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Translocation of a Polymer Chain Through a Nanopore Starting From a Confining Nanotube: The Limit of high Peclet Numbers GARY W. SLATER, DAVID SEAN, University of Ottawa, HENDRICK DE HAAN, University of Ontario Institute of Technology — We use Langevin Dynamics simulations to study a scenario where a confining nanotube is used as a way to limit the range of conformations available to a polymer chain prior to driven translocation. We find that the tube not only reduces the variance in translocation times (a useful result for practical applications), but also that the elongated polymer conformations yield longer translocation times (also a useful result) that can be dominated by the post-propagation process when the diameter of the nanotube is smaller than a universal critical value. We adapt the tension propagation theory for this geometry and find agreement with the simulations using a single friction parameter to model the roles of both the nanopore and the crowding. To gain insight into the physical mechanisms behind this effective friction, we systematically remove i) crowding on the trans-side and/or ii) monomer collisions with the membrane containing the nanopore. We find that higher Peclet numbers increase the impact of crowding on the trans side but diminish the impact of the friction between the nanopore and the polymer.

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