

Abstract Submitted
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Polymer Micro-scrolls KYRIAKI KALAITZIDOU, ALFRED J. CROSBY, Polymer Science and Engineering Department, University of Massachusetts, Amherst, CROSBY TEAM — This research focuses on the spontaneous formation of geometric structures of Au-coated crosslinked polydimethylsiloxane (PDMS) films. The Au-PDMS bilayer is fabricated on a rigid glass substrate that is pre-coated with a sacrificial layer of polyacrylic acid (PAA). Upon dissolution of the PAA, micro-scale, equilibrated structures are formed in a water bath due to a residual stress in the bi-layer film. The residual stress develops due to the difference in coefficients of thermal expansion for the two materials and the constraint at the bi-layer interface. A phase diagram that predicts the shape of the bilayer structures as a function of residual strain, the materials properties, the thickness of the two layers and the lateral sample dimensions is presented. This phase diagram serves as a design tool for fabricating tubes, rings and chiral scrolls on the micron length scale. These structures combined with their demonstrated reversibility have potential as capsules in drug delivery systems and novel conductive composites.

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