

Dual-View Liquid Crystal Display Using Patterned E-Type Polarizer

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We present a dual-view liquid crystal display (LCD) that allows two faces of the display viewed at opposite directions to show different image/video content simultaneously. This device is characterized by two-domain twisted nematic (TN) liquid crystal (LC) and patterned E-type polarizer. Figure 1 is a schematic drawing of the proposed structure, where a layer of two-domain TN LC consisting of right-view and left-view subpixels is sandwiched in between a pair of crossed O-type polarizer and E-type polarizer [1].

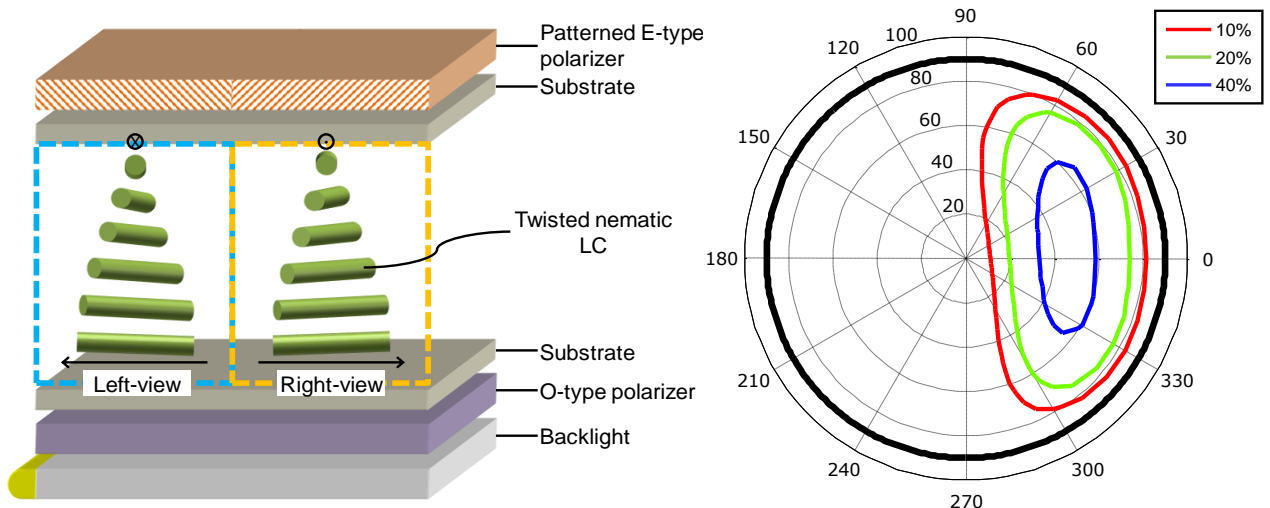


Figure 1. Proposed structure of dual-view liquid crystal display

Figure 2. Iso-luminance contour of the bright state at 3.1 V.

The viewing angle characteristics, including the iso-luminance and iso-contrast ratio contours, have been studied. Figure 2 plots the iso-luminance contour of the bright state at 3.1 V for levels of 10%, 20%, and 40%. We note that all three levels of luminance are located within the right half of the entire viewing zone. When the viewing angle exceeds 20°, crosstalk will never go over 1%. In particular, crosstalk observed at +45° is calculated for voltages varying from 0 to 5 V. We find out that, for all voltages or gray scales, the crosstalk stays below 0.07%. With such trivial crosstalk, it can be said that the proposed solution is free from the crosstalk for a wide range of both viewing angles and gray scales.

References:

- [1] C. P. Chen, Y. Wu, L. Zhou, K. Wang, Z. Zhang, and C. G. Jhun, *Appl. Opt.* **56**, 380 (2017).

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