

Development of microgels/ liquid-core capsules composite systems

Capsules composed of a liquid-core surrounded by a polysaccharide membrane, prepared by millifluidic¹⁻³ or reverse spherification⁴, are widely used. Their functionality depends considerably on their permeability and mechanical stability. To modulate their physicochemical properties, several strategies based on polymers blending were developed.⁵⁻⁶

Microgels are smart macromolecular networks swollen by the solvent and which can modulate both their shape and size in response to external stimuli (temperature, pH, ionic force...)⁷.

The objective of this project is to prepare composite systems composed of microgels/ liquid-core capsules and to evaluate their physicochemical properties. To accomplish this, microgels will be first synthesized and characterized using microscopy and dynamic light scattering. Then composite microgels - polysaccharide capsules will be prepared using an already optimized approach. The physicochemical properties of the composite system will be investigated using rheology, compression experiments, and microscopy techniques. The encapsulation of an active molecule will be also envisaged and its release properties from the complex system will be studied using UV-Vis spectroscopy.

References:

¹Alessandri et al., *PNAS* 110.37 (2013): 14843-14848. ²Bremond et al., *Soft Matter* 6.11 (2010): 2484-2488. ³Rolland et al., *Soft matter* 10.48 (2014): 9668-9674. ⁴Ben Messaoud et al., *J. of colloid and inter sci* 469 (2016): 120-128. ⁵Ben Messaoud et al., *J. of colloid and inter sci* 440 (2015): 1-8. ⁶Ben Messaoud et al., *Carbohydrate polymers* 144 (2016): 428-437. ⁷Plamper and Richtering, *Accounts of chemical research* 50.2 (2017): 131-140.

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