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Evolution of Particle-Scale Dynamics in Suspensions of Weakly Attractive Colloids Undergoing Structural Arrest H. GUO, D. LIANG, Johns Hopkins U., S. RAMAKRISHNAN, C.F. ZUKOSKI, UIUC, J.L. HARDEN, U. of Ottawa, R.L. LEHENY, Johns Hopkins U. — Suspensions of colloids with weak, short-range attractions can undergo an ergodic to nonergodic transition (ENT) as the strength of the attraction or the particle concentration increases. At low densities the transition corresponds to gelation, while at high densities it is identified as an attractive glass transition. We employ x-ray photon correlation spectroscopy (XPCS) to investigate the slowing dynamics associated the ENT in suspensions of nanometer-scale silica colloids coated with octadecyl-hydrocarbon-chains at wavevectors corresponding to interparticle length scales. At high temperatures the chains form a solvated brush that stabilizes the colloids. At low temperature, the brush collapses leading to a short-range attraction between colloids. Following a quench in temperature, the intermediate scattering function displays two features, a plateau value and a terminal relaxation time, that increase with time since the quench. A comparison between suspensions with concentrations of $\phi = 0.20$ and 0.43 shows qualitative differences in their temporal evolution, indicating a crossover from gelation-like to glass- like dynamical arrest. Further, a comparison with rheometry indicates how the slowing particle-scale dynamics correlates with the growth of the system's elastic modulus.

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