Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Ink-jet patterned superhydrophobic paper for open-air surface microfluidic devices MOHAMED ELSHARKAWY, THOMAS SCHUTZIUS, CONSTANTINE MEGARIDIS, University of Illinois at Chicago — We present the production of superhydrophobic paper via polymer solution drop-casting on silicon carbide paper. The resulting substrate is patterned using household inkjet printers. The patterning process yields the ability to produce regions of varying wettability by simply controlling the intensity of ink deposited and surface area over which the ink is applied. By manipulating the two previously mentioned parameters we can develop surfaces that are capable of selective droplet sliding and adhesion. The mentioned methodology has produced superhydrophobic paper of advancing angles $157^\circ \pm 4.5^\circ$, receding angles $130^\circ \pm 6.3^\circ$, and droplet sliding angles of $13^\circ \pm 2.3^\circ$. We demonstrate the ability to vary the sliding angles of 10μL water droplets from 13° to 40° by printing lines of a constant intensity but varied width (.1 mm to 2 mm). It is thus possible to produce open-air surface microfluidic devices that are capable of pumpless transport, mixing, and rapid droplet sampling. The ease of the patterning technique allows for any imaginable 2D device to be printed, restricted only by the pattern usability and functionality. Lastly, post processing of printed areas using pH indicator solutions has demonstrated the use of these substrates in the area of Point-of-Care diagnostics.

Mohamed Elsharkawy
University of Illinois at Chicago

Date submitted: 02 Aug 2013 Electronic form version 1.4