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Electrokinetic Transport in Nanochannels Grafted with Polyelectrolyte Brushes with End-Charging SIDDHARTHA DAS, GUANG CHEN, Univ of Maryland-College Park — Electrokinetic transport in nanochannels grafted with polyelectrolyte (PE) brushes is important for applications such as ion transport, ion manipulation, flow valving, etc. We discuss here a semi-analytical mean field theory approach to study electrokinetic transport in nanochannels grafted with polyelectrolyte brushes with end-charging. The model first probes the thermodynamics and the electrostatics of the PE brushes by appropriately accounting for the entropic (elastic), excluded volume, and electrostatic effects. The resulting knowledge on the electrostatic potential and the PE configuration is next used to obtain the electroosmotic transport. Results demonstrate the role of surface charges (at the end of the PE brushes) in modifying (shrinking or swelling) the brush height. This, in turn, alters the electroosmotic body force and the PE brush layer induced drag force on the fluid flow; therefore, the flow field eventually evolves from a non-trivial interplay of the PE electrostatic, entropic, and excluded volume effects.

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