# Electrokinetic Transport in Submicron Channels

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A common method for moving materials through the channels of microfabricated fluidic devices (microchips) is electrokinetic transport, i.e., electrophoretic migration of ions and electroosmotic flow of bulk fluid. Electrokinetic transport is simple to implement and only requires electrical connections between the voltage source and microchip. Active control of the applied potentials enables picoliter to nanoliter volumes to be mixed or dispensed with high precision. To date, most of the work has been performed in channels with dimensions ranging from 10 to 100 μm where the double layer thickness is much less than the cross-sectional dimensions. Electrokinetic transport is considered to be axially planar throughout this range of dimensions. As channel dimensions enter the submicron regime, volumetric flow rates are expected to scale with cross sectional area in sublinear fashion. Microfluidic components that have such characteristics are of interest for multiple reasons. For example, such a component could be used to provide electrical connection to a microchannel while restricting conduction of fluid. We are experimentally investigating the electrokinetic transport properties of submicron channels and comparing to theory. Potential applications of such microfluidic features will be discussed.



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