

Electrochemical Biosensors Based on Polypyrrole and Laccase for the Detection of L-Tyrosine in Pharmaceutical Products

Authors

Dinu Ancuta *, Apetrei Constantin *

Abstract

A compound of great interest to both researchers of medicine, chemistry and psychologists is tyrosine (Tyr), an amino acid synthesized in the body from phenylalanine, because it is the main responsible for the installation of diseases and conditions that grew during the pandemic caused by the new coronavirus Sars- CoV-2. Parkinson's disease, depression, Alzheimer's disease, premenstrual syndrome and ADHD (attention deficit hyperactivity disorder) are just some examples of other clinical manifestations of individuals suffering from a deficit or excess of tyrosine. Sensors and biosensors are state-of-the-art devices, used in various fields of activity, due to the multiple advantages they have: low manufacturing costs, miniaturization and portability, high sensitivity, and fast response. These devices can be successfully applied for rapid and early detection of this amino acid in real samples. In the present study, electrochemical biosensors based on polypyrrole doped with various anionic agents and enzyme laccase were studied by a comparative analysis in order to detect L-Tyrosine (L-Tyr). The methods used for the characterization of these devices were chronoamperometry, cyclic voltammetry and Fourier Transform Infrared Spectroscopy. The results obtained with the novel biosensors showed higher performances than those reported in the literature in the terms of sensitivity, selectivity and detection limit. These validation results demonstrated that L-Tyr can be successfully applied to both pharmaceutical products and human serum.

Keywords

L-Tyrosine, polypyrrole, biosensor, laccase, cyclic voltammetry