Abstract Submitted
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The effect of multivalent counterions on electrokinetically driven flows[1] NECMETTIN CEVHERI, MINAMI YODA, Georgia Institute of Technology — Various numerical and experimental studies have shown that even trace amounts of multivalent counterions can greatly affect electroosmosis by changing the wall zeta-potential ζ_{w} via both electrostatic and chemical interactions with the diffuse and Stern layer parts of the electric double layer (EDL). We have previously shown that replacing 1% of the monovalent cation by Ca^{++} can almost halve the electroosmotic mobility, and hence the inferred ζ_{w} of a symmetric monovalent electrolyte solution [Datta *et al.* (2009)]. These counterions can, however, also affect electrophoresis of the tracers by changing the particle zeta-potential ζ_{p}. Evanescent-wave particle velocimetry was used to study how trace amounts of divalent cations such as $Ca^{++}$and Mg^{++} affect velocities in the electrokinetically driven flow of various aqueous monovalent electrolyte solutions through channels with a minimum dimension $H \approx 30\mu$m. In all cases, the Debye length $\ll H$. The ζ_{p} of the tracers were characterized by light scattering, and the steady-state distribution of tracers over the first 300 nm next to the wall was determined from these data to investigate the interactions between the negatively charged particle and wall surfaces and the mobile divalent counterions.

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