

One-step electrochemical deposition of Polypyrrole–Chitosan–Iron oxide nanocomposite films for non-enzymatic glucose biosensor

ABSTRACT

One-step electrodeposition method of Polypyrrole–Chitosan–Iron oxide (Ppy–CS–Fe₃O₄) nanocomposite films (Ppy–CS–Fe₃O₄NP/ITO) has been developed for the fabrication of advanced composite coatings for biosensors applications. The FESEM and EDX results provide the evidence of successful incorporation of Fe₃O₄ into Ppy–CS molecules. The presence of Fe₃O₄ nanoparticles in the nanocomposite films was further confirmed by the XRD and XPS spectrums. The fabricated electrode Ppy–CS–Fe₃O₄ NP/ITO shows a fast amperometric response with high selectivity to detect glucose non-enzymatically with improved linearity (1–16 mM) and the detection limit of (234 μM) at a signal-to-noise ratio (S/N=3.0).

Keyword: Electrodeposition; Glucose biosensor; Nanocomposites; Iron oxide nanoparticles; X-ray techniques XPS