Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Driven Coalescence of Sessile Drops on PDMS Surfaces SHAHAB SHOJAEI-ZADEH, CHRISTINE APPLEBY, SHELLEY ANNA, Carnegie Mellon University — Knowledge of the dynamic behavior of droplets on a surface is important in numerous technological processes including spray cooling, ink-jet printing, and solder jet technology. Although spreading and deposition of drops on surfaces have been studied in detail, most studies on coalescence focus on spherical drops in bulk. In studies of coalescence on surfaces, drops merged due to natural spreading, with little control over drop size or velocity of approach. In this study, we utilize a microfluidic device to inject volume into two approaching sessile drops at a controlled rate, while controlling their separation and thus the initial drop size at coalescence. We simultaneously acquire high-speed images of the side and top views of the coalescence event through use of a prism. Through measurements in both viscous and inertial regimes, we investigate the influence of surface wettability, initial drop size at coalescence, and velocity of approach on the coalescence dynamics. We compare with available theory and propose new scaling arguments with respect to the injected volume flow rate.

Shelley Anna
Carnegie Mellon University

Date submitted: 03 Aug 2006 Electronic form version 1.4