Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

**Effect of charge patterns along nanopores on the translocation kinetics of flexible polyelectrolytes** HARSH KATKAR, MURUGAPPAN MUTHUKUMAR, University of Massachusetts — One of the major challenges in DNA sequencing with nanopore-based electrophoresis is to slow down the DNA translocation. In the present study, we investigate the effectiveness of charge patterns along the pore on translocation dynamics. We perform a coarse-grained, three-dimensional Langevin dynamics simulation of a uniformly charged flexible polyelectrolyte translocating under uniform external electric field through a patterned solid-state nanopore. We maintain the total charge along the pore to be constant, while varying its distribution by placing alternate charged and uncharged sections of different lengths along the pore length. We observe a translocation success ratio close to 100 percent due to the presence of an attractive section near the cis end of the pore in all studied patterns. Further, we observe a nonmonotonic dependence of the translocation time with the period of the pattern. The optimum period corresponding to the longest translocation time is independent of lengths of polyelectrolyte and pore within the range studied. Calculations of mean first passage time based on free energy are able to predict the optimum period of the pattern qualitatively.

Murugappan Muthukumar
University of Massachusetts

Date submitted: 09 Nov 2012 Electronic form version 1.4