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Responsive Water Pinning in Liquid Crystal Elastomers

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Liquid crystal elastomers (LCEs) are an exceptional framework for highly active and functional soft matter. Briefly, LCEs couple the anisotropic LC director to a soft polymer network resulting in a zoo of phase-dependent responsive properties including reversible optical switching, mechanical stiffening, and shape-shifting in response to heat, light, or magnetic/electric fields. Here, we obtain reversible surface instabilities in LCEs with large amplitude features that are strikingly similar to that of rose petals and display temperature-responsive water pinning properties. Further, the ability to program arbitrary shape-changes, such as a smooth film that morphs into a replica of a lupin leaf, offers a route to cheaply and quickly produce functional surface roughening for wetting applications.

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