Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Oscillation and recoil of single and consecutively printed droplets

XIN YANG, VIRAL CHHASATIA, YING SUN, Drexel University — Drops are often used as building blocks for line and pattern printing where their interactions play an important role in determining the morphology and properties of deposited functional materials. In this study, the impact, spreading and oscillation of single and consecutively printed drops on substrates of different wettabilities are examined using a high speed camera. The results show that, for a single droplet impacting at a low Weber number, both the inertia and surface tension play important roles in the initial spreading stage before the droplet starts to oscillate. On a substrate of higher wettability, drop oscillation is damped down faster due to stronger viscous dissipation resulted from a longer liquid oscillation path. It is also found that when a drop impacting on an evaporating sessile drop sitting on a hydrophobic substrate, recoil of the combined drop is observed, in contrast to no recoil for the impact of a single drop under the same condition. Furthermore, a single-degree-of-freedom vibration model for the height of oscillating single and combined drops on a hydrophobic substrate is established. The results show that as viscosity of liquid increases, damping of drop oscillation becomes faster, and the combined drop oscillates longer compared to a single drop.

Xin Yang
Drexel University

Date submitted: 02 Aug 2012 Electronic form version 1.4