Abstracts of Posters

P01
SYNTHESIS OF POLYLACTIC ACID (CO)POLYMERS BEARING DOUBLE BONDS OF DIFFERENT ORIGIN FOR CONSTRUCTION OF BIODEGRADABLE MONOLITHS

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In this report the synthesis of polymers that can be used for construction of biofunctional bio-degradable supraporous monoliths is described. Such monoliths are suggested as scaffolds for bone tissue engineering. It is well known that major drawbacks of known biodegradable scaffolds based on polylactic acid (PLA) are uncontrollable mechanical properties, as well as obstacle introduction of reac-tive groups for biofunctionalization. To overcome these difficulties, the new "Molecular Lego" strategy is proposed. The constructional details for such "Lego" are planning to form for polymers based on lactic acid but containing reactive double bonds. In our work we synthesized two types of PLA polymers bearing unsaturated bonds. First type involves PLA macromolecules which measured amount of chain-terminal methacrylate group. Such polymers were synthesized by ring-opening polymerization of lactide in a presence of 2-hydroxyethylmethacrylate (HEMA). The copolymer PLA-HEMA obtained will be applied for construction of intramolecular cross-linking within PLA-based macroporous scaffolds. The second type of polymers discussed is amphiphilic block-copolymers synthesized by cou-pling of PLA and poly(ethylene glycol) (PEG) macromolecules. The latter can also represent copolymers of ethylene glycol with monomers containing unsaturated bond in their structure (PEG-db). Such macromolecules were synthesized by two general ways: (1) condensation of ethylene glycol with bifunctional unsaturated substances, like 1,6-dichlorhex-3-ene; (2) ring-opening copolymerization of ethylene oxide with unsaturated molecules containing oxirane ring in their structure like glycidyl methacrylate (GMA) and allylglycidyl ether (AGE). The macromolecules obtained are perspective for followed surface biofunctionalization of PLA-monolithic scaffolds by means of grafting of reactive hydrophilic polymers.

P02
SEPARATION OF HUMAN IMMUNOGLOBULIN G SUBCLASSES USING MONOLITH TECHNOLOGY

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There is an increasing demand for highly purified immunoglobulin G (IgG) since they have found wide range of potential application in immunodiagnostics and immunotherapy.(1) Human IgG consists of four subclasses (IgG1, IgG2, IgG3 and IgG4) that show differences in some of their physicochemical characteristics and biological properties.(2) The present study aims to separate subclasses of human IgG using monolithic stationary phase by SMB technology. For this purpose, preliminary experiments will be performed using CIM® r-Protein A tube monolithic column and CIM® disk (QA, DEAE and SO3) monolithic columns (BIA Separations, Inc.). The chromatographic behavior of the human IgG and its subclasses will be examined and parameters such as the buffer type, gradient mode, flow rate, pH and salt concentration will be optimized.

Reference
[1] M´H. Hasnoi, M. Debbia, S. Cochet, J. P. Cartron, P. Lambin, and O. Bertrand, J Chromatogr A, 766, 49-60, (1997). [2] R. G. Hamilton, Clin. Chem., 33/10, 1707-1725, (1987).

P03
RIBONUCLEASE MONOLITHIC-COLUMN BIORECTORS: PREPARATION AND PROPERTIES EXPOLRATION

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Nowadays immobilized enzymes are widely extended in different areas of science, medicine and biotechnology. The great advantage of application of enzymes attached to a solid surface is the high stability of enzyme structure (consequently, constant for a long time activity), as well as the opportunity of multiple usage of biocatalysts and facilitated removal of reaction products. It is known that successful realization of counted preferences of immobilized enzymes depends on the nature of solid phase, its properties and the way of protein linkage. There are a lot of various requirements for solid phase, such as high chemical and biological stability, large values of specific surface area and porosity necessary for sufficient surface concentra-tion and accessibility for substrate (macro)molecules. Currently, the growing attention is paid to macroporous monolithic materials as solid phases for preparation of high flow-through bioreactors. Firstly, the properties of these materials satisfied to all demands for heterogeneous biocatalysts preparation. Secondly, macroporous monoliths are characterized by unique structure allowing the realization convection controlled mass transfer. In this work, the results of preparation of heterogeneous biocatalysts consisting of ribonuclease A (RNase A) immobilized onto the surface of macroporous polymethacrylate columns, as well as their properties were studed. Macroporous monolithic columns were prepared by thermo-initiated polymerization of monomers in stainless steel 4.6x50 mm columns. For the synthesis glycidyl methacrylate (GMA) was used as a functional monomer whereas ethylene dimethacrylate (EDMA) or glycerol dimethacrylate (GDMA) were used as cross-linkers. Immobilization of enzyme was carried out via both direct reaction of amino groups of enzyme with epoxy groups of sorbent, and through the aldehyde-bearing macromolecular spacer (oxi-dized poly(2-deoxy-N-methacryloylamido-D-glucose) (MAG, MM 25,000). Heterogeneous biocatalysts obtained were installed in chromatographic system to test the enzymatic proper-ties using zonal elution approach. For this purpose, specific for RNase A low molecular substrate, namely, cytidine-(2')3-cyclophosphate, was used. The values of Michaels' constants (KM), maximum reaction velocity (Vmax), specific activity (Asp), as well as turnover number (k3) were determined and compared.

P04
IMPROVED L-HISTIDINE IMMOBILZED MONOLITHS FOR ANTIBODY PURIFICATION AND THEIR CHARACTERIZATION

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Selective recovery of antibodies (Ab's) from biological source under mild elution conditions without affecting their structure and related functions is of prime importance in understanding their biological role. Conventional biospecific ligands such as antibodies, Protein A/G coupled to various support systems have been employed for the purification of antibodies. A clear understanding of the mixed mode interaction of protein with such affinity ligands has lead to use of conceptual ligands termed in 1989 as "Pseudobiospecific affinity ligands". These pseudobiospecific affinity ligands can be tailored to have very high selectivity with mild adsorption and desorption conditions to overcome the inherent limitations associated with aforementioned biospecific affinity ligands. Pseudobiospecific ligand affinity chromatography is based on the

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