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The time distribution of charged biopolymers translocation through voltage-biased solid-state nanopores[1]

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When a charged DNA or protein molecule is passing through a voltage biased solid-state nanopore in an ionic solution, it generates a current blockage signal characterized by its amplitude and time duration (or translocation time). Many parameters such as solution viscosity, applied voltage, the size, conformation, charge, and the charge sequence of the molecule could all contribute to the translocation time and its distribution. By fitting the translocation times to the solution of a Smoluchowski-type equation for 1D-biased diffusion and using the Einstein relation, the viscous drag force on uniformly charged DNA molecules and the uncertainty in determining the DNA chain length due to the contribution of Brownian motion can be evaluated. Furthermore, the time distribution of globular shaped particles and not uniformly charged unfolded protein molecules will also be discussed.

[1] Li, J. and D.S. Talaga, *The distribution of DNA translocation times in solid-state nanopores.* J. Phys. Condens. Matter 2010. **22**: p. 454129 (8pp).

[2] Ling, D. and X. Ling, *First-passage-time analysis of DNA translocation in solid-state nanopores*, in *APS March Meeting 2012* 2012: Boston, Massachusetts.

[3] Ledden, B., D. Fologea, D.S. Talaga and J. Li, *Sensing Single Protein Molecules with Solid-state Nanopores*, in *Nanopores: Sensing and Fundamental Biological Interactions*, S.M. Iqbal and R. Bashir, Editors. 2011, Springer: New York. p. 129-150.

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