

Abstract Submitted
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Surprising non-monotonic dependence of a polymer's diffusion coefficient on the degree of disorder of the medium OWEN HICKEY, GARY SLATER, University of Ottawa — Many studies have found that the diffusion coefficient of a polymer in a disordered array of obstacles is much lower when compared to polymers in an ordered array of obstacles. We present simulation results based on the Bond-Fluctuation Monte Carlo algorithm where we determine the layout of the obstacles using a local harmonic potential well. When the potential is very strong the obstacles take on a periodic structure and the resulting dynamics obey the scaling laws of reptation. As we reduce the strength of the potential the obstacles are able to move small distances and we see an increase in their diffusion coefficient. Eventually, as the strength of the potential goes to zero and the array becomes completely disordered, strong entropic traps form trapping the polymers for long periods of time which dramatically reduces the diffusion coefficient. The surprising increase of the diffusion coefficient for intermediate amounts of disorder appears to be related to reptation inside wider channels

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