Séminaire

Mardi 24 février 2026 à 10h30

Amphithéâtre Henri Benoît

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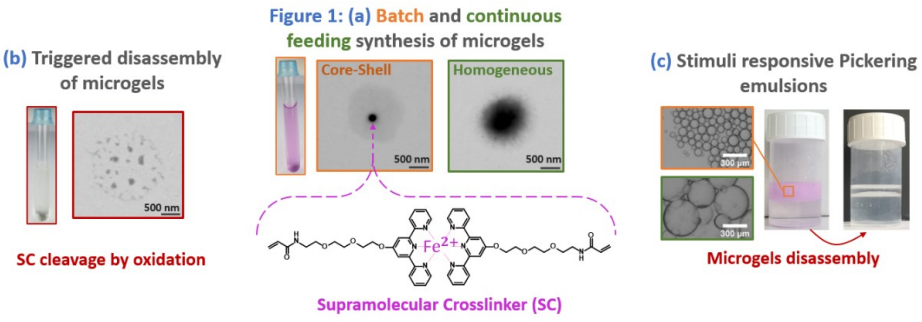
Stimuli-Responsive Supramolecular Microgels: from Microstructure Control to the Study of their Interfacial Behavior

Stimuli-responsive microgels with a well-controlled size and structure are of great interest not only in fundamental research but also in a broad range of applications [1, 2]. In this context, we synthesized supramolecular poly(N-isopropylacrylamide) (PNIPAM) microgels by successfully incorporating a home-made metallosupramolecular crosslinker (SC). (Figure 1a) [3] We show that SC is a powerful tool to both quantitatively characterize and drastically tune the microgels structure, which is a current challenge in literature. Thus, “ultra” core-shell microgels are obtained by batch synthesis conditions, while more homogeneous structures are obtained by a continuous feeding of SC during the precipitation polymerization synthesis. [4]

Besides, these microgels can be disassembled on demand since SCs are cleavable by oxidation, as proven by the disappearance of the characteristic SC pink color. (Figure 1b) The kinetics of SC cleavage (probed by UV-Visible spectroscopy), the kinetics of microgel disassembly (probed by light scattering measurements) and the mass distribution of the polymer chains resulting from the microgel disassembly (analyzed by Size Exclusion Chromatography) are correlated to the microgel initial structure.

Thanks to their original properties, these microgels have been used to steadily stabilize oil-in-water Pickering emulsions, as well as to destabilize them on demand if cleaved. (Figure 1c) [5] Moreover, looking at the droplets size and Cryo-SEM images, we evidenced that the microgel structure is a key parameter to control emulsion properties. [6]



1. M. Karg et al, Langmuir. 35, 6231 (2019) https://doi.org/10.1021/acs.langmuir.8b0430
2. A. Brézault et al, Macromol. Chem. Phys. 2300372 (2023) https://doi.org/10.1002/macp.20230037
3. A. Brézault et al, Macromolecules. 57, 6, 2651 (2024) https://doi.org/10.1021/acs.macromol.3c0255
4. A. Brézault et al, Polymer. 336, 128850 (2025), https://doi.org/10.1016/j.polymer.2025.12885
5. A. Brézault et al, JCIS. 704, 139371 (2026), https://doi.org/10.1016/j.jcis.2025.13937
6. A. Brézault et al, JCIS. 704, 139858 (2026), https://doi.org/10.1016/j.jcis.2026.139858

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