Abstract Submitted
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Living Microlens Arrays[1] JESSICA ZIMBERLIN, PATRICIA WADSWORTH, ALFRED CROSBY, University of Massachusetts — Using the properties of living cells and early tissue formation, we define adaptable surface structures of three-dimensional, hexagonal arrays of microlenses. These "living" microlenses are achieved by growing a monolayer cell sheet on a thin film of polystyrene [PS] attached to a substrate of crosslinked poly(dimethyl siloxane) [PDMS] microwells. The contractile nature of the cells attached to the surface and the compliance of the PDMS surface geometry allows the PS thin film to buckle, forming arrays of convex microlenses. The curvature of the microlens structures is related to the strain applied by monolayer cell sheets to the PS surface. We use this measurement to differentiate the strains applied by two different cell types and relate these strains to differences in the intercellular coupling of the different cell types. We also show that by adding different chemical triggers to the system, the contractile nature of the cells changes, modifying the focal length of the microlenses. This design introduces a new paradigm for advanced materials and offers great promise for a range of applications.

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