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Characterization of Idealized Helical Repeat Proteins in Silicon Nitride Nanopores[1] JIALI LI, BRADLEY LEDDEN, University of Arkansas, DAVID TALAGA, Montclair State University, AITZIBER CORTAJARENA, LYNNE REGAN, Yale University — In this work, we report the measurement of consensus tetratricopeptide repeat (CTPR) proteins with single silicon nitride nanopores. The CTPR proteins were measured in KCl solution at pH below and above its isoelectric point (pI), as well as with and without denaturing agent, Guanidine HCl. When a CTPR protein molecule transits through a nanopore driven by an applied voltage, it partially blocks the ions (K^+ and Cl^-) flow in the nanopore and generates a characteristic electric current blockage signal. The current blockage signal reveals information about the size, conformation, and primary sequence of the CTPR protein molecule. Previous translocation studies carried out with DNA have established that higher bias voltages result in shorter duration current blockages indicating that DNA translocates faster at a stronger electric field. However, our CTPR translocation studies show that longer duration current blockades were observed at higher bias voltages. We discuss how the inhomogeneous distribution of the primary charge sequence of the CTPR proteins predicts translocation barriers that are proportional to the bias voltage. Larger barriers at higher bias voltages will result in longer translocation times, consistent with our experimental results.

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