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Aperture-Embedded Polymer Microlenses for Ultra-Low-Cost Microscopy Platforms (Foldscope)[1] LAUREL KROO, GEORGE K. HERRING, MANU PRAKASH, Stanford University — Our lab has recently introduced an ultra-low cost microscopy platform: Foldscope, an origami based print-and-fold paper microscope for applications in disease diagnostics and science education. This current study introduces the concept of aperture-embedded microlenses made of ultra-violet curable polymers as a solution for high-throughput roll-to-roll manufacturing of micro-optical components utilized in Foldscope. The approach employs fluid droplets trapped in an aperture via capillary forces to induce various characteristic lens surfaces. By implementing static and dynamic pressure as a method to manipulate the droplet, a large and versatile range of optical surface shapes become viable. When the polymer droplet acquires the desired shape on either side of the aperture, the lens is frozen *in situ* within milliseconds with a high-power UV source. We explore the dynamics of ultra-fast curing of polymeric droplets through both experimental and analytical means. The presented capillary induced printed lens manufacturing enables ultra-low cost optical instruments.

[1]Prakash Labs, Stanford University

Laurel Kroo
Stanford University

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