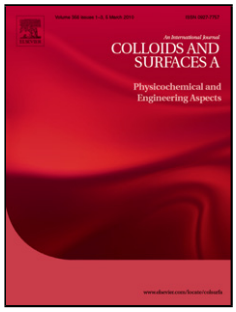

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Synergetic effect of polyethylene glycol-grafted chitosan and bovine serum albumin on colloidal stability of polyelectrolyte nanocapsules

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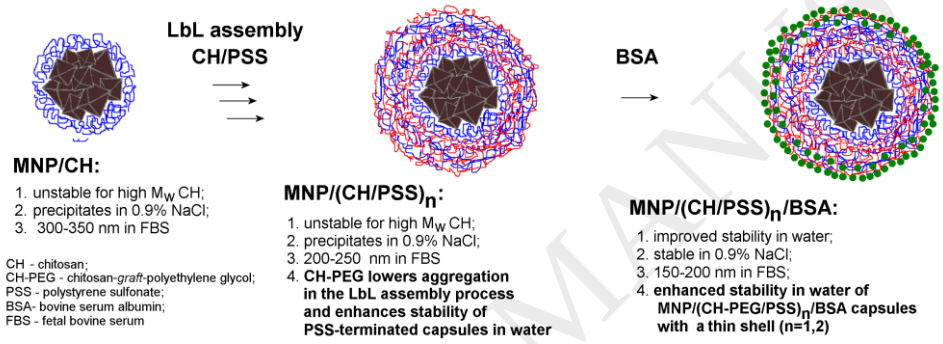
Graphical abstract



Abstract

Layer-by-layer (LbL) nanocapsules with a shell on the basis of chitosans (CH) of different molecular weights (CHx, hereafter x stands for M_w of the polysaccharide used), including those grafted with polyethylene glycol (CHx-PEG), and polystyrene sulfonate (PSS) were obtained on Mg-doped magnetite cores (MNP) and further coated with a layer of bovine serum albumin (BSA). The outermost BSA layer plays a key role in maintaining high aggregative stability of nanocapsules in 0.9% NaCl and preserving their low diameter in serum. The diameter of nanocapsules remains below 100 nm in the process of LbL assembly of low molecular weight CHx. The influence of polyethylene glycol-grafted CHx on the stability of LbL nanocapsules is contradictory. The co-introduction of two hydrophilic components, i.e. CHx-PEG and BSA, in the LbL shell supports high aggregative and sedimentation stability of the colloids, increases storage time of aqueous solutions of nanocapsules to the higher degree than each component on its own. The synergetic effect of copolymer and albumin on stability is especially noticeable for the nanocapsules containing one or two bilayers. By using PEG-grafted chitosans and BSA in