Phase behavior of a suspension of rod-like colloids plus interacting polymer chains

A dispersion of repulsive rods such as colloidal boehmite, gold particles or viruses like Tobacco Mosaic Virus (TMV) and fd-virus undergoes an isotropic-nematic (I-N) transition at low rod concentrations. By mixing rods with nonadsorbing polymer chains it is possible to induce phase transitions at even lower rod concentrations in a controlled way. It is therefore useful to have a simple theory at hand for colloidal rod-polymer mixtures, see Fig. 1.

In this MSc thesis (or BSc honours) project theory will be developed for the phase behaviour of fluid mixtures containing rod-like colloids and non-adsorbing interacting polymer chains. We use existing theory\(^1\) for mixtures of rods and ideal polymers\(^2\) and extend this towards interacting polymers. If time allows we can also look at non-hard\(^3\) rods like charged rods plus depletants.

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\(^3\) Maartje S. Feenstra, BSc (honours) thesis ‘Depletion in Colloid-Polymer Mixtures: The effect on non-hard spheres on the phase behaviour’, July 2014.