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DNA-based biosensor for detection of ganoderma boninense, an oil palm pathogen utilizing newly synthesized ruthenium complex [Ru(phen)2,(qtpy)]2+ based on a PEDOT-PSS/Ag nanoparticles modified electrode

ABATRACT

An electrochemical DNA biosensor has been developed for detection of ganoderma boninense, an oil palm pathogen utilizing newly synthesized ruthenium [Ru(phen)2,(qtpy)]2+ complex as hybridization indicator. The sensor incorporated the use of a gold electrode (AuE), modified with a conducting nanocomposite of poly(3,4-ethylene-dioxythiophen) - poly(styrenesulfonate) (PEDOT-PSS) and silver nanoparticles (AgNPs). A specific sequence of a ganoderma boninense DNA probe has been immobilized on the modified electrode and the hybridization event was monitored via intercalation of the ruthenium complex to the hybridized DNA. Effect of hybridization temperature and time was evaluated and found to be optimal at 45 °C in 25 minutes for the hybridization. Detection of target DNA ranged from 1.0 x 10-15 M to 1.0 × 10-9 M was performed, and a correlation relationship of 0.9756 and detection limit of 5 × 10-16 M were obtained. The newly synthesized ruthenium complex was able to be used is a novel redox marker and can be adopted for routine detection of DNA.

Keyword: Biosensor; Ganoderma boninense; DNA; PEDOT-PSS; Ruthenium complex.