

Amperometric Biosensor for Glucose Determination Based on a Recombinant Mn Peroxidase from Corn Cross-linked to a Gold Electrode

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Abstract : Using a recombinant enzyme derived from corn and a simple modification, we fabricated a facile, fast, and cost-beneficial biosensor to measure glucose. The Nafion/ Plant Produced Mn Peroxidase (PPMP)- glucose oxidase (GOx)- Bovine serum albumin (BSA) /Au electrode showed an excellent amperometric response to detect glucose. This biosensor is capable of responding to a wide range of glucose—20.0 μ M–15.0 mM and has a lower detection limit (LOD) of 2.90 μ M. The reproducibility response using six electrodes is also very substantial and indicates the high capability of this biosensor to detect a wide range of 3.10 \pm 0.19 μ M to 13.2 \pm 1.8 mM glucose concentration. Selectivity of this electrode was investigated in an optimized experimental solution contains 10% diet green tea with citrus containing ascorbic acid (AA), and citric acid (CA) in a wide concentration of glucose at 0.02 to 14.0mM with an LOD of 3.10 μ M. Reproducibility was also investigated using 4 electrodes in this sample and shows notable results in the wide concentration range of 3.35 \pm 0.45 μ M to of 13.0 \pm 0.81 mM. We also used other voltammetry methods to evaluate this biosensor. We applied linear sweep voltammetry (LSV) and this technique shows a wide range of 0.10–15.0 mM to detect glucose with a lower detection limit of 19.5 μ M. The performance and strength of this enzyme biosensor were the simplicity, wide linear ranges, sensitivities, selectivity, and low limits of detection. We expect that the modified biosensor has the potential for monitoring various biofluids.

Keywords : plant-produced manganese peroxidase, enzyme-based biosensors, glucose, modified gold electrode, glucose oxidase

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