A non-enzymatic Electrochemical Sensor Based on rGO-PPy for Rapid and Sensitive Determination of Histamine in Meat

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Sensitive and reliable quantification of histamine (His) is essential to ensure food safety. In this study, a sensing material consisting of reduced graphene oxide/polypyrrole (rGO-PPy) composites is successfully prepared by a two-step synthesis method and verified by transmission electron microscopy (TEM), Fourier transform infrared (FTIR) spectroscopy, ultraviolet-visible (UV-vis) spectroscopy, X-ray diffraction (XRD) and X-ray photoelectron spectroscopy (XPS). Based on rGO-PPy, an electrochemical method is established, and the electrochemical behaviours are studied by cyclic voltammetry (CV), electrochemical impedance spectroscopy (EIS) and differential pulse voltammetry (DPV). The experimental parameters, such as the detection method, the concentration and volume of rGO-PPy modified on GCE, and the pH value of the buffer solution, are optimized. Under the optimized conditions, the linear equation of the electrochemical sensor to His is $I (\mu A) = 0.01047c + 0.1842$ ($R^2 = 0.9970$) with a linear range of 10~800 μM , and the detection limit is 3.01 μM . Practical samples are also detected, which proves that the sensor has great application prospects. Therefore, this idea and method will make an excellent contribution to food safety.

Keywords: rGO-PPy; Histamine; Electrochemical sensor; Food safety

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