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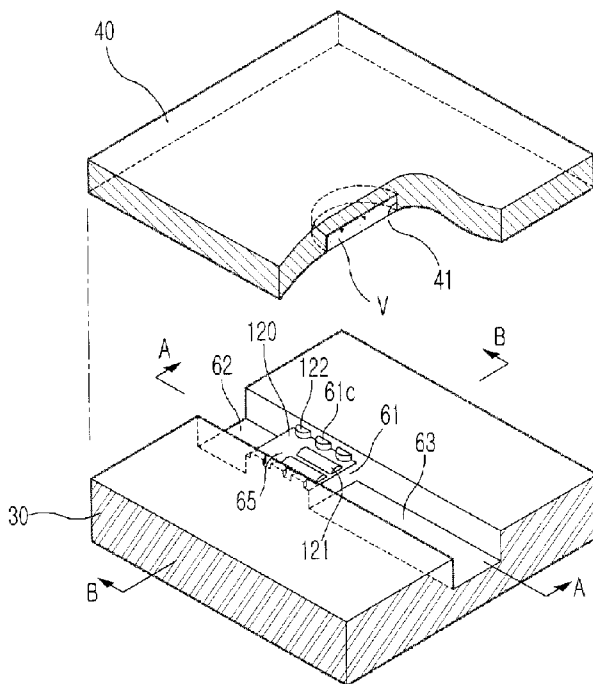
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(54) **Title:** VALVE UNIT, MICROFLUIDIC DEVICE HAVING THE SAME, AND METHOD OF DRIVING THE VALVE UNIT

[Fig. 2]



(57) **Abstract:** A normally open valve unit to close a channel, a microfluidic device equipped with the same, and a method of driving the valve unit are provided. The valve unit includes a valve substance including a phase transition material, a valve substance chamber which communicates with the channel and in which the valve substance is disposed, and a fusion structure formed in a section of the channel in which, wherein when the valve substance contained in the valve substance chamber is fused by applied energy and flows into the section of the channel in which the fusion structure is formed, and the valve substance is heated to melt the fusion structure and conduct fused bonding of the channel, thereby closing the channel.

WO 2011/055942 A3





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**B. FIELDS SEARCHED**

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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

Japanese utility models and applications for utility models

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

eKOMPASS(KIPO internal) &amp; Keywords:valve, microfluidic, phase transition material, microchannel, fusion, chamber

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 10-2009-0014871 A (삼성전자주식회사) 11 February 2009 See claims 1,4,7,8,11-13,30, figures 1-3	1-31
A	KR 10-2009-0020086 A (삼성전자주식회사) 26 February 2009 See claim 4, figure 5	1-31
A	US 2007-0092409 A1 (CHRISTOPHER BEATTY et al.) 26 April 2007 See the abstract, claims 1,14	1-31

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

\* Special categories of cited documents:

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Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 10-2009-0014871 A	11.02.2009	EP 2006588 A2	24.12.2008
		EP 2006588 A3	01.09.2010
		KR 10-2008-0112573 A	26.12.2008
		US 2008-0314465 A1	25.12.2008
KR 10-2009-0020086 A	26.02.2009	EP 2028496 A2	25.02.2009
		EP 2028496 A3	01.07.2009
		US 2009-0053108 A1	26.02.2009
		US 2010-0290955 A1	18.11.2010
		US 7790110 B2	07.09.2010
US 2007-0092409 A1	26.04.2007	WO 2007-050418 A1	03.05.2007