Abstract Submitted
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Statics and dynamics of polymer droplets on topographically structured substrates[1] MARCUS MUELLER, NIKITA TRETYAKOV, Georg-August University, Gottingen, Germany — Using Molecular Dynamics simulations of a polymer liquid flowing past flat and patterned surfaces, we investigate the influence of corrugation, wettability and pressure on slippage and friction at the solid-liquid interface. We devise a computational method to compute the interface potential that does not rely on grandcanonical simulation techniques and quantitatively compare droplet profiles obtained in simulations with the predictions of a thin-film equation using the independently determined interface potential. For substrates structured by one-dimensional, rectangular grooves, we observe a gradual crossover between the Wenzel state, where the liquid fills the grooves, and the Cassie state, where the corrugation supports the liquid and the grooves are filled with vapor. Using two independent flow set-ups, we characterize the near-surface flow by the slip length and the position, at which viscous and frictional stresses are balanced according to Navier's partial slip boundary condition. This hydrodynamic boundary position depends on the pressure inside the channel and may be located above the corrugated surface. In the Cassie state, we observe that the edges of the corrugation contribute to the friction.

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Marcus Mueller
Georg-August University, Gottingen, Germany

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