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A Microfluidic System with Nonenzymatic Glucose Sensor

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Keywords: nonenzymatic glucose sensor, nanoporous, microfluidic system

Abstract:

In this paper, we report an amperometric-type enzymeless glucose sensor system based on nanoporous platinum (Pt) and platinum/platinum oxide (Pt/PtO) reference electrode, which are integrated with microfluidic chip. Glucose sensor employing no enzyme implies a breakthrough in developing a new one with better reliability and longer shelf time. Recently our research group reported that nanoporous Pt electrodes work as an excellent glucose detector, which substantially overcomes the critical drawbacks of the previously developed enzymeless sensors. This novel invention is expected through further straightforward modification to be applied to the disposable strip-type glucose sensor which is now all enzyme-based sensor. For a multiple-use sensor system, however, it requires appropriate peripheral devices that rinses and reconditions the sensor in a programmed sequence. To address this matter, we integrated porous Pt films on patterned Pt substrates and Pt/PtO as a solid state reference electrode on a microfluidic chip including such peripheral devices. With developed system, amperometric response of glucose oxidation was monitored after delivering solution to electrochemical reaction chamber electroosmotically. The sensitivity of developed system was 0.28 μ A/mM when tested with glucose solution diluted in PBS buffer.

Nanotech 2004 Conference Technical Program Abstract