Volume 98 • 2024 ISSN 2214-7853

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Second International Conference on Advances in Mechanical Engineering and Material Science

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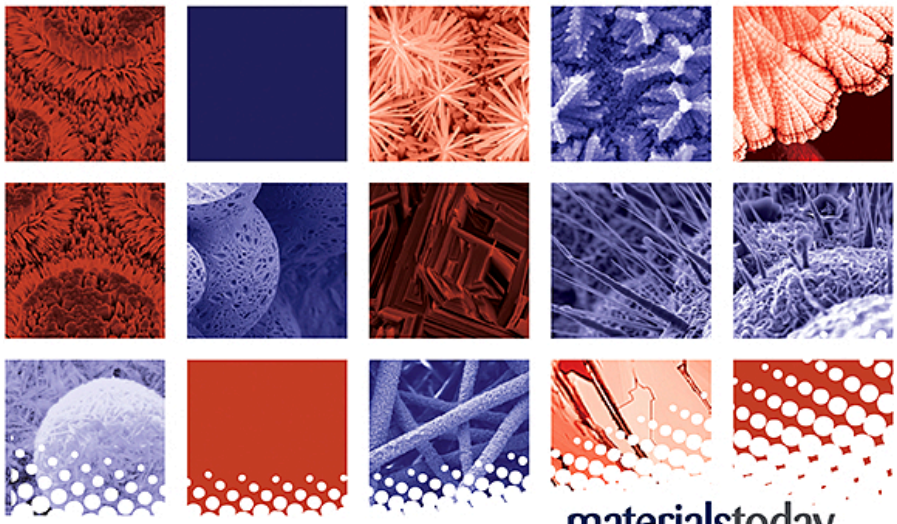

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Materials Today: Proceedings

Available online 15 May 2023

In Press, Corrected Proof What's this?

Investigations on structural, op properties of microwave-assist nanocomposite thin films

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https://doi.org/10.1016/j.matpr.2023.05.119

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Abstract

The reduced graphene oxide:Zinc oxide (rGO:ZnO) nanocomp optimized wet-chemical sol–gel derived spin-coating metho microwave-assisted approach was adopted for the reduction rGO on the microstructural and optoelectronic properties of Z ratios of rGO. The results showed significant changes in the n properties of the rGO:ZnO composite films. X-ray diffraction of the composite films with a preferential growth orientation Good optical transparency in the visible wavelength region w As the weight percentage of rGO increased from 0% to 20%, th noticed, indicating the weak Burstein-Moss effect. The optica of rGO increases, resulting in the reduction of transmittance resistance and therefore the resistivity of the composite films ZnO matrix. The lowest values of sheet resistance and resistiv been recorded for 10% rGO:ZnO composite film. The obtained composite film could be a potential candidate for electrode a

Introduction

Metal oxide nanomaterials with diverse compositions and ric environment and energy fields. Among them, zinc oxide (ZnC and is extensively studied due to its intriguing properties, wh low cost, a direct energy wide band gap (3.37 eV), high chemi exciton binding energy (60 meV). ZnO is widely used as trans electrical devices such as organic light-emitting diodes (OLEI solar cells [1], [2], [3], [4]. Several studies have shown that Zr its mobility, optical and magnetic properties, donor and acce Further, several efforts have also been made to modify the pr with graphene oxide (GO) and reduced graphene oxide (rGO) for device application [7], [8], [9], [10]. GO is a one-atom-thic and epoxide groups on its basal plane and carboxyl groups or carbon structure with a mixture of sp^2 and sp^3 hybridized ca functional groups in graphene oxide also makes it a very che energy gap manipulation by simple chemical methods [11]. M enables it to form a stable and homogeneous dispersion in va water [12]. For the reduction of GO, chemical, thermal, optica been used. Recently, the microwave reduction technique has reduction technique since microwave heating depends on th absorption characteristics of the material. This method is mo because the substance can be heated uniformly and effective mechanical stirring. In the present work, the GO is reduced b the composite films of rGO:ZnO was fabricated using an opti the role of rGO on the structural and optoelectronic properti

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Section snippets

Preparation of GO and rGO

A modified Hummer's method was used to prepare GO from purchased from SDFCL. For the synthesis, 1 g of the natural gr conical flask along with conc. H_2SO_4 (98% pure from Merck C Chemicals) was gradually added while being stirred in an ice explosion. The mixture was diluted by adding 150 ml of distil magnetic stirrer for 6 h at…

Structural study

The crystalline structure of pure ZnO and rGO:ZnO composit 1 shows the diffractogram of ZnO and rGO:ZnO composite fil the composite films exhibit significant diffraction peaks corr showing that the ZnO thin films are polycrystalline and have File No. 36–1451, a=b=3.249 Å, c=5.206 Å). However, after int

Conclusion

In summary, the rGO:ZnO composite thin films were fabricat
effective, sol–gel derived, spin coating technique. A simple, fa
approach was used for the reduction of the graphene oxide. T
polycrystallinity of the rGO:ZnO composite thin films with h
confirmed the preferable c-axis orientation of the crystallites
optical…

CRediT authorship contribution statement

N. Rashmi: . **F.J. Serrao:** . **V.S. Kindalkar:** . **K. Kumara:** . **N.B. I**
G. D'sa: Formal analysis, Investigation, Methodology, Writing

Declaration of Competing Interest

The authors declare that they have no known competing fina
that could have appeared to influence the work reported in t

Acknowledgement

The Authors are thankful to the Head of the Institute of Sahy
Management (Autonomous) and the Head of the 'Thin Film R
experimental facilities.…

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