ABSTRACT

MOLECULARLY IMPRINTED NANOPARTICLES PREPARATION, CHARACTERIZATION AND ITS USAGE FOR LYSOZYME PURIFICATION

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Molecularly imprinted polymers (MIP) are easy to prepare, stable, inexpensive and capable of molecular recognition. MIPs can be considered as affinity separation media. The aim of this study was to prepare lysozyme-imprinted poly(HEMA-MATrp) nanoparticles which can be used for the purification of lysozyme from aqueous solutions. Lysozyme was complexed with MATrp and the lysozyme-imprinted poly(HEMA-MATrp) nanoparticles were synthesized by miniemulsion polymerization reaction. Also, non-imprinted nanoparticles were synthesized without lysozyme for control experiments. Adsorption of lysozyme onto lysozyme imprinted poly(HEMA-MATrp) polymer was investigated in batch system under various medium conditions (i.e. pH, ionic strength, lysozyme concentration, temperature). Characterization of nanoparticle polymer was conducted using FTIR, SEM, AFM, Zeta sizer and Elemental analysis. The specific surface area of the lysozyme imprinted particles was found to be 1648,0 m^2/g with a size range of 261 nm in diameter. According to the elemental analysis results, the particles contained 0,85 µmol MATrp/g polymer. The maximum lysozyme adsorption capacity was 1182,8 mg/g polymer. Ethylene glycol was used for desorption of lysozyme. The adsorbed lysozyme was desorbed with 94 % recovery. It was observed that after 5 adsorption-desorption cycle, there is no significant loss in adsorption capacity. In order to show the selectivity of the lysozyme imprinted poly(HEMA-MATrp) nanoparticles, adsorption of lysozyme, bovine serum albumin (BSA) and cytochrome c were investigated. The results show that the imprinted nanoparticle has high selectivity and sensitivity for lysozyme.

Key Words: Molecular imprinting polymers, nanoparticle, lysozyme