O 13. CORE-SHELL NANOPARTICLES FOR DETECTION OF HYDROGEN PEROXIDE

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ABSTRACT: Fast and accurate determination of hydrogen peroxide is important in many fields, such as clinical chemistry, biotechnology, environmental monitoring, pharmaceuticals, and food analysis. Various techniques including spectrometry, chemiluminescence, chromatography and electro-chemistry have been widely used to detect hydrogen peroxide due to its low cost, simplicity, high sensitivity and good selectivity. Therefore, various chemically modified electrodes, especially enzyme-based electrodes have been widely established for the detection of hydrogen peroxide. However, the activity of enzymes is limited due to ease of denaturation, leakage, time-consuming, costly preparation. In order to resolve these problems, numerous efforts have focused on developing non-enzymatic electrodes. Various nanostructured metals, alloys, and metal oxides had been explored extensively because of their unique physical and chemical properties. Moreover, the stability, chemical activity, and poisoning resistance of bimetallic electrode materials can be adjusted by controlling their morphologies, structures, compositions, or sizes. In recent years, especially nanoparticles with core–shell structures are attracting great attention due to their enhanced catalytic activities. On the other hand, carbon materials have been used as a matrix to enhance electron transfer rates and electrocatalytic activities. As one important carbon material, carbon nanotubes reveal a significant impact in fields of science and technology because of its remarkable physical and chemical properties. The unique properties of carbon nanotubes, such as remarkable surface area, excellent conductivity, and wide electrochemical range, make it an ideal material in electrochemical sensors.
In the present study, CNTs supported palladium based bimetallic core-shell nanocatalysts were prepared to detect hydrogen peroxide. Electrochemical methods (cyclic voltammetry and chronoamperometry) were used to evaluate the electrocatalytic activities of the catalysts towards H_2O_2 oxidation.

Keywords: non-enzymatic sensor, hydrogen peroxide detection, core-shell nanoparticles