MOLECULARLY IMPRINTED POLYMER-BASED ELECTROCHEMICAL SENSOR FOR DETECTION OF AZOXYSTROBIN IN AQUEOUS MEDIA

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This study presents the development of an innovative molecularly imprinted polymer (MIP)-based sensor for azoxystrobin (Az) fungicide detection in aqueous matrices. The MIP was electrochemically synthesised on a gold electrode, employing aniline and meta-phenylenediamine as functional monomers. Several electro-polymerizable monomers, including 2-methyl-4-nitroaniline, 3-aminothiophenol, pyrazole, pyrrole, and meta-phenylenediamine, were assessed as possible monomers for synthesising MIP. Aniline was rationally selected considering its superior binding energy in the complex with Az, while meta-phenylenediamine functioned as an effective cross-linking agent, facilitating the formation of a three-dimensional polymeric network containing tailored recognition sites for Az. The optimization of various synthesis parameters, such as the monomer concentration ratios, solution pH, and charge density of the electrodeposition process (galvanostatic), was carried out aiming to improve the sensor's overall performance.

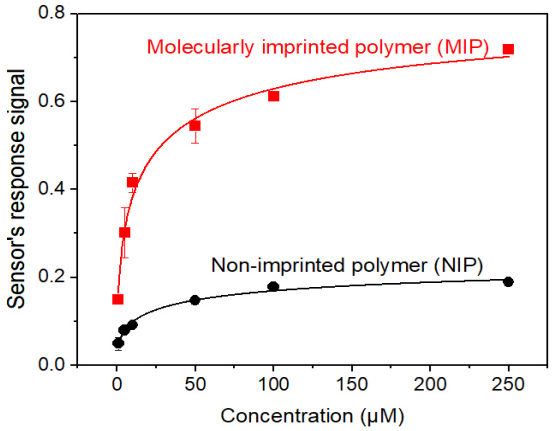

Fig. 1. Adsorption isotherms of MIP sensors and NIP sensors towards increasing concentration of Az.

The preliminary results derived from the adsorption isotherms (Fig. 1) indicate that MIP binds Az more than three-fold as compared to the respective reference material (non-imprinted polymer, NIP), signifying its potential for the selective recognition of Az. Nonetheless, additional experimentation is required to thoroughly evaluate the sensor's selectivity and practical applicability in complex water samples. This study highlights the promise of MIP-based electrochemical sensors for detecting environmental contaminants in water and advancing analytical tools for water quality monitoring and risk assessment.

This work was supported by the Estonian Research Council (grant PRG307).

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