

Abstract Submitted
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Immiscible surfactant droplets on thin liquid films: Spreading dynamics, subphase expulsion, oscillatory instabilities and the effect of spatial confinement DAVID SINZ, MYROSLAVA HANYAK, ANTON DARHUBER, Mesoscopic Transport Phenomena Group, Department of Applied Physics, Eindhoven University of Technology — After deposition of immiscible, surface-active liquids on thin liquid films of higher surface tension, Marangoni stresses thin the liquid film around the surfactant droplet and induce a flow directed away from the surfactant source. We present a combined experimental and numerical study elucidating a variety of aspects of this phenomenon. In a radially symmetric configuration we investigated an oscillatory instability, caused by temporary trapping and subsequent release of subphase liquid from underneath the surfactant droplet. We provide evidence that this expulsion has a pronounced effect on the spreading dynamics. Using chemical surface patterning we study the effect of spatial confinement of the subphase liquid on the spreading dynamics. The lateral confinement induces non-uniform height- and surface velocity profiles, which manifest themselves in a pronounced transition in the time evolution of the subphase morphology. With respect to both the spreading rates as well as the evolving morphology, excellent agreement between experimental and simulation results has been achieved.

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