Simultaneous Determination of Theophylline and Caffeine Using Poly(L-phenylalanine)-Reduced Graphene Oxide Modified Glassy Carbon Electrode

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Theophylline (TP) and caffeine (CF) are two purine alkaloids which widely exist in our human diet. In the present work, poly(L-phenylalanine)-reduced graphene oxide (P(L-Pal)/rGO) modified glassy carbon electrode (GCE) was fabricated and applied to simultaneously determine the concentrations of TP and CF. The P(L-Pal)/rGO composite film was prepared by one-step electropolymerization using cyclic voltammetry, and the surface morphology was investigated by scanning electron microscope. The electrochemical behaviors of TP and CF on P(L-Pal)/rGO/GCE were investigated using cyclic voltammetry and differential pulse voltammetry. By optimizing parameters, the fabricated sensor exhibited excellent performance to simultaneously determine TP and CF in a wide linear range of 1–260 μM . The detection limits were 0.35 and 0.5 μM (S/N = 3), respectively. The presented method shows good sensitivity and stability, and can be used for the determination of TP and CF in samples of green tea, coffee and tablets.

Keywords: Poly(L-phenylalanine); Reduced graphene oxide; Electropolymerization; Simultaneous determination.

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