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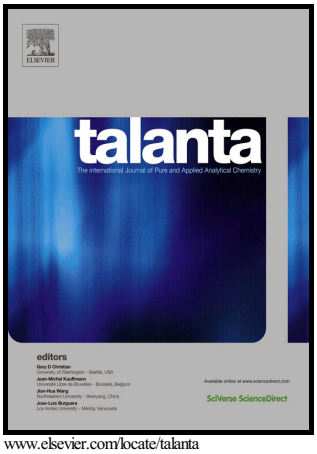

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CARBON NANOSTRUCTURED FILMS MODIFIED BY METAL NANOPARTICLES SUPPORTED ON FILTERING MEMBRANES FOR ELECTROANALYSIS

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Abstract

A novel methodology to prepare sensors based on carbon nanostructures electrodes modified by metal nanoparticles is proposed. As a proof of concept, a novel bismuth nanoparticle/carbon nanofiber (Bi-NPs/CNF) electrode and a carbon nanotube (CNT)/gold nanoparticle (Au-NPs) have been developed. Bi-NPs/CNF films were prepared by 1) filtering a dispersion of CNFs on a polytetrafluorethylene (PTFE) filter, and 2) filtering a dispersion of Bi-NPs chemically synthesized through this CNF/PTFE film. Next the electrode is prepared by sticking the Bi-NPs/CNF/PTFE film on a PET substrate. In this work, Bi-NPs/CNF ratio was optimized using a Cd^{2+} solution as a probe sample. The Cd anodic stripping peak intensity, registered by differential pulse anodic stripping voltammetry (DPASV), is selected as target signal. The voltammograms registered for Cd stripping with this Bi-NPs/CNF/PTFE electrode showed well-defined and highly reproducible electrochemical. The optimized Bi-NPs/CNF electrode exhibits a Cd^{2+} detection limit of 53.57 ppb. To demonstrate the utility and versatility of this methodology, single walled carbon nanotubes (SWCNTs) and gold nanoparticles (Au-NPs) were selected to prepare a completely different electrode. Thus, the new Au-NPs/SWCNT/PTFE electrode was tested with a multiresponse technique. In this case, UV/Vis absorption spectroelectrochemistry experiments were carried out for studying dopamine, demonstrating the good performance of the Au-NPs/SWCNT electrode developed.