Electroactive polymer functionalized graphene nanocomposites as a biosensing platform

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ABSTRACT SUBMISSION

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Text Abstract	Development of state-of-the-art biosensing nanomaterials using commercially available low-cost materials is one of the key steps in the advancement of electrochemical biosensing systems. In such a context, graphene based nanocomposites are of particular interest. Graphene based nanocomposites are a promising candidate as biosensing materials, largely due to their high electrical conductivity, large specific surface area, high-speed electron/heat mobility, and biocompatibility. Chemically functionalized reduced graphene oxide (RGO) is a flexible two-dimensional (2D) material for the development of a versatile electrochemically active platform for a range of sensing applications. Herein, we report redox functionalization of polymer linked RGO and the development of a versatile biosensing platform for chemically important analytes. Ferrocene redox moieties were attached onto RGO nanosheets via a branched polymer. The polymer acts as a reducing agent as well as a molecular spacer for extending the RGO matrix. The functionalized RGO is electrochemically active and can offer a biocompatible microenvironment for immobilization of different enzymes. The immobilized enzymes retained their activity and exhibited efficient electrocatalytic oxidation of their substrates, indicating that redox functionalized RGO successfully mediates bioelectrocatalytic electron transfer of the redox enzymes. This new electroactive platform shows overall excellent stability, selectivity, reproducibility, and fast response time for biosensing applications.
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