Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Flow control for a paper-based microfluidic device by adjusting permeability of paper ILHOON JANG, GANGJUNE KIM, SIMON SONG, Dept. of Mechanical Convergence Engineering, Hanyang University, Korea — The paper-based microfluidics has attracted intensive attention as a prospective substitute for conventional microfluidic substrates used for a point-of-care diagnostics due to its superior advantages such as the cost effectiveness and production simplicity. Generally, a paper-based microfluidic device utilizes capillary force to drive a flow. Recent studies on flow control in such a device aimed at obtaining accurate and quantitative results by varying a channel geometry like width and length. According to the Darcy's law describing a flow in a porous media like paper, a flow rate can be adjusted the permeability of paper. In this study, we investigate a flow control method by adjusting the permeability of paper. We utilize the wax printing for the adjustment and the fabrication of paper channels. A rectangular wax pattern was printed on one inlet channel of a Y-channel geometry. By varying the brightness of the wax pattern, a relationship between the flow rate and permeability changes due to the wax was investigated. As a result, we obtained an effective permeability contour with respect to the wax pattern length and brightness. In addition, we developed a paper-based micromixer of which the mixing ratio was controlled precisely by adjusting the permeability.

Ilhoon Jang
Dept. of Mechanical Convergence Engineering, Hanyang University, Korea

Date submitted: 30 Jul 2014 Electronic form version 1.4