A highly stable oxygen-independent glucose biosensor based on a chitosan-albumin cryogel incorporated with carbon nanotubes and ferrocene

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Abstract	A novel, excellently stable glucose biosensor was fabricated based on a chitosan-bovine serum albumin (Chi-BSA) cryogel with incorporated multiwalled carbon nanotubes (MWCNTs), ferrocene (Fc), and glucose oxidase (GOD). A porous Chi-BSA cryogel was prepared by freezing and thawing of the chitosan-albumin hydrogel, synthesized by crosslinking with glutaraldehyde. The electron transfer of the Chi-BSA cryogel was enhanced using MWCNTs mediated by the Fc trapped within the cryogel. The glucose response of this biosensor was amperometrically measured at an applied potential of 0.175 V versus Ag/AgCl in a flow injection system. The MWCNTs/Chi-BSA-Fc/GOD biosensor demonstrated high operational stability after more than 350 injections (RSD = 3.6%), with a wide linear range from 0.010 to 30 mM and a low Michaelis-Menten constant (1.5 mM). The fabricated biosensor response to glucose was not affected by dissolved oxygen and showed no response to the common interferences in blood samples such as, ascorbic acid and uric acid, in physiological levels. In comparison with the standard hexokinase-spectrophotometric method employed by the hospital, the glucose concentrations in blood plasma samples measured by the modified electrode were in good agreement (P > 0.05). This chitosan based cryogel would be an excellent enzyme supporting material for other biosensor applications. (C) 2013 Elsevier B.V. All rights reserved.
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