

Characterization of Polymer Dispersed Liquid Crystal Having Dichroic Dyes

Gi Heon Kim, Won-Jae Lee and Yong Hae Kim
 ETRI, 138 Gajeongno, Yuseong-gu, Daejeon 138-700, Korea
 Tel.:82-42-860-1153, E-mail: kimgh411@etri.re.kr

Polymer dispersed liquid crystal (PDLC) by mean of an electric field can be changed from a light-scattering opaque phase (OFF state) to a optically transparent phase (ON state) without polyimide alignment layers and polarizers. PDLC composed of LC droplets embedded in a polymer matrix opened many opportunities for optoelectronic applications such as flat panel displays, signage displays, and switchable privacy window [1-4]. The guest-host (GH) effect, the phenomenon of the orientation change of dichroic dyes by LC molecules, was first reported by Heilmeyer in 1968. However, the transmissive-mode GH-LCDs have some leakages such as low contrast ratio (CR) and low transmittance.

In this study, color dye-doped PDLCs (D-PDLCs) for transparent displays were prepared by doping color dye (red, green and blue) into the photo-reactive monomers and the nematic LC (NLC) mixtures. These D-PDLCs do not require polarizers and polyimide alignment layers, leading to higher transmittance/CR, more shock resistance, and a wide viewing angle [5]. The gap of the D-PDLC cells was controlled by using a ball spacer (height, 3~6 μm). The D-PDLC mixture was introduced into sandwiched substrates by mean of modified ODF (one drop fill) method at 50 $^{\circ}\text{C}$.

We fabricated glass-based color D-PDLCs and investigated their electro-optical characteristics.

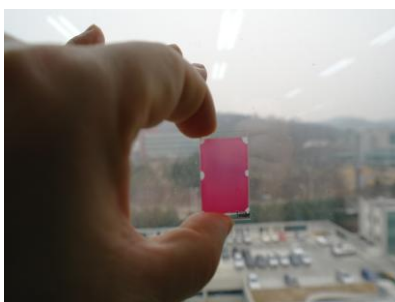


Fig. 1. D-PDLC panel

Acknowledgment

This work was supported by the ICT R&D program of MSIP/IITP[10041416, The core technology development of light and space adaptable energy-saving I/O platform for future advertising service].

References

1. C. W. Su and M. Y. Chen, *J. Display Tech.* vol 18, p. 683 (2014).
2. E. M. Kim, I. Choi, Y. Kim, J. Lee, Y. Choi, J. Cho, Y. Kim and G. Heo, *Jpn. J. Appl. Phys.* vol. 53, p. 095505-1 (2014).
3. J. Kim and J. Han, *Electron. Mater. Lett.* vol. 10, p. 665 (2012).
4. G. D. Filpo, S. Siprova, G. Chidichmo, A. Mashin, F. P. Nicoletta and D. Cupelli, *Liq. Cryst.* vol. 39, p. 359 (2012).
5. Y. J. Jeon, G. H. Lee, J. E. Jang, K. Y. Hwang, F. Ahmad, M. Jamil, J. W. Lee and J. E. Jung, *Liq. Cryst.* vol. 39, p. 1314 (2012).