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ORIGINAL ARTICLE

A novel, green, rapid, nonchemical route hydrothermal assisted biosynthesis of Ag nanomaterial by blushwood berry extract and evaluation of its diverse applications

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Abstract

Silver nanoparticles (Ag Nps) were synthesised using blushwood berry seeds extract as a reducing agent via hydrothermal route. The synthesized nanoparticles were characterized by XRD, UV–vis, SEM, EDAX and TEM analysis. Moreover, silver nanoparticles were tested for photoluminescence, photocatalytic, antibacterial and anticancer studies. The TEM images clearly reveal the average particle size of 30 nm. Furthermore, photocatalytic degradation of methylene blue by Ag Nps has shown good photocatalytic activity. The photoluminescence studies for the synthesized material exhibited yellow emission by exciting at 436 nm. Antibacterial activity of the Ag Nps were carried out by disc diffusion method against both gram-positive and gram-negative bacterial strains. Ag Nps show the significant antioxidant activity through scavenging of 1,1-diphenyl-2-picrylhydrazyl (DPPH) free radicals. Furthermore, in vitro studies revealed dose-dependent cytotoxic effects of Ag Nps treated MCF-7, A549 and PC-3 cell lines. This is the first report on the hydrothermal synthesis of Ag Nps using blushwood berry extract. Results of present study could contribute to synthesize new and cost-effective drugs from blushwood berry using Ag Nps as nanocatalyst by green approach.

Keywords Hydrothermal synthesis · Blushwood berry · Ag Nps · Photocatalytic · Photoluminescence · Anticancer

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FULL PAPER

Applied Organometallic Chemistry WILEY

Facile combustion synthesis of Ag_2O nanoparticles using cantaloupe seeds and their multidisciplinary applications

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Silver oxide nanoparticles (Ag_2O NPs) were prepared using cantaloupe (*Cucumis melo*) seeds as a fuel by employing a green synthesis method. The prepared Ag_2O NPs were investigated using powder X-ray diffraction (PXRD), UV–visible spectrum, Fourier transform infrared analysis, transmission electron microscopy (TEM), scanning electron microscopy (SEM) with energy-dispersive spectroscopy, and photoluminescence studies. PXRD data reveal the establishment of cubic crystal structure of Ag_2O NPs. According to SEM and TEM results, the morphology of the prepared NPs was agglomerated and spherical. The photodegradation activity of the prepared Ag_2O NPs over methylene blue dye was promising under visible light irradiation. Furthermore, the antimicrobial assay of the synthesized Ag_2O NPs was carried out by the disc diffusion method against Gram-positive and Gram-negative microbial strains.

Highlights

- This is the first report on the synthesis of silver oxide nanoparticles using a natural reducing agent (cantaloupe seeds extract) for luminescence and dye-degradation applications.
- Silver oxide nanoparticles were prepared by a combustion-assisted green method using cantaloupe seeds extract.
- Silver oxide nanoparticles showed promising photocatalytic activity against methylene blue under visible light irradiation.
- From the luminescence study, the silver oxide nanoparticles were observed to be in the visible region which emits yellow light.
- Antibacterial activity (foodborne pathogens) of silver oxide nanoparticles was evaluated.

KEYWORDS
Ag_2O NPs, cantaloupe, luminescence, methylene blue, photocatalyst

1 | INTRODUCTION

Nanoparticles (NPs) are important elements in nanotechnology and display exceptional advanced properties based on their characteristics, such as morphology, size, and other size-dependent possessions.[1] These distinctive features have led to NPs having a decisive role in optics, energy science, biomedicine, and other health-care applications.[2] Silver NPs have tremendous applications, in comparison with all transition-metal NPs, in the field of biology, especially in agriculture, forensic science, cosmetics, and food chemistry.[3–6] The variety and

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WILEY

RESEARCH ARTICLE

Enhanced security-aware technique and ontology data access control in cloud computing

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Summary

Nowadays, security and data access control are some of the major concerns in the cloud storage unit, especially in the medical field. Therefore, a security-aware mechanism and ontology-based data access control (SA-ODAC) has been developed to improve security and access control in cloud computing. The model proposed in this research work is based on two operational methods, namely, secure awareness technique (SAT) and ontology-based data access control (ODAC), to improve security and data access control in cloud computing. The SAT technique is developed to provide security for medical data in cloud computing, based on encryption, splitting and adding files, and decryption. The ODAC ontology is launched to control unauthorized persons accessing data from storage and create owner and administrator rules to allow access to data and is proposed to improve security and restrict access to data. To manage the key of the SAT technique, the secret sharing scheme is introduced in the proposed framework. The implementation of the algorithm is performed by MATLAB, and its performance is verified in terms of delay, encryption time, encryption time, and ontology processing time and is compared with role-based access control (RBAC), context-aware RBAC and context-aware task RBAC, and security analysis of advanced encryption standard and data encryption standard. Ultimately, the proposed data access control and security scheme in SA-ODAC have achieved better performance and outperform the conventional technique.

KEYWORDS

advanced encryption standard, cloud computing, data encryption standard and security-aware ontology access control, ontology data access control

1 | INTRODUCTION

Cloud computing technology is an advanced paradigm ID network, and its fast growth demands on numerous applications and services in the networking field.[1] The advantage of this technology is that it can be accessed from any location in the work at any time. Infrastructure as a service model elaborates the cloud model to provide services such as online storage and data servers.[2] Involvement of cloud computing in the business sector promotes the business to make economic benefits and market demands of the products.[3] Ontology is another set of paradigm in cloud computing that has the specified features such as a representation of knowledge as a form of formal and structured. It is an optimal tool that provides potential logical interfaces that are purely based on a well distinct set of data and knowledge.[4] The tool

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Structural and Biological Investigation of Green Synthesized Silver and Zinc Oxide Nanoparticles

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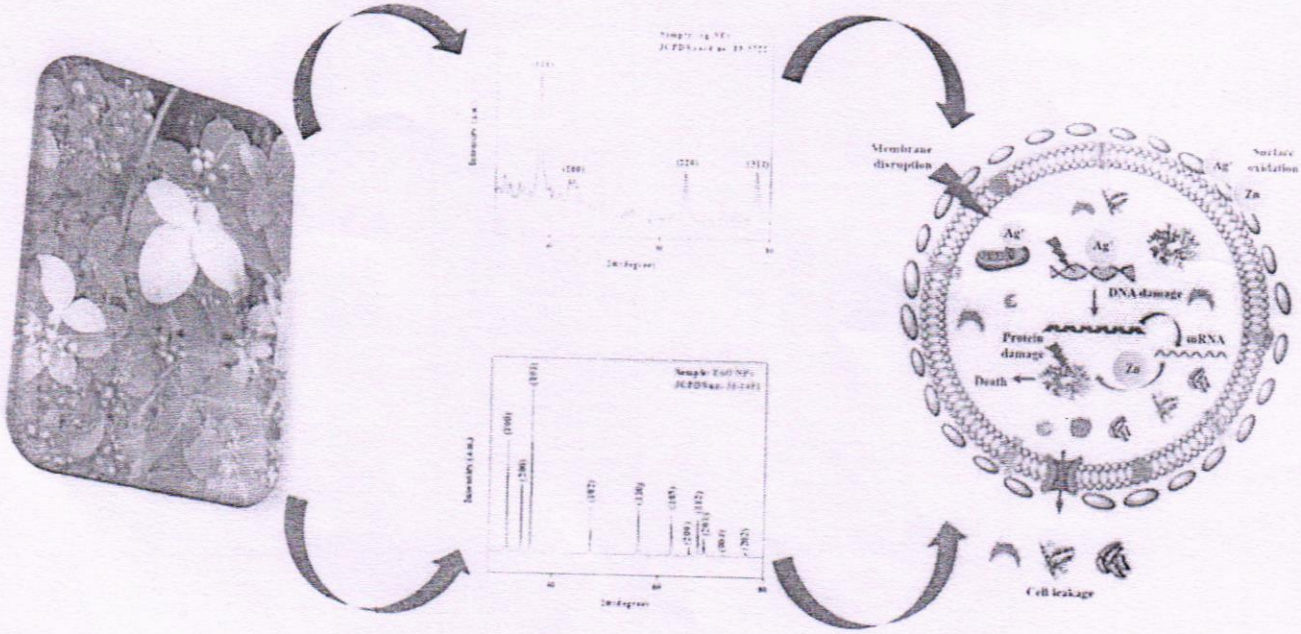
Abstract

Green synthesis nanoparticles are considered as an alternative effective resource instead of chemical engineered nanoparticles. Using seed extract for green synthesis, essential for the reduction and oxidation process of the metals. *Rauvolfia tetraphylla* (L.) seed extract was used to synthesize dark brown colored silver (Ag) and white colored zinc oxide (ZnO) nanoparticles. Synthesized nanoparticles were characterized by different spectroscopic analysis (XRD, XPS, and SEM with EDAX). Characterization results confirmed the particle morphology, and structure. The synthesized Ag and ZnO NPs were analyzed against two gram positive and three gram negative bacteria. Increased levels of green synthesized Ag and ZnO NPs showed increased zone of inhibition than compared with ciprofloxacin (positive control). Our study proved that the green synthesized Ag and ZnO NPs showed similar unique physical and chemical properties with composite/doped metal oxide nanoparticles but less toxic while their discharge into the ecosystem.

Graphic Abstract



Keywords Silver · Zinc oxide · Green synthesis · SEM · EDAX · Antibacterial studies

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Original Article

In-vitro antibacterial, antioxidant and cytotoxic potential of gold nanoparticles synthesized using novel *Elaeocarpus ganitrus* seeds extract

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ABSTRACT

In the present study, we have follwed the hydrothermal path for the synthesis of gold nanoparticles (Au NPs) from the biomaterial *Elaeocarpus ganitrus* seeds extract, which is a rapid, eco-friendly, non-chemical way. The prepared NPs were thoroughly analysed by powder x-ray diffraction and high resolution transmission electron microscopy studies and were also tested for anticancer studies. Besides, the antioxidant, antibacterial and anticancer properties of Au NPs were studied. *In vitro* studies revealed the dose-dependent cytotoxic effect of Au NPs. The prepared nanoparticles showed good cytotoxic impact against a prostate cancer (PC-3) cells line. The evidences of the current study lead to the synthesis of novel and cost-effective drugs from *Elaeocarpus ganitrus* seeds extract by using the bio approach.

1. Introduction

The research on nanotechnology is an auspicious area for cancerous therapy and diagnostics in the biomedical approach. Cancer is a dangerous and threatening disease in the world and does increases the morbidity and mortality of human life. Malignancy treatment incorporates chemotherapy, radiotherapy and medical procedure and is an incredibly factor in its introduction, improvement and result, since now and again these treatments fizzle or cause the reoccurrence of tumor cells [1]. Likewise, greater parts of the disease drugs kill both harmful and ordinary cells in an irregular way [2]. Many degenerative diseases of aging such as brain malfunction, cataracts, cardiovascular diseases and cancer, are generated by the over production of free radicals inside the body which is caused by oxidative stress. The free radicals and receptive oxygen species are to be deactivated before they harm cells. Further, by the unexpected increment in the bacterial obstruction against numerous anti-toxins [3], researchers have looked into techniques to grow new successful antimicrobial operators that beat protections of these microorganisms and that are likewise cost effective [4]. Subsequently, selective medications, which are less lethal, eco-accommodating and cheap, should be investigated. The present work deals with Au NPs that exhibit effective cytotoxicity against prostate cancer (PC-3) cells. The level of cell was essentially diminished by expanding the concentration from 20 to 100 μg/mL.

A tree, called *Elaeocarpus ganitrus*, is an enormous evergreen expansively leaved tree whose seeds are customarily utilized for petition globules in Hinduism. The seeds are called Rudraksha, or Rudraksh [5]. *E. ganitrus* seeds are usually found in the foothills of icy Himalayan Mountains in South-East Asia, the Australian part of New Guinea, Indonesia, Nepal, Hawaii, and Guam. E. ganitrus trees are rarely found in South India [6]. Even if found, they usually do not yield E. ganitrus seeds. However, two E. ganitrus trees in Udupi Kakkunje Garodi yield *E. ganitrus* seeds during the whole year. The seeds are secured by an external husk of blue shading when they are completely ready, and, therefore, are otherwise called blueberry dots [7,8].

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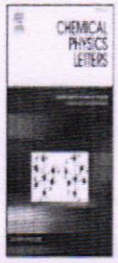

Research paper

Hydrothermal synthesis of gold nanoparticles using spider cobweb as novel biomaterial: Application to photocatalytic

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HIGHLIGHTS

- Gold nanoparticles (Au NPs) have been synthesized using a novel, facile, fast and single step advanced hydrothermal method.
- In the synthesis part, we used novel biomaterial: Spider Cobweb as reducing and stabilizing agent.
- Au NPs were non-toxic to spider cobweb and are environmentally safe.
- They have also shown excellent catalytic activity for the reduction of Rhodamine-B and Methylene blue.

ARTICLE INFO

Keywords:
Spider cobweb
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Gold nanoparticles
Nanocatalyst

ABSTRACT

In the present study, we have followed the hydrothermal path for the synthesis of gold nanoparticles (Au NPs) from the novel biomaterial spider cobweb, which is a rapid & non-chemical way. The synthesized nanoparticles were thoroughly characterized by XRD, UV-vis, SEM, EDAX and TEM studies used for the photocatalytic dye degradation studies. Here we have used two dyes namely Rh B and MB, Au NPs has shown the good photo-catalytic activity, this is due to more sensitive to light and reduces the electron-hole recombination.