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Tunable Surface Interactions in Adsorbing Polymer Solutions SOROUR HOSSEINI, MARIAN MANCIU, Physics Department, University of Texas at El Paso — Grafted polymers typically enhance the stability of colloidal dispersions, via the long ranged sterical repulsion due to the overlap of their polymer brushes, which can be thicker that the typical range of the DLVO interactions. However, if the polymers are adsorbing on the colloidal surfaces, there is the possibility of bridge formation between particles and therefore long-range attractions are induced (a procedure commonly used for the flocculation of colloidal suspensions). The two effects are competing, and might result in attractive interactions at larger distances and repulsive interactions at shorter distances. These distances, as well as the magnitude of the interactions, depend on the system parameters, such as the grafted density in the brush, the length of the polymer, the adsorption energy between monomers and surfaces, the quality of the solvent or the polymer charge (for polyelectrolytes). We will show that a simple model, which suggests that the configuration of a polymer chain grafted on the interface can be described in terms of short configurations (loops, trains and tails), for which the probability of occurrence are calculated via a constrained minimization, can be employed to determine the interactions between polymer grafted colloidal particles. By tuning the system parameters, the attractive or repulsive interaction can be tailored at any desired distance.

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