

Abstract Submitted  
for the MAR14 Meeting of  
The American Physical Society

**The short- and long-time diffusivities of many spheres in the presence of depletants** MEHDI KARZAR-JEDDI, Department of Mechanical Engineering, University of Connecticut, Storrs, CT 06269, REMCO TUINIER, DSM ChemTech; Van't Hoff Laboratory for Physical and Colloid Chemistry, Utrecht University, the Netherlands, TAKASHI TANIGUCHI, Graduate School of Engineering, Kyoto University, Katsura Campus, Nishikyo-ku, Kyoto 615-8510, Japan, TAI-HSI FAN, Department of Mechanical Engineering, University of Connecticut, Storrs, CT 06269 — In a colloid-polymer mixture, polymer depletion plays a key role in phase behaviors and transport properties of colloids. We investigate the stochastic motion of many colloidal spheres in dilute polymer solutions and resolve the short-time and long-time self-diffusivities of the spheres under the depletion effect. The pair additive mobility tensor is computed by the boundary integral method, which accounts for the solvent or depletion layer, and a uniform bulk polymer solution elsewhere. The stochastic Brownian displacement is coupled to the mobility analysis through the fluctuation-dissipation theorem. By tracking the particle trajectories, we found a significant increase of the short-time self-diffusivity due to caged depletion effects. Additional to the slip-like behavior that enhances the diffusivity, the long-time behavior is further complicated by the entropic force that tends to coagulate the spheres.

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Date submitted: 15 Nov 2013

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