RGO-TiO_2 nanocomposite with highly exposed {001} facets for photoelectrochemical performance and electrochemical determination of dopamine

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Crystal facet engineering has attracted worldwide attention in the facet manipulation of TiO_2 surface properties. An improved synthesis solvothermal route has been employed for the formation of TiO_2 nanosheets with highly exposed {001} facets decorated on reduced graphene oxide (RGO) sheets. The RGO-TiO_2 nanocomposite could be materialized with high yield by following a stringently methodical yet simple approach. Photocurrent response of RGO-TiO_2 nanocomposite was discovered to outperform that of pure TiO_2 as a tenfold increase in photocurrent density was observed for the RGO-TiO_2 electrodes. This may be contributed by faster electron transport and delayed recombination of electron-hole pairs due to improved ionic interaction between titanium and carbon. In contrast to bare GCE, the RGO-TiO_2 nanocomposite modified glassy carbon electrode (GCE) displays reversible redox event and reduced peak-to-peak separation which indicates decreased overpotential, signifying the minimal use of energy to drive a reaction. The electrode manifests its use as a sensor for dopamine (DA) as it possesses a detection limit of 4 µM over a satisfactory linear range of 2-200 µM.