Preparation of reduced graphene oxide decorated with Cu-Co Oxide Electrode and its application for Sensitive Determination of Nitrite in Food Samples

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Received: 6 September 2021 / Accepted: 14 October 2021 / Published: 10 November 2021

This study was focused on the electrochemical determination of nitrite in food samples using reduced graphene oxide decorated with Cu-Co oxide nanoparticles (Cu-Co oxide NPs) on a glassy carbon electrode (Cu-Co oxide/rGO/GCE). An electrodeposition technique was used for the modification of the GCE surface with rGO and decoration of the rGO nanosheets with Cu-Co oxide NPs. Morphological and structural analyses using SEM and XRD revealed that rGO nanosheets were electrodeposited on GCE in a typical crumpled and slightly curved structure which provided more active defect sites and a high specific surface area for high porous electrodeposition of Cu-Co oxide NPs. The electrochemical studies using the CV and DPV techniques showed that Cu-Co oxide/rGO/GCE exhibited a sensitive, stable, and selective response to nitrite because of the synergetic effect of Cu-Co oxide NPs and rGO, and the sensitivity, limit of detection and linear range of Cu-Co oxide/rGO/GCE to determination of nitrite were obtained at 0.07436 $\mu\text{A}/\mu\text{M}$, 0.04 μM and 100 to 2800 μM , respectively. The practicability of Cu-Co oxide/rGO/GCE was investigated in the determination of the nitrite in ham sausage sample, and the results exhibited acceptable values for recoveries (97.42 to 98.65%) and RSDs (3.55 to 4.23%) for the detection of nitrite, indicating to great precision and accuracy in the determination of nitrite content in food samples.

Keywords: Electrodeposition; Cu-Co oxide nanoparticles; reduced graphene oxide; Nitrite; Food samples

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