

Design and Fabrication of Quartz-based Micro Prism Array of Dual-view
Display by Using Reactive Ion Etching

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Abstract

In this paper, a quartz-based micro-prism array structure is newly proposed as the "parallax barrier", and such a device is designed only for fitting the size of a 2.2 inch LCD panel, the most popular size for the TV on mobile phone. The optical simulation software LightTools was applied to verify whether the designed structure can work or not. The parameters we considered including the viewing angle, viewing distance, vertex angle of prism, refractive index of quartz ($=1.46$) and the sub-pixel width ($=66\ \mu\text{m}$). 1,000,000 rays emitted from the dual view display panel are simulated, as the result, our designed quartz-based micro-prism array structure can successfully separate images from odd or even sub-pixels into two different viewers and the view angle is indeed 80° as our requirement. The key to control the red, green, blue light from different sub-pixels can be precisely guided into the same direction is ascribed to the arrangement of the vertex angles of the relative prisms (R: 47.1° , G: 47.2° , B: 47.4°). Three steps of lithography and the reactive ion etching can fabricate the precise angle and size of our needs. The left and right images generated by our designed dual-view display are quite pellucid without color difference, and very similar to our simulation.