Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Protein translocating as unfolded chains through solid-state nanopores THOMAS AREF, ALEXEY BEZRYADIN, UIUC — We have detected translocation of the protein shrimp alkaline phosphatase (SAP) through a solid-state nanopore. The nanopores were fabricated in a silicon nitride membrane using a highly focused electron beam in a transmission electron microscope. Once formed, the nanopore was wet with an electrolytic solution and current was driven through it by application of an electric potential. When introduced to the negative side of the nanopore, the negatively charged SAP produced current blockages as the protein molecules were driven through the pore by the electric field. No current blockages occurred when protein had not been added to the electrolytic solution nor when polarity of the applied electric field was reversed. Furthermore, this globular protein does not appear to translocate as a sphere as might be expected, but rather goes through as an unfolded chain. Our current blockage events are similar to signals produced by lambda DNA translocating through a nanopore significantly larger than the DNA's diameter. This has implications for future experiments using nanopores to probe proteins.

Thomas Aref
UIUC

Date submitted: 20 Nov 2006 Electronic form version 1.4