Conference "Dynamic Wetting of Flexible, Adaptive, and Switchable Substrates"



Beitrag ID: 32

Typ: Talk

Moving wetting ridges: Impact of surface rheology?

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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, but the geometry of the ridge tip is solely governed by the balance of surface tensions. If the droplet moves, strong viscoelastic dissipation in the soft solid leads to viscoelastic breaking. For most soft materials, such as PDMS, dissipation remains integrable, and should thus not impact the tip geometry. Recently, an increase of the ridge opening angle at large speeds was reported, triggering a debate on possible mechanisms. We visualize moving wetting ridges at high spatio-temporal resolution and determine the tip geometry for various liquids and substrate rheologies. We observe an increase of the ridge opening angle at large speeds, even for very mild deformations as caused by the low surface tension of a fluorinated oil. Such phenomenology can be explained by a surface rheology with a relaxation rate that is different from the bulk.

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Sitzung Einordnung: Short talks