

New nanocomposite planar nanostructures and colloid capsules based on the complexes of polymers, lipids, amphiphiles and functional nanoparticles: synthesis, structure, properties and controlled stimuli-addressed activation



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We present results of design, preparation and characterization of new nanocomposite nanostructures: monolayers, films and colloid capsules perspective for development of novel efficient means for capsulation, targeted transport, controlled spatial localization and stimuli-addressed delivery of various compounds in aqueous media for biomedical controlled drug delivery and other applications. The developed nanostructures are based on the complexes of biogenic lipids, synthetic cationic amphiphilic compounds, biogenic and synthetic polyelectrolytes, and functional inorganic nanoparticles (magnetic iron oxide nanoparticles and plasmonic Au nanoparticles). The features of interactions of colloid inorganic nanoparticles and polyelectrolytes of aqueous phase with hybrid Langmuir monolayers and liposomes formed by phosphatidylcholine and cationic amphiphiles have been studied. Nanocomposite capsules were prepared by sequential adsorption of colloid inorganic nanoparticles and polyanions onto the cationic hybrid liposomes. The electromagnetic impulses effects on the nanocomposite capsules have been studied and discussed.