

Abstract Submitted  
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**Tunable Time-Dependent Colloidal Interactions** ANDREW M. BERGMAN, W. BENJAMIN ROGERS, VINOTHAN N. MANOHARAN, Harvard University — Self-assembly of colloidal particles can be driven by changes in temperature, density, or the concentration of solutes, and it is even possible to program the thermal response and equilibrium phase transitions of such systems [1]. It is still difficult, however, to tune how the self-assembly process varies in time. We demonstrate control over the time-dependence of colloidal interactions, using DNA-functionalized colloidal particles with binding energies that are set by the concentration of a free linker strand in solution. We control the rate at which this free strand is consumed using a catalytic DNA reaction [2], whose rate is governed by the concentration of a catalyst strand. Varying the concentration of the linker, its competitor, and the catalyst at a fixed temperature, we can tune the rate and degree of the formation of colloidal aggregates and their following disassembly. Close to the colloidal melting point, the timescales of these out-of-equilibrium assembly and disassembly processes are determined by the rate of the catalytic reaction. Far below the colloidal melting point, however, the effects from varying our linker and competitor concentrations dominate. [1] Rogers and Manoharan, *Science* **347** (6222): 639-642 (2015). [2] Zhang, Turberfield, Yurke and Winfree, *Science* **318** (5853): 1121-1125 (2007).

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