

E-Tongue Based on Metallo-Porphyrins for Histamine Evaluation

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Abstract : The general objective of the presentation is the development of an e-tongue like sensor based on modified screen printed electrode (SPE) structures with a receptor part made of porphyrins/metalloporphyrins chemically bound to graphene (the sensitive assembly) to act as antennas and "capture" the histamine molecules. Using a single, ultra-sensitive electrochemical sensor, we measured the concentration of histamine, a compound which is 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). Our approach for the chemical immobilization of the porphyrins onto the surface of the graphenes was via substitution reaction: a solution of graphene in SOCl₂ was heated to 80°C for 6 hours. Upon cooling, the metallo-porphyrins were added and ultrasonicated for 4 hours. The solution was then allowed to cool to room temperature and then centrifuged in order to separate the deposit. The sensitive assembly was drop casted onto the carbon SPE and cyclic voltammetry was performed in the presence of histamine. The reaction is quasi-reversible and the sensor showed an oxidation potential for histamine at 600 mV. The results indicate a linear dependence of concentration of histamine as function of intensity. The results are reproducible; however the chemical stability of the sensitive assembly is low.

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

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