113-040

GLYPHOSATE HERBICIDE DETECTION USING HORSERADISH PEROXIDASE AND Fe2O3@C NANOPARTICLE MODIFIED CARBON PASTE ELECTRODE

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While pesticides are released intentionally into the environment causing many health effects, there is a lack of monitoring data on these contaminants. Therefore, developing sensitive and selective sensor for them is very important and interesting. Iron nanoparticle coated with nanostructured carbon had been recently synthetized and characterized presenting an excellent biocompatibility and offers many opportunities for scientific studies. Herein, nanowires of carbon coated ferric oxide (Fe2O3@C) were synthesized and then used to prepare a modified carbon paste electrode (CPE), suggesting a promising immobilization matrix to horseradish peroxidase (HRP). Firstly, amperometric sensor based on a modified CPE doped with Fe2O3@C had been developed and compared with CPE doped with Fe2O3 and also with the plain CPE. Appropriate amounts of the Fe2O3 and Fe2O3@C (0–70 weight% with respect to graphite) were mixed with graphite powder and then Nujol was added to construct the modified electrode with different percentages and evaluated in detail through cyclic voltammetry (CV) method. Modified CPE present undoubtedly electrocatalytic activity and it also demonstrates that the core-shell presents a less effect amount between carbon-carbon between the core-shell and graphite. Results indicate that electrical interface defined between the graphite matrix in the electrode and Fe2O3@C nanowires is better than the interfaces defined between Fe2O3 particles and graphite. Aliquots of fresh solution of AChE was spread onto the surface of modified CPE and dried in refrigerator at 4ºC to prepare HRP/graphite:Fe2O3@C electrode. It was possible to realize that the carriers elements do not suffer interference from the enzyme, showing that the carbon shell layer is suited for the enzyme biocompatibility. The performance of this biosensor were studied using square wave voltammetry method (SWV) and the detection of glyphosate was performed via inhibiting action. The modification of the electrode provides high operational stability and sensitivity and makes it possible to detect the pollutants in the waters on the level of limited threshold levels.