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Transflective liquid crystal display with a single cell gap in a patterned vertically aligned mode

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We propose a novel transflective liquid crystal display (LCD) configuration with a single cell gap in a patterned vertically aligned (PVA) mode. In conventional transflective LCDs, the problem of optical path difference between transmissive and reflective parts was solved by adopting multi-cell gap or dual LC mode. However, these approaches require complex manufacturing processes. Moreover, the different LC response to an applied voltage in the transmissive and reflective parts results in severe grayscale difference together with threshold voltage shift. In this work, the optical path difference in a single cell gap simply compensated by designing pixel electrode structures between transmissive and reflective parts in a PVA mode. In addition, our transflective LCD was constructed with the same polarizers and retardation films over the whole panel area because, in the presence of applied voltage, the optic axes of the LC layer are generated differently in a azimuthal direction depending on the patterned electrode structures in two parts. Our structure of the transflective LCD showed that the simulated and measured electro-optic characteristics in transmissive and reflective parts are well matched each other over the whole gray scale range.