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Abstract
In recent years, the diabetes has become one of the top ten causes of death for the people in Taiwan. Therefore, developing a glucose biosensor which can detect the glucose rapidly and conveniently is an important research subject. Nowadays, sometimes the preservatives are used in the food industry for food preservation, therefore, developing a planar sensor for detecting the hydrogen peroxide is also an important research subject. The glucose and oxygen can be catalyzed by the glucose oxidase to produce the gluconic acid and hydrogen peroxide. Because the ferrocene ($Fe(C_5H_5)_2$) possesses the excellent conductivity and catalytic characteristic, it can be used to elevate the responding current for detection of reduction of hydrogen peroxide. A study was conducted to use the ferrocene to modify the carbon paste electrode which was used as the working electrode to detect the responding current of reduction of hydrogen peroxide and then the concentration of hydrogen peroxide could be obtained from the responding current and consequently, the concentration of the glucose could be obtained. At 30 ℃, -200 mV operating potential, 500 rpm stirring rate and in 0.05 M PBS buffer solution (pH = 7.4), when the carbon paste electrode was modified with the ferrocene [ferrocene : graphite carbon powder = 3:7（weight ratio）], the detection limit was 0.01 mM H_2O_2 ; the linear range was 0.01 ~ 0.5 mM H_2O_2 ; R^2 = 0.993, and the sensitivity was 260.6 μA/cm2 mM H_2O_2. The results showed that the responding current for the carbon paste electrode modified with the ferrocene could be increased significantly and the sensitivity of the responding current of the carbon paste electrode modified with the ferrocene was two times of that of the unmodified carbon paste electrode.
The most suitable mixing ratio of ferrocene to graphite carbon powder obtained from the above mentioned results could be further applied to fabricate the glucose biosensor, by using the glucose oxidase which was immobilized by the Nafion on the surface of electrode. The detection limit was 0.06 mM $C_6H_{12}O_6$; the linear range was 0.06 ~ 2 mM $C_6H_{12}O_6$; R^2 = 0.992 and the sensitivity was 83.1 μA/cm2 mM $C_6H_{12}O_6$.
For the hydrogen peroxide screen printed planar sensor, the detection limit was 0.01 mM H_2O_2 ; the linear range was 0.01 ~ 0.4 mM H_2O_2 ; R^2 = 0.994, and the sensitivity was 238.27 μA/cm2 mM H_2O_2. For the glucose screen printed planar sensor, the detection limit was 0.06 mM $C_6H_{12}O_6$; the linear range was 0.06 ~ 2.5 mM $C_6H_{12}O_6$; R^2 = 0.997 and the sensitivity was 5.12 μA/cm2 mM $C_6H_{12}O_6$.
Advisory Committee Li,Chin Hou - advisor

Lin,Hau - advisor

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