

Designing a biosensor for determination of H₂O₂ by using silver electrode modified with CuO nano particles and catalase

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Abstract

In this study, we introduced a new biosensor for measurement of hydrogen peroxide (H₂O₂) by using of Catalase enzyme, Copper oxide nanoparticles and silver electrode. Copper oxide nanoparticles catalyze the redox protein Catalase enzyme and therefore facilitate the electron transfer between the silver electrode surface and the redox protein. Copper oxide nanoparticles have been synthesized in the laboratory, were studied by using a variety of chemical spectrum UV – Vis, XRD, SEM and TEM. XRD confirmed that using our synthesis are of copper oxide nanoparticles. Nanoparticles showed Absorption spectrophotometry at 265 nm and thus nanoparticles showed the quantum properties. SEM and TEM showed that nanoparticles were to form spherical and have size 35 - 45 nm. Direct electrochemistries of Catalase enzyme with the use of these nanoparticles were easily. And a pair of semi-reversible redox peaks shown of Fe(II) and Fe(III) with the formal potential (E °) -0/1995V electrode against a silver /silver chloride (Ag / Ag cl) at pH = 7 and 0.1M phosphate baffle . Designed sensor has high sensitivity and short response time (<7sec), and in linear range of 25µM to 800 µM can be used to determine hydrogen peroxide. This biosensor also has very good stability.

Keywords: Biosensor, Hydrogen peroxide, Catalase enzyme ,Copper oxide nanoparticles, silver electrode electrode.