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Stiff Filamentous Viruses Probe the Mobility of Counterions During Nanopore Translocations ANGUS MCMULLEN, JAY TANG, DEREK STEIN, Brown University — We study the electrophoresis of two different filamentous viruses and double-stranded DNA through solid-state nanopores. The two viruses we examine, *fd* and M13, are both 880 nm in length, 6.6 nm in diameter, very stiff, and monodisperse. They only differ in their linear charge density, which is 30 % lower for M13 than for *fd*. Filamentous viruses are therefore ideal for testing transport models and for comparisons with DNA dynamics. We find that the mean translocation speed of *fd* virus is related to the nanopore diameter, D, and the virus diameter, d, as $\ln(D/d)^{-1}$, in agreement with the conventional electrokinetic model of translocations. In order to obtain quantitative agreement between that electrokinetic model and the measured translocation dynamics, however, one must conclude that the mobility of counterions within a few Angstroms of the polymer surface is strongly reduced from the bulk value. Similar reductions in counterion mobility near *fd*, M13, and dsDNA explain their dynamics over a wide range of ionic strengths. This work was supported by NSF Grant CBET0846505, NSF Grant PHYS1058375 and Oxford Nanopore Technologies.

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