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Liquid Crystalline Properties of Amyloid Protein Fibers in Water RAFFAELE MEZZENGA, ETH Zurich, JIN-MI JUNG, University of Fribourg, Switzerland — We have studied the liquid crystalline features of two colloidal systems consisting of food protein amyloid fibrils in water, obtained by heat-denaturation and aggregation of β-lactoglobulin, a globular dairy protein. The resulting fibrils, have a monodisperse cross section of about 4 nm and two groups of polydisperse contour lengths: (i) fibrils 1-10 μm long, showing semiflexible polyeletrolyte-like behaviour and (ii) rigid rods 100-200 nm long. In both systems, the fibers are highly charged (+5 e/nm) and stable in water at low ionic strength (0.01 M) and low pH (pH 2). The physical properties of these systems are studied using a polymer physics approach and phase diagrams of these two systems are obtained by changing concentration and pH. Both systems exhibit rich phase behaviours. Interestingly, the experimentally measured isotropic-nematic phase transition was found to occur at concentrations more than one order of magnitude lower than what expected based on Onsager theory. Experimental results are revisited in terms of the Flory theory developed for rigid polymers in solvent of varying conditions.

Raffaele Mezzenga
ETH Zurich

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