Fabrication of Active Micro-lens Array using a Liquid Crystal and a Polymer

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Abstract

Emerging liquid crystal based micro-lens developments will be introduced in this presentation. In recent years the micro-lens array is one of the most widely studied electro optical device applications of liquid crystals due to its valuable utilizations in applications such as optical communication elements, optical information processing units and three-dimensional display components. To date, various approaches for liquid crystal based micro-lens arrays have been demonstrated [1-3].
In this presentation, the techniques for realizing active micro-lens arrays using the combined system of a liquid crystal and a polymer will be discussed. Electrically controllable birefringence of liquid crystals can provide the active features of the micro-lens array. To obtain diverse dynamic characteristics such as a tunable focal length, fast switching, and independent focusing properties for different input polarizations, we suggest various micro-lens structures. In these configurations, various polymers (UV epoxy and liquid crystalline polymer) are utilized for simple fabrication of the device. These micro-lens arrays can be applied to different optical systems such as optical transmission, data storage and three-dimensional displays due to their simple fabrication process and dynamic properties.

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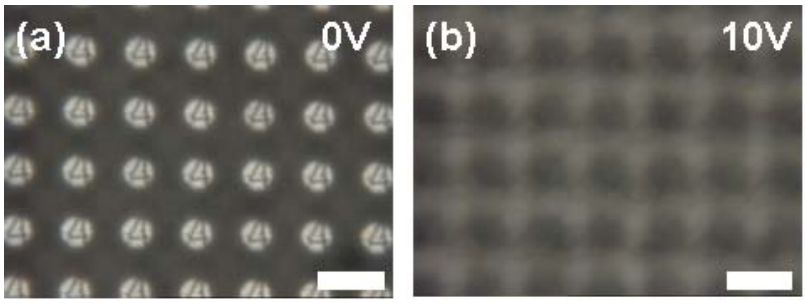

(a) Focused images of micro-lens arrays at 0V. (b) De-focused images of the device at 10V application. The scale bar represents 200 μm.