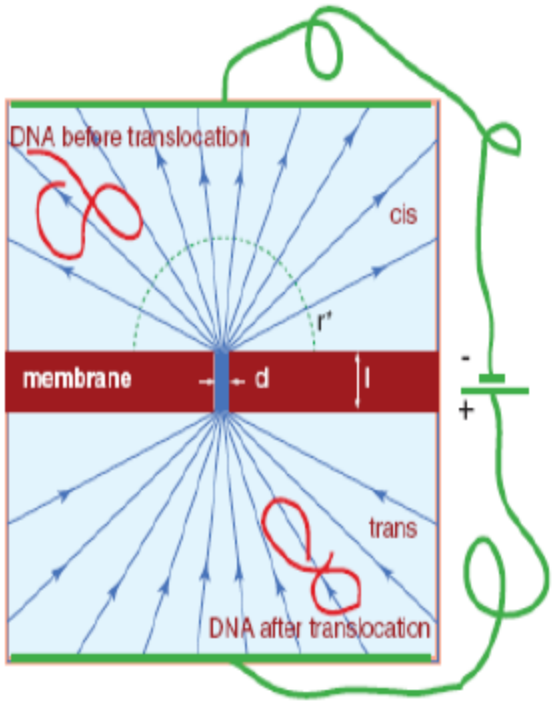
NU-MRSEC MRSEC *Seminar Series*



Electrostatic Focusing of DNA into Nanoscale Pores

Dr. Yitzhak Rabin
Institute for Nanotechnology and Advanced Materials
Bar-Ilan University, Israel

Thursday, July 22
2:00

Ford ITW Classroom

Nanopores are sensors capable of analyzing individual unlabelled DNA molecules in solution. While the critical information obtained from nanopores (e.g., DNA sequence) is the signal collected during DNA translocation, the throughput of the method is determined by the rate at which molecules arrive and thread into the pores. Using a combination of experiment and theoretical modeling, we study the process of DNA capture into silicon nanopores of molecular dimensions. We find an increase in capture rate as the DNA length increases from 800 to 8,000 basepairs and a length-independent capture rate for longer molecules. We show that this change of behavior is the signature of a transition from a free energy barrier dominated regime to a diffusion limited regime as the molecular weight increases. We also show that capture rates can be increased dramatically by enhancing the electric field in the vicinity of the pore by setting up salt gradients across the pore.