



Dielectric elastomer stack actuator-based autofocus fluid lens

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Résumé en anglais	<p>Extremely small cameras and many cell phones simply do not have enough room to allow users to move a rigid lens the distance required for a varying range of focal lengths. An adaptive liquid lens, however, enables small cameras to focus without needing extra room. An autofocus liquid lens provides several advantages over a traditional lens in terms of efficiency, cost, compactness, and flexibility. But one of the main challenges in these lenses is a high driving voltage requirement of around at least 1.8 kV. In this paper, we propose a new design of a liquid lens based on a dielectric elastomer stack actuator (DESA), which significantly overcomes the aforementioned existing problem. The lens consists of a frame (a thin DESA membrane with a hole in the middle), silicon oil, and water. A voltage range is applied on the membrane in order to change the hole dimension. Due to change of hole dimension, a change in meniscus occurs that changes the focal length of the lens. In this research work, various experimental results are achieved by configuring two DESA with different active areas. Depending on the active area of the membrane, the length of the laser beam on the plane varies from 6 to 35 mm, and the driving voltage is in the range of 50–750 V.</p>
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Liens

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