

Electrochemical Study of Poly(Azure A)-Film Manganese-Hexacyanoferrate-Complex modified Electrodes for Histamine Detection [†]

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Abstract: Histamine is a well-known biogenic amine, which is often contained in some fermented foods and drinks. High volumes of histamine contaminated food intake can lead to food poisoning and serious allergic reaction to the human body. In addition, the USA food and drug administration (FDA) set a guidance level and also informed, that higher histamine concentrations can cause histamine poisoning when the concentration level exceeds 200 ppm. In this condition, to ensure the food quality is highly necessary and important to detect and quantification of histamine levels from the food samples. In the present work, we have constructed a poly(azure A) (PAA) film manganese-hexacyanoferrate (MnHCF) complex modified screen-printed electrodes for rapid and online histamine analysis. The proposed sensor is used for histamine oxidation by electrochemical techniques such as cyclic voltammetry and chronoamperometry. The electrochemical techniques were carried out with histamine in an optimal condition such as supporting electrolyte, pH, working potential window, and scan rate. The PAA- MnHCF complex modified electrode showed oxidation potential of histamine at 0.9 V in phosphate buffer solution (0.1 M PBS, pH 7.4) at the scan rate of 50 mV/s. The bare screen-printed electrode showed oxidation potential of histamine at 1.1 V with a smaller current response at the same experimental condition. The interference study was performed by chronoamperometry, and the selected interferences (glucose, l-cystine, and putrescine) were tested with PAA- MnHCF complex modified electrodes. Based on the obtained results, it was found that the developed modified electrodes offer accuracy, fast analysis, selectivity, and reproducibility towards histamine analysis.

Keywords: conducting polymers; screen-printed electrodes; electrochemical sensor; histamine; poly(azure A); manganese hexacyanoferrate