

Project 3.7. Paper and other fibrous materials as micro/nanomolds for deposition on electrodes surface molecularly imprinted polymers of developed surface

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Background:

According to L. C. Pauling, a two noble prize winner, the secret of life is hidden in molecular recognition, that is the ability of one molecule to “recognize” another through weak bonding interactions. Molecularly imprinted polymers (MIPs) are tailor made recognizing materials that can mimic recognition of biological receptors. They outperform these natural receptors in several aspects including durability, chemical stability, and low production costs. If used for chemosensors fabrication, they should be deposited on transducers surfaces as thin films to facilitate analyte binding close to this surface. Novel techniques of MIP deposition as thin films, surface development of MIP these films, or introduction of unique properties are very much demanded in terms of selective and sensitive chemosensors fabrication.

Therefore, in recent years special attention has been paid to syntheses of micro- and nanostructured MIPs. Sacrificial mold synthesis is the method that offers the most precise control over the structure of the synthesized nanometrials. This synthesis involves MIP deposition inside porous materials, i.e., colloidal crystals of silica and polymer spherical beads. Then, the mold is removed resulting in pending nanostructured MIP deposition in the form of micro-/nanorods, filaments, stripes or dots. This nanostructuring provides significant MIP surface development and, consequently, enhances MIP chemosensor sensitivity, detectability, and shortens its response time.

Aim:

Within this project new methods of micro- and nanostructured MIP films deposition will be introduced. For that purpose, cellulose paper and other inexpensive fibrous materials, namely cellulose acetate filter membranes, fabric or cotton wool will be applied as the sacrificial molds. Moreover, we will apply these films for devising selective chemosensors for selected antibiotics and hormones, that pollute food products.

Requirements:

- candidate should have Master degree in chemistry, biochemistry, biotechnology, pharmacy, material engineering or related sciences or to be student of fifth year of mentioned above sciences with fixed date of Master thesis defence.
- sufficient knowledge in such fields as electrochemistry, organic chemistry, analytical chemistry or nanotechnology.
- good proficiency in English speaking and writing.
- experience in molecular imprinting or sensors will be welcome.
- high grades from Bachelor and Master studies.
- ability to work in team.
- high motivation to work in science.