Electrochemical DNA biosensor for the detection of trichoderma harzianum based on agold electrode modified with a composite membrane made from an ionic liquid, ZnO nanoparticles and chitosan, and by using acridine orange as a redox indicator.

Abstract

An electrochemical DNA biosensor was developed that is based on a gold electrode modified with a nanocomposite membrane made from an ionic liquid, ZnO nanoparticles and chitosan. A single-stranded DNA probe was immobilized on this electrode. Acridine orange was used as the hybridization probe for monitoring the hybridization of the target DNA. The biosensor was capable of detecting target DNA in the concentration range from 1.0 × 10-14 to 1.8 × 10-4 mol L-1, with a detection limit of 1.0 × 10-15 mol L-1. The approach towards constructing a DNA biosensor allows studies on the hybridization even with crude DNA fragments and also to analyze sample obtained from real samples. The results show that the DNA biosensor has the potential for sensitive detection of a specific sequence of the Trichoderma harzianum gene and provides a quick, sensitive and convenient method for the study of microorganisms.

Keyword: Chitosan; DNA electrochemical biosensor; DNA hybridization.