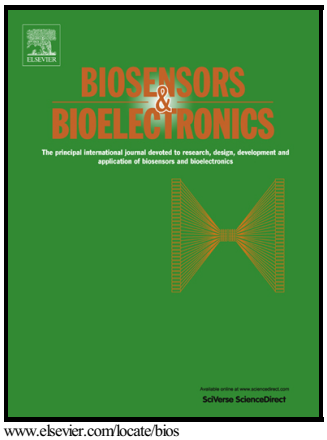

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Real-time electrochemical detection of hydrogen peroxide secretion in live cells by Pt nanoparticles decorated graphene–carbon nanotube hybrid paper electrode

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Abstract

In this work, we develop a new type of flexible and lightweight electrode based on highly dense Pt nanoparticles decorated free-standing graphene–carbon nanotube (CNT) hybrid paper (Pt/graphene–CNT paper), and explore its practical application as flexible electrochemical biosensor for the real-time tracking hydrogen peroxide (H_2O_2) secretion by live cells. For the fabrication of flexible nanohybrid electrode, the incorporation of CNT in graphene paper not only improves the electrical conductivity and the mechanical strength of graphene paper, but also increases its surface roughness and provides more nucleation sites for metal nanoparticles. Ultrafine Pt nanoparticles are further decorated on graphene–CNT paper by well controlled sputter deposition method, which offers several advantages such as defined particle size and dispersion, high loading density and strong adhesion between the nanoparticles and the substrate. Consequently, the resultant flexible Pt/graphene–CNT paper electrode demonstrates a variety of desirable electrochemical properties including large electrochemical active surface area, excellent electrocatalytic activity, high stability and exceptional flexibility. When used for nonenzymatic detection of H_2O_2,

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