

E-Tongue Based on Metallo-Porphyrins for Histamine Evaluation

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Abstract

The aim of this work is the development of an e-tongue like sensor. It is based on modified screen printed electrode (SPE) structures with a receptor part made of porphyrins/metalloporphyrins that are chemically bound to graphene (the sensitive assembly) to act as antennas and “capture” the histamine molecules. Histamine is a compound strongly connected to the level of freshness in foods: the caution level of histamine is 50 ppm, whereas the maximum accepted levels range from 200 ppm to 500 ppm. Using a single, ultra-sensitive electrochemical sensor, we measured the concentration of histamine. In our approach, the chemical immobilization of the porphyrins onto the graphene surface was via substitution reaction using SOCl_2 . The sensitive assembly revealed a quasi-reversible reaction towards histamine with an oxidation potential at approximately 600 mV. The results indicate a linear dependence of concentration of histamine as a function of intensity and good chemical stability in acidic environments.

Keywords: histamine, cyclic voltammetry, food freshness, metallo-porphyrin

Acknowledgments: 87PD/2020, 393PED/2020, 18/N/2019