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Solid-State Synthesis of POPD@AgNPs Nanocomposites for Electrochemical Sensors

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ABSTRACT:

In the present work, Poly(o-phenylenediamine) (POPD) stabilized silver nanoparticles (POPD@AgNPs) nanocomposites was synthesized by solid state oxidative polymerization method using o-phenylenediamine dihydrochloride (oPD-HCl) as monomer and silver nitrate (AgNO3) used as metal precursor as well as oxidizing agent no other external oxidizing agent was used. POPD@AgNPs nanocomposites were characterized by various instrumental techniques to confirm their size, shape and its composition. The electrocatalytic activity of POPD and POPD@AgNPs modified electrode was investigated over the oxidation of hydrazine (N2H4) and reduction of hydrogen peroxide (H2O2) using Cyclic Voltammetry (CV), Differential Pulse Voltammetry (DPV) and Chronoamperometry techniques. POPD and POPD@AgNPs were characterized using HR-TEM, FE-SEM, XRD, UV-Visible, FT-IR, Micro Raman spectroscopy and those results were confirmed their chemical purity, particle size, shape and its elemental compositions. Moreover, the DPV and chronoamperometry reveals that POPD@AgNPs is a good sensor for the electrochemical gas detection of N2H4 and H2O2 because it has good stability, easy-operation, excellent reproducibility, high sensitivity and good limit of detection when compared to with pure POPD. This system shows good stability, excellent sensitivity, response and the detection limit was obtained for the detection of N2H4 and H2O2 in trace level gases, which was lower than some of the modified electrodes.