DNA hybridization based on Trichoderma harzianum gene probe immobilization on self-assembled monolayers on a modified gold electrode

Abstract

Electrochemical DNA sensors based on the recognition of a base single- or double-stranded DNA (ss/ds-DNA) sequence specific to a Trichoderma harzianum gene and immobilized onto a gold disk electrode are described here. The ssDNA probe was immobilized on the modified gold electrode to measure the electrochemical response. The hybridization of the probe ssDNA with the target DNA was explored by differential pulse voltammetry (DPV) using methylene blue (MB) as an electroactive indicator. MB on a modified gold electrode was found to be more largely localized than that on a bare gold electrode. Peak currents were found to increase in the order of hybrid-modified-AuE > probe-modified-AuE > non-harzianum > non-complementary DNA. Control experiments with the non-complementary oligonucleotides were performed to assess whether the DNA biosensor responded selectively, via hybridization, to the target. The variation in redox current with the different concentrations of target DNA was linear in the range of 1–20 ppm. Various properties and characteristics of this sensor were also described in this report. A novel approaches to construct an electrochemical biosensor consisting of the probe ssDNA to hybridize with crude DNA fragments from real samples was successfully applied in the study of biological microorganisms.