A Poisson / Nernst-Planck model for ionic transport through synthetic conical nanopores

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EUROPHYSICS LETTERS 71 (2005) 35-41

A theoretical model for ionic transport through synthetic conical nanopores obtained using the track-etching technique is presented. The model is based on the Poisson and Nernst-Planck equations. The results provided by the theory are compared with recent experimental current-voltage curves obtained for polymeric membranes containing single, gold-coated conical nanopores. The calculated profiles of average concentration and electric potential along the pore symmetry axis allow for an intuitive explanation of the rectification properties observed in these systems.