Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

The Effect of Electrophoresis and Electroosmosis on Colloid Dynamics at a Micro-Nano-Channel Junction GILAD YOSSIFON, YOAV GREEN, Technion - Israel Institute of Technology — Understanding the electrokinetic interaction between nano-colliodal particles and a nano-channel is of particular interest in the fast growing field of micro- and nano-fluidics. It is well established that both nanocolloids and nanochannels/nanopores play an important role in biomolecular detection. Combining these may open new routes for a more sensitive detection platform. Our design consists of a nano-slot bounded by two micro-chambers, wherein we introduce the dispersed nano-colloids. We drive the fluid and particles into the channel via an electric field using electrophoresis and electro-osmosis. We have derived an analytic expression for the colloid dynamics within the microchamber, away from the nanoslot entrance vicinity where dielectrophoresis effects are dominant. We account for the two opposing mechanisms - electrophoresis and electroosmosis. The latter accounts for the dependence of nanochannel electro-osmotic permeability on electric Debye layer overlap intensity. These theoretical results stand in good qualitative agreement with the experimental findings.

Yoav Green
Technion - Israel Institute of Technology

Date submitted: 03 Aug 2012 Electronic form version 1.4