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Experimental Nanofluidics in an individual Nanotube ALESSANDRO SIRIA, PHILIPPE PONCHARAL, ANNE LAURE BIANCE, REMY FULCRAND, STEPHEN PURCELL, LYDERIC BOCQUET, Laboratoire de Physique de la Matiere Condensee et Nanostructures — Building new devices that benefit from the strange transport behavior of fluids at nanoscales is an open and worthy challenge that may lead to new scientific and technological paradigms. [1-3] We present here a new class of nanofluidic device, made of individual Boron-Nitride (BN) nanotube inserted in a pierced membrane and connecting two macroscopic reservoirs. We explore fluidic transport inside a single BN nanotube under electric fields, pressure drops, chemical gradients, and combinations of these. We show that in this transmembrane geometry, the pressure-driven streaming current is voltage gated, with an apparent electro-osmotic zeta potential raising up to one volt. Further, we measured the current induced by ion concentration gradients and show its dependency on the surface charge.

[1] L. Bocquet, E. Charlaix, Chem. Soc. Rev., 39, 1073 (2010).
[2] M. Majumder et al., Nature 2005, 438, 44.
[3] J.K. Holt et al. Science 2006, 312, 1034.

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