ChitosanÃ¢Â€Â"Fe3O4 Nanoparticles Cryogel for Glucose Biosensor Development

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Abstract	Chitosan was widely used as a supporting material for enzyme immobilization. However, the non-conductive properties of chitosan could be a severe problem in the application of biosensors with electrochemical detection. This research aimed to modify the chitosan cryogel with Fe3O4 nanoparticles for glucose biosensor application. The glucose biosensor used glucose oxidase enzyme as biological sensing element which was immobilized on the working electrode of electrochemical detection. Chitosan-Fe3O4 composite cryogel was used as supporting material for glucose oxidase immobilization. The detection optimization was also performed by varying the operating conditions such as buffer pH and reaction temperature. The result showed the optimum conditions were the addition of Fe3O4 nanoparticles for 4% (w/v), phosphate buffer solution of 100 mM with pH of 7.0, and reaction temperature at 25Ã‚Â°C. The glucose determination showed linearity for increasing oxidation peak and decreasing reduction peak with the glucose concentration, with regression equation of y = -6.804x Ã¢Â€Â" 104.32 and y = 4.5872x + 133.37 respectively. Furthermore, the limit of detection and limit of quantification for oxidation peaks were 0.38 mM and 1.25 mM respectively. The reduction peak showed a limit of detection of 0.32 mM and a limit of quantification of 1.07 mM.
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