ACHIEVEMENTS OF FACULTY MEMBERS

1. NUMBER OF RESEARCH PAPERS PUBLISHED IN JOURNAL (2023-2024)

S.No.	Year	Name of the Faculty Member	Department	Title of the Research papers	Name of the Journal	Month & Year	Vol. & Issue No.	P.No.	ISSN. No.	Impact Factor	UGC / Scopus/ SCI/SCIE/ Peer reviewed/
1.	2023-2024	Kandasamy Selvam, Chinnappan Sudhakar	Biotechnology	Biodegradation of low-density polyethylene film by Bacillus gaemokensis strain SSR01 isolated from the guts of earthworm	Environmental Geochemistry and Health	April-24	46		0269-4042	3.8	Scopus, SCIE
2.	2023-2024	Kandasamy Selvam, Chinnappan Sudhakar	Biotechnology	Green synthesis and characterization of silver nanoparticles from sandalwood (Santalum album L.) extract for efficient catalytic reduction, antioxidant and antibacterial activity	Biocatalysis and Agricultural Biotechnology	April-24	57	103094	1878-8181	3.8	Scopus
3.	2023-2024	K. Selvam, T. Selvankumar	Biotechnology	Green synthesis of gold nanoparticles using macroalgae Halimeda macroloba extract and their photocatalytic degradation of methylene blue and methyl orange	Polymers for Advanced Technologies	April-24	35 (4)	e6383	1099-1581	3.4	Scopus, SCI, SCIE
4.	2023-2024	Kandasamy Selvam, Chinnappan Sudhakar	Biotechnology	Green Synthesis and Characterisation of Iron Oxide Nanoparticle Using	Waste and Biomass Valorization	March-24	15	6415–6429	1877-2641	2.8	Scopus, SCIE

				Ziziphus oenoplia Fruit Extract: A Biomedical and Environmental Potential							
5.	2023-2024	Chinnappan Sudhakar, Kandasamy Selvam,	Biotechnology	Biomimetic synthesis of Ag@Fe bimetallic nanoparticles from Palmyra sprouts extract and their antibacterial, photocatalytic degradation of malachite green	Inorganic Chemistry Communications	March-24	161	112132	1387-7003	5.4	Scopus, SCIE
6.	2023-2024	Kandasamy Selvam, Chinnappan Sudhakar	Biotechnology	Optimization of laccase production from Bacillus subtilis strain KSK02 utilizing bi-substrates and their reactive red-120 dye degradation potential	Biomass Conversion and Biorefinery	February-24	15	22587 – 22601	2190-6815	4.1	Scopus, SCIE
7.	2023-2024	Thangaswamy Selvankumar	Biotechnology	Implications of Asparagus racemosus and Terminalia chebula extracts on oxazolone induced inflammatory bowel disease in Danio rerio (zebrafish)	Biocatalysis and Agricultural Biotechnology	August-23	51	102790	1878-8181	3.8	Scopus
8.	2023-2024	Kandasamy Selvam	Biotechnology	Phyto-mediated synthesis of silver nanoparticles using flower extract of Erythrina indica and evaluation of their biological activities	Inorganic Chemistry Communications	December-23	158	111610	1387-7003	5.4	Scopus, SCIE
9.	2023-2024	R Yuvarajan	Biotechnology	Larvicidal Efficacy and Characterization of Silver Nanoparticles Derived from Aqueous Leaves Extracts of Trichosanthes	Indian Journal of Science and Technology	October-23	16 (39)	3258-3266	0974-5645		UGC

				tricuspidata against Dengue Vector Ades aegypti							
10.	2023-2024	Thangaswamy Selvankumar	Biotechnology	Drug Resistance, Characterization and Phylogenetic Discrepancy of Salmonella enterica Isolates from Distinct Sources	Current Microbiology	August-23	80 (9)	314	1432-0991	2.6	Scopus, SCIE
11.	2023-24	S.Sakthivel M.Rajapriya M.Guhanathan	Mathematics	A Study on Applications of Partial differential equations using Fourier transform	International journal of creative research thoughts	April 2024	12 & 04	488-494	2320 2882	7.97	UGC
12.	2023-24	S.Sakthivel M.Guhanathan M.Dineshkumar	Mathematics	A study on numerical solution of Partial Differential Equation	International journal of creative research thoughts	April 2024	12 & 04	i519-i524	2320 2882	7.97	UGC
13.	2023-24	S.Sakthivel M.Rajapriya M.Dineshkumar	Mathematics	A study on Applications of Partial differential Equation using Cauchy Integral formula with Laplace Transform	International journal of creative research thoughts	April 2024	12 & 04	i423-i427	2320 2882	7.97	UGC
14.	2023-24	K.Thavamani M.Valli S.Sudha	Statistics	A study on Awareness level of Diabetic Patients	International journal of creative research thoughts	April 2024	12 & 04	i429-433	2320 2882	7.97	UGC
15.	2023-24	P.B.Deepa , DJ. Josephine Daisy	Commerce CA	"Investment Strategy Vs Savings of Paid Personnel with Special Reference to Bengaluru City"	STR Publication	October 2023	16 (5)	508-516	2581-3986	-	UGC
16.	2023-24	R.Vijay Kumar, K.Prabakaran	Physics	Tight Focusing of a higher order Radially Polarized sinh-Gaussian beam Transmitting through Cosine Phase Plate	International Journal of Advanced Science and Engineering	August 2023	10 (1)	2349-5359	2454-9967	-	Scopus

17.	2023-24	V Hariharan	Physics	Fabrication of Visible Light Active MoS2-W-Cu Ternary Heterojunction for Enhanced Photocatalytic Degradation.	Acta Physica Polonica A	March 2024	145	361-369	1898-794X		UGC
18.	2023-24	K.Selvaraj	Commerce	A Study on Socio-Economic Conditions of Construction Workers in Kozhikode District	Journal of Purchasing, Logistics and Supply Chain Management System	Dec2023	Vol4 Issue 2	30-35	**3048-6254**	5.69	UGC

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ORIGINAL PAPER

Biodegradation of low-density polyethylene film by *Bacillus gaemokensis* strain SSR01 isolated from the guts of earthworm

Arunagiri Ragu Prasath · Kandasamy Selvam · Chinnappan Sudhakar

Received: 8 December 2023 / Accepted: 20 February 2024 / Published online: 9 April 2024

Abstract In recent years, low-density polyethylene (LDPE) has emerged as an essential component of the routine tasks that people engage in on a daily basis. However, over use of it resulted in environmental buildup that contaminated aquatic habitats and human health. Biodegradation is the most effective way for controlling pollution caused by synthetic plastic waste in a sustainable manner. In the present study, the LDPE degrading bacterial strain was screened from gut of Earthworms collected from plastic waste dumped area Mettur dam, Salem district, Tamil Nadu, India. The LDPE degrading bacterial strain was screened and identified genotypically. The LDPE degrading *Bacillus gaemokensis* strain SSR01 was submitted in NCBI. The *B. gaemokensis* strain SSR01 bacterial isolate degraded LDPE film after 14 days of incubation and demonstrated maximum weight loss of up to 4.98%. The study of deteriorated film using attenuated total reflection-Fourier transform infrared revealed the presence of a degraded product. The degradation of LDPE film by *B. gaemokensis* strain SSR01 was characterized by field-emission scanning electron microscopy analysis for surface alterations. The energy dispersive X-ray spectroscopy test confirmed that the broken-down LDPE film had basic carbon reduction. The present study of LDPE flim biodegradation by *B. gaemokensis* strain SSR01 has acted as a suitable candidate and will help in decreasing plastic waste.

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Green synthesis and characterization of silver nanoparticles from sandalwood (*Santalum album* L.) extract for efficient catalytic reduction, antioxidant and antibacterial activity

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Santalum album L.
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Antibacterial activity
Antioxidant assay
Catalytic applications

ABSTRACT

Metal nanoparticles that have been manufactured in a green environment have been recognized as potentially useful materials for the development of nanomedicine due to the fact that they are eco-friendly, non-toxic, and durable. Silver nanoparticles (AgNPs) have been demonstrated to be beneficial in a variety of applications, including those in the fields of biomedicine and environmental protection, according to research. Our study aims to prepare AgNPs using sandalwood (*Santalum album* L.) extract. Sandalwood-based silver nanoparticles (SW-AgNPs) that were characterized using a variety of techniques, including UV–Vis spectroscopy, Fourier transform infrared (FT-IR) spectroscopy, X-ray diffraction (XRD), and scanning electron microscopy-energy dispersive X-ray (SEM-EDS) analysis. The antioxidant activity of the produced SW-AgNPs was examined in relation to the radical scavenging of 2,2-diphenyl-1-picrylhydrazyl (DPPH) and showed a maximum of 80.21 ± 0.91% after the concentration of SW-AgNPs was set at 500 μg/mL. The antibacterial efficiency of SW-AgNPs was tested against infection causing bacteria (*Staphylococcus aureus* and *Pseudomonas aeruginosa*) with zones of inhibition of 17.2 and 12.3 mm, respectively. The SW-AgNPs showed photocatalytic decolorization efficiency of around 71.3% and 92.14% for the Malachite green (MG), methylene blue (MB) dyes respectively, after a 150 min incubation. The results that were obtained therefore present a potential way for the green synthesis of SW-AgNPs utilizing *S. album* L. extract, which has significant applications in the fields of biopharmaceuticals and catalysis.

1. Introduction

Nanotechnology is a scientific and technological discipline focused on the manipulation and regulation of materials at the nanoscale, generally ranging from 1 to 100 nm (Dousari et al., 2023; Kumar et al., 2023; Saeed et al., 2023). At this particular magnitude, materials have distinctive characteristics and actions that deviate from their larger-scale equivalents. Nanotechnology is an interdisciplinary area that combines physics, chemistry, biology, and engineering. It has many applications in domains including medical, electronics, energy, environmental, pharmaceutical and materials research (Abada et al., 2023; Chadha et al., 2024; Sharifi-Rad et al., 2024b; Zhang et al., 2023). Nanoparticles (NPs) can be produced by a range of techniques, such as chemical, physical, or biological resources. Biological techniques utilize living organisms or their extracts to produce NPs. Biological method is commonly

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SPECIAL ISSUE ARTICLE

polymers advanced technologies WILEY

Green synthesis of gold nanoparticles using macroalgae *Halimeda macroloba* extract and their photocatalytic degradation of methylene blue and methyl orange

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Abstract

Green synthesis of gold nanoparticles (AuNPs) is gaining attention of researchers because of their varieties of biomedical and environmental applications. This study reported the novel eco-friendly synthesis of AuNPs using green macroalgae *Halimeda macroloba* (HM) extract and evaluate their photocatalytic potential. The green synthesized *H. macroloba* mediated gold nanoparticles (HM-AuNPs) was characterized using UV–visible spectrophotometry, Fourier-transform infrared (FT-IR) spectroscopy, transmission electron microscope (TEM), scanning electron microscope-energy dispersive spectroscopy, x-ray photoelectron spectroscopy (XPS), and particle size distribution (PSD) anlaysis. The UV–visible spectrum shows a sharp intense plasmonic resonance peak at 543 nm. The bioactive compounds present in HM were primarily responsible for the biological reduction of gold ions validated by FT-IR analysis. XRD analysis proved the crystalline face centered cubic structure of the HM-AuNPs. The average particle size of 18.72 nm and morphological evidences were obtained from the images from TEM. The metallic form of biosynthesised HM-AuNPs was confirmed by XPS results with a distinctive binding energy. The photocatalytic degradation ability of the green synthesized HM-AuNPs was investigated against the methylene blue (MB) and methylene orange (MO) dyes under sunlight irradiation. The HM-AuNPs exhibited 97.23% and 89.91% photocatalytic activity against MB and MO after 90 min of exposure to sunlight, respectively. The overall results of this research indicate that *H. macroloba* mediated HM-AuNPs can be used as an effective option for the degradation of industrial dyes.

KEYWORDS
gold nanoparticles, *Halimeda macroloba*, photocatalytic activity

1 | INTRODUCTION

The increase in the global human population has necessitated the need for and expansion of industries such as the textile, food, cosmetics, and pharmaceutical industries. These industries require dyes to change the color of the clothes, they require attractive colorants to be added to the foods, and they require antibiotics for human treatment.[1,2] As a consequence of this, there has been a rise in demand, which has resulted in a substantial amount of production and consumption. Water pollution within the environment has been caused

Waste and Biomass Valorization
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ORIGINAL PAPER

Green Synthesis and Characterisation of Iron Oxide Nanoparticle Using *Ziziphus oenoplia* Fruit Extract: A Biomedical and Environmental Potential

Kandasamy Selvam[1,2] · Chinnappan Sudhakar[1] · Balakrishnan Senthilkumar[3] · Vaiyamalai Sakthivel[1] · Arunagiri Ragu Prasath[1] · Venkatachalam Sangameshwaran[1]

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Abstract

The present study proves the effective green synthesis of iron oxide nanoparticles (IONPs) using *Ziziphus oenoplia* fruit (ZOF) extract and their application for antioxidant, antibacterial, catalytic degradation and larvicidal activity. We used UV–Visible spectroscopy, Fourier-transform infrared (FTIR) spectroscopy, X-ray diffraction (XRD), Field emission scanning electron microscopy (FESEM), and vibrating sample magnetometer (VSM) to study the functional group, morphology, and optical properties of green synthesised ZOF-IONPs. The UV–Visible spectrum of ZOF-IONPs showed the surface plasmon resonance (SPR) band at 289 nm. The XRD and FE-SEM analyses confirmed that the ZOF-IONPs exhibited a crystalline structure, with an average size of 23.5 nm. The synthesised ZOF-IONPs have good antioxidant activity and enhanced DPPH scavenging efficiency. ZOF-IONPs against *E. coli, K. pneumonia, S. aureus*, and *P. aeruginosa* demonstrated substantial antibacterial activity. High-content ZOF-IONPs inhibited *E. coli* and *S. aureus* by 16.9 ± 0.20 mm and 16.2 ± 0.17 mm, respectively. ZOF-IONPs degraded methylene blue (MB) dye over 95.21% in 120 min, demonstrating their high and rapid degradation. Larvicidal activity of ZOF-IONPs was substantial in *Cx. quinquefasciatus* with LC_{50} 64.77 ± 0.8 µg/mL and LC_{90} 92.54 ± 1.0 µg/mL. *A. salina* was less hazardous in ZOF-IONPs suspension after 48 h. Our landmark study indicates that green ZOF-IONP synthesis from *Z. oenoplia* fruit extract can create versatile biomedical and environmental applications.

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Short communication

Biomimetic synthesis of Ag@Fe bimetallic nanoparticles from Palmyra sprouts extract and their antibacterial, photocatalytic degradation of malachite green

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Keywords:
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Photocatalytic decolorization

ABSTRACT

The present study aimed to biomimetic synthesis of silver-iron bimetallic nanoparticles (Ag@Fe BMNPs) was achieved by bio-reduction of silver nitrate ($AgNO_3$) and Ferric(III) nitrate $Fe(NO_3)_3$ using Palmyra sprout (PS) extract. The synthesized PS-Ag@Fe BMNPs were characterized by UV–Visible spectrophotometer, Fourier-transform infrared (FT-IR) spectroscopy, High-resolution scanning electron microscope (HR-TEM), Field-emission scanning electron microscope (FE-SEM), vibrating sample magnetometer (VSM), and X-ray diffraction (XRD), respectively. The UV–Vis spectra of PS-Ag@Fe BMNPs showed a broad absorption peak at 310 nm and FT-IR represented bioactive functional groups. The results of the XRD pattern confirmed the crystalline nature of PS-Ag@Fe BMNPs. HR-TEM and FE-SEM results prove the spherical shape of PS-Ag@Fe BMNPs and the presence of Ag and Fe peaks at 3.0, 6.4, and 7.2 keV, respectively. The photocatalytic efficiency of PS-Ag@Fe BMNPs against malachite green (MG) showed 91.23 % decolorization within 180 min of direct sunlight irradiation. In addition, antibacterial properties of PS-Ag@Fe BMNPs against human bacterial pathogens was evaluated. Hence, the green synthesized PS-Ag@Fe BMNPs were confirmed to be a potential substance for biomedical and environmental remediation.

1. Introduction

Bionanoscience and bio-nanotechnology are rapidly expanding research areas because of their diverse applications in biomedical sciences and environmental pollution control [1,2]. Nanoparticles (NPs) have recently been used in biomedical sciences for targeted drug delivery, antimicrobial development, disease diagnosis, and treatment, as well as in environmental sciences for heavy metal removal, wastewater treatment, and dye removal [3–7]. In recent time, bimetallic nanoparticles (BMNPs) have received a lot of attention in comparison to monometallic components because of their improved physical properties such as size, shape, morphology, and so on. The unique surface properties of BMNPs allow for a wide range of potential applications in antibacterial, antifungal, anticancer, antioxidant, anti-inflammatory, sensor, catalysis, heavy metal, larvicidal, and dye decolorization activity [8–11]. Silver-iron oxide BMNPs (Ag@Fe BMNPs) have piqued the interest of researchers working in fields such as medicine, environment, sensors, and solar cells [12,13].

BMNPs have been synthesized using a variety of physical and chemical methods, including laser ablation, hydrothermal, electrochemical, lithography, microwave, and thermal decomposition [14–16]. These methods require a great deal of energy and pressure, as well as expensive and toxic materials that could be extremely dangerous to the environment. As a result, it is critical to develop a simple, green, and cost-effective method for synthesizing NPs from non-toxic natural sources. Green synthesis of Ag@Fe BMNPs can be achieved from plants, bacteria, actinomycetes, fungi, yeast, and algae. Many studies have been published on the production of Ag@Fe BMNPs with potential antibacterial and photocatalytic properties, such as using different plant extracts of palm date fruit [17], *Gardenia jasminoides* [18], *Beta vulgaris* [19], *Eryngium planum* [20], *Matricaria chamomilla* [21], *Crataegus pinnatifida* [22], *Salvia officinalis* [23], *Oxystelma esculentum* [24], and *Adathoda vasica* [25]. Alkaloids, flavonoids, polyphenols, proteins, enzymes, and many other vital biomolecules found in plant extracts may

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Biomass Conversion and Biorefinery
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ORIGINAL ARTICLE

Optimization of laccase production from *Bacillus subtilis* strain KSK02 utilizing bi-substrates and their reactive red-120 dye degradation potential

Kandasamy Selvam[1] · Chinnappan Sudhakar[1] · Arunagiri Ragu Prasath[1]

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Abstract
In this study, *Bacillus subtilis* strain KSK02 consumed waste groundnut shell and *Borassus flabellifer* fruit husk to produce laccase using solid-state fermentation (SSF) by response surface methodology-Box-Behnken design (BBD-RSM). In order to enhance the biodegradability of groundnut shell waste (GNSW) and *Borassus flabellifer* fruit husk waste (BFFHW), the alkaline pre-treatment of both of these waste products was explored in this work. The morphological changes induced by the pre-treatment of both the GNSW and the BFFHW were characterized by scanning electron microscopy (SEM). The initial pH, incubation time, and concentrations of GNSW and BFFHW variables were designed for each fermentation condition of the *B. subtilis* strain KSK02 to enhance laccase production. *B. subtilis* strain KSK02 was able to produce a maximum production of amylase (423 U/mL) under optimal conditions during the fermentation process. These conditions included GNSW (2 g/L), BFEFBW (1.5 g/L), pH 7.0, and incubation time of 96 h. The maximum 89% decolorization was observed after 24 h of bacterial laccase treatment. The efficacy of the bacterial laccase in removing reactive red-120 (RR-120) from aqueous solutions using *Vigna radiata* seeds was demonstrated in the phytotoxic test. Molecular docking exhibited the binding affinity score of − 54.62 kcal/mol between the laccase-RR-120 dye complex. This study outlines statistically performed optimization approaches for improving bacterial laccase production, which resulted in a production system that is both high-yielding and cost-effective for a laccase with potential applications in textile color removal.

Keywords Groundnut shell waste · *Borassus flabellifer* fruit husk waste · Bacterial laccase · Response surface methodology · RR-120 dye degradation

1 Introduction

The textile sector is one of the largest contributors of polluted wastewater in the world [1–3]. The textile industry produces 1.6 million L of wastewater every day and releases 54% of colored effluents, and approximately 280,000 tons of textile dyes are discharged into water resources worldwide [4–6]. Textile wastewater has a low level of biodegradation and a high quantity of salt. This wastewater also contains chemicals, dyes, and reagents. Organic dyes are frequently removed from wastewater without the requisite pretreatment, posing a tough challenge for researchers to tackle. Textile wastewater has emerged as one of the key sources of significant pollution concerns on a global scale due to its high carcinogenic potential and difficulty in degrading [7–9]. The discharge of wastewater from the textile industry into bodies of water limits the passage of sunlight, which is essential for the process of photosynthesis carried out by aquatic plants and animals [10, 11]. Ultra-filtration, chlorination, chemical coagulation, adsorption on activated carbon, reverse osmosis, and ion exchange are some of the most often used chemical and physical procedures for bleaching textiles [12–15]. Chlorination and chemical coagulation are two other methods. The processes of ultrafiltration, chlorination, and chemical coagulation are some of the other options [16–18]. Although these procedures do not cause any damage to the dyes, they do transfer contaminants from one location to another.

Laccases (E.C.1.10.3.2), a multi-copper oxidase, are derived from plants, bacteria, and fungi. It oxidizes and

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Implications of *Asparagus racemosus* and *Terminalia chebula* extracts on oxazolone induced inflammatory bowel disease in *Danio rerio* (zebrafish)

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Asparagus racemosus
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Antioxidant activity
Inflammatory bowel disease
Zebrafish

ABSTRACT

Inflammatory Bowel Disease (IBD) occurs in the human intestine without any definitive etiology for which there is no cure yet. The present study analyses the anti-inflammatory and anti Inflammatory Bowel Disease (IBD) potentials of the methanol extract of Indian herbal plants *Asparagus racemosus* (AR) and Terminalia chebula (TC). First, we prepared methanolic extracts of AR root and TC fruit using the Soxhlet procedure and analyzed their phytochemical composition by GC-MS. Second, the extracts were used against *Escherichia coli* and Bacillus cereus cultures and observed for growth and biofilm inhibition. Third, the anti-oxidant assays were performed for the same extracts. Finally, we studied pathological and hematological analysis to study a reduction in the number of inflammatory cells following oxazolone-induced IBD in the zebrafish (*Danio rerio*). Both extracts contain steroids, terpenoids, tannins, phenols, and carbohydrates as active ingredients with moderate antibacterial activity against *Escherichia coli* and Bacillus cereus with minimum inhibitory concentration (MIC) of 12.5 μg/ml (TC) and 25 μg/ml (AR) against both bacteria. AR extract showed high biofilm inhibition on *E. coli* (80.8 ± 0.81%) and B. cereus (92.8 ± 1.08%) at 800 μg/mL and showed high DPPH radical scavenging activity IC50 value of 139.9 μg/mL. Further in IBD zebrafish, AR (14 mg/L) and TC (60 mg/L) exhibited a significant reduction in inflammatory cells in blood and improved pathological scores in the gut compared with positive drug Prednisolone (50 mg/L). Moreover, T. chebula showed a greater reduction in the number of inflammatory cells recruited in the intestine of IBD-induced fish compared to *A. racemosus* at the time point and dose examined.

1. Introduction

Asparagus racemosus (AR), also known as Shatavari, is one of the most common medicinal herbs found in India. Extracts of this plant has been used to treat various inflammatory conditions such as stomach ache, skin burns, skin diseases, diarrhoea, excessive perspiration, cough, and bronchitis (Battu and Kumar, 2010). The plant is found mainly on land below sea level and in tropical cli-

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Short communication

Phyto-mediated synthesis of silver nanoparticles using flower extract of *Erythrina indica* and evaluation of their biological activities

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Cytotoxicity
Photocatalytic activity

ABSTRACT

The goal of this research was to investigate the antibacterial, cytotoxic and photocatalytic properties of silver nanoparticles synthesized from *Erythrina indica* flowers (EIF-AgNPs). The green synthesized EIF-AgNPs were characterized by UV–visible spectroscopy, field emission scanning electron microscopy (FESEM), high-resolution transmission electron microscopy (HR-TEM), X-ray diffraction (XRD), and Fourier transform infrared spectroscopy (FT-IR). The UV–visible spectrum of EIF-AgNPs revealed a 420 nm surface plasmon resonance (SPR) peak. The XRD analysis exhibited that the EIF-AgNPs were crystalline in nature. FT-IR revealed that the flower extract has been stabilized with the EIF-AgNPs by a capping agent. Furthermore, electron microscopy indicated that the EIF-AgNPs were spherical in shape and measured 42.3 nm in diameter. The eco-friendly synthesized EIF-AgNPs show potential antibacterial activity against *Staphylococcus aureus* and *Salmonella typhi* in a well-diffusion assay. In addition, *in-vitro* cytotoxicity tests on MCF-7 cell lines demonstrated that EIF-AgNPs (42.5 μg/mL) have harmful effects. Furthermore, EIF-AgNPs had a high degradation efficiency for reactive orange 16 (RO16), with 90 % elimination after 120 min of sunlight irradiation. Overall, the findings of this study indicate that *Erythrina indica* flower biosynthesized EIF-AgNPs may have antibacterial, cytotoxic and photocatalytic effects.

1. Introduction

In the past few decades, bionanotechnology has been a major field of present investigates dealing with the green synthesis and manipulation of nanoparticles structures ranging from about 1–100 nm. In recent time, metal nanoparticles have significantly focused the scientist attention because of their essential applications in cosmetics, antimicrobial, textile fabrics, health, food, environmental, optic, chemical industries, catalysts, drug delivery, electronics, and biomedical sciences [1–3]. Silver nanoparticles (AgNPs) are one of the noble metal nanoparticles that are well known to have substantial applications in a variety of industries. The AgNPs can be synthesized by different methods, like physical hydrothermal, microwave process, and chemical methods. Unfortunately, these methods are especially expensive, require high energy consumption, and may use dangerous chemicals for the synthesis AgNPs [4,5]. Therefore, there is also a need to develop environment-friendly methods without using toxic chemicals.

The green synthesis of AgNPs is a rapidly growing and cost-effective research project in metal nanoparticle synthesis. Green synthesis of AgNPs was employed using bacteria [6], fungi [7–9], algae [10] and plants [11,12]. Among, plant-based extracts as a reducing and capping agent was more valuable than other synthesis. The various natural plant compounds like flavonoids [13], terpenoids [14], phenols [15], saponins [16], polysaccharides [17], and quinines [18] present in the plants cause the reduction of metal ions. Various plant flowers have been used for the synthesis of AgNPs, including *Zephyranthes rosea* [19], *Thunbergia grandiflora* [20], *Tilia cordata* [21], *Allium sativum* [22], Fritillaria flower [23], *Cassia auriculata* [24] and *Fraxinus excelsior* [25].

Erythrina indica is a thorny deciduous tree in the Fabaceae family with red blooms. It's commonly known as the Indian coral tree, and it's traditionally been utilized as a medicinal plant to treat a variety of human ailments [26]. A wide range of medicinal formulations have been developed from *E. indica* that exhibit analgesic, anti-arthritic, anti-hypertriglyceridemia, anti-inflammatory and muscle-relaxing effects [27]. Although the literature has reported on the strong medicinal potential of the various parts of *E. indica* extract, there is no available data in the literature for the green synthesis of *E. indica* flower extract-mediated AgNPs, which is a biocompatible and cost-effective agent for antibacterial activity and photocatalytic degradation. Herein, we first time report the green, and eco-friendly synthesis of AgNPs using *E. indica*

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INDIAN JOURNAL OF SCIENCE AND TECHNOLOGY

RESEARCH ARTICLE

Larvicidal Efficacy and Characterization of Silver Nanoparticles Derived from Aqueous Leaves Extracts of *Trichosanthes tricuspidata* against Dengue Vector *Ades aegypti*

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Abstract

Objectives: The present investigation aims to analyze the larvicidal activity of *T. tricuspidata* plant extract and silver nanoparticles from aqueous extracts of *T. tricuspidata*. **Methods:** silver nanoparticles synthesized from *T. tricuspidata* leaf extract, were evaluated against larvae of *A. aegypti*. Synthesis of AgNPs was confirmed using UV–Vis spectroscopy, and characterized using powdered X-ray diffraction, scanning electron microscopy and transmission electron microscopy. **Findings:** For characterization of green silver nanoparticle UV-visible spectroscopy has been used which yield pointed peak at 454nm. A particle size analyzer was used to characterization of the average size (181nm) distributions in the intensity (57.7%) of silver nanoparticles, and X-ray diffraction (XRD) of planes (111, 200, 220, and 311) intensity (2θ) peaks validated the silver ion's cubic structure. The highest mortality was determined from the silver nanoparticles against *A. aegypti* in the LC_{50} value of 30.928. **Novelty:** The nanoparticle synthesized from *T. tricuspidata* leaf extract was found to excellent toxic effect against the disease transmitting vector mosquitoes. The silver nanoparticles is a rapid, eco-friendly, and a single-step approach and the AgNps formed can be potential mosquito larvicidal agents.

Keywords: Larvicidal Activity; Silver Nanoparticles; SEM; T. Tricuspidata; A. Aegypti

1 Introduction

Mosquitoes spread Malaria, Dengue, Chikungunya, Filariasis, and Japanese encephalitis, creating a major public health problem among the other diseases that result in significant morbidity and mortality each year around the world[1]. Dengue fever presently threatens around 2500 million people, or two-fifths of the world's population. Accord

Drug Resistance, Characterization and Phylogenetic Discrepancy of *Salmonella enterica* Isolates from Distinct Sources

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Current Microbiology

Aims and scope

Submit manuscript

Sureka Indrajith, Sisubalan Natarajan, Selvankumar Thangasamy & Sivakumar Natesan

Abstract

Salmonella enterica is one of the foodborne pathogens that can infect humans, spreading from one person to another by contaminated food and water. To identify the pathogenic *S. enterica* from the contaminated food product, culture-based and molecular identifications, drug resistance profiling, virulence and genetic traits of the strains have been used. Herein, different animal products was subjected to screen for *S. enterica* prevalence, pathogenic characterization and compared with clinical *Salmonella* isolates (human). A total of 173 isolates from animal products and 51 isolates from clinical samples were collected. *S.* Typhi,

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INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

A STUDY ON APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS USING FOURIER TRANSFORM

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Abstract: The specific objective is to prove the existence and uniqueness of the solution of the proposed PDE. The existence and uniqueness of the solution have been proved. To demonstrate the existence of the solution, the Fourier transformation was used. The variational formulation was used to prove the uniqueness of the solution. The combination of the Fourier transformation and the variational formulation yielded the expected results: the existence and uniqueness of the solution.

Key Words: Partial differential equation, Integral Transform and Fourier transform

I. Introduction:

Joseph Fourier, a French mathematician, had invented a method called Fourier transform in 1801, to explain the flow of heat around an anchor ring. Since then, it has become a powerful tool in diverse fields of science and engineering. It can provide a means of solving unwieldy equations that describe dynamic responses to electricity, heat or light. In some cases, it can also identify the regular contributions to a fluctuating signal, thereby helping to make sense of observations in astronomy, medicine and chemistry. Fourier transform has become indispensable in the numerical calculations needed to design electrical circuits, to analyze mechanical vibrations, and to study wave propagation. Fourier transform techniques have been widely used to solve problems involving semi- infinite or totally infinite range of the variables or unbounded regions. In order to deal with such problems, it is necessary to generalize Fourier series to include infinite intervals and to introduce the concept of Fourier integral.

II. Basic Definitions:

Partial Differential Equation:

An equation which involves several independent variables denoted by $x, y, z, t, \ldots$, a dependentvariable and its partial derivatives with respect to the independent variables such as, $F(x, y, z, t, \ldots, u, u_x, u_y, u_z, u_t, \ldots, u_{xx}, u_{yy}, \ldots, u_{xy}, \ldots) = 0$ is called *a partial differential equation*.

Integral Transform:

An Integral transform of function, $f(t)$ defined on a finite (or) infinite interval $a < t < b$ are particularly useful in dealing with problems in linear differential equations.

A general linear integral transformation of a function $f(t)$ is represented by the equation $F(s) = T\{f(t)\} = \int_a^b k(s,t).f(t)dt$. i.e., that a given function $f(t)$ is transformed into another function $F(s)$ by means of an integral. The new function $F(s)$ is said to be the transform of $f(t)$, and $k(s,t)$ is called the *kernel of the transformation*. Both $k(s,t)$ and $f(t)$ must satisfy certain conditions to ensure existence of the integral and a unique transform function $F(s)$.

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INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

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A STUDY ON NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATION

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Abstract: This paper introduces a solution of partial differential equation using numerical mehods. The numerical results demonstrate that this method is able to provide more accurate numerical approximations in partial differential equation.

Keywords: Partial differential equation & Numerical methods

I. Introduction:

A real-life problem can be perspective as a system. It may agree inputs in a quantitative form (in some sense) and process them though one or more phases (or, using different subsystems), and ultimately produce a quantitative form of output (in the same sense or some other sense). In a biological system, an action accepts input in the form of some signals (such as light, temperature, sound, pressure, smell, touch, etc.) though the sensing devices (such as eye, ear, skin, nose, tongue, etc.). These devices are able to convert those signals to its appropriate (or, equivalent) amount of electrical signals. These then flow through the nervous system from the nerves into the brain.

II. Basic Definition and Terminology:

Definition: Partial differential equations are those which contain one or more partial derivatives, usually with respect to two or more independent variables.

Definition: The order of a partial differential is that of the partial derivatives of highest order in the partial differential equation.

Definition: The degree of a partial differential equation is that of highest degree of the partial derivatives in the partial differential equation, provided the equation can be written in some polynomial form.

Definition: A partial differential equation is said to be linear if its partial derivatives are linearly connected irrespective of the types of coefficients (constants and variables).

Definition: A linear partial differential equation is said to be homogeneous if the partial derivatives involved in the terms of the equation are all of the same order, and otherwise non-homogeneous.

III. Numerical Solutions of Partial Differential Equation:

A general linear second-order partial differential equation:

$$a_1 \frac{\partial^2 u}{\partial t^2} + a_2 \frac{\partial^2 u}{\partial t \partial x} + a_3 \frac{\partial^2 u}{\partial x^2} + D\left(t, x, u, \frac{\partial u}{\partial t}, \frac{\partial u}{\partial x}\right) = 0 \quad (3.1) \quad \text{or} \quad a_1 u_{xx} + a_2 u_{xy} + a_3 u_{yy} + a_4 u_x + a_5 u_y +$$

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INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

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A STUDY ON APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATION USING CAUCHY INTEGRAL FORMULA WITH LAPLACE TRANSFORM

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Abstract: In this paper we present the possibility of applying the Cauchy integral formula using Laplace transforms in partial differential equations (PDE's).

Keywords: Partial differential equation, Laplace transform & Cauchy Integral Formula.

I. Introduction:

In this paper, we discussed the idea about the solution of partial differential equation using Laplace transform with the help Cauchy integral formula. There are numerous integral transforms that have been developed over the years, many of which are highly specialized. The most versatile of all integral transforms, including the Fourier transform, is the Laplace transform. Laplace transforms date back to the French mathematician Laplace who made use of the transform integral in his work on probability theory in the 1780s. S. D. Poisson (1781-1840) also knew of the Laplace transform integral in the 1820s and it occurred in Fourier's famous 1811 paper on heat conduction. Nonetheless, it was Oliver Heaviside who popularized the use of the Laplace transform as a computational tool in elementary differential equations and electrical engineering. We can define the Laplace transform outright, but it is instructive to formally derive it and its inversion formula directly from the Fourier integral theorem.

II. Basic Definitions & Facts:

Definition: Let $f(t)$ be a piecewise continuous function. where the function $f(t)$ is said to be of exponential order α, if there exists a real and finite positive number M such that $\lim_{t\to\infty}|f(t)|e^{-\alpha t} \leq M$ and we write $|f(t)| = O(e^{\alpha t})$

Definition: Let $f(t)$ be a continuous and single-valued function of the real variable t defined for all t, $0 < t < \infty$, and is of exponential order. Then the Laplace transform of $f(t)$ is defined as $\mathcal{L}\{f(t)\} = \bar{f}(s) = \int_0^\infty e^{-st} f(t)dt$, (2.1)

Fact 2.1: The application of an integral transform to a Partial Differential Equation reduces the independent variables by one.

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A STUDY ON AWARENESS LEVEL OF DIABETIC PATIENTS

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Abstract:

There is a significant health burden due to the rising incidence of diabetes mellitus and its related health problems. Preventing and controlling this disease will mostly depend on raising awareness of it. Additionally, poor glycemic control brought on by noncompliance with the management increases the risk of dangerous consequences. The current study was carried out to gauge medication adherence and gauge patients with Type 2 diabetes's awareness of diabetes from a variety of perspectives. In this research, we use a pie diagram to explain the age distribution of respondents based on their knowledge of their diabetes and symptoms.

Keywords: Distribution, diabetics and Pie diagram.

I. Introduction

In the modern life style people's habits quite changing. It includes their choice in entertainment, social movement, food habits etc. Genetic factors, environmental changes and life style of the people which cause major health disorders and diseases. A prominent disease among them is diabetes mellitus. Diabetes is a disease in which pancreas produces little or no insulin. Insulin is the hormone, a source of energy, which helps tissues of the body to absorb glucose. When the glucose level in the blood is above normal a person is identified as a diabetic patient. People with diabetes have complications in converting food into energy. After a meal, food is broken down into sugar called glucose, which is carried by the blood to cells throughout the body. Cells use insulin to help them convert blood glucose into energy. The international Diabetes Federation estimates that the number of diabetic patients in India have almost doubled from 19 million in 1995 to 40.9 million in 2007. It is estimated to increase to 69.9 million by 2025. Currently, up to 11% of India's urban population and 3% of the rural population above the ages of 15 have diabetes. The World Health Organization estimates that mortality from diabetes and their heart disease cost India about $210 billion every year and it is expected to increase to $335 billion in the next ten years.

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"Investment Strategy Vs Savings of Paid Personnel with Special Reference to Bengaluru City"

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Abstract

People all throughout the world frequently save money. The investing notion phenomena emerged later. Investment is one of the activities that everyone does these days. In the market, there are numerous investing prospects. People are free to invest and make decisions based on their options. Profit, security, capital growth, or regular returns are the primary reasons people invest. This essay investigates the many investment options and the elements that are particularly important when determining an investing strategy. Through surveys given to salaried employees in Bengaluru City's southern region, the researcher gathered 150 sample sizes. The best investment possibilities are identified in the current analysis for each individual investor. Most employees who are compensated are expected to protect their investments and, ideally, receive regular returns on their investments. Through a variety of informational networks and the influence of social media, respondents are well-informed about the investment options available in the market that meet their needs for balancing risk and return.

Keywords : Investment Strategy, Savings options, Risk and Return balance

Introduction:.

In the context of the economy, saves and investments are monetary assets that, at some point in the future, will provide income or see their value increase. For their continued development, developing nations like India require an increase in the amount of cash available to them. There are many different types of economic indicators that can be used to measure different aspects of economic growth, such as GDP, NDP, GNP, and NNP. The primary responsibility of the government is to ensure that the needed amounts of capital are invested in the right places at the right times in order to facilitate well-planned development. Increasing the capital-output ratio will result in a greater amount of investment. In order to increase the amount invested, several investment programs and schemes will need to be implemented.

In today's market, investors want to see regular returns in addition to safety, liquidity, reduced risk, and ease of transferability. Following the effects of COVID-19, investors are exercising increased caution when selecting the investing pattern that they will follow. People who previously prioritized saving money through means such as a piggy bank, bank deposit, post office deposit, fixed deposit, acquisition of homes, land, etc. are increasingly turning their attention to investing in stock exchanges.

Investment VS Savings:

The main aim of Investment and savings are financial security. But it is important to know that both terms are quite different in nature. Saving is for the preparation of unexpected situations with short-term goals, any liquidity purchase, or vacation trip but it may not help them with their long-term goal of meeting the inflation rate in the future.

Investment is a way to meet the long-term goal with higher returns and also it helps to meet the inflation rate in the future with some risk-taking and sometimes with no guarantees. This can be rectified only by investing in a diversified portfolio.

RESEARCH ARTICLE

Tight Focusing of a higher order Radially Polarized sinh-Gaussian beam Transmitting through Cosine Phase Plate

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ABSTRACT: The tight focusing of a double ring-shaped radially polarized sinh-Gaussian beam with a cosine phase plate is studied on the basis of the vector diffraction theory. Under a high-NA focusing condition, the strong longitudinal component forms a sharper spot at the focal point for both fundamental mode (R-TEM01*) beams and higher-order, radially polarized mode beams. Due to destructive interference between the inner and outer rings, double-ring-shaped radially polarized mode (R-TEM11*) beams in particular can significantly lower the focal spot size. Simulation results show that the focused fields and phase distributions at focus are largely influenced by both the cosine parameter and truncation coefficient of the incident beams. Moreover, shifted focal spot, optical cage patterns can be flexibly achieved by carefully choosing the cosine parameter (C) and it is also observed that the intensity distribution of the different mode has little variation among the degree of truncation (β) of the input beam beside the pupil. This work is important for optical manipulation, particle limitation systems, laser surface modification and laser direct writing techniques.

KEYWORDS: Higher order Sinh Gaussian beam, Vector diffraction theory, High NA lens, cosine phase plate.

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INTRODUCTION

A single-ring-shaped radially polarized beam, which is often referred to as an R-TEM01* mode beam, is of particular interest. In the case of high-numerical-aperture (NA) focusing the R-TEM01*beam can generate a strong longitudinal electric field at the focus [1]. This strong longitudinal component creates a tight focus that may increase the resolution of microscopes [2,3] and improve laser cutting capabilities in processing materials [4].Numerous techniques for producing the radially polarized beam have been described due to the benefits of the beam that were previously discussed. Zhan [5] discovered that the scattering force along the optical axis is zero in 2004, when he estimated the radiation forces on metallic Rayleigh particles at the focus using a highly focused vector R-TEM01* beam. This performance is highly helpful in capturing metallic particles that absorb metal. Due to the decreased scattering, Kawauchi et al., [6] and Nieminen et al., [7] showed that R-TEM01* beams can be utilized to enhance the functionality of optical tweezers in the geometrical optics domain and the Mie regime. Yan and Yao [8] demonstrated, the radiation forces on more general dielectric particles with size ranging from the Rayleigh regime to several wavelengths, illuminated by a highly focused R-TEM01* beam. Ahluwalia et al.,[9]reported experimentally the polarization-induced torque of an R-TEM01* beam acting on anisotropic micro-particles.

The R-TEM01* beam is superior to the linearly polarized beam in the Rayleigh domain, according to the analytical studies reported by Chen et al., [10]. A doughnut-shaped (single-ring) radially polarized beam was produced by superimposing the two orthogonally polarized Gaussian modes TEM10 and TEM01 outside or

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Fabrication of Visible Light Active MoS_2–W–Cu Ternary Heterojunction for Enhanced Photocatalytic Degradation

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The increase in environmental pollution has led to a novel ternary photocatalytic system for remediation. These photocatalytic systems exhibit superior visible light active band gap of $Mo_{0.99}W_{0.005}Cu_{0.005}S_2$. A highly effective visible light active ternary heterojunction was fabricated using the hydrothermal method. Herein, it reports the hydrothermal synthesis of MoS_2–W–Cu as a photocatalyst, efficiently exhibiting greater photocatalytic activity for wastewater treatment under visible light. The photocatalytic degradation of methylene blue in aqueous suspension has been employed to evaluate the visible light photocatalytic activity of the prepared samples. The blue shift in the absorption onset confirms the size quantization of pure and doped MoS_2 nanoparticles, which act as effective and stable catalysts, making it possible to utilize visible light in photocatalysis. The as-prepared samples were characterized using field emission scanning electron microscope, energy dispersive X-ray analysis, X-ray diffraction, UV-visible, and UV-visible differential reflectance spectroscopy techniques. The characteristic Bragg peaks of $Mo_{0.99}W_{0.005}Cu_{0.005}S_2$ are reduced, indicating the possible formation of layered MoS_2. The field emission scanning electron microscope morphologies of MoS_2, $Mo_{0.99}W_{0.01}S_2$, and $Mo_{0.99}W_{0.005}Cu_{0.005}S_2$ are disordered, and nanorods were induced in the hydrothermal method. The calculated band gap of the novel photocatalyst was found from the differential reflectance spectroscopy plot, which helped in understanding the photo-induced electron–hole pair's recombination. $Mo_{0.99}W_{0.005}Cu_{0.005}S_2$ doping of ternary sample, which increases the photocatalytic degradation, was studied in detail and the experimental result is reported.

topics: MoS_2, ternary photocatalytic, hydrothermal, heterojunction

1. Introduction

The unprecedented increase in industry and cultivation may cause severe problems to the environment and economic life [1]. In the case of health and the environment, some serious risks are present, like an increase in pollutants, the use of large amounts of toxic dyes, and the presence of unsafe medicinal compounds in wastewater worldwide [2]. In day-to-day life, humans and the surrounding environment are exposed to tons of dangerous synthetic pollutants, which are constantly discharged from industries as well as from households and contain a certain compound that is very hard to decompose [3]. This kind of toxic material weakens the ecosystem and puts many species on the verge of extinction. In overcoming these problems, some methods can be helpful, like the microbial decomposition method, flocculation precipitation method, photocatalytic degradation method, etc. [4]. Among them, the most efficient and easiest way to remove these types of pollutants from wastewater is photocatalytic degradation since it is a technology with the potential to oxidize a great variety of complex organic compounds into simple molecules. It is equally important to find a suitable catalytic material, which needs to be beneficial to solve these problems and also needs to be environmentally friendly [5]. In the reformation of the environment and purification of water, semiconductor photocatalyst materials are used due to their good response [6]. Organic and inorganic pollutants are eliminated by using photocatalytic materials such as ZnO, Fe_2O_3, TiO_2, CdS, and MoS_2 [7]. Among these, MoS_2 has a better photoharvesting property and is a noble material, which is earth-abundant, metal-free, easy to synthesize, and has a morphological characteristic of delivering more active sites for pollutant observation [8]. Among the semiconductor materials, MoS_2 is the assuring material due to its efficiency in photocatalytic degradation and degradation under visible light in a promising way, enabling the development of a cost-effective and efficient photocatalyst material [4]. Many synthesis methods were developed to fabricate the MoS_2 nanostructures, such as hydrothermal method, chemical vapor deposition,

A Study on Socio-Economic Conditions of Construction Workers in Kozhikode District

Jisha C. Chandran

K. Selvaraj

Keywords: Construction Industry, Construction workers, Economic Status, Finance, Socio-economic condition

PDF

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Articles

Abstract

The construction industry plays a very important role in the economic development of our country. Due to the globalization and development of information technology, in the current scenario, creating an effective workforce is very essential to achieve the goals of every sector. The main objective of this study is to analyze the socio-economic conditions of construction workers in the construction industry in Kozhikode district. The data used for this study are primary data and secondary data. Primary data collected through structured questionnaire and interview schedule among various construction industries in Kozhikode district. A total of 750 questionnaires were distributed, 642 numbers were received. Secondary data was collected from various textbooks, government gazettes, magazines, journals etc. Percentage analysis technique was used to study the socio-economic