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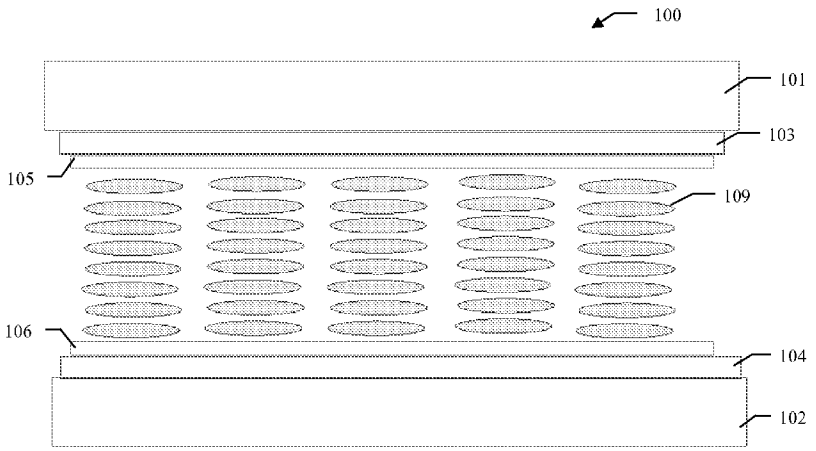

FIG. 1

(57) Abstract: Disclosed herein is a liquid crystal lens with a variable focal length. The gradient profile of the liquid crystals molecules that causes the gradient profile of the refractive index is achieved by inducing non-uniformly distributed anchoring energy and an external electric or magnetic field applied to the liquid crystal layer. Unlike existing electrically controlled liquid crystal lens, the external electric or magnetic field has a uniform spatial distribution within the liquid crystal layer. The focal length of the liquid crystal lens is controlled via the non-uniformly distributed anchoring energy and by varying the uniformly distributed electric or magnetic field.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - G02F 1/13 (2009.01)
USPC - 349/200
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)
IPC(8) - G02F 1/13 (2009.01)
USPC - 349/23, 33, 57, 200; 359/665, 721

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)
USPTO EAST System (US, USPG-PUB, EPO, DERWENT)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2004/0125294 A1 (ANGELE et al) 01 July 2004 (01.07.2004) entire document	1-26
Y	US 6,191,881 B1 (TAJIMA) 20 February 2001 (20.02.2001) entire document	1-26
Y	US 2007/0273812 A1 (BONE et al) 29 November 2007 (29.11.2007) entire document	3
Y	Cho et al., "Photo-induced liquid crystal alignment on imide oligomer containing cinnamate group", Materials Science and Engineering: C, Volume 24, Issues 1-2, (2004), pps. 195-199.	6, 19-24
Y	JP 2004/226974 A (CHAO et al) 12 August 2004 (12.08.2004) entire document	7, 18
Y	US 2006/0001810 A1 (PARK) 05 January 2006 (05.01.2006) entire document	8, 25, 26
Y	US 2005/0264751 A1 (GOTO) 01 December 2005 (01.12.2005) entire document	9
Y	Ren et al., "Adaptive liquid crystal lens with large focal length tunability", Optics Express, Volume 14, Issue 23, (November 13, 2006), pp. 11292-11298.	11
Y	US 6,778,246 B2 (SUN et al) 17 August 2004 (17.08.2004) entire document	13
Y	US 4,190,330 A (BERREMAN) 26 February 1980 (26.02.1980) entire document	14, 15

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Date of the actual completion of the international search	Date of mailing of the international search report
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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.
Y	US 6,061,043 A (BONNETT et al) 09 May 2000 (09.05.2000) entire document	20-24
Y	US 2006/0274296 A1 (TOLBERT et al) 07 December 2006 (07.12.2006) entire document	20-24
Y	US 5,540,997 A (PERETTIE et al) 30 July 1996 (30.07.1996) entire document	26