Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Glass Coating for PDMS Microfluidic Channels by Sol-Gel Methods THAO DO, ADAM ABATE, DAVID WEITZ, Harvard University — Soft lithography in polydimethylsiloxane (PDMS) allows one to fabricate complex microfluidic devices easily and at low cost. However, PDMS swells in the presence of many organic solvents, which can significantly degrade the performance of PDMS microfluidic devices. We present a method to coat PDMS channels with a glass-like layer using sol-gel chemistry. As a demonstration of chemical resistance, we flow toluene and aqueous Rhodamine B through coated PDMS channels. Toluene is an organic solvent that significantly swells PDMS in a matter of seconds. Rhodamine B is an organic fluorescent molecule that leaches into PDMS and can therefore be used as a fluorescent probe. Indeed, the coating suppresses swelling of the channels when exposed to toluene; it also prevents leaching of Rhodamine B into PDMS channels. In addition, the channels can be functionalized with silanes to precisely control surface properties. We exploit the high chemical resistance and precise surface functionalization of the coating to produce both direct toluene-in-water and inverted water-in-toluene emulsions in coated, functionalized, PDMS microfluidic channels. This combines the ease of fabrication afforded by soft-lithography with the precision control afforded by sol-gel glass.

Thao Do
Harvard University

Date submitted: 21 Nov 2007 Electronic form version 1.4