CARBON NANOTUBE MODIFIED ELECTROCHEMICAL GENOSENSOR FOR THE DETECTION OF MICROORGANISMS

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Electrochemical detection technologies combined with nanomaterials provide designing a new generation of bioelectronic devices (biosensors) which offer a relatively low cost, rapid and easy analysis. Among nano-sized particles, carbon nanotubes have still been received enormous interest in the biosensing field because of their many advantages such as their high surface area, high electrical conductivity, high chemical stability and significant mechanical strength.

Electrochemical genosensor (DNA biosensor) systems based on carbon nanotubes (CNTs) have already been studied extensively and optimized in detail, but they are still waiting for effective advances in the medical area. Here, we described an electrochemical genosensor using carbon nanotube containing carbon graphite (CGE) electrode to detect E. coli bacteria. The guanine signal enhancement was monitored to understand the role of CNTs in the designed biosensor. The disposable carbon graphite electrode was prepared with/without CNTs. After the immobilization of bacteria specific DNA sequence onto GCE, the modified electrode with CNTs showed significant signal enhancement in the electrochemical oxidation peak of guanine compared to the signal obtained from bare GCE. These preliminary results represent applicable and more sensitive DNA detection for clinical genetic analysis and the methodology can be adopted for the analysis of any gene region. In the following studies hybridization signal and the effect of CNT modifications on hybridization response were analyzed. Future evaluations of the sensor are briefly discussed.

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Figure 1. Schematic presentation of DNA modification onto carbon nanotube

References