SL 11

HYDROPHILIC MICROSPHERES CONTAINING α-*tert*-BUTOXY-ω-VINYLBENZYL-POLYGLYCIDOL FOR IMMUNODIAGNOSTICS: SYNTHESIS, PROPERTIES AND BIOMEDICAL APPLICATIONS

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One of the most important requirements for microspheres suitable for diagnostic applications is inertness of their surface with contact of tissues or biological liquids. Moreover, in many medical applications such as diagnostic tests, drug delivery systems, temporary and permanent implants, surfaces should allow for controlled and efficient covalent immobilization of biomolecules (antibodies, enzymes, oligosaccharides, etc) without their unwanted and uncontrolled adsorption.

Recently, our attention was concentrated on synthesis and surface properties of poly(styrene/α-tert-butoxy-ω-vinylbenzylpolyglycidol) microspheres (P(S/PGL)) with hydrophilic polyglycidol in the surface layer. Polyglycidol is a hydrophilic polymer, which backbone is similar to poly(ethylene oxide) but it has one methylhydroxyl group in each repeating unit. This group can be used, after activation, for covalent binding of biomolecules.

In this communication, we report on synthesis and characterization of microspheres with polyglycidol content in their interfacial layer and on interactions (adsorption and/or covalent immobilization) of selected proteins with their surface.

Microspheres were obtained by one step emulsion copolymerization of styrene and soluble in water α-tert-butoxy-ω-vinylbenzylpolyglycidol macromonomer (PGL) (M_n=2700) initiated with $K_2S_2O_8$. Syntheses yielded monomodal microspheres with the number average diameters in the range from 200 to 900 nm and with controlled surface fraction of polyglycidol, depending on concentration of macromonomer in polymerizing mixture.

Our studies were directed towards determination of the dependence of particles' diameters, charge and electrophoretic mobility on pH of medium, ionic strength and temperature. Results of these investigations allowed better understanding of subsequent studies of protein interactions with surface of microspheres. Important results were obtained in studies of protein adsorption and covalent immobilization on P(S/PGL) microspheres. In all investigated cases the maximal surface concentration of adsorbed proteins was much lower for P(S/PGL) microspheres than for the polystyrene ones (PS). The modification of hydroxyl groups from PGL allowed for efficient covalent immobilization of biomolecules with elimination of non specific adsorption.