

On the validity of continuous modelling of ion transport through nanochannels

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Ion transport through nanopores is modelled by the Smoluchowski equation. The model, based on properties of a bulk electrolyte solution and containing no adjustable parameters, is compared with ion current data recorded for single cylindrical nanopores in polymeric films. It predicts qualitatively a possibility of constructing an ion current rectifier based on the symmetric nanopore with asymmetric charge distribution. Our experimental data, however, indicate that the bulk-type diffusion approach does not describe the surface current, which gives a significant contribution to the total ion current through nanopores.