

Furthermore, embodiments of the disclosed methods do not involve the more complex and less scalable steps of stabilization of droplets by pickering emulsion and then subsequently growing shell on the pickering stabilized emulsion to obtain hollow structures. Instead, embodiments of the disclosed methods involve creating a primary inner core such as an inorganic inner core, for example, a silica inner core, then producing a pickering emulsion using polymer particles, and then curing it on the surface to create a polymer shell, thus obtaining a hybrid capsule by simple steps.

As compared to known methods that involve in situ polymerization (which can be sort of classified as precipitation polymerization), embodiments of the disclosed method are able to use preformed commercially available functional polymers. As such, embodiments of the disclosed method are able to separate a polymer coating incorporation step from a primary capsule shell (e.g. silica) formation step, thus having more versatility and do not suffer from the shortcomings of an active reacting with the functional polymer. If desired, embodiments of the methods disclosed herein may optionally involve a polymerization step that is done separate in water to form latex particles which are adsorbed onto and cured to form a polymer shell around existing primary capsule shell such as silica shell. This allows a sufficiently distinct polymer layer around a first primary capsule shell such as a first silica shell to be formed and no cross-linking (chemical reaction) is involved in creating a second polymer shell/coating and hence only a physical approach is used for shell formation.

Advantageously, embodiments of the disclosed methods are capable of preparing an active loaded primary capsule e.g. silica capsule (as opposed to hard solid particle) whilst forming substantially uniform coating around the surface e.g. a silica surface using polymer latex particles (e.g. a reinforced silica shell by physical deposition of preformed polymeric nanoparticles on micron sized silica particles may be obtained). Accordingly, embodiments of the methods disclosed herein are capable of producing capsules with potentially higher stability to high shear compared to capsules in the art.