A highly sensitive determination of sulfite using a glassy carbon electrode modified with gold nanoparticles-reduced graphene oxide nano-composites

Hao Yu, Xiao Feng, Xiao-xia Chen, Shan-shan Wang, Jun Jin

PII: S1572-6657(17)30552-0
DOI: doi: 10.1016/j.jelechem.2017.08.007
Reference: JEAC 3448

To appear in: *Journal of Electroanalytical Chemistry*

Received date: 19 April 2017
Revised date: 28 July 2017
Accepted date: 3 August 2017

Please cite this article as: Hao Yu, Xiao Feng, Xiao-xia Chen, Shan-shan Wang, Jun Jin , A highly sensitive determination of sulfite using a glassy carbon electrode modified with gold nanoparticles-reduced graphene oxide nano-composites, *Journal of Electroanalytical Chemistry* (2017), doi: 10.1016/j.jelechem.2017.08.007

A highly sensitive determination of sulfite using a glassy carbon electrode modified with gold nanoparticles-reduced graphene oxide nano-composites

Hao Yu*, Xiao Feng, Xiao-xia Chen, Shan-shan Wang, Jun Jin

(College of Chemistry and Chemical Engineering, Yan'an University, Shaanxi Key Laboratory of Chemical Reaction Engineering, Yanan Key Laboratory of Analytical Technology and Detection, Yan'an, 716000, Shaanxi, China)

*Corresponding author. E–mail address: yananyh2013@163.com

Tel.: + 86 911 2332037, fax: + 86 911 2332317

Abstract: A gold nanoparticles-reduced graphene oxide composite (AuNPs-rGO) was synthesized by chemical co-reduction strategy using ethylene glycol (EG) as a reducing agent. The structure and composition of this AuNPs-rGO composite were characterized by X-ray powder diffraction (XRD), X-ray photoelectron spectroscopy (XPS), scanning electron microscope (SEM), as well as the transmission electron microscope (TEM) techniques. Moreover, a glassy carbon electrode (GCE) was modified with this AuNPs-rGO composite by dropping method. The electrochemical behavior and the electrocatalytic activity of this AuNPs-rGO/GCE electrode for the oxidation of sulfite were also investigated using electrochemical impedance spectroscopy (EIS) and cyclic voltammetry (CV). The results showed that this AuNPs-rGO/GCE exhibited high electrochemical activity for the oxidation of sulfite under the synergistic action of AuNPs and rGO. In 0.10 mol L^{-1} H_2SO_4, the linear range for the determination of sulfite by amperometry at 0.40 V *vs* SCE was 2.0 × 10^{-7}–2.3 × 10^{-3} mol L^{-1} (r^2 = 0.995 6) with a detection limit of 4.5 × 10^{-8} mol L^{-1} (S / N = 3). The sensitivity for the determination of sulfite is 1026.5 μA (mmol L^{-1})$^{-1}$ cm^{-2}. At last, the as-prepared modified electrode was successfully used for the determination of sulfite in red wines with satisfactory results.