PSIII-8

Transflective Liquid Crystal Display with Single Cell gap

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Transflective liquid crystal displays (LCDs) have been studied for mobile application since their device performances can be achieved under both indoor and out door environment, as well as low power consumption. Most transflective LCDs consists of two subpixels of transmissive part and reflective part. In early transflective LCDs, the cell gaps in the two subpixels are different from each other for compensating optical path difference between two subpixels. However, such transflective configurations require complex fabrication processes and the display performances are decreased because of the LC molecule's deformation at boundaries of subpixels. Recently, various transflective LCDs with two kinds of LC modes in a single cell gap were proposed. But the different LC modes result in different electro-optic characteristics, so different driving schemes are required for high display performances.

In this paper, we propose a tranflective LCD configuration with a single cell gap and a single LC mode. The optical path difference could be simply compensated by controlling the alignment of the LC layer between a transmissive part and a reflective part. The different alignment directions between two parts are produced using a two-step exposure of the linearly polarized ultra violet (LPUV) lights on a photosensitive polymer layer. In our configuration, the metal reflectors were used as an electrode, reflector and a photomask which produces a different alignment direction of LC between a transmissive part and a reflective part. Since the birefringence axis of the LC layer is generated in a different alignment direction, our transflective LCD could be constructed with the same polarizers and retardation films over the whole panel area. The simulated and measured electro-optic characteristics in a tansmissive part and a reflective part for our transflective LCDs are well matched each other over the whole gray scale range.

Keyword : Transflective, Single cell gap, Liquid crystal display

Accompanied by the 2nd Exhibit on
Liquid Crystal Electro-Optics and Photonics Technologies

12th International Topical Meeting on Optics of Liquid Crystals

Book of Abstracts

October 1-5, 2007

Hotel NH

Puebla City México

Organized by

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THURSDAY OCTOBER 4

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