

# Using Solid-Stabilised Emulsion Templates for the Preparation of Functional Microcapsules

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Our research group has recently been interested in the production of microcapsules from solid-stabilised emulsion templates. We are particularly interested in using responsive building blocks as part of the stabilising mechanism of the initial emulsions to introduce different functionalities to the final capsules. In addition, we are also interested in the feasibility to produce capsules from Pickering emulsion templates in a large-scale and are currently exploring a number of methods to do so.

This presentation will firstly introduce our work on stabilising emulsions with core-shell nanoparticles, where the solid core is coated with a stimulus-responsive polymer. Subsequently we will show that well-controlled chemical cross-linking of the particles at the oil-water interface allows the construction of a robust shell around the oil emulsion droplets, creating a way to control release of encapsulated material through changes in external stimuli. These structures, that we call capsules at this stage, can also be drained from their oil content, dried and swollen again to encapsulate a water-soluble active of choice.

Secondly, we will report a simple one-pot, scalable procedure for preparing hollow microcapsules from Pickering emulsions with a shell comprised of an inner polymeric porous membrane and an outer layer of colloidal particles. Here, a volatile solvent is extracted from solid-stabilised emulsions resulting in the precipitation of a high molecular weight polymer at the oil-water interface, which entraps the adsorbed colloidal monolayer. We demonstrate the versatility of this method by using several types of particle emulsifiers and by preparing microcapsules of different size, porosity and surface properties. We also demonstrate how this method can be used to prepare polymeric microcapsules with gold nanoparticles embedded within their shells.