Encapsulation of surfactant-polyelectrolyte complexes via sequential adsorption of polyelectrolytes

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Interaction of oppositely charged surfactants and polyelectrolytes usually results in formation of nanostructured surfactant-polyelectrolyte complexes. Depending on the relative concentration and properties of the surfactant/polyelectrolyte pair, such complexes can be used as cores for encapsulation of various active components.

The aim of this work was to develop a method of preparation of loaded nanosize capsules based on the encapsulation of surfactant-polyelectrolyte complex by sequential adsorption of polyelectrolytes. Using various types of cationic surfactants (N-dodecyl N,N,N trialkyl ammonium bromides, and N,N,N’,N’-tetramethyl-N,N’-di(ndodecyl)-alkylene-diammonium bromides (gemini cationic surfactants having two dodecyldimethylamonium groups connected at the level of head-groups by a (-CH2-)n spacer group)), and of polyanion: PSS poly(sodium-4-styrene sulfonate), surfactant-polyelectrolyte bulk complexes were formed. These negatively charged cores (complexes) were encapsulated by layer-by-layer adsorption of polyelectrolytes, polycation PDADMAC (Polydiallyl Dimethyl Ammonium Chloride) and polyanion PSS. We used the saturation method for formation of consecutive layers and we determined the optimal conditions concerning concentration of surfactant and polyelectrolytes to form stable capsules. Obtained nanocapsules were characterized by dynamic light scattering (DLS) and ζ-potential measurements. Average size of capsules was in range 80-100nm. To demonstrate possibility of encapsulation of hydrophobic compound, we enclosed oil-soluble fluorescent dye, Cumarine-6.

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