

An optical based on graphene quantum dots for hydrogen peroxide detection

ABSTRACT

Graphene quantum dots (GQDs) is a zero-dimensional material of the carbon family and considered as a small cutting fragment from graphene sheet. It has unique electronic and optical properties due to electron confinement in the finite size of graphene cluster that leads to the opening of energy gap and quantization of electronic energy. In this study, biosensing based on GQDs in combination with enzyme (horseradish peroxidase, HRP) for the determination of hydrogen peroxide (H₂O₂) has been presented. The GQDs was used as an indicator reveals the fluorescence property of the system based on fluorescence quenching of GQDs which is induced from the enzymatic reaction. The presence of H₂O₂ quenches the fluorescence intensity of GQDs system which is proportional to the concentration of H₂O₂. Parameters optimization such as response time, enzyme concentrations, pH of buffer have been investigated. For linear calibration graph, it showed a linear dependence on the H₂O₂ concentration ranging from 1.0 to 100.0 μ M with the detection limit of 1.0 μ M.

Keyword: Quantum dots; Fluorescence; Hydrogen peroxide; Quenching; Sensor