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Tuning the Adhesion of Soft Elastomers with Topographic Patterns ALFRED CROSBY, EDWIN CHAN, University of Massachusetts — Nature (e.g. gecko and jumping spider) utilizes surface patterns to control adhesion. The primary mechanism of adhesion for these systems can be sufficiently described by linear elastic fracture mechanics theory and material-defined length scales. Based upon these natural inspirations, similar mechanisms can be used to control the adhesion of elastic polymers. For viscoelastic polymers, patterns tune adhesion through additional mechanisms that have not been previously observed. Here, we illustrate the effects of topographic patterns in tuning the adhesion for soft, elastic or viscoelastic, elastomers. Contact adhesion tests based on Johnson, Kendall and Roberts (JKR) theory are used to characterize the adhesion of patterned poly(dimethyl siloxane) as well as poly(n-butyl acrylate) elastomers. We demonstrate that patterns can be utilized to control the adhesion of these polymers by: 1) controlling the balance of initiation and propagation for local separation process, 2) controlling the local crack velocity to alter the global viscoelastic response, and 3) altering the local separation mode through modification of a polymer layer's lateral confinement.

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