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Droplets on compressed soft solids

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When a liquid droplet rests on a soft surface, capillary forces at the contact line deform the solid into a sharp wetting ridge. The size of the wetting ridge is given by the elasto-capillary length. If the droplet moves, strong viscoelastic dissipation in the soft solid leads to viscoelastic breaking. Recently, it was shown that droplet speeds depend on a pre-stretch of the material, which is incompatible with linear viscoelastic theory. In this poster we discuss visualizations for moving wetting ridges at high spatio-temporal resolution, and recent experiments with droplets on pre-strained materials. Here we apply a compression instead of a stretch and observe a bi-directional interaction of wetting ridges with the creasing instability of compressed surfaces: the deformation under a droplet may trigger creasing, and droplets on creased surfaces move due to the inhomogeneous surface topography. This may have important implications in biology, where materials are typically soft but rarely flat.

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