Title:

Investigating the gelation mechanism of a colloid gel with thermo-reversible color change using SANS

Abstract:

Small Angle Neutron Scattering (SANS) probes structures over length scales from about one nanometer to hundreds of nanometers and is widely used for soft-matter systems. In this neutron school experiment, we study a new class of colloidal gels formed in binary solvents, known as solvent-segregation-driven gels (SeedGels). When colloidal particles are dispersed in a binary solvent with one solvent component preferentially attracted to the particle surfaces, the microscopic solvent phase separation can lead to the formation of a SeedGel with colloidal particles to preferentially jam within one solvent phase, creating distinct particle-rich and solvent-rich domains. SeedGels are thermoreversible and exhibit highly reproducible structures upon temperature cycling. Some systems also show temperature-controlled, tunable coloration across the visible spectrum, enabling potential optical applications. By measuring samples as a function of temperature and using contrast variation, SANS provides insight into the gelation mechanisms of SeedGels. Various aspects of the experiments from the sample preparation and SANS instrument setup to data treatment and interpretation will be discussed.