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Thermal response of polymer coated colloidal diffusion near surfaces STEPHEN ANTHONY, HUILIN TU, LIANG HONG, PAUL BRAUN, STEVE GRANICK, Departments of Chemistry and of Material Science, University of Illinois — Thermally responsive poly(/N/-isopropylacrylamide) (PNIPAAm) tethered silica particles represent a potential building block for new materials. For this research, Surface-initiated Atom Transfer Radical Polymerization (ATRP) was chosen for its ability to generate well defined, homogeneous polymer brushes on silica nanoparticles and surfaces. Phase contrast optical microscopy was used along with single particle tracking methods to characterize the motion of these particles in suspension as well as close to brush modified surfaces. Temperature dependence experiments reveal that increased temperature decreases the radius of the particles. Additionally, heating may trigger a transition from "sticky" surfaces to "slippery" surfaces. Below LCST, swelled PNIPAAm chains may interdigitate and slow down particle motion. Thermal hysteresis was also apparent; kinetic trapping of particles resulted in the retention of an immobilized population upon cooling. Furthermore, the analysis of the diffusion dynamics also implies interparticle interactions and particle-surface interactions. Understanding the kinetics of this complex fluid system facilitates the design and control of novel materials.

Stephen Anthony
Department of Chemistry, University of Illinois

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