

Multilayers of chitosan and alginate for the development of core-shell nanocapsules

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The Layer-by-Layer (LbL) self-assembly deposition can be performed by consecutively adsorbing oppositely charged polyelectrolytes on to a charged template. The main driving force is thus the strong electrostatic interaction between oppositely charged polyelectrolytes. This technique has been extensively used for the preparation of capsules, mainly because it is an inexpensive, highly adaptable, and facile solution-based assembly method, thus allowing materials to be designed and assembled with specific properties and nanoscale precision. Moreover, LbL capsules are promising and multifaceted nanocarriers with a wide range of applications.

The present work aims at developing biodegradable nanocapsules as carriers of different bioactive compounds (5-aminosalicylic acid and Glycomacropeptide) through the LbL assembly of chitosan and alginate. Nanocapsules were built through the deposition of four (chitosan/alginate) layers on polystyrene (PS) nanoparticles (diameter \approx 120 nm), used as templates, being the bioactive compounds deposited on the third layer, followed by removal of the PS core with Tetrahydrofuran. Multilayer capsules were characterized by means of dynamic light scattering (DLS) (size and zeta potential). The zeta potential showed the stepwise deposition of chitosan (\approx +58) and alginate (\approx -59) alternating layers on the PS nanoparticles. DLS measurements showed that the size of the nanocapsules is on the order of nanometers, with increasing values with the successive deposition of the polyelectrolytes. Also the encapsulation efficiency of the bioactive compounds in the capsules was determined, with the best results (\approx 70%) for the system containing 5-aminosalicylic acid.

These multilayer capsules demonstrated a good ability to encapsulate two different bioactive compounds, being a promising carrier system with functional properties for applications in different areas such as food and pharmaceutical industries.