Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

DNA Physical Mapping via the Controlled Translocation of Single Molecules through a 5-10nm Silicon Nitride Nanopore DEREK STEIN, WALTER REISNER, ZHIJUN JIANG, NICK HAGERTY, CHARLES WOOD, JASON CHAN, Brown University — The ability to map the binding position of sequence-specific markers, including transcription-factors, protein-nucleic acids (PNAs) or deactivated restriction enzymes, along a single DNA molecule in a nanofluidic device would be of key importance for the life-sciences. Such markers could give an indication of the active genes at particular stage in a cell's transcriptional cycle, pinpoint the location of mutations or even provide a DNA barcode that could aid in genomics applications. We have developed a setup consisting of a 5-10 nm nanopore in a 20nm thick silicon nitride film coupled to an optical tweezer setup. The translocation of DNA across the nanopore can be detected via blockades in the electrical current through the pore. By anchoring one end of the translocating DNA to an optically trapped microsphere, we hope to stretch out the molecule in the nanopore and control the translocation speed, enabling us to slowly scan across the genome and detect changes in the baseline current due to the presence of bound markers.

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Date submitted: 20 Nov 2008 Electronic form version 1.4