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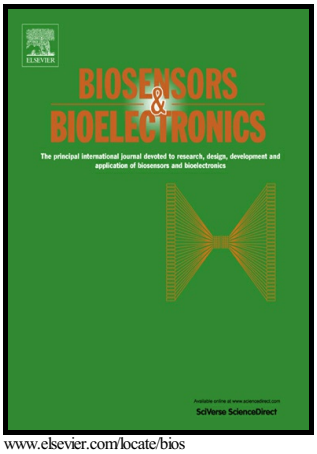


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# A Wearable Electrochemical Glucose Sensor based on Simple and Low-Cost Fabrication Supported Micro-Patterned Reduced Graphene Oxide Nanocomposite Electrode on Flexible Substrate

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## Abstract

In this study, a reduced graphene oxide (rGO)-based nanostructured composite working electrode of high quality was successfully microfabricated and micro-patterned on a flexible polyimide substrate using simple low-cost fabrication processes. Gold and platinum alloy nanoparticles were electrochemically deposited onto the microfabricated rGO surface and chitosan-glucose oxidase composites were integrated onto the modified surface of the working electrode to develop a human sweat-based wearable glucose sensor application. The fabricated biosensor exhibited excellent amperometric response to glucose at a detection range of 0–2.4 mM (covers the glucose range in sweat), with a sensitivity of 48 μA/mMcm$^2$, a short response time (20 sec), and high linearity (0.99). The detection limit for glucose was calculated as 5 μm. The human sweat/mixing glucose samples initially used for testing indicated acceptable detection performance and stability for low glucose concentrations. These results confirm that the proposed nanostructured composite flexible working electrode and fabrication process are highly promising for application as human sweat-based electrochemical glucose sensors.

## Keywords

wearable biosensor, high sensitivity, human sweat, reduced graphene oxide, electrochemical sensor, micro-fabrication, flexible electrode

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