

Preparing capsules from water-in-water emulsions, towards synthetic cells

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We report the bulk preparation of hollow capsules having a gelatin shell. Hot aqueous dispersions ($>40^{\circ}\text{C}$) of gelatin/polyethyleneglycol (PEG) form aggregated gelled droplets upon cooling. However, addition of alginate ($<0.1\%$) yields to non-aggregated PEG-in-gelatin-in-PEG double emulsion droplets possessing a multinuclear core. Upon resting the double emulsion above the melting temperature of gelatin, the inner PEG-in-gelatin droplets coalesced resulting in the formation of yolk (PEG)-shell (gelatin) mononuclear capsules dispersed in the PEG continuous phase. These capsules, which we called gelatinosomes, are shown to encapsulate payloads even when further dispersed in water, suggesting possible applications in microencapsulation, drug delivery and synthetic biology.

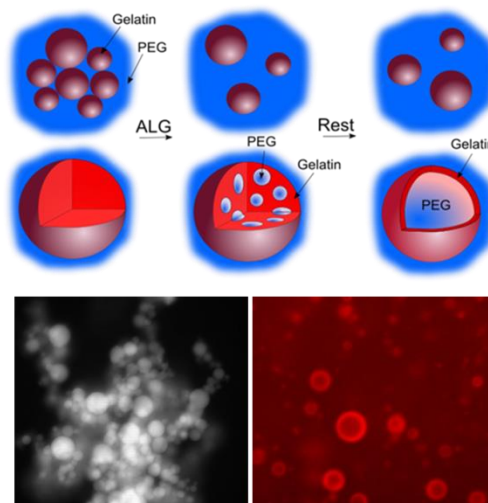


Figure 1: Up) Schematic representation showing how hollow capsules called ‘gelatinosomes’ are prepared. **Bottom)** Epifluorescence images of aggregated gelatin beads (left) and ‘gelatinosomes’ (labelled with Pyronin, right).