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Entropy Driven SolidSolid Transitions in Colloids CHRISY XIYU DU, GREG VAN ANDERS, RICHMOND NEWMAN, SHARON GLOTZER, University of Michigan — In classical, equilibrium statistical mechanics, entropy-driven order remains one of the most enigmatic phenomena. Although there is considerable work on entropy-driven fluid-solid transitions, the multiplicity of crystals that form in systems of hard, anisotropically shaped colloids suggests the possibility of studying entropy-driven solid-solid phase transitions. Here, we introduce a family of minimal model systems that exhibit solidsolid phase transitions that are driven by changes in the shape of colloidal particles. We carry out a detailed investigation of the thermodynamics of a series of isochoric, diffusionless solidsolid phase transitions within a single shape family, and find transitions that require thermal activation, or are discontinuous, and transitions that occur without thermal activation, or are continuous. Our results have direct implications for designing reconfiguration in soft materials, and our approach opens new avenues for the detailed study of the basic physics of solid-solid transitions, with potential applications in other areas of physics.

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