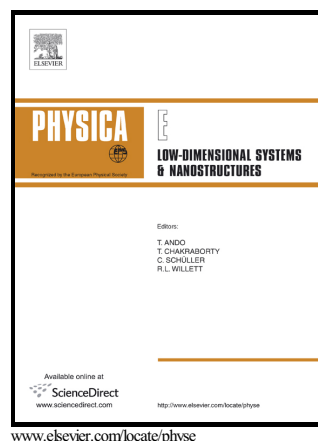


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A new facile route for synthesizing of Graphene Oxide using mixture of sulphuric-nitric-phosphoric acids as intercalating agent

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Abstract

In this work, graphene oxide (GO) has been prepared through three different processes namely, eco-friendly Hummers method, modification in improved Hummers method and a new approach. This new approach has been designed by changing some processing parameters and intercalating agent for significant reduction in processing time and to improve the quantity of GO in comparison to the other two methods. This has been achieved through better oxidization of graphite using nitric-sulphuric acid ($\text{HNO}_3\text{-H}_2\text{SO}_4$) as intercalating agent. X-ray diffraction (XRD), Field Emission Scanning Electron Microscopy (FESEM), Energy-dispersive X-ray spectroscopy (EDX), Raman spectroscopy, Atomic Force Microscopy (AFM), X-ray photoelectron spectroscopy (XPS), UV-visible spectroscopy, and Thermogravimetric analysis (TGA) are used to characterize the GO prepared through different processes. These characterizations have confirmed an improved exfoliation of graphite, using addition of HNO_3 in intercalating agent, in a short processing time and bring on higher yield of GO via this new process.

Keywords: Graphite; Graphene oxide; Chemical modification; Nanostructure

1. Introduction

Now-a-days, graphene oxide (GO) has been widely used in diverse applications like composites, optoelectronics, drug-delivery and bio-devices etc. [1-2]. Although the exact structure of GO is not clear however a wide range of oxygen functional groups like epoxides, alcohols, ketone carbonyls and carboxylic group are present on both basal planes and edges of GO [3,4]. These groups probably enhance the hydrogen bonding between the functional group and water

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