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

Hemashekhar Badar[1] · Chandrappa Chinna Poojari[1] · Govindappa Melappa[2] · Rajesh Rangappa[3] · N. Chandrasekhar[1] · Prathap Somu[4]

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

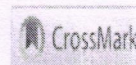## Introduction

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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Vinay S P,[1] Udayabhanu,[2] Nagaraju G,[2] Hemasekhar B,[3] Chandrappa C P,[3] Chandrasekhar N[1]

[1]Department of Chemistry, Shridevi Institute of Engineering and Technology, India
[2]Department of Biotechnology, Shridevi Institute of Engineering and Technology, India

Correspondence: Chandrasekhar N, Research and Development Center, Department of Chemistry, Shridevi Institute of Engineering and Technology, Tumakuru - 572106, Karnataka, India, Email chandruarshu@gmail.com

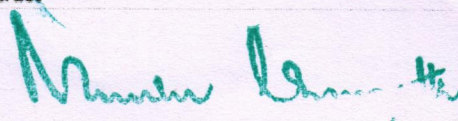**Received:** September 25, 2019 | **Published:** October 11, 2019

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

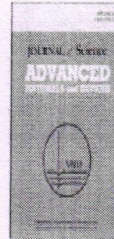### Collection and processing and preparation of *Durio zibethinus* extract

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ENGINEERING & TECHNOLOGY
TUMKUR - 572106.

Original Article

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

S.P. Vinay [a], Udayabhanu [b], G. Nagaraju [b], C.P. Chandrappa [c], N. Chandrasekhar [a, *]

[a] Research and Development Center, Department of Chemistry, Shridevi Institute of Engineering and Technology, Tumakuru, 572106, India
[b] Energy Materials Research Laboratory, Department of Chemistry, Siddaganga Institute of Technology, Tumakuru, 572103, India
[c] Department of Biotechnology, Shridevi Institute of Engineering and Technology, Tumakuru, 572106, India

ARTICLE INFO

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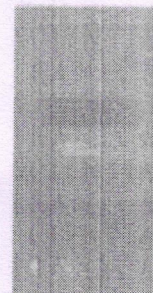
Plant-mediated green synthesis of Ag nanoparticles using *Rauvolfia tetraphylla* (L) flower extracts: Characterization, biological activities, and screening of the catalytic activity in formylation reaction

S.P. Vinay[a], Udayabhanu[b], G. Nagaraju[b], H.S. Lalithamba[c], and N. Chandrasekhar[a,*]

a. Research and Development Center, Department of Chemistry, Shridevi Institute of Engineering and Technology, Tumakuru - 572106, Karnataka, India.
b. Energy Materials Research Laboratory, Department of Chemistry, Siddaganga Institute of Technology, Tumakuru - 572103, Karnataka, India.
c. Department of Chemistry, Siddaganga Institute of Technology, Tumakuru - 572103, Karnataka, India.

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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Facile combustion synthesis of Ag$_2$O nanoparticles using cantaloupe seeds and their multidisciplinary applications

S.P. Vinay[1] | Udayabhanu[2] | H.N. Sumedha[2] | G. Nagaraju[2] |
S. Harishkumar[2,3] | N. Chandrasekhar[1]

[1]Research and Development Centre, Department of Chemistry, Shridevi Institute of Engineering and Technology, Tumakuru, Karnataka, 572106, India

[2]Energy Materials Research Laboratory, Department of Chemistry, Siddaganga Institute of Technology, Tumakuru, Karnataka, 572103, India

[3]Department of Pharmaceutical Chemistry, Kuvempu University, Post-Graduate Centre, Kadur, Karnataka, 572103, India

Correspondence
Chandrasekhar N, Research and Development Centre, Department of Chemistry, Shridevi Institute of Engineering and Technology, Tumakuru 572106, Karnataka, India.
Email: chandruharshu@gmail.com

Silver oxide nanoparticles (Ag$_2$O NPs) were prepared using cantaloupe (*Cucumis melo*) seeds as a fuel by employing a green synthesis method. The prepared Ag$_2$O 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$_2$O NPs. According to SEM and TEM results, the morphology of the prepared NPs was agglomerated and spherical. The photodegradation activity of the prepared Ag$_2$O NPs over methylene blue dye was promising under visible light irradiation. Furthermore, the antimicrobial assay of the synthesized Ag$_2$O 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.
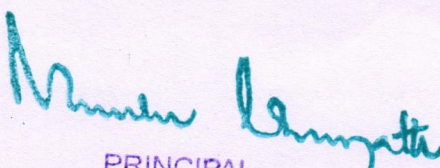
KEYWORDS
Ag$_2$O NPs, cantaloupe, luminescence, methylene blue, photocatalyst

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

Research paper

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

S.P. Vinay[a], Udayabhanu[b], G. Nagaraju[b], C.P. Chandrappa[c], N. Chandrasekhar[a,*]

[a] Research and Development Center, Department of Chemistry, Shridevi Institute of Engineering and Technology, Tumakuru, Karnataka 572106, India
[b] Energy Materials Research Laboratory, Department of Chemistry, Siddaganga Institute of Technology, Tumakuru 572103, Karnataka, India
[c] Department of Biotechnology, Shridevi Institute of Engineering and Technology, Tumakuru 572106, India

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

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 photocatalytic activity, this is due to more sensitive to light and reduces the electron-hole recombination.

ORIGINAL ARTICLE

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

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

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.

Soft Computing based Duplicate Text Identification in Online Community Websites

Basavesha D[#1], Dr. Y S Nijagunarya[*2]

#*Research Scholar, Department of Computer Science & Engg, Siddaganga Institute of Technology*
**Professor, Department of Computer Science & Engg, Siddaganga Institute of Technology*
Tumakuru, Karnataka, India

Abstract - As the number of social media websites and applications are increasing the amount and the speed of data generation is also increasing and in turn the chances of having duplicates in the data are also increasing. The presence of duplicates will reduce the quality of data and also deteriorates the accuracy of the final results. Therefore, identifying and removing the duplicates is very important and it is considered to be a necessary step in data preprocessing and data integration. In this paper we have made an extensive review on the state-of-the art literature in the field of duplicate text identification. The paper consists of a survey on the works related to duplicate data identification, duplicate text identification and duplicate record identification. We have discussed generalized step by step procedure for duplicate text identification that is followed by most of the researchers. We described about word embedding techniques, similarity estimation techniques, and different soft computing techniques such as neural networks, fuzzy logic, evolutionary algorithms, Bayesian networks and support vector machines. We summarized the state-of-the-art works in three categories like, duplicate question identification in quora and stack overflow, text identification in documents and record identification in small and large datasets. Finally we also discussed about the different metrics used to measure the performance of the model developed for duplicate identification.

Keywords — *Duplicate text, soft computing, neural network, fuzzy logic, bag-of-words.*

I. INTRODUCTION

Text mining is one of the important on-going research areas. The social media websites and online community cites are generating huge volume of data every day. The users are becoming the producers of this huge data both in the form of text and images. The rapid growth in volume of data makes it necessary to identify duplicate texts. Text analysis can be performed over online community databases for gathering preferences, for duplicate question detection, duplicate document detection, bug report detection etc. Duplicate text detection is very important task for data cleaning [1]. Data cleaning is a significant role in data mining. It is important to improve the quality of the data in data warehouse before applying data mining process. Data cleaning deals with identifying and removing the errors, missing values and removing the duplicates and inconsistencies to improve the quality of data. Removing duplicates in datasets actually means to remove the entities that are carrying same value for all the attributes [1]. Whereas removing duplicates in case of online community cites like quora and stack overflow actually means to identify the questions that are semantically same and can be answered with the same answer. By doing this it is possible to group all the questions together and provide answer that can satisfy all the questions. This ensures the quality and quantity of the content presented to the users. This enhances the user experience. Though many research works has been carried out on this area, still it is a challenging problem to detect duplicate text or record in quora, stack overflow, datasets and in other online community cites. The main reason behind this is the fact that, natural language is very expressive, same word gives different meaning based on situation and sequence, different words, phrases can be used to mean the same.

The step by step process for duplicate text detection is shown in the figure. The textual data is given as input to the word embedding system [2]. The word embedding system will represent the given input text in the form of vectors of real numbers. These vectors are then fed as input to the similarity checking techniques like Simhash and Minhash. The outcome of the similarity estimation is used to find the features of each text. The features are each text are computed together to find the distance between the both using some distance function. The distance can be computed either using Euclidian distance, Cosine distance or Manhattan distance.

During word embedding stage, the texts having same meaning will have same similar vector representation. Some of the most commonly used word embedding techniques are embedded layer, Word2Vec and Glove.