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Directed Assembly of Hierarchically Ordered Clusters from Anisotropic Microparticles[1] KOOHEE HAN, BHUVNESH BHARTI, North Carolina State Univ, C. WYATT SHIELDS IV, GABRIEL P. LOPEZ, Duke University, ORLIN D. VELEV, North Carolina State Univ — The directed assembly of colloidal particles with specific connectivity, symmetry, and directional response requires controlled interactions and means of programmable binding force. We will show how patchy microparticles can be hierarchically assembled into ordered clusters, resulting from directional interactions between metal-coated facets. First, we introduce lipid mediated capillary bridging as a new class of binding force for directed assembly of metallo-dielectric patchy microspheres. Iron oxide surface patches on latex microspheres were selectively wetted with liquid lipids, guiding the particle assembly into well-defined 2D and 3D clusters. The temperature driven fluid-to-gel phase transition of the fatty acids acts as a thermal switch for cluster assembly and disassembly. Secondly, we used external fields to bind patchy microcubes based on their polarization configuration and interparticle interaction. We present assembled clusters of cobalt-coated patchy microcubes that can be dynamically reconfigured using external magnetic field. The residual polarization of ferromagnetic cobalt patches allows for preserving the assembled sequence even in the absence of the field and drives dynamic reconfiguration of assembled clusters.

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