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Elastocapillary Deformations and Fracture of Soft Gels KAREN DANIELS, NC State University, MARION GRZELKA, ENS-Cachan, JOSHUA BOSTWICK, Clemson University — When a droplet is placed on the surface of a soft gel, the surface deforms by an amount proportional to the elastocapillary length calculated from the ratio of surface tension and elastic modulus. For sufficiently large deformations, the gel can fracture due to the forces generated under the liquid-gel contact line. We observe that a starburst of channel fractures forms at the surface of the gel, driven by fluid propagating away from the central droplet. To understand the initiation of these cracks, we model the substrate as an incompressible, linear-elastic solid and quantify the elastic response. This provides quantitative agreement with experimental measurements of the number of fracture arms as a function of material properties and geometric parameters. In addition, we find that the initiation process is thermally-activated, with delay time that decreases as a function of the elastocapillary length.

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