

Nanocapsules via Layer-by-Layer Self-assembly Technique

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Abstract

Since there are great potential applications of nano-structured colloidal materials in various areas, the design and fabrication of such systems have attracted significant interest ^[1].

The main objective of this research is to produce nano-capsules for drug delivery applications. The scope of this work includes the synthesis of silica and polystyrene particles, the fabrication on particle templates with biomaterials via Layer-by-Layer self-assembly method ^[2], and the core removal process.

There are two kinds of core templates in this project: silica and polystyrene particles. The silica particles were prepared through the hydrolysis of alkoxysilanes ^[3], and the polystyrene particles were from polymerization of styrene monomer ^[4], and both of the particles have the size range from tens of nanometers to microns. Chitosan and Dextran Sulfate Sodium Salt comprised the shell the capsules which were built on the core templates. In addition nanoparticles, such as laponite, gold, and magnetite can be incorporated into the capsules to give added mechanical strength and to make the capsules sensitive to external fields, such as light and magnetism

Zeta potential measurement is used to certify the existence of multi-layer film on the top surface of particles, and the final results including the core-shell construction and nano-capsules could be seen from SEM and TEM pictures.

References:

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