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Entropic springs in single-molecule polymer partitioning into protein nano-pores

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The capture and release of single polyethylene glycol molecules by the alpha-Hemolysin pore are observed as time-resolved reversible steps in ion conductance. The capture on-rate, inferred from the step frequency, decreases monotonically with polymer size. However, the polymer residence time shows a cross-over behavior, first increasing and then decreasing with molecular weight (*Phys. Rev. Lett.*, 2006, **97**:018301). Our interpretation is that in case of polymers which are too large to be accommodated within the pore, the out-of-the-pore part of the molecule pulls on the trapped part thus acting as an entropic spring.