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Adaptive lenses using transparent dielectric elastomer actuators SAMUEL SHIAN, ROGER DIEBOLD, DAVID CLARKE, School of Engineering and Applied Sciences, Harvard University — Variable focal lenses, used in a vast number of applications such as endoscope, digital camera, binoculars, information storage, communication, and machine vision, are traditionally constructed as a lens system consisting of solid lenses and actuating mechanisms. However, such lens system is complex, bulky, inefficient, and costly. Each of these shortcomings can be addressed using an adaptive lens that performs as a lens system. In this presentation, we will show how we push the boundary of adaptive lens technology through the use of a transparent electroactive polymer actuator that is integral to the optics. Detail of our concepts and lens construction will be described as well as electromechanical and optical performances. Preliminary data indicate that our adaptive lens prototype is capable of varying its focus by more than 100%, which is higher than that of human eyes. Furthermore, we will show how our approach can be used to achieve certain controls over the lens characteristics such as adaptive aberration and optical axis, which are difficult or impossible to achieve in other adaptive lens configurations.

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