Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Continuous Electrokinetic Separation of Particles and Cells in a Serpentine Microchannel[1] CAMERON CANTER, JUNJIE ZHU, Department of Mechanical Engineering, Clemson University, Clemson, SC 29634-0921, USA, TZUEN RONG TZENG, Department of Biological Sciences, Clemson University, Clemson, SC 29634-0314, XIANGCHUN XUAN, Department of Mechanical Engineering, Clemson University, Clemson, SC 29634-0921, USA — Particle separation plays an important role in many areas. A variety of force fields have been used to separate particles in microfluidic devices, among which electric field may be the most popular one due to its general applicability and adaptability. So far, however, electrophoresis-based separations have been limited to primarily batchwise processes. Dielectrophoresis (DEP)-based separations require in-channel micro-electrodes or micro-insulators to produce electric field gradients. In this talk we present a novel electrokinetic separation of particles in a serpentine microchannel. The continuous separation arises from the cross-stream particle dielectrophoresis induced by the non-uniform electric field inherent to curving microchannels. We demonstrate a size-based separation of polystyrene beads (1 μm and 5 μm in diameter) and microbial cells (*E. coli* and yeast) in the serpentine microchannel with the application of a small DC electric field. We also develop a numerical model to simulate the particle and cell separation processes.

[1]NSF CBET-0853873

Xiangchun Xuan
Department of Mechanical Engineering,
Clemson University, Clemson, SC 29634-0921

Date submitted: 27 Jul 2010 Electronic form version 1.4