

A study on computational implementation of cyclic voltammetry applying semi-infinite diffusion model

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The ionic transport phenomena near the electrode have been analyzed, herein the computational program to implement the electrical signal of cyclic voltammetry has been written by using MATLAB. For the ionic mass-transfer system, the governing equation and its boundary conditions are confined to the semi-infinite diffusion model and the reversible reaction at the electrode. In order to obtain the numerical solutions of cyclic voltammetry, the explicit finite difference method was applied. Experimental data for the cyclic voltammetry of 10mM K₃Fe(CN)₆ and 0.1M KCl system upon the ITO glass electrode were compared with the numerical ones. Present program explains the experimental results reasonably well, in which they approached the simulated ones more closely with decreasing the scan rate. Furthermore, other effects such as electrode area, electrochemical reaction constants and transferring coefficients were discussed quantitatively in cyclic voltametric system.

This work was supported by the NANO-Star center under the CRADA of AFIT-UT-KWU.