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A model nanocolloidal rod system to explore structural transitions in networks and bundles GEORGINA WILKINS, University of Michigan, PATRICK SPICER, The Procter and Gamble Company, MICHAEL SOLOMON, University of Michigan — We introduce a model system consisting of self-assembled polyamide anisotropic colloids suspended in aqueous surfactant solutions. The colloidal particles are formed by precipitation from an amorphous polyamide powder that is dispersed with mechanical agitation in an aqueous surfactant phase at temperatures from 59 to 100°C. The aspect ratio increases monotonically with temperature: at T = 59°C, short rods with aspect ratio r = 8 ± 1 form. At T = 100°C, rope like structures with r = 306 ± 14 form. By confocal laser scanning microscopy (CLSM) and dynamic light scattering (DLS) as volume fraction is increased we show a structural transition from dilute rod behaviour with diffusive dynamics to a homogeneous network structure with increasingly slow dynamics. Furthermore, increasing the aspect ratio of rods induces the same structural transition from dilute rod behaviour to a network structure. Finally, we vary the interaction potential between the rods by a polymer induced depletion interaction and observe an unexpected quiescent network to bundle transition. The bundles are several rod diameters wide and 1 - 2 rod lengths long. The rods appear to be ordered nematically within each bundle. The bundling transition leads to an order of magnitude decrease in the storage modulus of the suspensions.

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