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Electrophoretic "Equilibrium" Profile of Charged Colloids ROMAIN PLANQUES, PAUL CHAIKIN, Dept. of Physics, New York University — We perform an electrophoresis experiment of a concentrated colloid against a semipermeable membrane. The electric field forces the charged particles against the membrane and sets up a concentration profile similar to that of a colloid in gravitational sedimentation equilibrium where gravitational forces compete against the osmotic pressure gradient. In the present case there is a current which flows through the electrolyte so the system reaches a steady state profile rather than equilibrium. The electric field, colloid and ionic concentrations adjust self consistently to produce the profile. We use 91 nm polystyrene spheres with sufficient charge that they crystallize and observe their Bragg scattering as a function of height to determine the lattice spacing and particle concentration. We also use 700nm spheres and obtain their concentration profile with X-ray absorption. The fluid flow is zero for a capped system. Connecting a return tube from the supernatant side above the electrophoretic sediment to below the filter yields an electroosmotic flow and circulation. The profile changes substantially and allows us to study the hydrodynamic interactions as a function of concentration for the electrophoresing particles.

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