Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Microfluidic pumps based on Induced Charge Electroosmosis and flow Field Effect Transistor phenomena[1] GAURAV SONI, TODD SQUIRES, CARL MEINHART, University of California Santa Barbara — We are developing AC electrokinetic micropumps to drive electrically conductive biological fluids in microchannels. These pumps work on the principles of Induced Charge Electroosmosis (ICEO) and flow Field Effect Transistor (flowFET) phenomena. AC (as well as DC) electric fields can induce electrical double layer on a polarizable surface and in turn, cause fluid motion by moving this layer. However, when the polarizable surface is electrically floating, symmetric vortices are observed on the surface. Symmetry of this flow leads to zero net pumping. In order to achieve pumping, we apply a second AC signal to the polarizable surface. When the magnitude of this second AC signal is different from the floating potential of the surface, unidirectional flow is observed i.e., pumping is achieved by modulating the induced zeta potential of the surface. Pumping caused by modulation of zeta potential is also known as flowFET phenomenon and has been shown to work with DC electric fields by other community members. We show a detailed study of flowFET with AC electric fields.

[1]Supported by an Army grant: 8-487859-25500.

Gaurav Soni
University of California Santa Barbara

Date submitted: 03 Dec 2005 Electronic form version 1.4