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Sub-diffusion of DNA Coated Particles Near a Complementary DNA Covered Surface[1] LANG FENG, QIN XU, Center for Soft Matter Research, New York University, RUOJIE SHA, NADRIAN SEEMAN, Chemistry Department, New York University, PAUL CHAIKIN, Center for Soft Matter Research, New York University — We have measured the diffusive behavior of micrometer sized colloids in a DNA covered particle-surface system. Near the particle-surface melting temperature of $\sim 45^\circ$ C we observe conventional diffusion but as temperature is lowered we see a crossover to sub-diffusion over a narrow temperature range. The sub-diffusive behavior is intimately related to the broad distribution of local trapping times. We present a theoretical model which explains the sub-diffusion exponent μ in $< R^2(t) > \sim t^\mu$, which ranges from $\mu = 1$ at 44.7° C to $\mu = 0.33$ at 44.1° C. From the distribution of number of DNA bonds we calculate the trapping time distribution and average trapping time. When the measurement time exceeds the average trapping time the system is in equilibrium and exhibits conventional diffusion. When the measurement time is less than the average trapping time the system is not in equilibrium and is sub-diffusive.

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