FABRICATION OF A NOVEL XANTHINE BIOSENSOR BASED ON ENZYME MODIFIED GLASSY CARBON ELECTRODE FOR FISH FRESHNESS DETECTION

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Abstract: Protection of freshness and extending shelf life of fish, meat and other derived products is one of the greatest challenges of industries [1, 2]. One of the most important needs in the food industry is determining the freshness of fish meat because this factor is the most important criterion for manufacturing high quality foodstuff. It is well known that after the death of a fish, ATP is degraded into xanthine, which the levels of xanthine in fish product increases with the storage of fish meat. Thus, determination of xanthine level in meat provides can be considered as a powerful tool in the food industries for evaluating the freshness of fish meat [3]

In the present work, sensitive and selective detection of xanthine molecule in food industries is of tremendous important for evaluating the meat freshness. A new and simple-to-preparenanobiocomposite forimmobilization of xanthine oxidase (XO) is describedbyincorporating multi-walled carbon nanotube (MWCNT) and poly(aspartic acid) composite film electrodeposited on glassy carbon electrode (GCE). The optimization of bio-analytical experimental condition such a**s** percentage of MWCNT, immobilizing time of the enzyme, the response time of electrode and the working pH was performed in detail. The fabrication process of the enzyme electrode was pursued by cyclic voltammetry (CV), electrochemical impedance spectroscopy (EIS) and scanning electron microscopy (SEM).The developed biosensor was employed for the determination of xanthine in fish meat based on differential pulse voltammetry (DPV) method.The DPV study of XD/poly (Aspartic acid)/ MWCNT/GCE exhibits wide linear range (5.0×10^{-9}- 50×10^{-6} mol.L^{-1}), with a detection limit of 1.6×10^{-9} mol.L^{-1} and surprisingly high selectivity. Finally,the developed biosensor was successfully applied for xanthine determination in fish meat at different storage time.

Keyword: Electrochemical biosensor; Multi walled carbon nanotube;Electropolymerization; Fish meat;Xanthine oxidase; Xanthine; Poly(aspartic acid).

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