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Previous Next

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Metal-free graphene-based nanoelectrodes for the electrochemical determination of ascorbic acid (AA) and *p*-nitrophenol (*p*-NP): implication towards biosensing and environmental monitoring †

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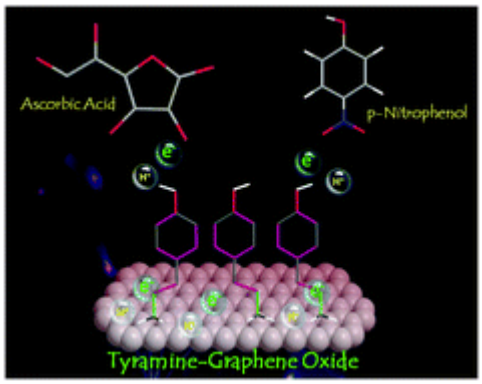
Abstract

Herein, a metal-free tyramine-functionalized graphene oxide (T-GO) electrocatalyst was used for the electrochemical determination of ascorbic acid (AA) and an organic pollutant specially substituted by a phenolic compound, *i.e.*, *p*-nitrophenol (*p*-NP), in 1 M phosphate buffer solution at pH 7 as a model species. The cyclic voltammetry investigation of AA and *p*-NP has a significant role in biosensing and the management of industrial waste. Thus, the electrochemical detection of AA and *p*-NP was successfully achieved using the T-GO-modified GC electrode for the oxidation of AA at an onset potential of −0.03 V *vs.* SCE. A redox reaction occurred for the detection of *p*-NP at an onset potential oxidation peak (O1) of 0.047 V *vs.* SCE and reduction peaks (R1 and R2) at −0.62 V *vs.* SCE and 0.147 V *vs.* SCE, respectively. The stability and reproducibility of the T-GO-based electrocatalyst were outstanding for the detection of both AA and *p*-NP, which can be attributed to its improved active surface area after the functionalization of GO with tyramine.



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