PROTEIN-RESPONSIVE POLYMER FILM PREPARED VIA COMBINED USE OF CONTROLLED/LIVING RADICAL PHOTOPOLYMERIZATION AND MICROCONTACT IMPRINTING

Anna Kidakova, Vitali Syritski, Jekaterina Reut, Andres Öpik

Department of Materials and Environmental Technology, Tallinn University of Technology, Ehitajate tee 5, 19086 Tallinn, Estonia
e-mail:avitarita@gmail.com

In this study, we describe a strategy for the formation of a molecularly imprinted polymer (MIP) capable of selective rebinding of protein-sized molecules and interfaced with a planar sensing surface. The strategy is based on the synergistic use of the surface-initiated controlled/living radical (C/LR) photopolymerization and microcontact imprinting approach aiming at design of a protein-responsive polymer for biosensing application. Bovine serum albumin (BSA), 2-(diethylamino)ethyl methacrylate, bis-acrylamide were used as a model protein, a functional monomer and a cross-linker, respectively, to prepare the BSA-MIP film. The initiator grafting to the SPR chip was characterized by XPS. The BSA-MIP films were characterized in terms of their chemical composition by IR spectroscopic ellipsometry and contact angle measurements. The BSA-MIP film were studied in terms of their recognition capability and selectivity towards the target protein (BSA) through the analysis of the responses of the BSA-MIP modified SPR sensors upon interaction with BSA and interfering proteins, human serum albumin (HSA) and Fc-fragment of immunoglobulin G (Fc). It was found that BSA-MIP adsorbed BSA with KD values in the nanomolar range (68 nM) and with about two times higher adsorption capacity as compared to HSA and Fc. Also, after 25 regeneration cycles, the BSA-MIP film showed very good reproducibility and stability. The presented simple synthesis strategy could be potentially employed for the preparation of protein-MIP films on a planar sensor transducer allowing to develop sensing systems for detection of clinically relevant proteins.

Euroopa Liit
Euroopa
Regionaalarengu Fond

Eesti
tuleviku heaks