Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

On the universality of Marangoni-driven spreading CLAAS VISSER, Harvard University, BRAM VAN CAPELLEVEEN, ROBIN KOLDEWEIJ, DETLEF LOHSE, University of Twente — When two liquids of different surface tensions come into contact, the liquid with lower surface tension spreads over the other. Here we measure the dynamics of this Marangoni-driven spreading in the drop-drop geometry, revealing universal behavior with respect to the control parameters as well as other geometries (such as spreading over a flat interface). The distance L over which the low-surface-tension liquid has covered the high-surface-tension droplet is measured as a function of time t, surface tension difference between the liquids $\Delta\sigma$, and viscosity η, revealing power-law behavior $L(t) \sim t^{\alpha}$. The exponent α is discussed for the early and late spreading regimes. Spreading inhibition is observed at high viscosity, for which the threshold is discussed. Finally, we show that our results collapse onto a single curve of dimensionless $L(t)$ as a function of dimensionless time, which also captures previous results for different geometries, surface tension modifiers, and miscibility. As this curve spans 7 orders of magnitude, Marangoni-induced spreading can be considered a universal phenomenon for many practically encountered liquid-liquid systems.

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Date submitted: 19 Jul 2017 Electronic form version 1.4