11.07.2007
		EP 1805804 A4	21.11.2007
		EP 1849191 A2	31.10.2007
		EP 1861916 A2	05.12.2007
		EP 1935086 A2	25.06.2008
		EP 1949528 A2	30.07.2008
		EP 1961047 A2	27.08.2008
		EP 1992010 A2	19.11.2008
		EP 1997149 A2	03.12.2008
		EP 1997150 A2	03.12.2008
		EP 1998902 A2	10.12.2008
		EP 1999796 A2	10.12.2008
		JP 2008-514006 A	01.05.2008
		JP 2008-529281 A	31.07.2008
		JP 2008-537640 A	18.09.2008
		JP 2009-505430 A	05.02.2009
		JP 2009-528680 A	06.08.2009
		JP 2009-528681 A	06.08.2009
		JP 2009-528682 A	06.08.2009
		JP 2009-529805 A	20.08.2009
		JP 2009-540537 A	19.11.2009
		KR 10-2007-0064345 A	20.06.2007
		KR 10-2008-0052596 A	11.06.2008
		US 2005-183767 A1	25.08.2005
		US 2005-183768 A1	25.08.2005
		US 2005-186338 A1	25.08.2005
		US 2005-186342 A1	25.08.2005
		US 2006-060237 A1	23.03.2006
US 2006-062902 A1	23.03.2006		
US 2006-153985 A1	13.07.2006		
US 2006-157103 A1	20.07.2006		
US 2006-160261 A1	20.07.2006		
US 2006-207644 A1	21.09.2006		
US 2007-000537 A1	04.01.2007		
US 2007-074755 A1	05.04.2007		
US 2007-092648 A1	26.04.2007		
US 2007-163383 A1	19.07.2007		

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2009/036083

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		US 2007-163637 A1	19.07.2007
		US 2007-163638 A1	19.07.2007
		US 2007-163639 A1	19.07.2007
		US 2007-163640 A1	19.07.2007
		US 2007-163641 A1	19.07.2007
		US 2007-163643 A1	19.07.2007
		US 2007-163644 A1	19.07.2007
		US 2007-166453 A1	19.07.2007
		US 2007-169809 A1	26.07.2007
		US 2007-169810 A1	26.07.2007
		US 2007-169811 A1	26.07.2007
		US 2007-169812 A1	26.07.2007
		US 2007-169813 A1	26.07.2007
		US 2007-186971 A1	16.08.2007
		US 2008-020503 A1	24.01.2008
		US 2008-121277 A1	29.05.2008
		US 2008-124831 A1	29.05.2008
		US 2008-135099 A1	12.06.2008
		US 2008-135811 A1	12.06.2008
		US 2008-135812 A1	12.06.2008
		US 2008-138501 A1	12.06.2008
		US 2008-142072 A1	19.06.2008
		US 2008-142073 A1	19.06.2008
		US 2008-142080 A1	19.06.2008
		US 2008-142081 A1	19.06.2008
		US 2008-142082 A1	19.06.2008
		US 2008-142083 A1	19.06.2008
		US 2008-142084 A1	19.06.2008
		US 2008-149176 A1	26.06.2008
		US 2008-213467 A1	04.09.2008
		US 7115304 B2	03.10.2006
		US 7276724 B2	02.10.2007
		US 7306823 B2	11.12.2007
		US 7604843 B1	20.10.2009
		US 7605328 B2	20.10.2009
		WO 2005-081788 A2	09.09.2005
		WO 2005-081788 A3	09.09.2005
		WO 2005-081789 A2	09.09.2005
		WO 2005-081789 A3	09.09.2005
		WO 2006-033858 A1	30.03.2006
		WO 2006-073437 A2	13.07.2006
		WO 2006-073437 A3	13.07.2006
		WO 2006-078985 A2	27.07.2006
		WO 2006-078985 A3	27.07.2006
		WO 2006-101986 A2	28.09.2006
		WO 2006-101986 A3	28.09.2006
		WO 2006-135377 A2	21.12.2006
		WO 2006-135377 A3	21.12.2006
		WO 2007-022221 A2	22.02.2007
		WO 2007-022221 A3	22.02.2007
		WO 2007-041533 A2	12.04.2007

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2009/036083

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		WO 2007-041533 A3	12.04.2007
		WO 2007-065096 A2	07.06.2007
		WO 2007-065096 A3	07.06.2007
		WO 2007-101099 A2	07.09.2007
		WO 2007-101099 A3	07.09.2007
		WO 2007-101135 A2	07.09.2007
		WO 2007-101135 A3	07.09.2007
		WO 2007-101136 A2	07.09.2007
		WO 2007-101136 A3	07.09.2007
		WO 2007-101138 A2	07.09.2007
		WO 2007-101138 A3	07.09.2007
		WO 2007-101138 A9	07.09.2007
		WO 2007-106756 A2	20.09.2007
		WO 2007-106756 A3	20.09.2007
US 6127202 A	03.10.2000	CN 1214445 C	10.08.2005
		CN 1241804 A	19.01.2000
		CN 1241804 A0	19.01.2000
		EP 0978882 A2	09.02.2000
		EP 0978882 A3	20.08.2003
		EP 0978882 B1	15.08.2007
		EP 1870943 A2	26.12.2007
		EP 1870943 A3	12.03.2008
		EP 1870943 B1	29.04.2009
		JP 04-303363 B2	01.05.2009
		JP 2000-058893 A	25.02.2000
US 5985691 A	16.11.1999	CN 1143399 C	24.03.2004
		CN 1213186 A	07.04.1999
		CN 1213186 A0	07.04.1999
		EP 0881695 A2	02.12.1998
		EP 0881695 A3	21.04.1999
		EP 0881695 B1	13.09.2006
		EP 0881695 B9	14.02.2007
US 2005-0266600 A1	01.12.2005	None	