ABSTRACT

DEVELOPMENT OF MOLECULARLY IMPRINTED POLYMER BASED SENSORS FOR VOLTAMMETRIC DETECTION OF SAME PESTICIDE AND ORGANIC MOLECULES

Mert SOYSAL

Ph.D. Thesis, Department of Chemistry
Supervisor: Prof. Dr. A. Ersin KARAGÖZLER
2013, 107 pages

Molecular imprinted polymers (MIP) are new-generation, smart materials that are three dimensional, cross-linked structures in which specific sites are contained for recognition of target molecules or ions. These three dimensional highly cross-linked network MIP materials are obtained by the polymerization of functional and crosslinking monomers in the presence of template molecules. After polymerization, the template is removed and a free cavity is obtained with shape and an arrangement of functional groups being complementary to the structure of the template. In that way, a molecular memory is introduced into the polymer, which is now capable of rebinding the analyte with a very high specificity. In recent years, molecular imprinting polymers has become increasingly attractive in many fields of chemistry particularly in separation, sensor etc..

In this study, the synthesis of disulfiram and thiram imprinted polymers were performed as the first time in the literature. Carbon paste electrodes were prepared by using synthesized imprinted polymers and the oxidation signal of template molecules were measured by voltammetry. The imprinted polymers were characterized by scanning electron microscopy and Fourier transform infrared spectroscopy techniques. The removal of template process was tested by using carbon paste electrodes prepared with imprinted but unleached, imprinted and leached and non-imprinted polymers. In addition, the selectivity of the imprinted polymer against its own template was evaluated using the structural analogues of the template molecule.

Key words: molecular imprinting polymer, voltammetric sensor, pesticide, organic molecule, carbamate.