



US009410085B2

(12) **United States Patent**  
**Xie**

(10) **Patent No.:** **US 9,410,085 B2**  
(45) **Date of Patent:** **Aug. 9, 2016**

(54) **LIQUID CRYSTAL BLEND, LIQUID CRYSTAL DISPLAY PANEL AND LIQUID CRYSTAL DISPLAY DEVICE**

(71) Applicant: **BOE TECHNOLOGY GROUP CO., LTD.**, Beijing (CN)

(72) Inventor: **Chang Xie**, Beijing (CN)

(73) Assignee: **BOE TECHNOLOGY GROUP CO., LTD.**, Beijing (CN)

(\* ) 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.: **14/573,485**

(22) Filed: **Dec. 17, 2014**

(65) **Prior Publication Data**  
US 2016/0046865 A1 Feb. 18, 2016

(30) **Foreign Application Priority Data**  
Aug. 18, 2014 (CN) ..... 2014 1 0406436

(51) **Int. Cl.**  
**C09K 19/34** (2006.01)  
**C09K 19/02** (2006.01)  
**C09K 19/20** (2006.01)  
**C09K 19/30** (2006.01)  
**C09K 19/04** (2006.01)

(52) **U.S. Cl.**  
CPC ..... **C09K 19/3402** (2013.01); **C09K 19/02** (2013.01); **C09K 19/20** (2013.01); **C09K 19/3003** (2013.01); **C09K 2019/0466** (2013.01); **C09K 2019/3004** (2013.01); **C09K 2019/3016** (2013.01); **C09K 2019/3027** (2013.01); **C09K 2019/3422** (2013.01)

(58) **Field of Classification Search**  
CPC ..... C09K 2019/3422  
USPC ..... 252/299.63; 3/299.63  
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,621,552 A \* 4/1997 Coates ..... C09K 19/544 349/86  
6,256,081 B1 7/2001 Lee et al.  
2006/0158573 A1 7/2006 Huh et al.  
2008/0204646 A1 8/2008 Lim  
2013/0258222 A1\* 10/2013 Kim ..... G02F 1/13439 349/33  
2014/0111730 A1\* 4/2014 Goebel ..... H04L 7/08 349/56  
2015/0198855 A1\* 7/2015 Kim ..... G02F 1/141 349/33

FOREIGN PATENT DOCUMENTS

CN 101270287 A 9/2008  
CN 103320142 A 9/2013  
CN 103364980 A 10/2013  
CN 103443695 A 12/2013  
CN 103740377 A 4/2014  
JP 2007-314795 A 12/2007

OTHER PUBLICATIONS

2nd Office Action issued Chinese application No. 201410406436.0 issued Nov. 26, 2015.  
1st Office Action issued Chinese application No. 201410406436.0 issued Jul. 2, 2015.

\* cited by examiner

*Primary Examiner* — Chanceity Robinson  
(74) *Attorney, Agent, or Firm* — Nath, Goldberg & Meyer; Joshua B. Goldberg

(57) **ABSTRACT**

The present invention provides a liquid crystal blend having a higher perpendicular dielectric constant, as well as a liquid crystal display panel and a liquid crystal display device comprising the liquid crystal blend. Since the liquid crystal blend of the present invention contains negative liquid crystal material and has a perpendicular dielectric constant between 3.5 to 4.5, it can improve the transmittance of the liquid crystal layer obtained thereby, compared with the liquid crystal blend without negative liquid crystal material, while other relative properties thereof such as clearing point, response time of the display obtained therefrom, and image sticking at high temperature can also meet the requirements of liquid crystal devices.

**9 Claims, No Drawings**