Abstract Submitted
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Colloidal interactions and self-assembly using DNA hybridization PAUL BIANCANIELLO, Department of Physics and Astronomy, University of Pennsylvania, ANTHONY KIM, Department of Chemical and Biomolecular Engineering, University of Pennsylvania, JOHN CROCKER, Department of Chemical and Biomolecular Engineering, University of Pennsylvania — The specific binding of complementary DNA strands has been suggested as an ideal method for directing the controlled self-assembly of microscopic objects. Using an optical tweezer method, we have directly measured the attractive interaction and dynamics between DNA-grafted colloidal microspheres. The interactions measured can be modeled in detail with no free parameters, using well-known statistical physics and chemistry, boding well for their application to directed self-assembly. The microspheres' binding dynamics, however, show a surprising power-law scaling that can significantly slow annealing and crystallization. These slow dynamics are due to the lubrication forces in the nanoscale, polymer-filled gap between the spheres. Reducing the density of grafted DNA strands can speeds the dynamics sufficiently to grow small colloidal crystals.

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