Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Microfluidic modeling of the effects of nanoparticles on the blood-brain barrier in flow[1] CRAIG SCHWAIT, University of Pennsylvania, RYAN HARTMAN, YUPING BAO, YAOLIN XU, University of Alabama — The difficulty of diffusing drugs across the blood-brain barrier (BBB) has caused an impasse for many brain treatments. Nanoparticles (NPs), to which drugs can adsorb, attach, or be entrapped, have the potential to deliver drugs past the BBB. Before nanoparticles can be used, their effects on the BBB and brain must be ascertained. Previous steady-state studies fall short for closely modeling *in vivo* conditions. Convection of nanoparticles is ignored, and endothelial cells' (ECs) morphology differs based on loading conditions; *in vitro* loading with continuous flow exhibit ECs indicating a more similar *in vivo* phenotype. NPs interact with monocytes prior to the BBB, and their toxicity effects were measured in flow conditions using both Trypan Blue cell counting and cell proliferation assays. The microfluidic device designed to model the BBB contained a concentric PES hollow fiber porous membrane in PFA tubing. Full use of the device will include ECs adhered on the inner surface and astrocytes adhered to the outer surface of the PES membrane to model cerebrovascular capillaries.

[1]Funded by NSF REU Site 1062611

Amy Lang
University of Alabama

Date submitted: 19 Jul 2011 Electronic form version 1.4