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Self-assembly of magnetic nanoparticles JIYEON KU, PHILLIP GEISSLER, Department of Chemistry, University of California, Berkeley — When a solution containing nanocrystals dries, the solute deposits onto the underlying substrate. The nonequilibrium nature of such a process, together with anisotropic interactions between nanoparticles, can drive the formation of intricate transitory patterns. In particular, we are investigating how magnetic nanocrystals can coalesce into faceted, mesoscopic domains that have been observed in experiments. We model the nanoparticles as dipolar spheres and use Monte Carlo methods to advance their arrangements in time from an initially dispersed configuration. Competition between short-ranged, isotropic van der Waals forces and long-ranged, anisotropic electrostatic forces generates diverse hybrid structures, which exhibit both imperfect close-packing and incomplete dipole alignment. We explore the structures obtained under various conditions and speculate on dynamical mechanisms of aggregation and pattern formation.

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