

## **Interactions, directed assembly and transformations of colloids using DNA handshaking**

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DNA is a versatile tool for directing the controlled self-assembly of nanoscopic and microscopic objects. The interactions between microspheres due to the hybridization of DNA strands grafted to their surface have been measured and can be modeled in detail, using well-known polymer physics and DNA thermodynamics. Knowledge of the potential, in turn, enables the exploration of the complex phase diagram and self-assembly kinetics in simulation. In experiment, at high densities of long grafted DNA strands, and temperatures where the binding is reversible, these systems readily form colloidal crystals and colloidal clusters having a range of symmetries. For interactions that favor alloying between two same-sized colloidal species, our experimental observations compare favorably to a simulation framework that predicts the equilibrium phase behavior, growth kinetics and solid-solid transitions. We will discuss the crystallography of the novel alloy structures formed, the interesting diffusionless transformations they undergo, and the clusters resulting from reprogramming their colloidal interactions.