A Guidelines to Recognize Electrochemical Mechanisms with Coupled Chemical Reactions in Square-Wave Voltammetry

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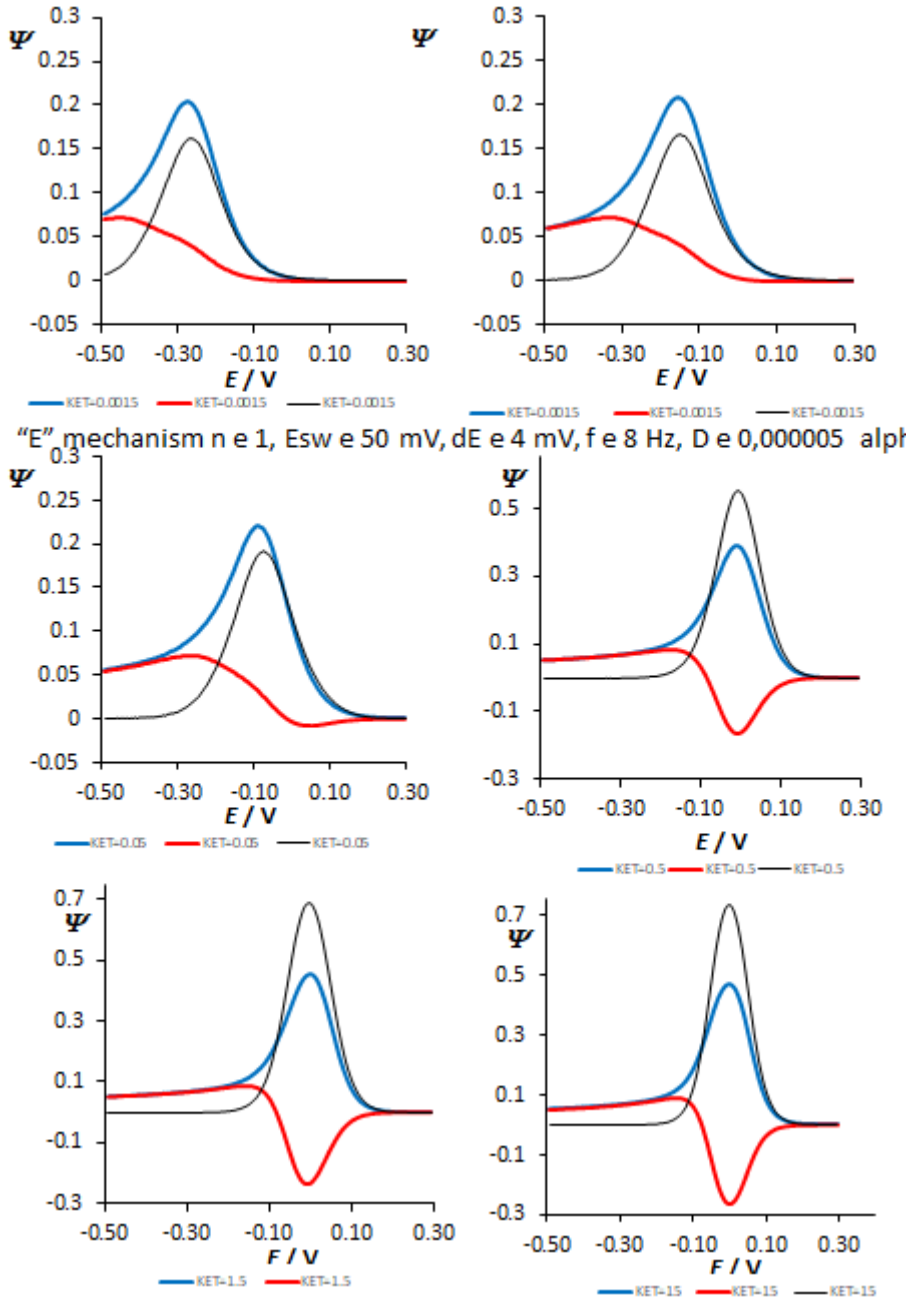
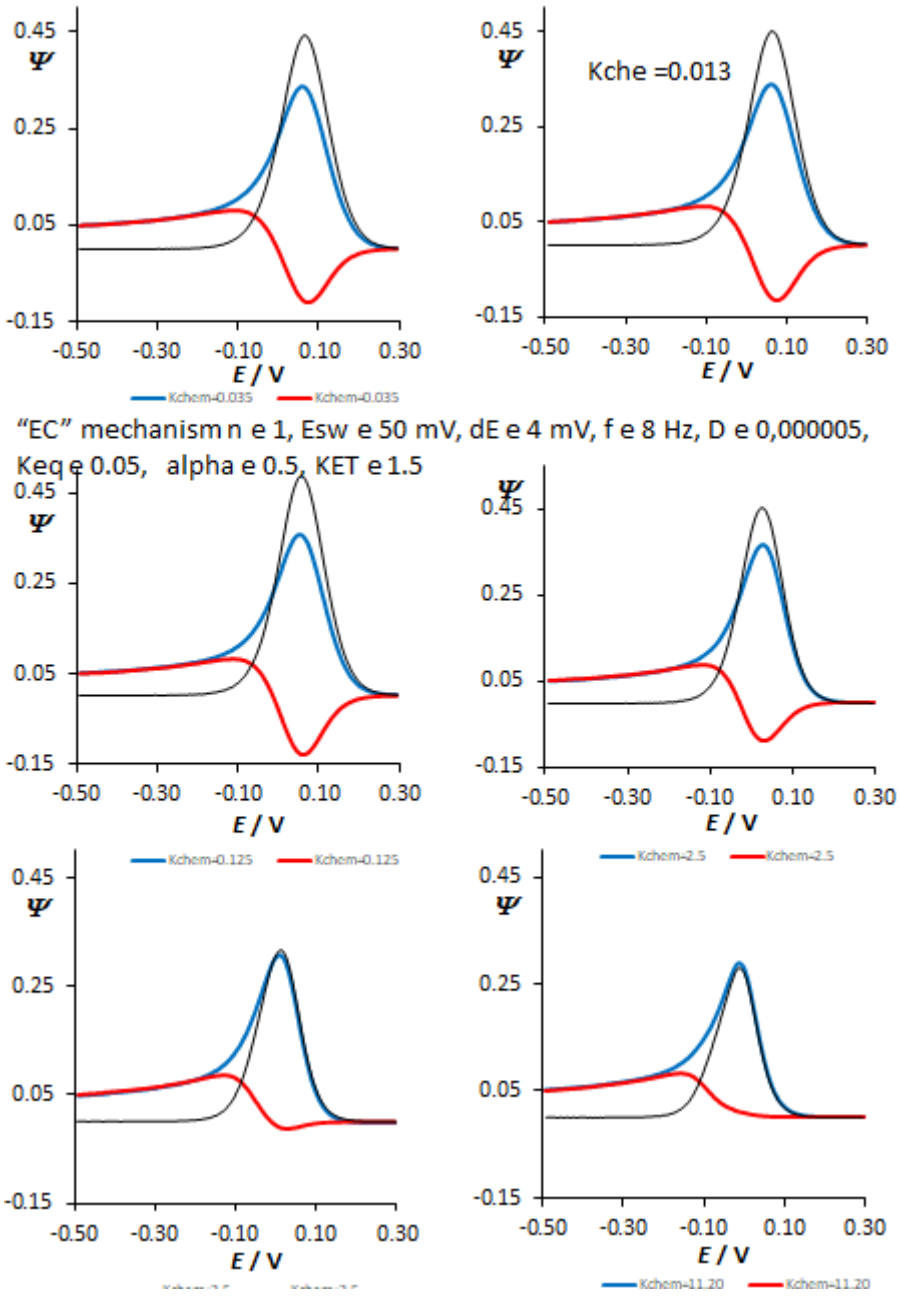
Abstract

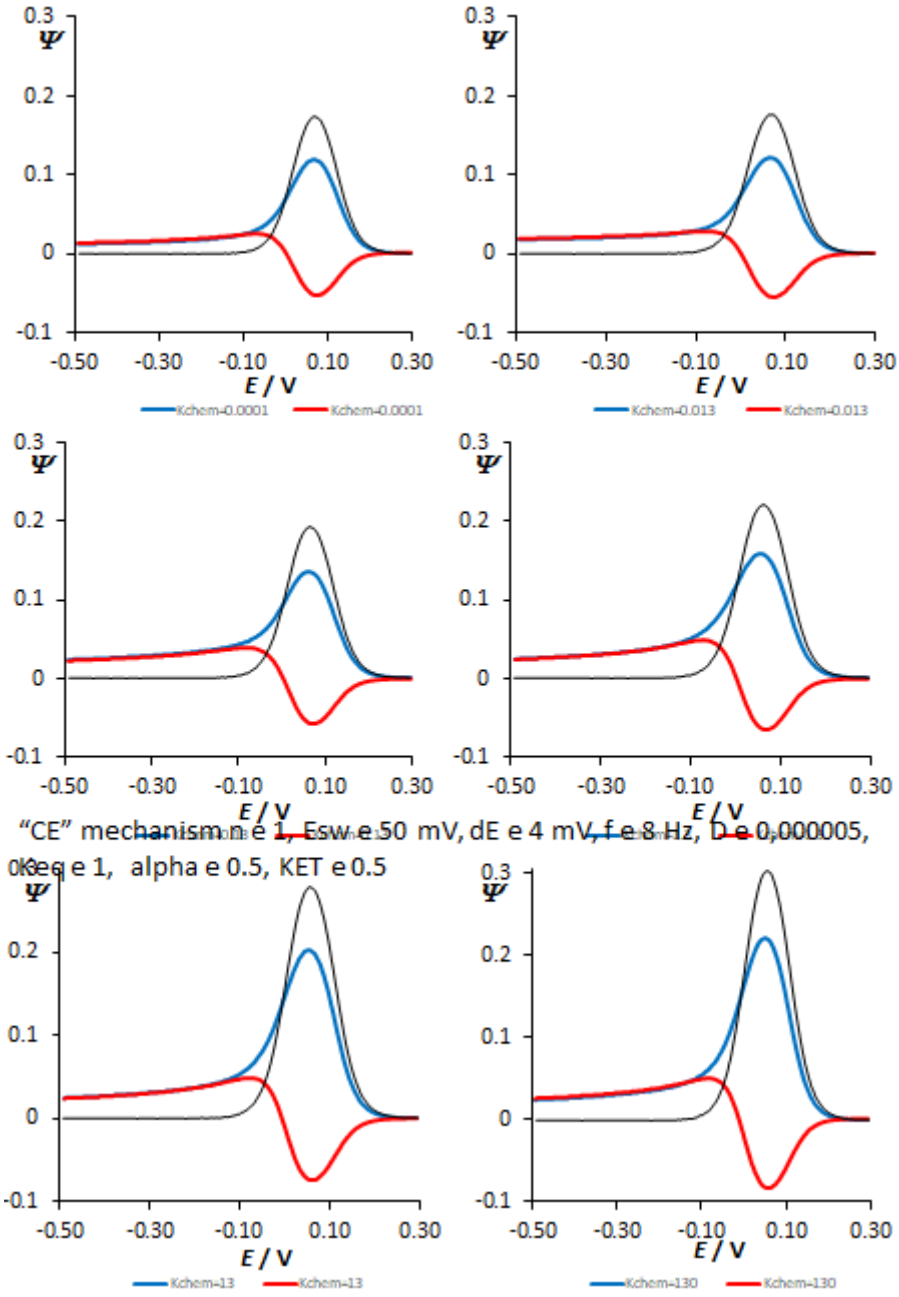
Although the square-wave voltammetry (SWV) is recognized as a leading member in the family of "Pulse" Voltammetric techniques, yet it is quite difficult for many experimentalists to recognize certain electrode mechanism simply from the features of obtained square-wave voltammograms. In this work, a series of theoretical square-wave voltammograms are presented, simulated for E, EC, CE and EC' mechanisms. Voltammetric patterns presented in this work are calculated as a function of the chemical rate parameters, and they provide quite specific features that can be explored for identification of some one-step electrode mechanism coupled with defined chemical reaction. The voltammograms presented in this work can serve as a simple guideline for the students and for those with not enough knowledge in voltammetry.



Square-wave voltammograms of Simple one step diffusional mechanism (E-mechanism)

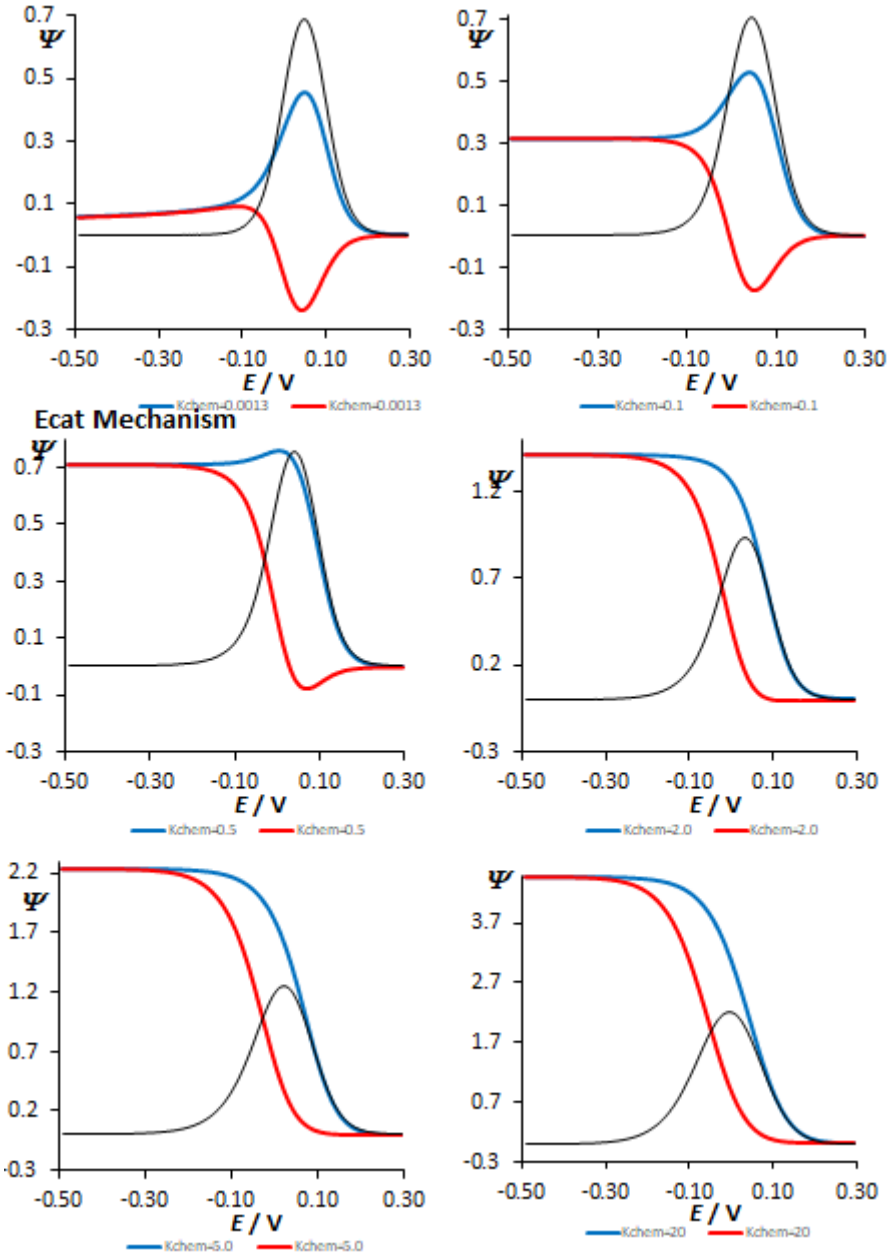


Square-wave voltammograms of Simple one step diffusional mechanism coupled with follow up reversible chemical reaction (EC-mechanism)



"CE" mechanism n e 1, Esw e 50 mV, dE e 4 mV, f e 8 Hz, D e 0,000005, Keq e 1, alpha e 0.5, KET e 0.5

Square-wave voltammograms of Simple one step diffusional mechanism coupled with preceding reversible chemical reaction (CE-mechanism)



Square-wave voltammograms of Simple one step diffusional mechanism coupled with irreversible regenerative chemical reaction (EC' or ECat-mechanism)

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