Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Generalized Electrokinetic Transport of Ions in Nanochannels[1]
FABIO BALDESSARI, JUAN G. SANTIAGO, Stanford University — We present a generalized model for calculating transport of dilute analytes in long, thin nanochannels with overlapped electric double layers, and in the presence of an axial electric field. Differently than published models, we adopt equilibrium between the ionic solutions in the wells and inside the nanochannel to self-consistently predict background electrolyte ion densities and the electric potential field. Furthermore, our model includes the (strong) dependence of ion mobility on local ionic strength of the electrolyte. We present predictions solving simple one-dimensional integrals. We validate our predictions by comparing simulations with measurements of effective mobility of two charged fluorescent analytes in fused silica nanochannels (Bodipy with valence -1, and Fluorescein with valence -2). We present results of separation performance, and we compare electrokinetically-driven field flow fractionation to other established separation methods of the same family

[1]This work is sponsored by the National Institutes of Health (Grant N01-HV-28183) and by a National Science Foundation PECASE Award (J.G.S., CTS-0239080-001).

Fabio Baldessari
Stanford University

Date submitted: 31 Jul 2007 Electronic form version 1.4