Presentation Type: Poster Presentation

High Brightness 3D Display Using Orthogonal Polarized OLED

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Stereoscopic three-dimensional (3D) displays with viewing glasses have been widely developed and commercialized due to their good display performances and unlimited viewing points [1-4]. In the glasses-based 3D displays, to produce the binocular disparity, a display panel should generate two different images arriving at the left and right eyes. The two images with different polarization states are generated by the patterned retarder, which is attached on the outside of the display panel to change the polarization state. When we used a conventional unpolarized organic light emitting diodes (OLEDs) with a film-type patterned retarder (FPR) and linear polarizer, the intensity of emitted light reduced to below 50%. To solve this problem, a polarized OLED can be used with only a FPR for 3D display. The linearly polarized emitted light changed to right- and left- handed circularly polarized light through FPR without light loss. However, it is expensive and hard to align between display panel and a FPR.

In this paper, we proposed the patterned polarized OLED for high brightness stereoscopic 3D display. The patterned polarized OLED was fabricated using rubbing process with shadow mask. The emitting polymers are aligned along the rubbing directions on the alignment layer, and emit linearly polarized light with orthogonal directions. Passing through the QWP, linearly polarized light changed to right- and left-handed circularly polarized light at each region. Because this proposed system does not need an extra polarizer, the emitted lights preserved without any loss. We expect that the patterned polarized OLED is applicable to not only high performance stereoscopic 3D display but also functional organic electro-optical devices.

References

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