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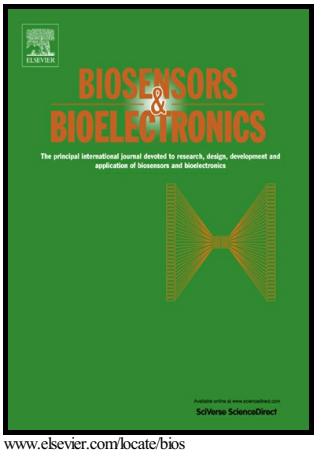

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Masoud Ghanei-Motlagh, Mohammad Ali Taher

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A novel electrochemical sensor based on silver/halloysite nanotube/molybdenum disulfide nanocomposite for efficient nitrite sensing

Masoud Ghanei-Motlagh*, Mohammad Ali Taher

Department of Chemistry, Faculty of Sciences, Shahid Bahonar University of Kerman, Kerman, Iran

*Corresponding author. *E-mail*: m.ghaneimotlagh@yahoo.com

Abstract

In the present study, the silver/halloysite nanotube/molybdenum disulfide (Ag/HNT/MoS_2) nanocomposite was successfully synthesized. For this purpose, the lumen of HNTs was firstly modified by silver to generate Ag nanorods via chemical process and then the MoS_2 layers deposited on the Ag/HNT nanocomposite by hydrothermal method. The characterization of Ag/HNT/MoS_2 nanocomposite were investigated by field emission scanning electron microscopy (FE-SEM), Fourier transform infrared (FT-IR) spectroscopy, transmission electron microscopy (TEM), X-ray photoelectron spectra (XPS), energy dispersive X-ray spectroscopy (EDS) and X-ray diffraction (XRD) analyses. The nanocomposite modified carbon paste electrode (CPE) was applied for the electrocatalytic detection of nitrite in aqueous solutions. It was demonstrated that the treatment of HNTs with Ag and MoS_2 materials enhanced the catalytic performance of modified CPE. At optimal experimental conditions, the designed sensor displayed remarkable sensing ability toward nitrite oxidation, offering a good linearity from 2 to 425 µM. The limit of detection (LOD) of the proposed strategy was estimated to be 0.7 µM based S/N=3. The good reproducibility, acceptable stability, fast response time and anti-interference performance of the proposed assay suggests that the modified CPE has great potential working as a nitrite electrochemical sensor for environmental applications.