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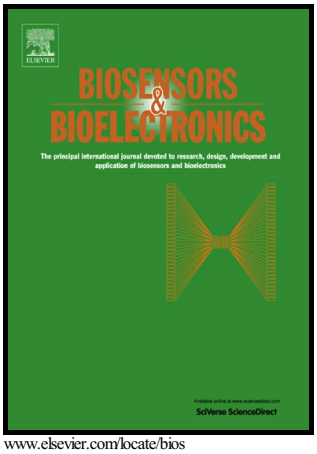

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Structuring Au nanoparticles on two-dimensional MoS_2 nanosheets for electrochemical glucose biosensors

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ABSTRACT

Two-dimensional (2D) bioelectronics is an emerging field of research which fuses the advantages of 2D nanomaterials with those of nanobiotechnology. Due to the various physical and chemical properties present in layered counterparts of 2D materials, including high charge density, large surface area, remarkable electron mobility, ready electron transport, sizeable band gaps and ease of hybridisation, they are set to become a versatile tool to fabricate sensitive and selective novel biodevices, which might offer an unique advantages to tackle key energy, medical and environmental issues. Current 2D bioelectronics research is focused on the design of simple-to-use and cheaper biodevices, while improving their selectivity, sensitivity and stability. However, current designs generally suffer from a lack of efficiency, relatively low sensitivity, slow electron transfer kinetics, high background charging current and low current density arising from poor mass transport. Here, we report a nanoparticle-structured MoS_2 nanosheet as an ideal semiconductor interface, which is able to form a homogenous layer on the electrode surface for the assembly of gold nanoparticles. This not only enhances electrocatalytic reactions, but also provides excellent electrochemical