

Single colloid electrophoresis

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Optical Tweezers are employed to study the electrophoretic and the electroosmotic motion of a *single* colloid immersed in electrolyte solutions of ion concentrations between 10⁻⁵ and 1 mol/l and of different valencies (KCl, CaCl₂, LaCl₃). The measured particle mobility in monovalent salt is found to be in agreement with computations combining primitive model molecular dynamics simulations of the ionic double layer with the standard electrokinetic model. Mobility reversal of a single colloid — for the first time — is observed in the presence of trivalent ions (LaCl₃) at ionic strengths larger than 10⁻² mol/l. In this case, our numerical model is in a quantitative agreement with the experiment only when ion specific attractive forces are added to the primitive model, demonstrating that at low colloidal charge densities, ion correlation effects alone do not suffice to produce mobility reversal.

References:

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