

Two-way Viewing Angle Switchable LCD with Two-Domain VA Structure

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Abstract

In this paper we propose a new method for obtaining two way switchable LCD. For this two domain vertical alignment LCD is used. A two way LCD is able to show different images on the same screen based on left and right perspectives. Viewing angle dependence of different grey levels of transmittance for the polar angles 0, +45 and -45 degree are also found out.

1. Objectives and Background

Nowadays for LCD, other than TV application, there are many opportunities to be used in public places where many people are present, for example in airplanes, trains or cafes. One of the remarkable advancement of LCD in public place is two way switchable LCD. By using this technology one person is able to show different images on the same screen based on left and right viewing angles.

2. Results

The cell parameters used in our experiment are the LC material MLC 6608 with refractive anisotropy (Δn) of 0.083, dielectric anisotropy ($\Delta \epsilon$) of -4.2, cell gap thickness of 3.65 μ m and petilt angle of 89 degree. The operational principle of two way switching is illustrated in Figure 1. When no voltage was applied, the LC director aligned in homeotropic manner and exhibited zero retardation. When the voltage became intermediate, the LC director was rotated to show two different modes of view at different viewing angle. They are right view mode and left view mode. Figure 2 shows viewing angle dependence of different grey levels of transmittance for the polar angles 0, +45 and -45 degree. From the transmittance curve, it is evident that at a voltage nearly 2.8V the LC showed right and left view mode. Figure 3 shows pictures of a cell at different viewing angles.

3. Impact

Based on the concept, commercialization of new products for the application to LCDs began by Sharp Engineering cooperation. But they used parallax barrier for two way switching. Here we proposed new method for obtaining two ways switchable LCD. For this two domain vertical alignment was used. This is more economic and adequate for promising commercial applications.

4. Acknowledgements

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5. Reference

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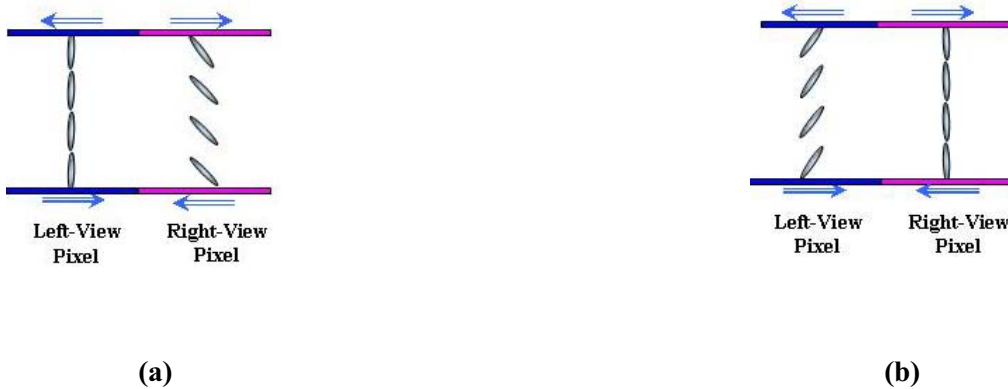


Figure 1. Operational principle of a two way switching LCD: (a) Right view mode and (b) left view mode.

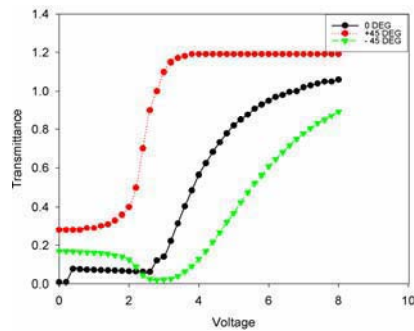


Figure 2. Transmittance for different polar angles.

