Direct Observation of Dewetting Dynamics on Soft Substrates

Qin Xu*[1]

[1]Laboratory of Soft and Living Materials, Department of Materials, ETH Zurich – Switzerland

Abstract

Wetting of liquid droplets on soft gels (E _˜ KPa) deforms gel interface significantly: a wetting ridge grows under the balance between liquid surface tension and solid surface stress near the contact line. Using interference microscopy and fast camera imaging, we directly observe the recovery of gel surface from this wetting-induced deformation after removing liquid droplet. We show experimentally that surface relaxation of soft gels cannot be simply modelled by their viscoelastic rheology. Instead, the relaxation behaviour is a consequence of interplay between different restoring stresses near the interface, including solid capillarity and elasticity, and resisting stresses from the bulk, such as osmotic pressure across the network and local viscous stresses. By measuring the scaling of wetting shapes under relaxation, we can determine which stress dominates the dissipation. Our results further extend the current understanding of elastocapillary with the effect of bulk porosity, and bring new insight into the study of wetting dynamics on soft materials.

*Speaker