

Abstract Submitted  
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**Surface wrinkling driven by swelling and its applications** HYUN SUK KIM, ALFRED CROSBY, University of Massachusetts Amherst — The nature of reversible surface wrinkling offers great promise for designing responsive or adaptive materials. We experimentally explore the reversibility and geometry of surface wrinkles driven by swelling an elastically-supported stiff plate by solvent vapor and liquid. We use crosslinked polydimethylsiloxane (PDMS) substrates with surfaces modified by ultraviolet-ozone (UVO) processing, creating materials with rigid, surface films that swell differentially in comparison to the underlying substrates. We observe the dependence of the wrinkle wavelength on the UVO time and thickness of elastomers. Furthermore, we identify a critical length scale for the swelling region below which wrinkle formation is suppressed. Taking advantage of the reversibility and geometric relations, we demonstrate advanced applications such as smart windows with swichable optical transparency and responsive channels in microfluidics.

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