Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Polymer translocation through a nanopore studied by Langevin dynamics LEI GUO, ERIK LUIJTEN, Department of Materials Science and Engineering, University of Illinois at Urbana-Champaign, Urbana, Illinois 61801 — Polymer translocation through a nanopore has gained considerable attention in recent years, due to its potential application in DNA-sequencing. The design of a corresponding device requires a full understanding of the translocation dynamics. The scaling of polymer translocation time τ with polymer chain length N is an important measure of the underlying dynamics. A recent experiment[1] has uncovered a scaling behavior $\tau \propto N^{1.26}$ that differs from the linear law observed in other experiments. To explain this newly-observed scaling behavior, we have employed Langevin dynamics simulations. Using a bead–spring model for the polymer chain and a membrane composed of one layer of hard-sphere particles, we have studied a wide range of chain lengths $20 \leq N \leq 640$, for different friction coefficients ξ. A crossover scaling behavior was found for τ, which is controlled by both N and ξ. We explain the measured scaling behavior from the chain conformations and instantaneous translocation velocities.

[1]A. J. Storm *et al.*, arXiv q-bio/0404041 (2004).

Lei Guo
University of Illinois at Urbana-Champaign

Date submitted: 28 Nov 2004 Electronic form version 1.4