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Mobility and diffusion of bound DNA-coated colloids ETIENNE DUCROT, JEREMY S. YODH, Center for Soft Matter Research, New York University, YU WANG, Molecular Design Institute, New York University, YUFENG WANG, Center for Soft Matter Research, New York University, XIAOLONG ZHENG, MARCUS WECK, Molecular Design Institute, New York University, DAVID J. PINE, Center for Soft Matter Research, New York University — DNA coatings have been proposed as a versatile means for programming the self-assembly of micrometer and nanometer size particles. Progress in achieving this goal for particles larger than about 100 nm, where the DNA coatings are typically much thinner than the particle diameter, has been impeded because such DNA-coated colloids stick to each other like Velcro; they collide and bind but fail to anneal into their preprogrammed structure. Most notably, they generally fail to assemble into colloidal crystals but form random aggregates We have prepared micrometer-size colloids coated with single stranded DNA that are mobile even after they bind, so that the particles can rapidly rearrange. Here we report measurements of the mean square displacement Δr^2 of one ssDNA particle on a second ssDNA particle immobilized on a substrate, when the temperature is quenched to just below the melting temperature (near 40°C). For shallow quenches of ΔT 0.5°C, the mean square displacement is proportional to time, Δr^2=At, indicating diffusive motion. For deeper quenches of ΔT 1°C, Δr^2=At$^\alpha$, where α¡1, indicating subdiffusive motion. This behavior is discussed in terms of a random distribution of traps.

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