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Surface patterns in thermally responsive elastomeric gels SHAWN CHESTER, LALLIT ANAND, MIT — Many stimulus responsive elastomeric gels operate in non-isothermal, chemically saturated environments in a variety of applications. We have recently developed a three dimensional continuum level theory to describe the coupled fluid permeation and large deformation response of thermally responsive elastomeric materials. In this work, we apply our theory and numerical simulation capability to the specific case of surface wrinkles induced via swelling of a thermally responsive gel bonded on top of a compliant impermeable elastic substrate. We show that we can numerically model the swelling behavior and subsequent surface pattern formation. Also, we examine the effect of substrate thickness by varying the ratio of gel to substrate thickness. Further, we show that it is possible to modulate the amplitude of the surface wrinkles by taking advantage of the thermally responsive nature of this class of materials.

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