

Abstract Submitted
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Strong Selective Adsorption of Polymers¹ TING GE, MICHAEL RUBINSTEIN, University of North Carolina at Chapel Hill — A scaling theory is developed for selective adsorption of polymers induced by the strong binding between specific (sticky) monomers and complementary surface adsorption sites. We demonstrate that, in addition to the expected dependence on the polymer volume fraction in the bulk solution, selective adsorption strongly depends on the ratio between two characteristic length scales, the root-mean-square distance l between neighboring sticky monomers along the polymer and the average distance d between neighboring surface adsorption sites. The role of the ratio l/d arises from the fact that a polymer needs to deform to enable the spatial commensurability between its sticky monomers and the surface adsorption sites for selective adsorption. The competition between the entropic penalty associated with the deformation of chains and the energetic gain from binding to adsorption sites determines the optimized structure of adsorbed polymers. We study strong selective adsorption of both telechelic polymers with two end monomers being sticky and multi-sticker polymers with many sticky monomers between sticky ends. We have constructed diagrams illustrating different adsorption regimes as a function of l/d and the bulk volume fraction of polymers for telechelic and multi-sticker polymers. For each regime, the conformations of adsorbed chains have been determined, and the thickness of the adsorption layer and the adsorbed amount of polymers in the layer have been calculated.

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