

Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Capillarity driven contact line motion in cyclic bridge-drop grab-release events HENRIK VAN LENGERICH, PAUL STEEN, Cornell University — Motivated by a reversible adhesion device which uses capillary forces to adhere to a substrate, we study the mechanical work done in a grab-release cycle. That is, the volume of a drop is increased until it grabs the substrate and forms a bridge and then shrunk until it goes unstable and releases from the substrate and forms a drop again. In the instant that a drop becomes a bridge (or vice versa) no work is done on the system, however, energy is dissipated due to the decrease in interfacial energy. This dissipation can be compared with the mechanical dissipation based on the fluid flow. For viscous fluids, a wedge model shows that most of the dissipation occurs in the vicinity of the contact line. The thermodynamic dissipation is compared with that expected in the fluid without the need of static contact angle or slip length.

Henrik van Lengerich
Cornell University

Date submitted: 05 Aug 2009

Electronic form version 1.4