

Screen-printed Electrode (SPE) based Solid-State pH Sensor

Speaker: Qiuchen Dong - University of CT, Storrs, CT

E-Mail: Qiuchen.Dong@uconn.edu

Abstract

Conventional pH measurement in liquid phase has come across painful issues, especially the easily broken glass electrode and limit to large-volume aqueous samples. Therefore, researchers strive to develop robust solid-state pH sensing electrodes for pH measurement in the microliter volume. In this study, screen-printed electrode (SPE) consisting of carbon working electrode (WE), carbon counter electrode (CE) and Ag/AgCl reference electrode (RE) will be used. On the other hand, many metal oxides, such as RuO₂, have been introduced into the field for the pH detection. However, iridium oxide (IrO_x) is the most promising material involved with electrochemical pH detections. By applying cyclic voltammetry method or drop-casting method, iridium oxide was deposited on the surface of working electrode (WE) of SPE. Hydraulic iridium oxide on SPE had super-Nernst constant under room temperature condition in our case by measuring open circuit potential. In such novel design and configuration, pH can be measured accurately and sensitively, with sensing performance comparable to that of conventional pH meters. This study demonstrates that SPE is an attractive platform of Solid-State pH electrode sensing in the liquid phase since it possesses the advantages of small-size, compatible multiple using condition, low cost, and a long-term stability. It will open a new avenue in pH monitoring.

Key word: pH measuring; Screen-printed electrode; iridium oxide; Super-Nernst constant.