US009411189B2

(12) **United States Patent**
Oh et al.

(10) **Patent No.: US 9,411,189 B2**
(45) **Date of Patent: Aug. 9, 2016**

(54) **LIQUID CRYSTAL CELL**

(75) Inventors: **Dong Hyun Oh**, Daejeon (KR); **Kyung Jun Kim**, Daejeon (KR); **Sung Joon Min**, Daejeon (KR); **Jung Sun You**, Daejeon (KR)

(73) Assignee: **LG CHEM, LTD.**, Seoul (KR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **13/601,628**

(22) Filed: **Aug. 31, 2012**

(65) **Prior Publication Data**

US 2013/0201435 A1 Aug. 8, 2013

(30) **Foreign Application Priority Data**

Aug. 31, 2011 (KR) 10-2011-0087945
Aug. 31, 2012 (KR) 10-2012-0096135

(51) **Int. Cl.**

G02F 1/1334	(2006.01)
C09K 19/54	(2006.01)
C09K 19/52	(2006.01)
G02F 1/137	(2006.01)

(52) **U.S. Cl.**

CPC ***G02F 1/1334*** (2013.01); ***C09K 19/52*** (2013.01); *C09K 2019/546* (2013.01); *G02F 1/13725* (2013.01); *G02F 2001/13345* (2013.01)

(58) **Field of Classification Search**

CPC .. C09K 19/52; C09K 19/2019; C09K 19/544; C09K 19/546; G02F 1/1334; G02F 1/2001; G02F 1/13345; G02F 1/13725

USPC 349/183, 186; 252/299.01, 299.5

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,892,560	A	4/1999	Yoshida et al.	
7,102,706	B2 *	9/2006	Kim	G02F 1/1334 349/88
9,182,624	B2 *	11/2015	Min et al.	G02F 1/1334 349/186
2002/0067329	A1 *	6/2002	Toko et al.	345/94
2002/0113920	A1 *	8/2002	Kubota et al.	349/86
2002/0126233	A1 *	9/2002	Yamagishi	G02F 1/136277 349/43
2007/0102668	A1	5/2007	Oh	
2011/0240920	A1 *	10/2011	Kilickiran et al.	252/299.63

FOREIGN PATENT DOCUMENTS

CN	1330777	A	1/2002
CN	102099432	A	6/2011

(Continued)

OTHER PUBLICATIONS

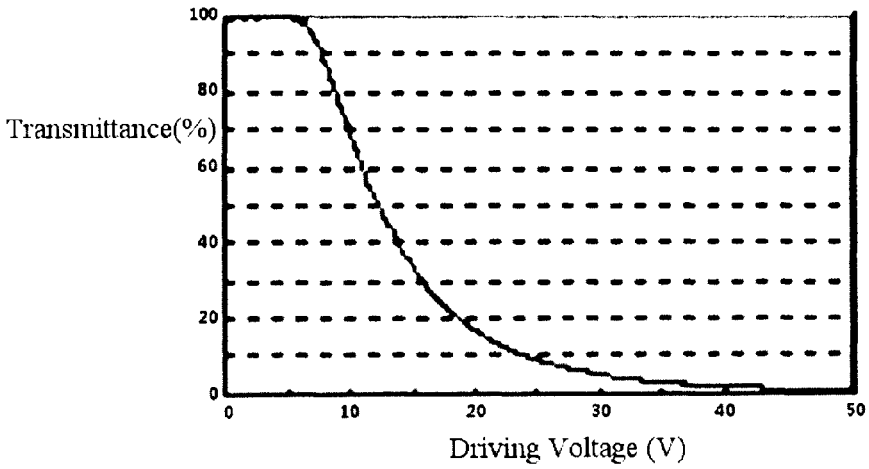
Office Action issued in Taiwanese Patent Appln. No. 101131730 on Dec. 17, 2014 with English translation, 11 pages.

(Continued)

Primary Examiner — Shean C Wu

(74) *Attorney, Agent, or Firm* — Rothwell, Figg, Ernst & Manbeck, P.C.

(57) **ABSTRACT**

A liquid crystal cell, a precursor of the liquid crystal layer, a method of manufacturing a liquid crystal cell, and use of the liquid crystal cell are provided. The liquid crystal cell may be manufactured simply in a consecutive manner using a roll-to-roll process. Also, the liquid crystal cell may be realized as a flexible device, and have an excellent contrast ratio. Such a liquid crystal cell can be applied in various applications including smart windows, window-protecting films, flexible display devices, active retarders for displaying 3D images, or viewing angle-adjusting films.

13 Claims, 5 Drawing Sheets