FIELD-CONTROLLED MODULATION OF DEPLETION FORCES IN DIPOLAR POLYMER BRUSHES AND COLLOIDAL SYSTEMS

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In this work, we use Langevin Dynamics simulations to demonstrate how external fields can effectively tune the behaviour of dipolar polymer brushes and dipolar colloidal suspensions. For dipolar polymer brushes, applied fields enable control over force profiles, facilitating the trapping and retention of colloidal particles within the brush structure, with the possibility of their subsequent release [1]. Additionally, by selecting appropriate field strengths, repulsive force barriers can be generated to hinder particles from approaching the grafting surface.

Regarding dipolar colloidal solutions, external fields provide a mechanism to adjust depletion interactions between large non-dipolar particles dispersed in the medium. By varying both the orientation and intensity of the applied field, these systems can be engineered to act as guiding platforms for assembling aligned clusters of non-magnetic colloids. They may also function as colloidal tweezers, enabling precise control of interparticle distances, or as ratchet-like devices [2].

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