Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Flow control mechanism of capillary driven flow in microchannel using non-mechanical forces. BHARATH BABU NUNNA, SHIQIANG ZHUANG, EON SOO LEE[1], New Jersey Inst of Tech — The capillary driven flow in microchannel is a self-driven flow by the natural phenomenon called surface tension of the fluid. The gradients in surface tension force which influence the flow field in microchannel is generated by the modulation of contact angle through a defined hydrophilization of the PDMS (Polydimethylsiloxane) microchannel surface. PDMS which is hydrophobic in nature is treated with various surface treatments in order to convert it to hydrophilic. The contact angle made by the fluid with the PDMS microchannel surface is altered when the surface is converted from hydrophobic to hydrophilic. The flow rate of fluid in the microchannel is directly proportional to the hydrophilicity of that microchannel since the capillary force which is the driving force of the flow is dependent on the contact angle. Flow control mechanism of capillary driven flow in microchannel using non-mechanical forces is developed by treating the microchannel surfaces with various surface treatments. The precise control of the surface characteristics like hydrophilicity and roughness of the miocrochannel helps to control the capillary flow in microchannel. The flow rate variation with respect to the various surface treated channels are studied.

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Date submitted: 02 Aug 2016 Electronic form version 1.4