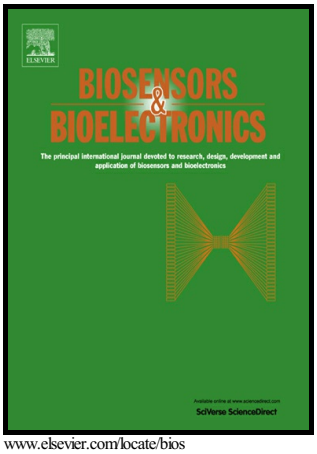

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Abstract

Electroplating of nanoporous Pt (nPt) induces an extremely strong tensile stress, which results in the exfoliation of nPt on flexible polymer substrate despite plasma treatment to improve adhesion. Here, we overcame this challenge by modifying flexible stainless-steel, and developed wearable, robust, flexible, and non-enzymatic continuous glucose monitoring system. The flexible stainless-steel was highly effective in improving the adhesion between the metal layer and substrate. The developed wireless system included electrochemical analysis circuits, a microcontroller unit, and a wireless communication module. Finally, we evaluated the continuous glucose monitoring system through two animal testing, by implanting into subcutaneous tissue and measuring interstitial fluid (ISF) glucose values at 5 to 15-min intervals. Comparison of the measured ISF glucose with blood glucose determined by the Clarke error grid analysis showed that 82.76% of the measured glucose was within zone A. Furthermore, the wearable glucose sensor exhibited bio-compatible to implant through various bio-compatibility tests.

Keywords: Non-enzymatic, Nanoporous platinum, Continuous glucose monitoring system, In vivo investigation