Color-filterless reflective liquid crystal mode using cholesteric liquid crystal film and circular polarizers

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Liquid crystal display (LCD) technology has been researched on simple structure, cost-effective fabrication, high resolution, thinner thickness and more portability for the use of devices without the limitation of area. Reflective LCD with the advantage of their high performance under outdoor environments is one of the most attractive devices which can be satisfied with these requirements [1]. The most attractive thing of reflective LCD is the readability in bright ambient as the power saving. However, in the conventional reflective LCD, the light efficiency is relatively low because incident light experience the color filter in twice times [2-4]. Therefore, we use the cholesteric liquid crystal layer to obtain the full color characteristic without color filter and realize the black state using the circular polarizers.

In this paper, we propose a new reflective liquid crystal display configuration using the cholesteric liquid crystal (ChLC) films. By using the circular polarizers and reflection layer, we can obtain the switching characteristics of the incident outer light. The patterned ChLC layer with red, green and blue can reflect the three colors without color filter and reflected circularly polarized light can pass through the outer circular polarizer. Our reflective LC device is expected to have brighter characteristics because the incident light cannot pass through the color filter in twice times. Therefore, light efficiency is much more increased in reflective mode and excellent dark state can be achieved without absorption layer.

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