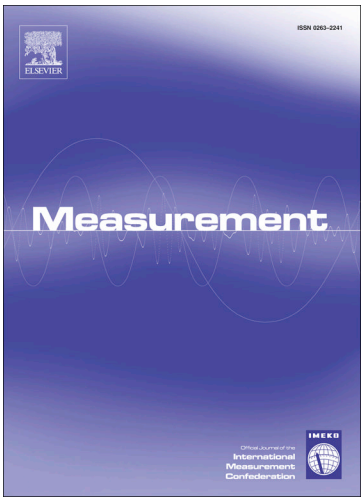

Development of a new voltammetric sensor by using a hybrid material consisting of gold nanoparticles and S-organic compounds for detection of deferiprone-anti-thalassemia and anti HIV-1 drug

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Development of a new voltammetric sensor by using a hybrid material consisting of gold nanoparticles and S-organic compounds for detection of deferiprone-anti-thalassemia and anti HIV-1 drug

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ABSTRAT

A hybrid inorganic/organic electrode material composed of gold template, gold nanoparticles, 3-mercaptopropionic acid and cysteamine was used for development of a new voltammetric sensor modified with 3D-self assembled layers. The newly prepared sensor was used for measurements of electrochemical oxidation and detection of deferiprone - anti-thalassemia and anti HIV-1 drug in water solution at pH 7.4, close to physiological one. A high improvement in electrooxidation of deferiprone as compared to that observed on the unmodified gold was detected by cyclic and differential pulse voltammetry. The measurements on prepared 3D-sensor have shown that deferiprone is irreversibly oxidized in two steps to the respective dione (peak I) which then undergoes anodic hydroxylation of methyl side chain (peak II). The results indicated that the 3D-modified electrode can be used for quantitative deferprone determination without any interference from biogenic species with ensuring a high sensitivity and a good selectivity. It was found that at the prepared sensor covered with the 3D-hybrid self-assembled layers a straight-line relation of the peak current density and deferiprone concentration was proved starting from 1×10^{-5} mol$\times$dm^{-3} to 8.5×10^{-3} mol$\times$dm^{-3} with a detection limit of $4.25\times1\,0^{-7}$ mol$\times$dm^{-3} and 9.14×10^{-7} mol$\times$dm^{-3}, for peak I and II. Comparison the results obtained on 3D-SAM prepared gold nanosensor with the data quoted in literature, obtained on 2D-sensors, yields an advantage of the first one.

Keywords: Hybrid material; 3D-Self-assembled layer; Voltammetric drug sensing; Gold nanoparticle; Deferiprone

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