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ORIGINAL PAPER

Rauvolfia tetraphylla (Devil Pepper)-Mediated Green Synthesis of Ag Nanoparticles: Applications to Anticancer, Antioxidant and Antimitotic

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Abstract

In the current examination, we have built up a novel, green approach for the synthesis of Ag NPs (silver nanoparticles) from *Rauvolfia tetraphylla* leaves extract. The synthesized Ag NPs were thoroughly characterized using different analytical techniques like Powder X-ray diffraction, Fourier transform infrared spectroscopy, UV–visible spectroscopy, scanning electron microscopy and transmission electron microscope analysis. It is confirmed as a cubic phased silver nanoparticle with an average particle size of around 40 nm with a spherical shape. Further, the characterized material was examined for antioxidant activity and it has shown the IC_{50} (inhibitory concentration 50%) value of 82.13 µg/mL against the scavenging of DPPH free radical. The cytogenetic effect of silver nanoparticles was tested on the root cells of *Allium cepa*, from this examination we have noted the antimitotic activity and precise chromosomal aberrations such as chromosome-breaks, chromosome-stickiness, laggard chromosome, clumped chromosome etc. By discharging Ag^+ ions and producing ROS, silver nanoparticle exhibits great anticancer activity. Therefore, this paperwork effectively shows the synthesis of Ag nanoparticles by simple eco-friendly green way utilizing *Rauvolfia tetraphylla* leaves to extract as a green reducing agent as well as stabilizing/capping agent for the synthesis of Ag NPs.

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Green Synthesis and Characterization of Silver Nanoparticles using *Cassia auriculata* Leaves Extract and Its Efficacy as A Potential Antibacterial and Cytotoxic Effect

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Abstract

Silver nanoparticles (Ag NPs) were prepared using *Cassia auriculata* leaves extract as a reducing agent via green synthesis method. From the PXRD, UV-Visible, FTIR, studies the synthesized NPs were characterized. The morphologies of the prepared NPs were studied by SEM and TEM analysis. The synthesized NPs were tested for antibacterial and anticancer studies. The PXRD data indicated that the synthesized nanoparticles belong to cubic phase structure. Presence of strong silver peaks was confirmed by EDAX studies. The SEM and TEM data revealed that spherical like structure were obtained. Antibacterial (MIC from 75 to 150 µl) activities were noticed for green synthesized Ag NPs. Furthermore, *in vitro* studies revealed dose-dependent cytotoxic effects of Ag NPs treated PC-3 cell line. This is the first report on the green synthesis of Ag NPs using leaves extract of *C. auriculata*. Results of present study could contribute to synthesize new and cost-effective drugs from *C. auriculata* by using green approach.

Keywords: Green synthesis, *Cassia auriculata*, silver nanoparticles, antibacterial, anticancer.

Introduction

Nanoparticles are usually categorized as materials

Cancer is one of the leading diseases which will cause global death rates up to 15 million by 2020 and is

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Research Article

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Ixora coccinea extract-mediated green synthesis of silver nanoparticles: Photodegradative and antimicrobial studies

Abstract

Silver nanoparticles (Ag NPs) was synthesized by green synthesis method using Ixora coccinea leaves extract as fuel. The structure and morphology of the product were characterized by Powder X-ray Diffraction, UV-Visible spectroscopy, Scanning Electron Microscopy and Transmission Electron Microscopy. The nanoparticles (NPs) were subjected to photocatalytic and antimicrobial studies. PXRD pattern demonstrates that the formed product belongs to the cubic crystal system. SEM images show that the particles are agglomerated to form spherical like structure and the average crystallite sizes were found to be 20nm. The prepared Ag NPs exhibit excellent photocatalytic activity for the photodegradation of methylene blue (MB) indicating that the Ag NPs are potential photocatalytic semiconductor materials. Ag NPs exhibit significant bactericidal activity against gram-positive (Pseudomonas aeruginosa, Escherichia coli and Klebsiella aerogenes) and gram-negative (Staphylococcus aureus) bacteria using the disc diffusion method. The study successfully demonstrates the synthesis of Ag NPs by simple eco-friendly route employing Ixora coccinea as a fuel that exhibits superior Photodegradative and antibacterial activities.

Keywords: green synthesis, Ixora coccinea, photocatalyst, dye degradation, antibacterial

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Introduction

In recent years, nanomaterials have been broadly studied compared to their huge materials due to their interesting physio-chemical properties.[1] Presently, the photocatalytic degradation has much alarming technique green-assisted technology for making free from organic and inorganic toxic pollutants in wastewater. Semiconductor

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Original Article

Novel Gomutra (cow urine) mediated synthesis of silver oxide nanoparticles and their enhanced photocatalytic, photoluminescence and antibacterial studies

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ABSTRACT

This work successfully synthesizes silver oxide (Ag_2O) nanoparticles (Nps) using cow urine. The presence of different biological components in cow's urine may act as fuel for the synthesis of Ag_2O Nps by a combustion method at 500 °C. This is a rapid and environmentally benign procedure, which has the added advantage of shorter response times and better control over size and shape. The synthesized nanoparticles were characterized by means of XRD, FTIR, UV-vis, SEM, EDAX and TEM and have been tested for photoluminescence and for photocatalytic and biological activities. They show good photocatalytic degradation of methylene blue, due to their sensitivity to absorb light with a wide band gap energy. Furthermore, we have examined the photoluminescence properties of the synthesized material and found that it has a yellow emission for excitation at 436 nm. In addition, the synthesized material exhibits a good antibacterial activity for both gram-positive and gram-negative bacterial strains by the disc diffusion method. It is shown that these combustion methods produce nano sized Ag_2O within less time suited for a large scale synthesis in an economic way.

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Endophytic fungus *Alternaria* spp isolated from *Rauvolfia tetraphylla* root arbitrate synthesis of gold nanoparticles and evaluation of their antibacterial, antioxidant and antimitotic activities

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Abstract

In our present study, we have developed a new, endophytic mediated technique for the synthesis of gold nanoparticles (AuNPs) from the endophytic fungus *Alternaria* spp. extract isolated from *Rauvolfia tetraphylla* root. The synthesized AuNPs were characterized using Ultraviolet-visible

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Plant-mediated green synthesis of Ag nanoparticles using *Rauvolfia tetraphylla* (L) flower extracts: Characterization, biological activities, and screening of the catalytic activity in formylation reaction

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KEYWORDS

Rauvolfia tetraphylla;
Silver nanoparticles;
Formylation;
Antibacterial;

Abstract. Various plant extracts have currently been used in the bioproduction of nanoparticles with enormous applications. In this study, *Rauvolfia tetraphylla* flower extracts were employed to obtain silver nanoparticles (Ag NPs) in bioproduction. The biologically produced nanoparticles were characterized by XRD, FTIR, UV-Vis, BET, SEM, EDXA, and TEM analyses. Phytochemical screening of the *Rauvolfia tetraphylla*

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ORIGINAL PAPER

Biogenically Synthesized Silver Nanoparticles Using Endophyte Fungal Extract of *Ocimum tenuiflorum* and Evaluation of Biomedical Properties

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Received: 26 September 2019

Abstract

In the present work, AgNPs have been prepared using an extract of *Exserohilum rostrata*, an endophyte fungus isolated from *Ocimum tenuiflorum* leaf and characterized using TEM, SEM, DLS, XRD, FT-IR, etc. The FT-IR analysis confirmed the capping of AgNPs with bioactive molecules of endophyte extract, thereby importing addition or enhancing AgNPs therapeutic properties. Endophyte extract and AgNPs offered significant inhibition in Gram-positive and Gram-negative bacteria. Further, we also demonstrated its ability to inhibit bacterial biofilm formation of *P. aeruginosa* and *S. aureus*. Furthermore, we also showed excellent antioxidant and anti-inflammatory activity of both endophyte extract and AgNPs. Moreover, we observed antibacterial, anti-inflammatory, and antioxidant activity enhanced the effect of AgNPs due to the synergistic effect of the bioactive agent forming the corona and inhabitant activity of AgNPs. We also demonstrated the antimitotic activity in *A. cepa* and antiproliferative activity in breast cancer cells. AgNPs have also found to be excellent compatibility with healthy human keratinocyte cells and RBC cells. Hence, we might say that biogenically synthesized AgNPs using endophyte extract possess anti-bacterial, anti-inflammatory, and anti-oxidant ability as well as antiproliferative activity in breast cancer cells and thus possible found its application in the biomedical industry due to it's eco-friendly and cost-effectiveness.

Keywords Silver nanoparticles · Endophyte fungi · Green synthesis · Biocompatibility · Anti-oxidant activity

Introduction

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Research Article

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Biomedical applications of *Durio zibethinus* extract mediated gold nanoparticles as antimicrobial, antioxidant and anticoagulant activity

Abstract

An eco-friendly and efficient method has been used for green synthesis of stable gold nanoparticles (Au NPs) using *Durio zibethinus* extract as a reducing and capping agent. The biologically produced nanoparticles were characterized by UV-Vis, XRD, SEM, EDAX and TEM analysis. The elemental composition of Au NPs was reported by EDAX spectral analysis. The bio-reduced Au NPs exhibited almost spherical. Increasing applications of NPs especially metallic nanoparticle plays an important role. Gold is one of the most useful metallic nanoparticles. Au NPs having unique physiochemical characteristics and wide usage in different field applications. Besides, antibacterial, antioxidant and anticoagulant properties of Au NPs were studied. It is proved that Au NPs synthesized using natural reducing agents (plant leaves, route, seeds, pulp, stem, etc.) are eco-friendly, inexpensive, have good anti-microbial activities against micro-organisms. This study established a synthesis of Au NPs using *Durio zibethinus* extract as a viable green route approach, with remarkable antimicrobial, antioxidant and anticoagulant activities. As far as we know, this is the first report of the use of *Durio zibethinus* extract to synthesize Au NPs.

Keywords: *Durio zibethinus*, gold nanoparticles, antimicrobial, antioxidant, anticoagulant

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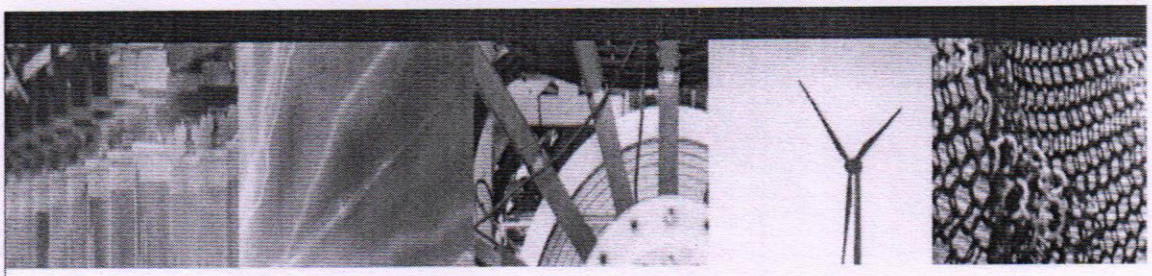
Introduction

Nanotechnology is an innovative branch of science deals with the formation, processing, and applications of nanomaterials. Nanoscale metal oxide semiconductor materials have been widely used in research due to their distinctive properties.[1] Efforts are being made to develop simple, nontoxic, biocompatible and eco-friendly nanomaterials through the green chemistry approach.[2-7] Different parts of plants synthesis of Au NPs using *Durio zibethinus* seeds extract as a capping and reducing agents, as well as a demonstration of its anti-microbial, antioxidant and anti-coagulant assays.

Experimental

Collection and processing and preparation of *Durio zibethinus* extract



Research Article

SN

Enhanced photocatalysis, photoluminescence, and anti-bacterial activities of nanosize Ag: green synthesized via *Rauvolfia tetraphylla* (devil pepper)

S. P. Vinay[1] · Udayabhanu[2] · G. Nagarju[2] · C. P. Chandrappa[3] · N. Chandrasekhar[1]

Abstract

In the current study, we have built up a novel, green approach technique for the synthesis of silver nanoparticles (Ag NPs) from *Rauvolfia tetraphylla* leaves extract. The synthesized nanoparticles were thoroughly characterized using different analytical techniques like X-ray diffraction, Fourier transform infrared spectroscopy, UV–Vis spectroscopy (UV–Vis), scanning electron microscopy, energy-dispersive X-ray spectroscopy and transmission electron microscope analysis. It is confirmed as a cubic phase with average particle size about 40 nm with a spherical shape. Further, the characterized material was inspected for the photocatalytic degradation of most common environmental pollutants (carcinogenic organic dyes) like Methylene blue (M.B), Rhodamine B (Rh. B) and Rose bengal (R.B) with degradation efficiency of 81, 55 and 80% respectively. In addition, it was examined by optical property (photoluminescence) with blue emission by the excitation at 370 to 400 nm, which is useful for blue LEDs (light emitting diode). Furthermore, it also shows the superior anti-bacterial activity against gram-positive bacterias such as *Pseudomonas aeruginosa*, *Escherichia coli* and *Klebsiella aerogenes* and gram-negative bacteria *Staphylococcus aureus*. Ag NPs synthesized using *Rauvolfia tetraphylla* leaf extract exhibited a good photocatalytic and antibacterial activity. Hence, it's a first to report the synthesis of Ag NPs using natural reducing agent *Rauvolfia tetraphylla* leaf extract for Luminescence and Dye degradation applications.

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Facile Green Chemistry Synthesis of Ag Nanoparticles Using *Areca Catechu* Extracts for the Antimicrobial Activity and Photocatalytic Degradation of Methylene Blue Dye

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Abstract

Green synthesis of silver nanoparticles (Ag NPs) using *Areca catechu* extract as reducing agent was investigated. The bioreduction of silver ions into silver nanoparticles was monitored using UV-visible spectrophotometry. The synthesized Ag NPs were studied by Fourier transform infra-red spectroscopy (FTIR), UV–visible spectroscopy, Transmission electron microscopy (TEM) analysis, Energy dispersive X-ray analysis (EDX) and X-ray diffraction (XRD) techniques. The photocatalytic degradation of methylene blue was estimated spectrophotometrically using the green synthesized silver (Ag) as nanocatalyst. Disc diffusion method was used to investigate the antimicrobial properties of the Ag NPs against the tested bacterial strains.