Square-Wave Voltammetry-Recent Bibliography from Macedonian Authors

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Abstract

Square-wave voltammetry (SWV) is recognized as a key electrochemical technique for getting insight in important electrode mechanisms, but also in kinetics and thermodynamic aspects of relevant biological and chemical systems []. It is ubiquitous technique that is widely explored in physics, chemistry, pharmacy, medicine, and biology. From the features of square-wave voltammograms one gets relevant information about the charge-transfer, adsorption and mass-transport phenomena taking place at the working electrode surface. Moreover, it is a very suitable tool for analysing relevant aspects of chemical reactions that are coupled to the electron transfer steps of electrode reactions []. Such electrochemical systems are quite pertinent since they mimic important physiological processes []. The voltammetric theories of such systems, based mainly on the Butler-Volmer formalism, reveal key mechanistic, kinetic and thermodynamic insights about processes affecting the features of voltammetric outputs. Estimation of the magnitude of standard rate constant of electron transfer step(s) $k_s^{\ominus}$ encompasses one of the most important applications of Square-wave voltammetry. The correlation of $k_s^{\ominus}$ with the difference in energy levels of atomic orbitals of working electrode and molecular/ionic orbitals of analyzed substrates provides key information about kinetics of many processes met in electrochemistry of various redox-active systems. For electrochemical reactions that are associated with chemical reactions, by combining the Butler-Volmer equation with modified Fick's laws we obtain implicit expressions that link the magnitude of Faradaic current (I) with the applied potential (E), and with parameters related to the kinetics of relevant processes involved in given electrochemical mechanism. We present in this work recent bibliography about theoretical modelling in Square-wave voltammetry of two Macedonian Authors-Valentin Mirceski and Rubin Gulaboski. It contains references that are relevant to various surface and diffusional mechanisms that are seen as models for many physiologically active systems.

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