Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Slip effects in dewetting polymer microdroplets JOSHUA D. MCGRAW, Saarland University, Experimental Physics, D-66041 Saarbrücken, THOMAS SALEZ, Laboratoire de Physico-Chimie Théorique, UMR CNRS Gulliver 7083, ESPCI, Paris, France, SIMON MAURER, TAK SHING CHAN, Saarland University, Experimental Physics, D-66041 Saarbrücken, MICHAEL BENZAQUEN, Laboratoire de Physico-Chimie Théorique, UMR CNRS Gulliver 7083, ESPCI, Paris, France, MARTIN BRINKMANN, Saarland University, Experimental Physics, D-66041 Saarbrücken, ÉLIE RAPHAËL, Laboratoire de Physico-Chimie Théorique, UMR CNRS Gulliver 7083, ESPCI, Paris, France, KARIN JACOBS, Saarland University, Experimental Physics, D-66041 Saarbrücken — Spherical caps on a substrate with less than equilibrium contact angles contract as a result of capillary forces. Applying the classical no-slip condition at the liquid-substrate interface results in diverging stress at the contact line. This divergence can be alleviated, however, by allowing finite flow velocity at the substrate, corresponding to the slip boundary condition. Experiments have been conducted in which glassy polystyrene microdroplets are placed upon, as substrates, different self-assembled monolayers (SAMs). The spherical caps are prepared such that initial contact angles are much less than the equilibrium contact angle. Above the glass transition temperature, a capillary induced flow is observed; the droplet radii shrink while their heights grow. Furthermore, the intermediate height profiles are highly non-spherical. Different SAMs give rise to differing slip lengths, resulting in dramatic changes to the temporal and morphological path these tiny droplets take toward their equilibrium spherical cap shapes.

Joshua D. McGraw
Saarland University, Experimental Physics, D-66041 Saarbrücken

Date submitted: 15 Nov 2013 Electronic form version 1.4