Abstract Submitted
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Large Apparent Electric Size of Solid-State Nanopores Obtained by Focused Ion Beam Milling REMY FULCRAND, CHOONGYEOP LEE, LAURENT JOLY, ALESSANDRO SIRIA, ANNE LAURE BIANCE, LYDERIC BOCQUET, Laboratoire de Physique de la Matiere Condensee et Nanostructures — Here, we report experimental results that show unexpectedly large ionic conduction in solid-state nano-pores, taking its origin in anomalous entrance effects [1]. The surface conductance inside the nano-pore is shown to perturb the three dimensional electric current streamlines far outside the nano-pore in order to meet charge conservation at the pore entrance. This supports the idea that ion transport is strongly perturbed outside the pore over a healing length given by the so-called Dukin length so as to meet ion current conservation at the entrance of the nano-pore. We developed a simplified analytical model for the conduction in nano-pores, which provides a very good agreement with experimental results. This unexpected effect can be interpreted in terms of apparent electrical size of the nano-pore much larger than its bare geometrical size. Our findings can have a major impact on the electrical detection of translocation events through nano-pores, as well as for ionic transport in biological nano-pores, which use electrical detection of translocation events [2].

[1] C. Lee, L. Joly, A. Siria, A.L. Biance, R. Fulcrand and L. Bocquet, *NanoLetters* **2012**, DOI: 10.1021/nl301412b
[2] L. Song, M.R. Hobaugh, C. Shustak, S. Cheley, H. Goaux *Science* **1996**, 274, 1859.

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