Rectification and voltage gating of ion currents in a nanofabricated pore

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EUROPHYSICS LETTERS 60 (2002) 349-355

We have fabricated a voltage sensor in the form of a conically shaped nanopore in a polyethylene terephthalate (PET) foil. The pore is produced by irradiation of the foil with a single heavy ion and subsequent etching in alkaline solution. The resulting pore functions as a voltage gate and rectifies ion current due to changes of its diameter in an electrical field. Ion currents through the pore show voltage-dependent fluctuations, whose kinetics are similar as in voltage-gated biological ion channels and pores.