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(G*) Shape of the capillary ridge on ideal elastomeric substrates

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Soft solids play an important role in stretchable electronics, cellular membranes and water collection. Upon introduction of a liquid contact line, soft solids can deform substantially causing changes to geometry and dynamics. On the nanoscale, the deformation at the liquid/solid contact line is a capillary ridge. We study these capillary ridges for a system which consists of a thin polymer film in the melt state atop an elastomeric poly(dimethylsiloxane) (PDMS) film. We use a thorough washing procedure to create our PDMS films which creates a true elastomer composed of only a crosslinked network. Our bilayer polymer films sit atop a solid silicon substrate. The liquid polymer layer dewets on the soft elastomer PDMS base. We vary the thickness of the underlying elastomer film, which changes the effective stiffness, therefore changing the size of the capillary ridge. We use atomic force microscopy to directly measure the shape of the capillary ridge in our system.

Keyword-1

Elastocapillarity

Keyword-2

Soft solid

Keyword-3

Thin polymer films

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