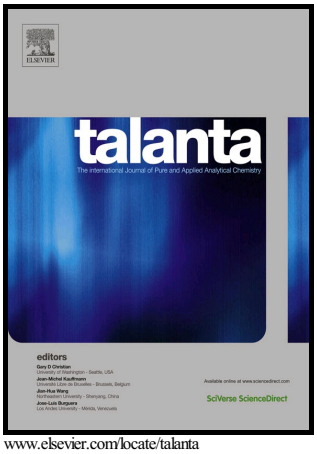

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ABSTRACT

In this work, fabrication of a novel and ultrasensitive electrochemical biosensor based on immobilization of tyrosine hydroxylase onto palladium-platinum bimetallic alloy nanoparticles/chitosan-1-ethyl-3-methylimidazolium bis(trifluoromethylsulfonyl) imide/graphene-multiwalled carbon nanotubes-IL/glassy carbon electrode for determination of L-tyrosine in some high tyrosine foods including cheese, egg and yogurt was reported. Immobilization of tyrosine hydroxylase onto the surface of the biosensor was performed by cross-linking tyrosine hydroxylase and chitosan through the addition of glutaraldehyde. Enzymatic biosensors employ the affinity and selectivity of catalytically active proteins towards their target molecules and here, the tyrosine hydroxylase selectively catalyzes the conversion of tyrosine to levodopa which can be oxidized at lower potentials than tyrosine. The modifications were characterized by electrochemical impedance spectroscopy, cyclic voltammetry, energy dispersive X-ray spectroscopic and scanning electron microscopy. Under optimal conditions, the biosensor detected tyrosine in concentration ranges of 0.01×10^{-9} to 8.0×10^{-9} mol L^{-1} and 8.0×10^{-9} to 160.0×10^{-9} mol L^{-1} with a limit of detection of 0.009×10^{-9} mol L^{-1}. The biosensor was able to selective determination of tyrosine even in the presence of common interferents therefore, the biosensor was highly selective. The biosensor also showed good operational stability, antifouling properties, sensitivity, repeatability and reproducibility.

Graphical abstract