

Abstract

The aim of this work is to explore the method of temporal resolution in potentiometry as a new prospective electrochemical analytical technique. In connection with interface of two immiscible electrolyte solutions (ITIES) it may find utilization in analytical chemistry. This technique up to my knowledge has not been published yet. Potential response of analyte on liquid/liquid interface includes both distribution processes, their temporal resolution and redox processes, which specificity can be modified by changing the composition of individual phases. Unlike „classic“ potentiometric techniques, limited just to potential determination, this method, which I have given the working name „time resolved potentiometry at liquid-liquid interface“ utilizes time development of potential response, which was found to be an analyte-specific function. The time resolved potentiometry presented in this work includes time course of potential response to analytical parameters specific for particular analyte. It brings series of data characterizing the analyte in given environment in a similar manner as spectra and may allow creating analyte-specific data package – fingerprint. Combination with ITIES allows, unlike potentiometry on solid electrode, easy modification of liquid phase by simple dissolving mediator, which can be either redox compound, catalytically active species or ion transfer compound. Besides, the liquid phase allows, compared to solid electrodes, easy regeneration by the solution replacement. This arrangement represents biomimetic model addressing the issue of potential response on liquid membrane, which is scarce in the literature.

For stationary nonaqueous phase redox mediators based on phthalocyanines, insoluble in water phase, were utilized, to avoid their bleeding to mobile aqueous phase. Further it contains the phase transfer agent TBA^+X^- , which mediate the transfer between aqueous and nonaqueous phase. Other experimentally variable components are composition of electrolyte and analyte. Sulphide compounds served as model analytes with numerous reaction pathways.

The first part of thesis is focused on characterization of newly synthesized phthalocyanines by UV/Vis spectroscopy, cyclic voltammetry at liquid phase modified solid electrode. The second part illustrates on model analyte which parameters affect the response of time resolved potentiometry. Conclusively, applicability of the technique is demonstrated and the construction functional model of sensor is presented.