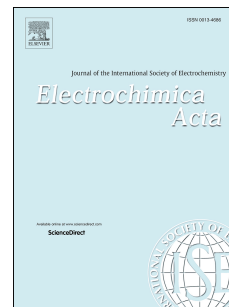


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Oxygen reduction on graphene sheets functionalised by anthraquinone diazonium compound during electrochemical exfoliation of graphite

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Abstract

In this paper, the oxygen reduction reaction (ORR) was studied on anthraquinone (AQ) modified and unmodified graphene sheets in aqueous solutions. AQ-grafted graphene sheets were prepared by one-pot synthesis procedure using electrochemical exfoliation of graphite and *in situ* spontaneous diazonium reduction at the same time in 0.1 M H₂SO₄. Unmodified and AQ-grafted graphene were characterised by thermogravimetric analysis and Raman spectroscopy. Covalent attachment of AQ on graphene was ascertained. The ORR was studied in acidic and alkaline electrolytes by the rotating disc electrode method. In both media, the prepared graphene materials were more active towards the ORR than bare glassy carbon. In alkaline solution, the number of electrons transferred per O₂ molecule for AQ-modified and unmodified graphene coated glassy carbon electrodes was higher than two indicating that the formed hydrogen peroxide is partially further reduced. Additionally, stability testing of the prepared electrodes during potential cycling yielded a small loss of activity.

Keywords: Oxygen reduction, Diazonium salts, Anthraquinone, Graphene, Electrochemical exfoliation

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