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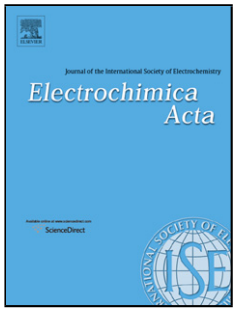

Title: Tetrahydrofuran and hydrogen peroxide mediated conversion of potassium hexacyanoferrate into Prussian blue nanoparticles: Application to hydrogen peroxide sensing

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Tetrahydrofuran and hydrogen peroxide mediated conversion of potassium hexacyanoferrate into Prussian blue nanoparticles: Application to hydrogen peroxide sensing

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Highlights ►

Research ► We report herein; ► Novel and fast synthesis of Prussian blue mediated by tetrahydrofuran and H_2O_2. ► Potassium ferricyanide, tetrahydrofuran and hydrogen peroxide under optimum composition leads to the synthesis of water soluble Prussian blue nanoparticles at 60°C within 20 minutes. ► As synthesized Prussian blue nanoparticles shows the good peroxidase mimetic activity. ► As synthesized PBNPs shows excellent electrochemistry. ► ►

Abstract

We report herein the synthesis of water soluble Prussian blue nanoparticles (PBNPs) from single precursor potassium hexacynoferrate. It has been found that potassium hexacyanoferrate undergo rapid conversion into water soluble PBNPs in the presence of tetrahydrofuran (THF) and hydrogen peroxide (H_2O_2) at 60°C. The nanomaterial having average size to the order of 38 nm is highly stable as homogeneous suspension for longer period (>3 months). The as synthesized PBNPs is characterized by UV-Vis spectroscopy, Fourier Transformation Infrared Spectroscopy (FT-IR), X-ray diffraction analysis (XRD), Energy dispersive spectroscopy (EDS), Transmission electron microscopy (TEM), and cyclic voltammetry. The PBNPs displays both homogeneous and heterogeneous catalysis having potentiality for H_2O_2 sensing generated through glucose oxidase catalyzed oxidation of glucose. The Michaelis–Menten constant (K_m) and the maximal reaction velocity (V_{max}) for H_2O_2 analysis are found to be 0.49 mM and 6.03×10^{-7} M s^{-1} justifying the use of nanomaterial as perfect peroxidase replacement. The