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Adaptable Polymer Microsrolls KYRIAKI KALAITZIDOU, Woodruff School of Mechanical Engineering, Georgia Institute of Technology, ALFRED J. CROSBY, Polymer Science and Engineering Department, University of Massachusetts, Amherst — Adaptable polymer particles that can change geometry, flow characteristics, and adsorption properties upon the stimulation of an environmental change, such as temperature are fabricated by utilizing the residual stress developed at the interface of a bilayer. We propose a phase diagram that can be used to predict the shape and the size of the adaptive polymer particles as a function of the materials modulus, thickness ratio and the bilayer's lateral dimensions. The method is applicable to any material combination that satisfies the design equations. The materials used in this work are gold/titanium (Au/Ti) and polydimethylsiloxane (PDMS). Initial demonstrations of this responsive control and its impact on properties of the adaptive polymer particles are also presented. These structures combined with their demonstrated reversibility have potential as capsules in drug delivery systems and novel conductive composites.

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