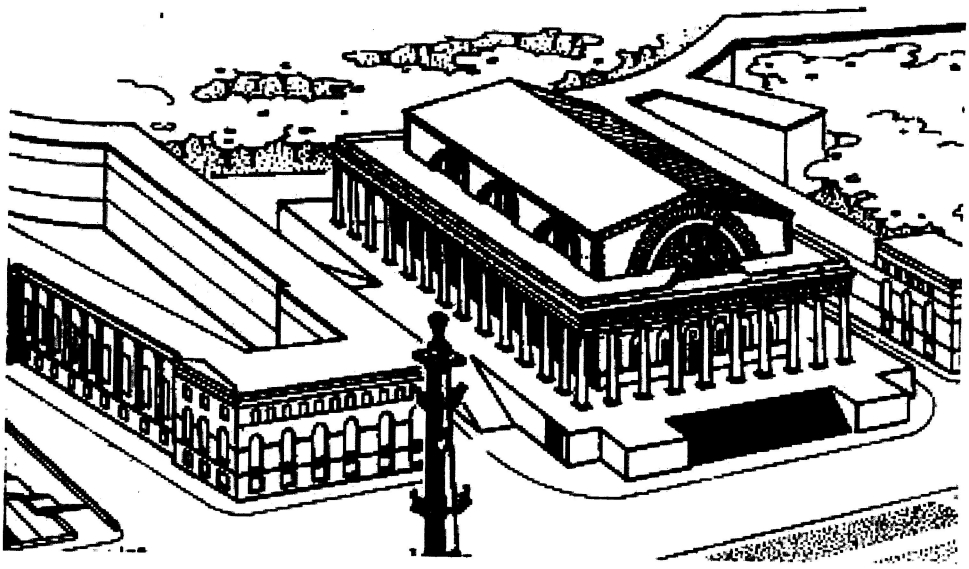
PROGRAM AND ABSTRACT BOOK



MODERN PROBLEMS OF POLYMER SCIENCE

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SESSION 3
BIO-RELATED AND MEDICAL POLYMERS

ORAL PRESENTATIONS

3-O-01

MOLECULAR IMPRINTED SUPERMACROPOROUS CRYOGELS FOR PROTEIN RECOGNITION

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Studying of biomolecules interactions at solid-liquid interface is important for a comprehension of various biological processes, such as cell adhesion, their interaction among themselves and with an intercellular matrix, fermentation catalysis, endocytosis, etc. Also similar researches have huge practical interest for analytical determination of biomolecules and their solid-phase extraction from various biological liquids.The relevant problem of modern chemistry, pharmacy, medicine and biotechnology is the creation of systems with properties of artificial receptors. Such systems should possess high selectivity of target biomolecules binding. In order to obtain such systems an alternative to method of direct biomolecules immobilization on the surface, which has a number of significant shortcomings is offered. The method of molecular imprinting consists in the formation of a pre-polymerization complex between the template-molecule and functional monomer, followed by crosslinking reaction and fixing the template in the polymer network. Finally, the molecules of template are removed and formed "cavities" or "imprint sites", which are complementary to the template molecule. For this reason, these prints are also called "artificial receptor".

The supermacroporous swelling systems were obtained by the formation of a polymeric structure in a semi-frozen system in which solvent crystals act as a porogen. These systems are usually termed as cryogels. They are of great interest for molecular imprinting of biomacromolecules, because they possess large pore size and high interporous connectivity that provides relatively free diffusion of protein in the system.

Imprinted systems are attractive for practical application because they are easy to obtain, stable during long time, and, at the same time, show high selectivity and specificity, which are comparable to parameters of natural ligand-receptor couples. Thus, the method of molecular imprinting is quite perspective for creation of biofunctional scaffold by formation of bioligands imprints, which are capable to interact specifically with cellular receptors, that will open new frontiers in the field of biodistinguishing systems creation.

In this regard, the purpose of this work was creation of polymeric matrices with molecular imprints of chymotrypsin in their structure. The matrices were obtained by cryo-copolymerization of 2-hydroxyethyl methacrylate with N,N'-methylene-bis-acrylamide or sodium alginate adduct with 2-hydroxyethyl methacrylate and poly(ethylene glycol) dimethacrylate at different comonomer concentrations and with various crosslinking degrees. The properties of the synthesized systems were studied. Developed interporous connectivity was studied by X-ray nano-tomography method, a presence of large sized (10 - 160 mm) pores in the cryogels was established by SEM method, using uniaxial compression tests resistance to mechanical deformation was investigated. Swelling capacity of obtained cryogels also was studied.

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