

Responsive Soft Materials by Self-Assembly

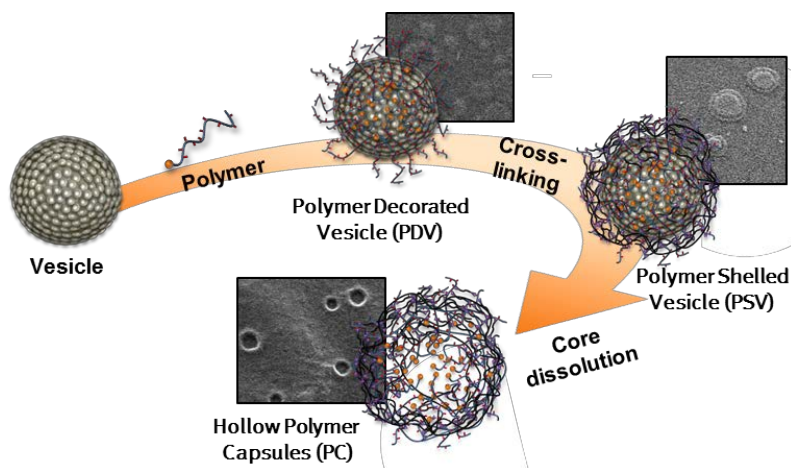
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Self-assembly is emerging as a superior method to prepare adaptive and responsive nanomaterials. Responsive multivalent interactions are key to such versatile materials. This lecture will highlight soft materials composed of cyclodextrins and/or superparamagnetic nanoparticles. It will be shown that using the host-guest chemistry of cyclodextrins, we can form hydrogels as well as nanocapsules. We can also make “magnetic vesicles” that self-assemble in microscale linear aggregates in aqueous solution under the influence of a magnetic field. The metastable linear aggregates can be stabilized by a noncovalent and photoresponsive cross-linker, which can be photoisomerized between an adhesive and a nonadhesive configuration. Thus, the hybrid material responds to magnetic field as well as to light and a stable self-assembled structure can only be obtained in a magnetic field in the presence of the noncovalent cross-linker. We have recently extended this strategy to superparamagnetic nanoparticles modified with cyclodextrin. These hybrid nanoparticles can be further functionalized using host guest interaction and molecular recognition and they can be used to capture and isolate proteins.



References:

1. A. Samanta, B. J. Ravoo, *Angew. Chem. Int. Ed.* **2014**, *53*, 12946–12950.
2. S. Himmelein, V. Lewe, M. C. A. Stuart, B. J. Ravoo, *Chem. Sci.* **2014**, *5*, 1054-1058.
3. J. H. Schenkel, A. Samanta, B. J. Ravoo, *Adv. Mater.* **2014**, *26*, 1076–1080.
4. Samanta, A.; Tesch, M.; Keller, U.; Klingauf, J.; Studer, A.; Ravoo, B.J. *J. Am. Chem. Soc.* **2015**, *137*, 1967–1971.