

Green reduction of graphene oxide by plant extracts : a short review

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ABSTRACT

A reduction of graphene oxide is generally involves the application of toxic and poisonous substance which unfortunately may hinder the potential of this process for mass production of graphene. The utilization of reducing agent such as hydrazine even though can result into a higher rate of deoxygenation of graphene oxide, may not only expose the user to the health risk but also significantly will create serious environmental issues if the applied solvent from a reduction step is accidentally released into a water source or ground without a pre-outlined disposal waste system. To counter this challenge, a numerous researches that have been working on the plant extracts for reduction of graphene oxide has emerged with the aim is to replace the hydrazine as a main reducing agent. Plant extracts is considered as the sustainable solution for future reduction of graphene oxide due to the low economical cost possess by a plant, is renewable and with a proper optimization of synthesis process, may offer a comparable or higher reduction rate than the conventional hydrazine. In this short review, a progress on the application of plant extracts for the reduction of graphene oxide has been discussed with an overview of the process effect on the properties of reduced graphene oxide and major surface characterization of reduced graphene oxide such as Raman spectroscopy and X-ray photon spectroscopy has also been included. It is wished that the presented review study in this paper will assist current and potential researcher into a discovery of new and novel plant extract-based reductant for future synthesis of the reduced graphene.

KEYWORDS

Green; Reduction; Graphene oxide; Plant extracts; Review

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