Electrochemical detection of hydrogen peroxide and glucose based on polyoxometalate-grafted graphene

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The integration of conductive carbon materials and metal, metal oxide nanoparticles is great interest in material science and practical applications. Electrochemical biosensors affect as follow electrode characteristics that is size, composition, surface area, and electron and ion conductivities. In preparation of POM-grafted reduced graphene oxide (POM-g-rGO) nanohybrids, a polymeric ionic liquid (PIL) was employed to link POMs to rGO. This process not only prevents rGO sheet aggregation, which commonly occurs during the reduction of GO sheet, but also facilitates charge transfer at the electrode/electrolyte interface. The unique nanostructure of resultant POM-g-rGO nanohybrids enabled well-defined multiple redox reaction of POMs and rapid electron transfer. The POM-g-rGO nanohybrids showed high electrocatalytic activities toward H2O2 and glucose molecules in flow-injection biosensor device with high sensitivity, low detection limit, and rapid response time.