Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Nanopore gating with an anchored polymer in a switching electrolyte bias[1] CRAIG WELLS, INING JOU, DMITRIY MELNIKOV, MARIA GRACHEVA, Clarkson Univ — We theoretically study the interaction between a tethered, negatively charged polymer chain of varying lengths and a solid state membrane with a nanopore when subject to a time-dependent applied electrolyte bias. Brownian dynamics is used to describe the movement of a biomolecule interacting with a membrane immersed in an electrolyte solution. With the help of an applied electrolyte bias, we can control polymer's equilibrium position, extending it inside the pore for a sufficiently positive bias. We find that the amount of time a polymer takes to enter and extend inside a nanopore in a positive bias increases nearly linearly with the chain length, corresponding to an electrically driven process. The time it takes for the chain to exit the pore, however, increases nearly quadratically with chain length, corresponding to a diffusion process. Understanding the dynamical behavior of the tethered polymer chain will facilitate further advances in this area of nanotechnology.

[1]NSF DMR and CBET Grant No. 1352218

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Date submitted: 05 Nov 2015 Electronic form version 1.4