

Electro-osmotic flow in bicomponent fluids

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The electroosmotic flow (EOF) is a widely used technique that uses the action of external electric fields on solvated ions to move fluids around in microfluidics devices. For homogeneous fluids, the characteristics of the flow can be well approximated by simple analytical models, but in multicomponent systems such as oil-in-water droplets one has to rely to numerical simulations. The purpose of this study is to investigate physical properties of the EOF in a bicomponent fluid by solving the coupled equations of motions of explicit ions in interaction with a continuous model of the flow. To do so we couple the hydrodynamics equations as solved by a Shan-Chen Lattice-Boltzmann method to the molecular dynamics of the ions. The presence of explicit ions allows us to go beyond the simple Poisson-Boltzmann approximations, and investigate a variety of EOF regimes.

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