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Morfološka i elektrohemijska karakterizacija nanočestica srebra i gvožđe-oksida namenjenih za elektroanalizu

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Nanočestice metala i oksida metala (NPs) privlače pažnju mnogih istraživača zbog svojih jedinstvenih optičkih i električnih svojstva. Ove nanočestice nalaze primenu u biologiji, medicini, kao i u elektronici, za izradu senzora. U ovom radu sintetisane su nanočestice srebra (Ag NPs) i gvožđe(III)-oksida (Fe_2O_3 NPs), jednostavnom „*solid-state"* metodom iz čvrstog stanja uz prisustvo različitih soli kao stabilizatora. Sintetisane su Ag i Fe_2O_3 NPs uz trinatrijum citrat kao stabilizator, kao i Fe_2O_3 NPs u prisustvu kalijum-hlorida. TEM merenjima nađeno je da su Ag NPs sferne, prosečne veličine od 25 nm, dok su Fe_2O_3 NPs takođe sferne i veličine 3 nm, u oba slučaja. Elektrohemijska karakterizacija sintetisanih Fe_2O_3 NPs i Ag NPs ugrađenih u elektrodu od ugljenične paste (CPE) izvedena je cikličnom voltametrijom (CV) u $[Fe(CN)_6]^{3-/4-}$ redoks sistemu. Izračunate su efektivne površine svih modifikovanih CPE, a električna provodljivost je poređena elektrohemijskom impedansnom spektroskopijom (EIS). Međusobnim upoređivanjem, utvrđeno je da CPE modifikovane sa Fe_2O_3 NPs pripremljene uz KCl, kao i AgNPs stabilizovane citratnim jonima pokazuju najbolji elektrohemijski odgovor. Ove NPs su i izabrane kao potencijalno aktivni materijali za elektrohemijske senzore.

Morphological and electrochemical characterization of silver and iron-oxide nanoparticles intended for electroanalysis

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Metal and metal oxide nanoparticles (NPs) attract the great attention of researchers due to their unique optical and electrical properties. These NPs are used in various biological and medical applications, as in electronics as sensors. In this work, silver and iron(III)-oxide NPs (Ag, Fe_2O_3 NPs) were synthesized by a simple solid-state chemical method in the presence of different stabilizers. Ag and Fe_2O_3 NPs were obtained with trisodium citrate as stabilizing agents. The second sample of Fe_2O_3 NPs was synthesized in the presence of potassium chloride. TEM measurements showed that the Ag NPs are spherical with a diameter of 25 nm, while Fe_2O_3 NPs were spherical with 3 nm in both cases. Electrochemical characterization of synthesized Fe_2O_3 NPs and Ag NPs incorporated in carbon paste electrode (CPE) was performed by cyclic voltammetry (CV) in $[Fe(CN)_6]^{3-/4-}$ redox system. Effective surface areas of all modified CPEs were calculated, and electrical conductivity was compared by electrochemical impedance spectroscopy (EIS). By mutual comparison, it was found that Fe_2O_3 NPs synthesized in the presence of KCl incorporated into CPE, and AgNPs surrounded by citrates, show the best electrochemical response. These NPs were selected as potentially active materials for electrochemical sensors.

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