Abstract

Voltammetric and electrochemical impedance spectroscopic (EIS) studies of generation one poly(propylene imine) (G1 PPI) dendrimer as an electroactive and catalytic nanomaterials both in solution and as an electrode modifier based on a simple one step electrodeposition method is presented. The G1 PPI exhibited a reversible one electron redox behaviour at $E^{0'}$ ca 210 mV in phosphate buffer pH 7.2 with diffusion coefficient and Warburg coefficient of $7.5 \times 10^{-10}$ $cm^2$ $s^{-1}$ and $8.87 \times 10^{-4}$ $\Omega$ $s^{-1/}$ respectively. Cyclic voltammetric electrodeposition of a monolayer of G1 PPI on glassy carbon electrode was carried out between −100 mV and 1100 mV for 10 cycles. The nanoelectrode was electroactive in PBS at $E^{0'}$ ca 220 mV. Kinetic profiles such as time constant ($4.64 \times 10^{-5}$ s $rad^{-1}$), exchange current ($1.55 \times 10^{-4}$ A) and heterogeneous rate constant ($4.52 \times 10^{-3}$ cm $s^{-1}$) obtained from EIS showed that the dendrimer layer catalysed the redox reaction of $Fe^{2+/3+}$ in $[Fe(CN)_6]^{3-/4-}$ redox probe.