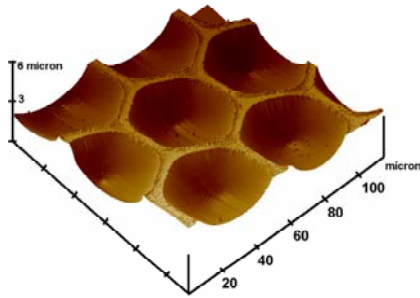


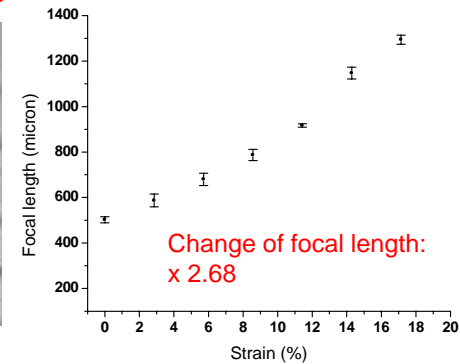
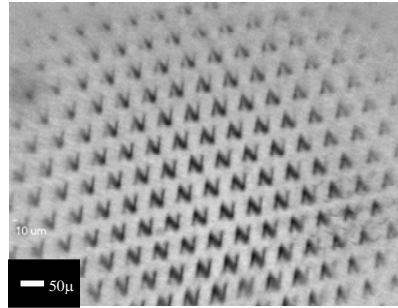
Synthesis of Intelligent, Bio-Inspired Hydrogel Microlens Arrays

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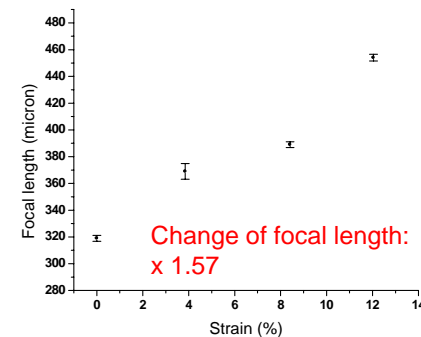
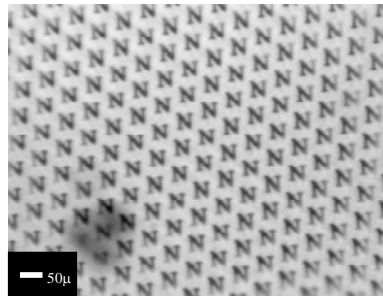
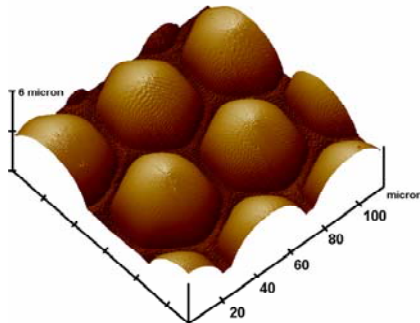
Concave microlens arrays



Focus through lens arrays



Convex microlens arrays



- Hydrogel microlens arrays could potentially change the lens volume and shape up to several hundred percent in response to the external stimuli, such as pH, temperature, light, electric potential, chemicals, and biological agents. However, the soft nature of hydrogels in water makes it questionable of their structural integrity during actuation. By copolymerizing methyl methacrylates with various hydrogel monomers at various compositions, we investigated how to tailor the stability of patterned hydrogels when in contact with water.
- Most of the tunable microlens arrays are multi-component systems, and require complex fabrication and assembly processes. Often times, the lens focal length cannot be tuned continuously in real-time. Therefore, we fabricated a single-component, strain responsive, variable-focus microlens array (both concave and convex) based on confined buckling of a soft elastomer, poly(dimethylsiloxane) (PDMS), and showed real-time tunability (see figures above).