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Nano-Fe_2O_3 čestice kao pojačivači voltametrijskog signala u indikaciji teških metala i pesticida

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Nanočestice na bazi oksida gvožđa (NPs) su privukle veliku pažnju imajući u vidu njihove fizičke, posebno magnetne, i hemijske osobine. U ovom istraživanju su nanočestice gvožđe(III)-oksida (Fe_2O_3 NPs) sintetisane jednostavnim hemijskim metodom u čvstom stanju iz dve različite soli, $FeSO_4 \cdot 7H_2O$ i $FeCl_3 \cdot H_2O$, u molskom udelu (1 : 2,5). Veličina NPs od 3 nm i njihov sferni oblik su određeni TEM merenjima. Dobijene NPs su dispergovane u vodi i monodisperzni koloid je okarakterisan UV-Vis i FTIR spektroskopijom, i merenjem zeta potencijala. Voltametrija sa obogaćivanjem i anodnim rastvaranjem i diferencijalana pulsna voltametrija su pokazale poboljšanje u kvantifikaciji odabranih teških metala i pesticida u uzorcima rečnih voda, kroz značajan pojačavajući efekat signala sintetisanih Fe_2O_3 NPs koji je zabeležen u elektrohemijskoj detekciji različitih vrsta važnih zagađivača životne sredine.

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Nano-Fe_2O_3 particles as voltammetric signal amplifiers in sensing of heavy metals and pesticides

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Iron oxide nanoparticles (NPs) has attracted great attention due to their unique physical, especially magnetic, and chemical properties. In this study, the iron(III)-oxide NPs (Fe_2O_3 NPs), were synthesized by a simple solid-state chemical method from two different ion salts, $FeSO_4 \cdot 7H_2O$ and $FeCl_3 \cdot H_2O$, in the molar ratio (1 : 2.5). The NPs size, 3 nm, and their spherical shape were evaluated by TEM measurements. The obtained NPs were dispersed in water and, monodisperse colloid was characterized by UV-Vis and FTIR spectroscopy and zeta potential measurements. Anodic stripping and differential pulse voltammetric measurements were shown improvement in the quantification of selected heavy metal ions and pesticide in river water samples, due to significant amplification effect of synthesized Fe_2O_3 NPs on electrochemical detection signal recorded at electrodes from different carbon materials. This study offers promising results which can lead to the application of iron NPs in the electroanalytical determination of different kinds of serious environmental pollutants.

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