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Abstract
Due to an occasional use of hydrogen peroxide in the food industry for the purpose of preservation nowadays, a rapid and convenient sensor for detecting the hydrogen peroxide is an important research subject. In recent years, diabetes has become one of the top ten causes of death for the people in our country and therefore, a convenient and rapid glucose biosensor also has become an important research subject. The glucose and oxygen can be catalyzed by the glucose oxidase and the glucose is oxidized to gluconic acid and the oxygen is reduced to hydrogen peroxide. A study was conducted to use the Coprecipitation method to prepare the Copper(Ⅱ) Hexacyanoferrate(Cu(Ⅱ) HCF) [Cu(Ⅱ)HCF : graphate carbon powders = 3 : 7(weight ratio)]. The Cu(Ⅱ)HCF was used to modify the carbon paste electrode because the Cu(Ⅱ)HCF possessed the excellent catalytic characteristic and it could be used with the graphite carbon powders and carbon paste to make the carbon paste electrode to elevate the responding current of the hydrogen peroxide.
A study of factorial design involving three factors[(A)operating potential, (B)stirring rate, (C)pH value of phosphate buffer solution(PBS)] and two levels was performed to analyze the effect of reaction parameters on the sensitivity and average responding current of detection of the hydrogen peroxide for the carbon paste electrode modified with the Cu(Ⅱ)HCF. The analysis of variance was performed by the SPSS (Statistical Package for the Social Science). The results of the calculating the effects showed that the sensitivity and average responding current at -200 mV operating potential were higher than those at -50 mV operating potential and the sensitivity and average responding current at 500 rpm stirring rate were higher than those at 300 rpm stirring rate. The value of the effect of pH value was negative which showed that the sensitivity and average responding current at pH=7.4 were lower than those at pH=4.0. The results of analysis of variance showed that the main effect of operating potential($F=27.691$, p value < 0.05)and the main effect of pH value($F=23.857$, p value < 0.05)were significant on the sensitivity and the main effect of operating potential($F=23.053$, p value < 0.05)and the main effect of pH value ($F=19.312$, p value < 0.05) were also significant on the average responding current. At -200 mV operating potential, 500 rpm stirring rate and in 0.05M PBS buffer solution(pH=4.0), the detection limit was 0.02 mM, the linear range was 0.02~2.8 mM H2O2, R2=0.9982 and the sensitivity was 141.04 μA/cm2U+5BCmM H2O2. At -200 mV operating potential, 500rpm tirring rate and in 0.05M PBS buffer solution(pH=7.4), the detection limit was 0.02 mM, the linear range was 0.02~2.6 mM H2O2, R2=0.9945 and the sensitivity was 121.606 μA/cm2U+5BCmM H2O2. The results showed that the optimum operating condition for this research is operating potential= -200mV , stirring rate = 500rpm, and pH = 7.4 .
Advisory Committee Hau Lin - advisor

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