

Electrochemical DNA biosensor for detection of porcine oligonucleotides using ruthenium(II) complex as intercalator label redox

ABSTRACT

A DNA biosensor detection of oligonucleotides via the interactions of porcine DNA with redox active complex based on the electrochemical transduction is described. A ruthenium(II) complex, $[\text{Ru}(\text{bpy})_2(\text{PIP})]^{2+}$, (bpy = 2,2 bipyridine, PIP = 2-phenylimidazo[4,5-f][1,10-phenanthroline]) as DNA label has been synthesized and characterized by ^1H NMR and mass spectra. The study was carried out by covalent bonding immobilization of porcine aminated DNA probes sequences on screen printed electrode (SPE) modified with succinimide-acrylic microspheres and $[\text{Ru}(\text{bpy})_2(\text{PIP})]^{2+}$ was used as electrochemical redox intercalator label to detect DNA hybridization event. Electrochemical detection was performed by cyclic voltammetry (CV) and differential pulse voltammetry (DPV) over the potential range where the ruthenium (II) complex was active. The results indicate that the interaction of $[\text{Ru}(\text{bpy})_2(\text{PIP})]^{2+}$ with hybridization complementary DNA has higher response compared to single-stranded and mismatch complementary DNA.

Keyword: DNA; Ruthenium; Porcine; Intercalator