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Enhanced non-enzymatic electrochemical sensing of hydrogen peroxide based on Cu_2O nanocubes/Ag-Au alloy nanoparticles by incorporation of RGO nanosheets

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Abstract

In the present work, novel RGO/Ag-Au/Cu_2O ternary nanocomposites electrochemical sensor for the detection of H_2O_2 has been successfully constructed. Due to the high conductivity of (reduced graphene oxide) RGO, the electrochemical activity of the binary Ag-Au/Cu_2O nanocomposites can be significantly prompted when introduction of RGO. The cyclic voltammetry curves (CV) amperometry results indicated the optimum RGO/Ag-Au/Cu_2O ternary nanocomposites showed good electrocatalytic activity for H_2O_2 reduction, with a linear response response range from 0.05 to 50.75 mmol/L at -0.2 V and a sensitivity of 0.14 μA mmol/L^{-1} cm^{-2}. In addition, the RGO/Ag-Au/Cu_2O sensor exhibited good selectivity. The excellent electrocatalytic sensor performance might be ascribed to the synergistic effect of the Ag-Au bimetallic alloys and the RGO contributed to the high electrochemical activity.

Keywords:

Ag-Au alloys; Cu_2O; reduced graphene oxide; electrochemical sensor; H_2O_2 detection

1. Introduction

In recent years, hydrogen peroxide (H_2O_2) is one of the most widely analytical objects in many fields, concluding food, environmental protection, clinical, pharmaceutical and industrials [1–3]. Accurate and sensitive detection of H_2O_2 is quite necessary to not only in