MULTI-GRAM PREPARATION OF PH-RESPONSIVE DX MG COLLOIDSOMES BY A SCALABLE APPROACH

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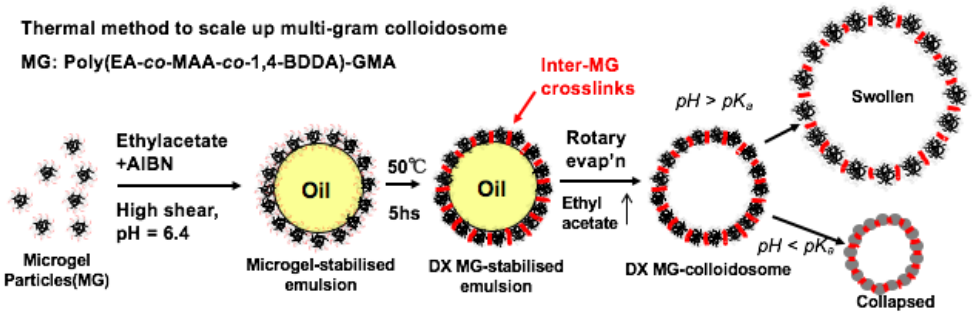
Biodegradable pH-responsive hollow polymer particles have excellent potential for preparing high performance biomaterials. Recently, we reported that pH-responsive microgel-colloidosomes was prepared using microgel particles as the building blocks and macro-crosslinker [1]. Our method used covalent inter-linking of vinyl-functionalised microgel particles adsorbed to oil droplets to form shells of doubly crosslinked microgels (DX MGs). Unfortunately, this method is unsuitable for scale up. Here, we greatly expand and extend that work by investigating pH-responsive hollow particle systems based on poly(EA-co-MAA) (ethyl acrylate and methacrylic acid) using a scalable thermal crosslinking route (Scheme 1). The hollow polymer particles were crosslinked by covalent inter-linking of vinyl-functionalised microgel particles and gave micrometer-sized colloidosomes that were pH-responsive (Fig. 1). This is the first time we have obtained more than 1 g of pH-responsive DX MG colloidosomes. The properties of these microgel-colloidosomes dispersions imply they have good potential for future application as injectable gels for regenerative medicine. Further, the work indicates that the size of the colloidosomes can be controlled simply by preparation conditions.



Scheme 1. Illustration of DX MG-colloidosome preparation using pH-responsive microgel particles.

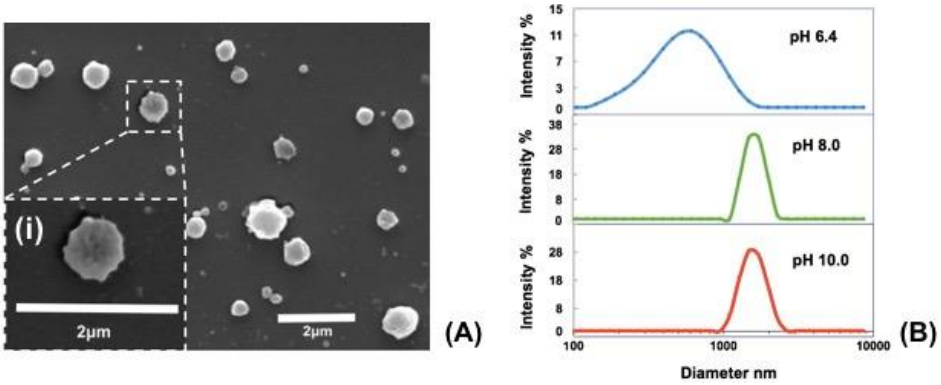


Figure 1. Morphologies of pH-responsive microgel coloidosomes (A) and DLS data measured at various pH values (B) for DX MG-colloidosomes

[1] Wang et al., *Chem. Commun*., 51, 3854, 2015.