Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

High-throughput rheology in a microfluidic device[1] ERIC FURST, KELLY SCHULTZ, University of Delaware, HYEJIN HAN, CHONGYOUP KIM, Korea University — High-throughput rheological measurements in a microfluidic device are demonstrated. A series of microrheology samples is generated as droplets in an immiscible spacer fluid using a microfluidic T-junction. The compositions of the sample droplets are continuously varied over a wide range. Rheology measurements are made in each droplet using multiple particle tracking microrheology. We review critical design and operating parameters, including the droplet size, flow rates and rapid fabrication methods. Validation experiments are performed by measuring the solution viscosity of glycerine and the biopolymer heparin as a function of concentration. Finally, an analysis of droplet mixing is performed in order to optimize the device performance. Overall, the combination of microrheology with microfluidics maximizes the number of rheological measurements while simultaneously minimizing the sample preparation time and amount of material, and should be particularly suited to the characterization of scarce or expensive materials.

[1]We acknowledge financial support from the NSF (CBET-0730292).

Eric Furst
University of Delaware

Date submitted: 12 Aug 2011 Electronic form version 1.4