ABSTRACT

The present study showed that metal oxide nanoparticles were effective matrix for immobilization of Glucose oxidase. The nanoparticles of zinc oxide and Iron oxide were synthesized by co-precipitation method. Precursors used in zinc oxide nanoparticles synthesis were zinc nitrate hexahydrate and sodium hydroxide while ferric chloride and sodium hydroxide were used for Iron oxide nanoparticles. Synthesized nanoparticles were characterized using various techniques such as UV spectroscopy, SEM and particle size analyzer. UV visible peaks for zinc oxide nanoparticles was observed at 374 nm. Scanning electron microscopy analysis revealed the hexagonal structure of zinc oxide nanoparticle with average 40 nm size. Further, Glucose oxidase was produced through submerged fermentation. For maximum production of glucose oxidase, different basic fermentation conditions such as glucose (6-16 %,w/v), nitrogen source and fermentation period (12-120 h) were optimized. After UV-Visible spectrophotometer analysis, it was observed that at 10% glucose (w/v), 1.5% (w/v) *A. niger* produced the maximum enzyme activity after the incubation of 48 h. Zinc oxide nanoparticles were functionalized through L-cysteine. Functionalized nanoparticles were activated through glutraldehyde. Glutraldehyde acted as the linker for linking nanoparticles to Glucose oxidase. Immobilization of GOx with nanoparticles resulted in increase of enzyme efficiency. Immobilized glucose oxidase showed 73% immobilization efficiency. Immobilized enzyme was finally sprayed on fruits (grapes and apples) to check its effect on fruits. Fruits sprayed with immobilized enzyme had shown no browning till 8 days.