

Chitosan-based microgels: Elaboration of a model soft-colloid with controlled microstructure

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Résumé :

In the rich landscape of soft colloids, fundamental understanding is required to synthesize well defined “model” systems that are homogenous at different scales. Their different architectures offer many possibilities to tailor the flow properties and performances of the complex fluid [1]. For microgel, a free-defect structure reaches a homogenous crosslink density, without “loop” and free dangling chains, and a narrow distribution in size. In literature, there is plenty of study about bio-based microgels, especially polysaccharides-based microgels [2]. Nevertheless, controlling their microstructure at different scales remains a challenge.

In this work, we aim to synthesize “model” bio-based soft colloids from chitosan to investigate the impact of their homogeneous/heterogeneous internal structures on their rheological properties in suspension. Chitosan was chosen due to its versatility and as a semi-rigid biopolymer (persistence length from 8 nm) which may provide a unique semi-rigid microgel.

To produce a chitosan-based microgels model, firstly, we focus on crosslinking strategies using thiol-ene chemistry [3] and the optimisation of water in oil emulsion to generate microgels. The rheological study highlights the effect of concentration and temperature on the reaction kinetics and the hydrogel's strength. The synthesis strategies will then be transposed to inverse emulsion and the parameters governing it will be studied during microgel formation.

Références :

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