Synthesising thermoresponsive colloidal molecules

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Spurred by the wealth of intriguing ordered phases accessible and enabled by important advances in the synthesis of colloids, enormous theoretical and experimental effort has been dedicated to the production of shape- and interaction-anisotropic particles. In this area, non-spherical clusters formed through the association of spherical colloids and referred to as colloidal molecules have gained much interest due to their potential applications in functional materials science where colloidal crystals with novel optical properties are desired. Moreover, when the colloidal molecules or their constituent building blocks are designed so that intermolecular interactions can be evoked, these systems can be used as model systems to study self-assembly and the concomitant construction of increasingly complex structures.

We describe a new route to colloidal molecules where thermoresponsive poly(*N*-isopropylacrylamide) (PNIPAM) and poly(*N*-isopropylmethacrylamide) (PNIPMAM) microgel particles serve as discrete, externally manipulable interaction sites. In a previous study we developed an *in situ* microgel-Pickering emulsion approach for the synthesis of micron-sized microgel-decorated polydimethylsiloxane (PDMS) emulsion oil droplets with a small number of microgels adsorbed to the droplet interface and whose reversible association could be triggered above the volume phase transition temperature (VPTT) of the microgels [1]. We have now studied the time evolution of the synthesis process, which can be quenched through dialysis at a desired state to yield colloidal molecule-like microgel clusters.

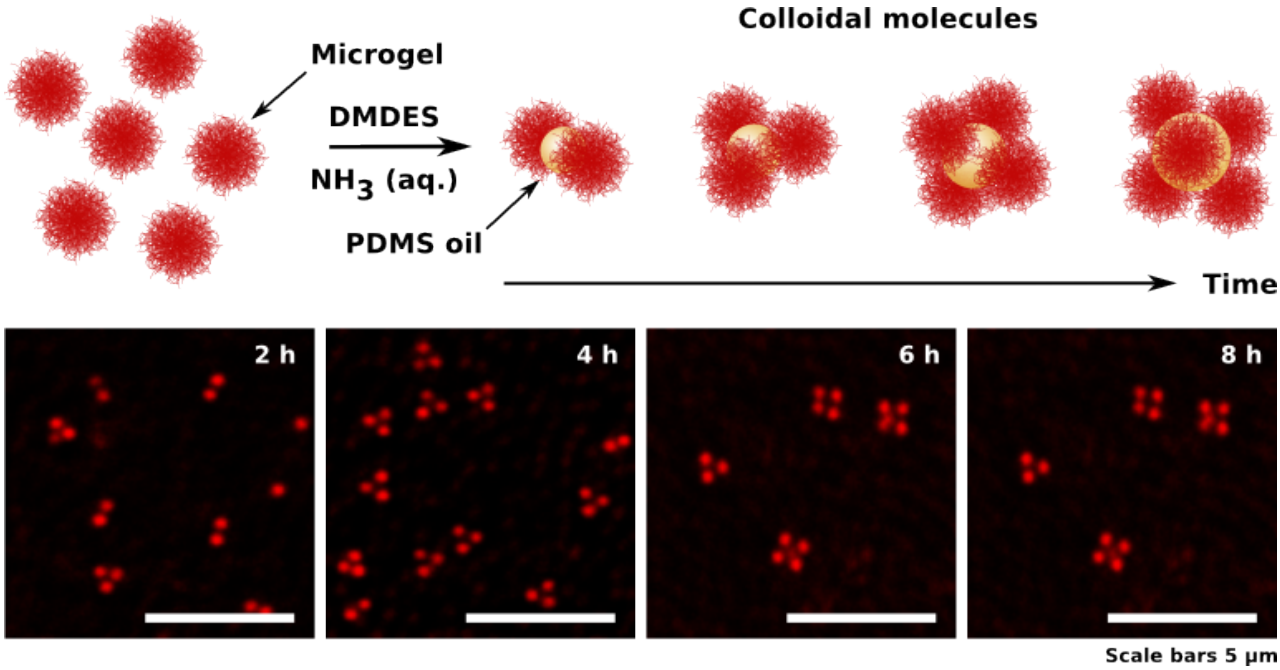

Figure 1 In the early stages of the *in situ* microgel-Pickering emulsion approach, micron-sized colloidal molecule-like microgel clusters are present. The growth can be quenched through dialysis.

[1] L. K. Månsson, J. N. Immink, A. M. Mihut, P. Schurtenberger and J. J. Crassous, *Faraday Discuss.*, 2015, **181**, 49.