

A portable pH sensor for u-Healthcare Service based on a Solid-State Reference Electrode using Nanoporous Platinum

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In order for u-healthcare service to be clinically effective, portable and easy-to-use sensor modules for biochemical assay of human samples should be provided. Blood pH measurement is one of the most fundamental assay methods, which has been carried out mostly using glass electrode or ion-selective field transistor-based sensor systems. A biggest challenge for a portable pH sensor module is to have a small size solid state reference electrode (SSRE), which will greatly contribute to size reduction as well as easy operation. In this research, a chip-type pH sensor module for u-healthcare system was developed using our proprietary technologies of nanoporous platinum (Pt) electrode. Nanoporous Pt electrodes function not only as a pH indicating electrode (pH-IE) but also a reference electrode (RE) if we provide a nanoporous Pt and polyelectrolyte (PE) junction. This technique offers an advantage of very low polarizability due to high exchange current density (i_0) of the nanoporous Pt electrode surface. The nanoporous Pt also shows near-Nernstian behavior with ignorable hysteresis and a short response time under the high variation of solution's pH. As a result, a novel SSRE using a nanoporous Pt and PE junction provides a reliable and stable potential in various pH sample solution. The proposed SSRE is truly miniaturizable and adequate for mass production, which will provide a cost effective solution in many medical and biological applications.

References

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