Minisymposium « Soft Matter Assemblies »

Lundi 1er décembre 2025 à 14h00

Amphithéâtre Henri Benoît

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Responsive Assemblies in Aqueous Media: From Molecular Interactions to Macroscopic Properties

The formation of reversible physical bonds between macromolecular chains in solution is a simple and versatile method for inducing a liquid/solid transition under controlled environmental conditions. Applications related to the gelation of aqueous media are extremely varied, as they concern a wide range of fields such as oil drilling, cosmetics and biomedical engineering.

The objective of this presentation is to provide a general overview of the structure/properties relationships of responsive gel-forming formulations, highlighting the key role of the interactions involved, their lifetime, and the various stimuli responsible for these transitions. Temperature will be the main trigger for these gelation phenomena but we will also consider the possibility of controlling the reversible formation of hydrogels by tuning other parameters such as pH, ionic strength, shear, or by using additives.

Théo Merland

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Aqueous Two-Phase Systems: From Stabilization to Rheological Properties

Aqueous two-phase systems are obtained by mixing two polymers in water and can be segregative if the polymers display repulsive interactions, or attractive when they are attractive. In both cases these biphasic systems are an opportunity to formulate emulsions deprived of organic phase, which can be fat for food or cosmetics, or toxic organic solvents in many fields. We aim to stabilize these mixtures over long time scales, typically months, to open doors for applications such as texturation or encapsulation.

In this presentation, two systems will be presented. The first consists in polysaccharide/protein mixtures that undergo associative phase separation, namely coacervates. We used two biopolymers that can selectively form gels depending on the thermal treatment of the mixtures. Their microstructure and rheological properties will be presented.

The second system uses the complex coacervation process at a nanometric scale to form fully hydrophilic co-assemblies with a core-corona structure. These co-assemblies named complex coacervate core micelles (C3M) were used as Pickering stabilizers for segregative systems, also known as water-in-water emulsions. The latter were stable for months thanks to the bis-hydrophilicity of the C3M. The control of stability and microstructure by physico-chemical parameters such as C3M concentration and ionic strength will be discussed.

Les personnes souhaitant rencontrer D. Hourdet ou T. Merland sont priées de prendre contact avec Mehdi Vahdati.