Development of electrochemical DNA biosensor for Trichoderma harzianum based on ionic liquid/ZnO nanoparticles/chitosan/gold electrode

Abstract

Electrochemical DNA biosensor was successfully developed by depositing the ionic liquid (e.g., 1-ethyl-3- methylimidazolium trifluoromethanesulfonate ([EMIM] [Otf])), ZnO nanoparticles, and chitosan (CHIT) nanocomposite membrane on a modified gold electrode (AuE). The electrochemical properties of the [EMIM][Otf]/ZnO/CHIT/ AuE for detection of DNA hybridization were studied. Under optimal conditions using cyclic voltammetry, the target DNA sequences could be detected in the concentration range of $1.0 \times 10^{-18}$ to $1.82 \times 10^{-4}$ mol L$^{-1}$, and with the detection limit of $1.0 \times 10^{-19}$ mol L$^{-1}$. This DNA biosensor detection approaches provide a quick, sensitive, and convenient method to be used in the identification of Trichoderma harzianum.