**Ionic conduction, rectification, and selectivity in single conical nanopores**

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Modern track-etching methods allow the preparation of membranes containing a single charged conical nanopore that shows high ionic permselectivity due to the electrical interactions of the surface pore charges with the mobile ions in the aqueous solution. The nanopore has potential applications in electrically assisted single-particle detection, analysis, and separation of biomolecules. We present a detailed theoretical and experimental account of the effects of pore radii and electrolyte concentration on the current-voltage and current- concentration curves. The physical model used is based on the Nernst-Planck and Poisson equations. Since the validity of continuum models for the description of ion transport under different voltages and concentrations is recognized as one of the main issues in the modeling of future applications, special attention is paid to the fundamental understanding of the electrical interactions between the nanopore fixed charges and the mobile charges confined in the reduced volume of the inside solution.