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Manipulating and Separating Polymers and Particles at the Microscale using Conformation-dependent Electrophoretic Mobility PATRICK UNDERHILL, HARSH PANDEY, Rensselaer Polytech Inst — Many separation techniques rely on different physical or chemical characteristics of the objects being separated. This includes separations based on size, total charge, or strength of interaction with a substrate. Recently there are many contexts in which it is important to manipulate or separate objects with different deformabilities. The deformability of an object is also important because it is related to the rheological response. We have developed a coarse-grained Brownian dynamics simulation model that incorporates the change in electrophoretic mobility of rigid as well as flexible objects with conformation. The model incorporates the effect in a computationally efficient way, and has been validated by comparing with experiments with double-stranded DNA. In this talk, we will describe the results of computer simulations using the new model in which we quantify the stretch and residence time of polymers in a combination of electric field gradients and pressure-driven flow. The coupling of the stretch and mobility leads to a new way trap and manipulate biomaterials. A comparison of the simulations with single molecule experiments will also be shown.

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