Micelle Separation In Microfluidic Devices

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ABSTRACT

The lab-on-a-chip-based systems have significant possibility for many life science applications, including genomic analysis, and cell counting and characterization. Integrated microfluidic devices use diffusion-based separation and detection, which allows the parallel flow in a single microchannel. In order to predict the behavior of a blood cell in a long microchannel, Brownian dynamics simulations with the bead-spring model were carried out for a micelle. We model a micelle that is an aggregate of the amphiphilic molecules in order to consider a blood cell. Each amphiphilic molecule is represented through a chain of several effective monomers. All the effective monomers are connected through a finitely extensible nonlinear elastic (FENE) potential. The diffusion tensor in this work includes the hydrodynamic interaction tensor, which relates the velocity perturbation and is obtained by finite element interpolation.