Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

**Experimental electrokinetic flow characteristics in cross-shaped microchannels with groove and wavy geometrical inhomegeneities** DIEGO OYARZUN, ALVARO SOCIAS, Universidad de Santiago de Chile, AMADOR GUZMAN, Pontificia Universidad Catolica de Chile — Electrokinetic flow instabilities (EKI) in cross-shaped microchannels occur when a critical local Rayleigh number is reached. To know the range of Rayleigh numbers when either stable or unstable electrokinetic flows happen is very important for suppressing or enhancing the EKI effect on processes such as injection or mixing. One way of enhancing flow mixing is by incorporating geometrical inhomogeneities on the microchannel walls such as groove and/or waves that can disturb or suppress convective and absolute instabilities for highly critical electrokinetic flow regimes. We, first experimentally investigate the flow pattern in a cross-shaped microchannel without groove and waves at the channel walls under an external electric field to determine the Rayleigh number range for stable and unstable flow regimes and the dominants frequencies associated to EKI. Then, we investigate the effect of grooves and waves at the microchannel walls on the electrokinetic flow characteristics for determining the effect of the existence of the geometrical inhomogeneities on the electrokinetic flow patterns for the range of sub-and super-critical Rayleigh numbers. Our primary results for local Rayleigh numbers based on a cross-shaped microchannel with flat walls indicate that at least for subcritical flow regimes there are no unstable, but stable flow regimes.

Amador Guzman
Pontificia Universidad Catolica de Chile

Date submitted: 16 Jul 2014 Electronic form version 1.4