

A nanodevice for rectification and pumping ions

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The transport properties of single asymmetric nanopores in polyethylene terephthalate (PET) are examined. The pores were produced by a track etching technique based on the irradiation of the foils by swift heavy ions and subsequent chemical etching. Electrical conductivity measurements show that the nanopores in PET are cation selective and rectify the current with the preferential direction of cation flow from the narrow entrance toward the wide opening of the pore. Moreover, the pore transports potassium ions against the concentration gradient if stimulated by external field fluctuations. We show that the rectifying and pumping effects are based on the ratchet mechanism.