

Abstract Submitted  
for the DFD11 Meeting of  
The American Physical Society

**Monodisperse droplet generation for microscale mass transfer studies**<sup>1</sup> CHRISTINE ROBERTS, REKHA RAO, ANNE GRILLET, CARLOS JOVE-COLON, CARLTON BROOKS, MARTIN NEMER, Sandia National Laboratory — Understanding interfacial mass transport on a droplet scale is essential for modeling liquid-liquid extraction processes. A thin flow-focusing microfluidic channel is evaluated for generating monodisperse liquid droplets for microscale mass transport studies. Surface treatment of the microfluidic device allows creation of both oil in water and water in oil emulsions, facilitating a large parameter study of viscosity and flow rate ratios. The unusually thin channel height promotes a flow regime where no droplets form. Through confocal microscopy, this regime is shown to be highly influenced by the contact angle of the liquids with the channel. Drop sizes are found to scale with a modified capillary number. Liquid streamlines within the droplets are inferred by high speed imagery of microparticles dispersed in the droplet phase. Finally, species mass transfer to the droplet fluid is quantitatively measured using high speed imaging.

<sup>1</sup>Sandia National Laboratories is a multi-program laboratory operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85

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Date submitted: 03 Aug 2011

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