TWO DAYS NATIONAL SEMINAR ON PROSPECTS IN MATERIAL SCIENCE

27th & 28th Feb 2020

Organized by

PG Department of Physics

Vellalar College for Women (Autonomous)

Erode-12, Tamil Nadu.

GOLDEN JUBILEE YEAR 2019 - 2020

NSPMS 2020

Seminar Proceedings

Two Days
National Seminar
on
PROSPECTS IN MATERIAL SCIENCE

(NSPMS-2020)

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PG DEPARTMENT OF PHYSICS

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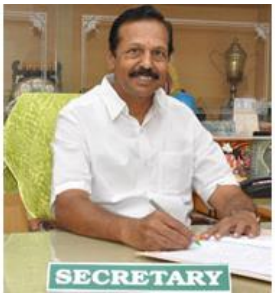

Message

It gives me an immense pleasure in writing this foreward for the Proceedings of the "Two Days National Seminar on Prospects in Material Science, NSPMS-2020" being organized by the PG Department of Physics on 27th & 28th February 2020. I am pleased to note that researchers from various Institutes/Universities from different parts of the states are presenting their research papers on the current aspects of Nanotechnology and Material Science.

This event is targeted towards researchers, professionals, educators and students to share innovative ideas, issues, recent trends and future directions in the field of Nanotechnology and Material Science. Seminars like these provide an ideal platform for the confluence of learned minds when knowledge is shared for the benefit of everybody. I am sure that all the delegates would be greatly benefited by the deliberations.

I wish all the participants and delegate a great success in their mission!!

Dr. N. Maragatham
Principal
Vellalar College for Women
Erode – 638 012

Message

I am extremely happy that PG Department of Physics has organized a "Two Days National Seminar on Prospects in Material Science, NSPMS-2020" on 27th & 28th February 2020. This seminar will focus on the recent advances in the field of Nanotechnology and Material Science. Advancement in understanding of a material type is often the forerunner to the stepwise progression of a technology. Hope, a number of delegates from across the states will gather to deliver the invited talks and to present their research papers.

I am confident that, this seminar will definitely provide an interactive platform where scholars, students from various Institutions, Research Laboratories and Industries can meet, discuss and project a road map for materials science research towards novel applications in various fields.

I hereby congratulate the organizing committee members for their efforts to organize a National Seminar. I strongly believe that this endeavour will prosper now and in the years to come.

I take this opportunity to wish a grand success of this National Seminar.

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Message

I am glad to invite all the delegates to a "Two Day National Seminar on Prospects in Material Science, NSPMS-2020" organized by the PG Department of Physics on 27th & 28th February 2020. The objective of this seminar is to bring the students, researchers and scientists from across the nation on a common platform to share and access the recent trends in the field of Nanotechnology and Material Science and to discuss ways to promote promising societal applications. This seminar is aimed to bring up substantial discussion on major sectors of material processing, characterization and device fabrication to meet the rapid advances in engineering and technology, the globalization and the changing social needs.

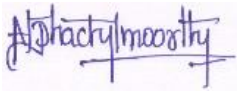
50 papers have been selected after peer review by covering wide areas of research in Nanotechnology and Material Science which have been included in the proceedings. I hope this conference would also provide young researchers, engineers, scientists and students an opportunity for interaction and benefiting from each other's wisdom and experience.

I encourage the delegates to take full advantage of the program and tackle the challenges in their respective areas of research.

I thank our Institution wholeheartedly for supporting this seminar.

I look forward all the delegates for their active participation.

Yours sincerely,



(N.Dhachanamoorthi)

Liquid Crystals and its applications

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The applications of Hydrogen Bonded Liquid Crystals (HBLC) are discussed. These materials can be extensively used in memory storage, optical shuttering, light modulation and optical filtering action. Ferroelectric HBLC can also be used for the above specified applications. The memory storage can be achieved in cholesteric and smectic C* phases where a transient field is applied to a HBFLC in a LC cell and a hysteresis electric loop can be formed. The area of the loop depends on the phase and the molecular structure of HBFLC. Optical shuttering is a phenomenon where light coming out of the liquid crystal cell will be extinct applying an external voltage. The magnitude of extinction time with applied voltage is in milliseconds. Light modulation is yet another technique where the liquid crystal is used to hop from one frequency to another frequency on the application of the field. HBLC can be used as optical filters both in the mesophase and at crystals.

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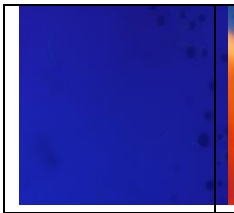
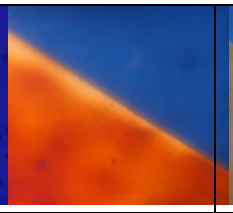
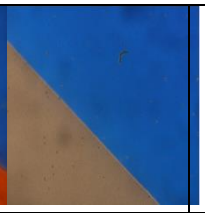
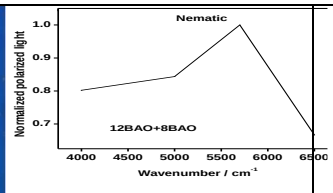
<td>  </td>
<td>  </td>
<td>  </td>
<td> 
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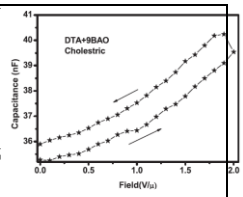
<td> 
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Development of Multiwalled Carbon nanotubes based flexible and wearable platform for multifunctional sensing applications

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A flexible sensor could be easily integrated into a suit for desirable personnel exposed to extreme working conditions. To date most of the sensors are made of metal oxide semiconductors and often requires high operation temperature ((150 - 350°C)and could not be worn in clothes due to their rigidity. In the present talk, I will focus on the development of flexible gas sensors based on MWCNTs offers extreme flexibility in design and device integration. We present a combination of Multiwalled carbon nanotubes and fabric to fabricate flexible gas sensors. Our work links the room temperature operation and flexibility of the sensors by utilizing MWCNTs on cotton fabrics. MWCNTs were grown using chemical pyrolysis method followed by purification. The pyrolysis grown MWCNTs were characterized for their morphology, structural, microstructural, electrical and surface properties. We use a simple spray coating process to fabricate MWCNTs/cotton fabrics sensors. The resistance of MWCNT network on textile could be controlled in a wide range from 100 MΩ to 2 KΩ by varying the concentration (0.1 mg/mL to 5 mg/mL) and a number of spray coating of MWCNT. The fabricated MWCNT enhanced textile sensors were attached to various human body parts (such as forehead, cheek, neck, abdomen, wrist, elbow, knee, wrist) and change in resistance pertaining to human body motion was measured. The wrist movement shows a decrease in the sensor resistance and elbow movement shows an increase in the resistance depends upon forward and reverse (due to compression and expansion of MWCNT junction network) bending of MWCNT coated fabric sensor.Further, the smart fabric was applied to monitor a wide range of humidity (RH = 19 - 93%) at room temperature.The sensor show highresponse (8%) for relative humidity (RH) of 57% with quick response (4±2 s) and recovery times (14±2 s) at room temperature. Surface functionality of the MWCNTs were altered by using conduction polymers to improve the selectivity of the sensor for vapor sensing applications. Polyvinyl alcohol covered MWCNTs show excellent selectivity towards ethanol discriminating other vapors. The flexible sensor show fast response and recovery about 24 and 29 seconds

respectively with LOD of about 10 ppm. On changing PVA functionalization to PANI, we obtain highly selective, flexible ammonia sensors.

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Metal Oxide Nanostructures for Gas Sensor & Environmental Monitoring Applications

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Rapid increase in environmental risks due to the fast industrialization along with the modern technological comforts is becoming a growing threat to our everyday life. Similarly, improper usage of pesticides in the agricultural sector as well as accidental industrial/domestic leakages of various toxic chemicals and gases may also result in a number of health hazards. Moreover, if the hazard materials are in gas form, the need of a proper sensing devices for an early detection and proper precaution are even more crucial as many of the toxic gases are either not detectable by our human sense organs or detected only after a significant harm is already caused. Hence, gas sensors are becoming an integrated part of our daily life as preventive tools such as fire alarm/smoke detector, LPG/CNG leak detectors, H_2, etc.

Even there are several reports on various gas sensors based on metal oxide nanostructures, but many of them are either having limited selectivity (ethanol, NO2, H2S) or the sensitivity of them is not up to the accepted level for various safety issues. Hence, superior quality gas sensors with wider selectivity (LPG, CH4, CO) are still a global technological challenge. Moreover, the response and recovery time as well as sensitivity and reproducibility of a gas sensor need a rigorous optimization process to reach the accepted level. Therefore, the proposed work will have a great opportunity for further improvement of the existing sensor materials for device applications.

It has been observed that Metal oxide based nanostructures are grown either (majority) using the chemical roots or (few) through the physical pathway. However, in both cases vacancy/impurities can play a very crucial role on defect induced band bending of the surface charge states of Metal oxide which further reflects the surface conductivity of the oxide materials. Therefore, chemical purity and crystal stoichiometry of Metal oxide can be the most deciding factors to tailor the surface electronic property and hence sensor performance. However, the chemical growth scheme is more

prone to the unintentional contaminations as compared to vacuum assisted physical growth roots. In addition, precise control over the film thickness is somehow more challenging in the case of chemical growth approach as compared to the growth via physical roots. On the other hand, controlled doping with wide varieties of dopants for oxide materials are more challenging in physical growth process and mostly limited within the chemical methods. Therefore a comparative study between the physical and the chemical growth mechanism of Metal oxide nanostructures and desired modification of electronic properties using controlled doping will be of real time technological demand. for a better understanding of the optimization process of the gas sensor performance.

Metal Halide Perovskite Nanomaterials for Advanced Optoelectronic Applications

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Nanomaterial research is one of the most important branches in modern physics and materials science. Nanomaterials generally displays optical and electrical properties distinct from their bulk counterparts mainly due to quantum confinement. In this lecture, I will emphasis on a particular new nanomaterial family: metal halide perovskites, which have received tremendous interest recently in photovoltaics and diverse photonic and optoelectronic applications (solar cells, lasers and photodetectors, radiation scintillators, and LEDs) due to their outstanding optoelectronic properties such as size-tunable optical band gaps, narrow emission and excellent charge-transport capabilities. The attention towards this material was only raised again when it was applied in a solar cell in 2009, which later turned out to be one of the most effective light absorber materials for solar cells to date [1-5].

In specific, the property of size-tunable optical band gaps in perovskites is identical that of traditional metal chalcogenide semiconductors which are widely used in semiconductor industries currently. The different synthesis approaches (i.e. hot-injection, sonochemical, hydrothermal, colloidal heating) and growth mechanisms of perovskite nanomaterials in different synthetic methodologies will be addressed along with their novel characteristics and applications. In specifically, quantum confinement effect on perovskite quantum dots and high external quantum efficiency will be discussed. Understanding the mechanism behind the formation of perovskite nanomaterial forming will help researchers to come up with effective strategies to struggle the emerging challenges of this family of materials, such as stability under ambient conditions and toxicity, towards next generation applications in photovoltaics and optoelectronics.

In addition to that the fabrication of optoelectronic devices such as solar cells, LEDs, laser devices, a new novel concept that radiation scintillators and their characterization of photo- physical, optoelectronic analyses with their excellent performances will be addressed in detail. Finally, I will provide an outlook for the future development on these modern perovskite nanomaterials.

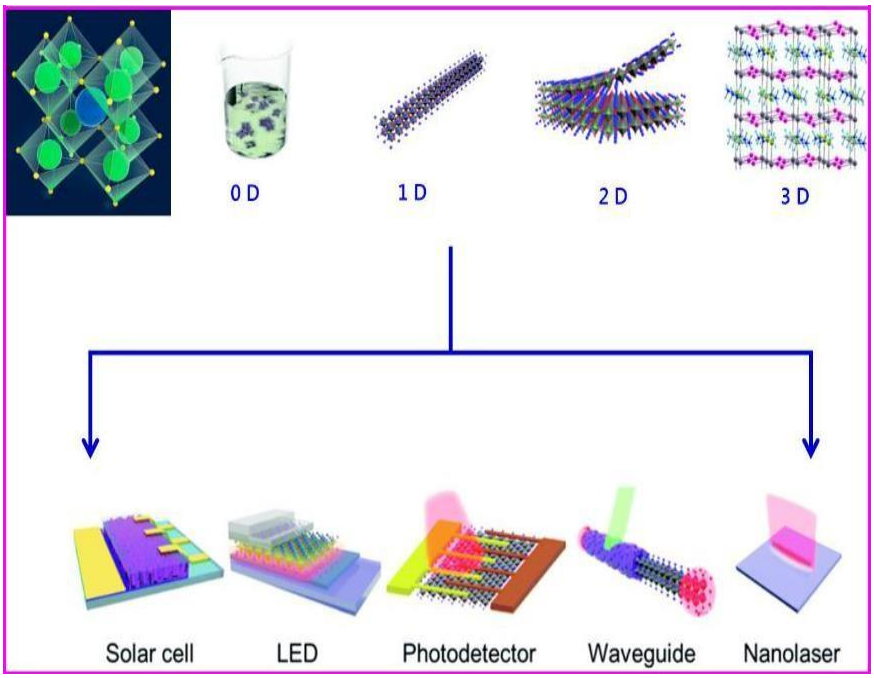

Figure 1 – Dimensions of Perovskite Nanomaterials and their optoelectronic Applications

Keywords:

Perovskite nanomaterials, quantum confinement, synthetic methodologies, optoelectronic devices, radiation scintillators, solar cells, LEDs

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Halide Perovskites for High Performance Solar Cells

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International Advanced Research Centre for Powder Metallurgy and New Materials, Hyderabad 500005

Abstract

Organometal halide perovskite solar cells(PSCs) reached certified power conversion efficiency of 25.2 % in lab-scale devices. These direct bandgap perovskite light absorbers possess novel intrinsic properties such as tunable bandgap, high optical absorption and long diffusion length. Low-temperature and solution processing of perovskite absorber film with excellent requisite properties makes this wonder material ideal choice for low-cost, high efficiency solar cells. Optical bandgap tuning through perovskite composition engineering also pave the way for the development of aesthetic, flexible, and light-weightpower source for niche markets such as consumer electronics, drones, and smart buildings. This talk will provide comprehensive insight on material selection and synthesis, thin film deposition and devicefabrication pertinent to high efficiency and stable large-area PSC modulesfor outdoor deployment. Ways to improve PSC's energy conversion efficiency and operational stability through rational device configuration and interface engineering will also be presented.

Development of Supercapacitors from Lab-Scale to Prototype - Using Nanostructure Materials

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CSIR-Central electrochemical Research Institute (CECRI), Karaikudi-630 003

For the past few decades, global warming and environmental pollution have been forced the people to move from conventional fossil fuels to green and sustainable energy resources. Sustainable energy resources such as wind and solar have supplied an enormous amount of energy to mankind. These renewable and environment-friendly energy resources require proficient energy storage technology which is extremely important to meet the requirements of smart grid management systems. In general, secondary batteries dominate such energy storage requirements. However, they could not sustain in all conditions, exceptionally the requirement of high power and long cycle life is mandatory when they are coupled with the grids.

In recent years, supercapacitors have been considered as a suitable candidate to fulfill the above requirements such as huge power and long cycle life. So far a wide variety of active materials have been synthesized and studied by many research groups; however, very few attempts have been succeeded with the full device level testing (Asymmetric/hybrid capacitors). Research and developments on the prototype (comparable with the commercial specification) are in scant and the conversion rate from lab scale to a prototype is less than 10%. This may be due to the issues associated with the device fabrication process and or lack understanding of the functioning of the full devices. Hence, in this lecture, the author briefly explains the approaches to overcome the recent issues which enable the fabrication of supercapacitor devices from lab scale to commercial perspective; and also wish to provide future research directions towards next-generation electrochemical supercapacitors.

Synthesis and Application of 2D materials

Dr. K. Vijayarangamuthu
Assistant Professor (DST-INSPIRE Faculty)
Center for Nanoscience and Technology
Pondicherry University

Since its first isolation in 2004, graphene has become one of the most important material in the field of materials science. Graphene's excellent electrical, chemical and optical properties along with physical flexibility and a huge surface to weight ratio have led to a plethora of scientific experiments. These qualities make graphene suitable for various energy and environmental applications like storing electric charge in batteries and super capacitors, and as catalysts in solar and fuel-cell electrodes and various types of sensors to monitor hazards environmental pollutants. Recently, along with graphene many two dimensional (2D) materials like black phosphorous and transition metal dichalcogenides materials are also emerging as a promising materials for future technologies. Though, these 2D materials shows properties complementary to those of graphene, they still have limitation in mass production and chemical functionalization. The appealing properties and mass production of graphene makes it as a hottest topic and led to a surfeit of scientific papers even today along with other 2D materials. The move towards future energy technologies with high capacity and clean renewable energy, such as solar power, hydrogen energy has made significant advances over the past few years. In the present scenario, the production of renewable energy and their storage systems need to be cost effective and stabilize for energy generation. So in this presentation, some novel approach for synthesis of various 2D materials and their prospective applications will be presented.

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Terminalia Catappa Assisted Synthesis of TiO_2 Nanoparticles – A Green Synthesis Approach

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Abstract

Nature motivates researcher to carry out new research in the science and technology, especially in the field of nanotechnology. In that natural systems Terminalia Catappa having very significant reducing and capping agent. Control of particle size and shape are important to make sure uniformity of the TiO_2 nanoparticles. One among the parameters which will influence the morphology of nanoparticle is plant extract, either in term of its concentration or pH. confirmed that concentration of the plant extract also features a significant role in controlling particle size and shape compare to the acidic. The Present work focused on to synthesis of Titanium dioxide (TiO_2) nanoparticles from Terminalia Catappa plant extract using Green synthesis method. The obtained TiO_2 nanoparticles have been characterized by X-ray Diffractometer (XRD), Scanning Electron Microscopy (SEM), UV-Visible Spectroscopy (UV-Vis) and Fourier Transform Infrared Spectroscopy analysis. In the XRD pattern the diffractogram indicates the formation of anatase phase TiO_2 with tetragonal crystal structure and average crystalline size is roughly range as 10-21nm. SEM micrograph reveals that the nanoparticles are homogeneously distributed with spherical shape morphology without agglomeration.

Keywords: Terminalia Catappa, SEM, XRD, TiO_2 nanoparticles

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MS2

Biogenic Synthesis of Silver Nanoparticles using Caltrop (TribulusTerrestris) leaf extract and its antibacterial activity

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Abstract

Silver Nanoparticles plays an integral part in the evolution of new anti-microbials against the broad ranges of pathogenic micro-organisms. Biological synthesis of metal nano-particles using plant extracts has been successfully consummated. In the present study, the bio-synthesis of Silver Nanoparticles (AgNPs) was conducted using the leaf extract of plant "TribulusTerrestris", having novel ethnomedicinal. To synthesize Silver Nanoparticles, the use of plant part acts as a reducing as well as capping agent. The synthesized AgNPs were characterized using Fourier Transform Infrared Spectroscopy (FTIR), Scanning Electron Microscope(SEM), X-ray Diffraction(XRD) and Energy Dispersive X-ray(EDX). The compounds responsible for silver ions and the functional groups present in plant extract were identified and investigated by FTIR technique. The two-dimensional image, external morphology, chemical composition and orientation of materials are done by XRD analysis. The study of the crystal structure and the identification of crystalline phases are done by SEM analysis. The information about chemical composition of a sample, distribution and concentration are done by EDX. The results of the present study shows that bio synthesized Silver Nanoparticles using TribulusTerrestris leaf extract have a potential to inhibit the growth of emerging bacteria.

Keywords: Silver Nanoparticles,"Tribulus Terrestris" Green Synthesis, FTIR, SEM, XRD and Antibacterial Activity

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MS3

Green Synthesis of Copper Oxide Nanoparticles Using Aloe Vera Extract

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Abstract

In material science, green method for synthesis of nanomaterials are feasible, cheaper and eco-friendly protocol. To accomplish this phenomenon, present study was aimed to synthesize Copper oxide nanoparticles using leaf extract of Aloevera with two different precursors $CuCl_2.2H_2O$ (Cupric chloride) and $CuSo_4.5H_2O$ (Cupric sulfate). The extraction of Aloevera is employed as reducing and stabilizing agent for this synthesis. Copper oxide Nanoparticles is effective use of biomedical application due to their antibacterial function. The synthesized Copper oxide nanoparticles were characterized by X-Ray Diffraction Spectroscopy (XRD), Energy Dispersive Spectroscopy (EDX), Fourier-Transform Infrared Spectroscopy (FT-IR) and Scanning Electron Microscope(SEM). XRD studies reveals the crystallographic nature of Copper oxide nanoparticles. Furthermore the Copper oxide nanoparticles have good Antibacterial activity against both gram negative (E.Coli, Klebsiellapneumonia) and gram positive (Bacillus cereus, Staphylococcus aureus) bacteria.

Keyword: Green synthesis, Aloevera, SEM, XRD, FTIR, Antibacterial activity

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MS4

Synthesis of Cadmium Sulfide (CdS) Thin Film doped with (Sn) by SILAR Method

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Abstract

Cadmium sulfide has been used in both photosensitive and photovoltaic devices. Direct band-gap of CdS thin films have been the subject of intensive research because of its intermediate band-gap, high absorption electron coefficient, electron affinity, low resistivity, and easy ohmic contact. The CdS doped with different weight percentage of Sn (1%,3%,5%) thin films have been synthesized by SILAR method. The characterisation of CdS doped with Sn thin films were characterized by SEM, EDAX, XRDFTIR, and UV-visible spectrometer techniques. The SEM morphological characterization of film shown as a well formed nano crystalline thin film. The molecular composition of the cadmium sulphide dope with Sn film analysed by using EDAX spectroscopy were conformed,atomic weight percentage of Cd=94.16%, S=1.65% and doped Sn 4.19%. The Optical characterisation studies showed that it has a high absorption co-efficient and band gap energy (Eg) of films were found be in 2.32eV (CdS.Sn1%), 2.26eV(CdS.Sn3%), and 2.10eV(CdS.Sn5%). The structural characterizations of XRD result conform that the cubic crystalline structure of the CdS.Sn thin films and average grain size of films were found in 37nm.

Keyword: CdSThin film, SILAR, SEM, XRD, UV-vis, Energy Dispersive Spectroscopy

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MS5

Green Synthesis of Silver Nanoparticles using SolanumTrilobatum Leaf Extract and their Antibacterial Activity

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Abstract

In the present study silver Nano particles have been synthesized from 'SolanumTrilobatum' leaf extract. Silver Nano particles have unique physical and chemical properties that are classified to have a great potential in medicinal applications. It can be cost effective, non toxic, environmentally friendly and reduce their size. Bio synthesis of silver Nano particles is a bottom-up approach that mostly involves reduction/oxidation reactions, green synthesis of AgNp's where characterized by X-Ray diffraction, FTIR, SEM, EDAX and UV-vis spectroscopy. Antibacterial activity of synthesized Silver Nanoparticles was done by agar well diffusion method against different pathogenic bacteria. The green synthesized Silver Nanoparticles can be used in the field of medicine, due to their high antibacterial Activity.

Keyword:Silver Nanoparticles Solanum Trilobatum, Green Synthesis, FTIR, UV, SEM, EDAX, XRD and Antibacterial activity

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MS6

Synthesis and Characterization of Silver Nanoparticles Using LawsoniaInermis Leaf

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Abstract

The Present work is focused on synthesisand characterization of Silver nanoparticles, using Lawsoniainermis leaf. It has been proposed as a cost effective and environment friendly to chemical and physical methods. Biologically synthesized silver nanoparticles have been widely used in the field of medicine. The prepared Silver nanoparticles are monitored through X-ray diffraction(XRD), UV-Vis Spectrophotometer(UV-Vis), Photoluminescence(PL), Field Emission Scanning Electron Microscope(FESEM), and Energy Dispersive Analysis X-ray (EDAX) analysis, Fourier Transform Infrared Spectroscopy (FTIR).

Keyword: Silver nanoparticles, LawsoniaInermis Leaf, XRD,UV-Vis, FESEM. EDAX, FTIR

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MS7

Exploring the Characterization of Ni Doped Mgo Nanoparticles Using Co-Precipitation Method

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Abstract

Nanotechnology is a field of applied science focussed on design, synthesis and characterization of nanomaterials. The nickel and magnesium have improved their applications in transparent electrodes and nanoelectronics. In addition, magnesium oxide had moisture resistance and high melting point properties. In the present work has been carried out in the development of green crystalline powder of nickel doped magnesium oxide nanoparticle by Co- precipitation method, from the mixture of nickel chloride and magnesium chloride with KOH as solvent. From the XRD results, crystal size of the particle can be observed. Spherical structure of Ni doped MgO nanoparticle were indicated by SEM results and powdered composition of samples were obtained from FTIR. EDAX represents the peak composition of the particle. The above analytical techniques have confirmed that the Ni doped MgO nanoparticles obtained from the mixture of Nicl and Mgcl.

Keyword: Nickel, Magnesium oxide, Nanoparticle, KOH

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MS8

Green Synthesis of Silver Nano Particals Using Acalypha Indica Leaf Extract and their Antibacterial Activty

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Abstract

In the commenced study silver nanoparticles have been synthesized from "ACALYPHA INDICA" leaf extract. Silver nanoparticles have unique physical and chemical properties that are systematized to have a great potential in medicinal application. It can be cost effective, non-toxic, environmental production and reduce their size. Bio synthesis of silver nanoparticles is a bottom-up approach that mostly involves reduction/oxidation reactions. Green synthesis of Ag nanoparticles where symbolize by XRD, FTIR, SEM, EDAX and UV spectroscopy. Antibacterial activity of synthesized silver nanoparticles was done by agar well diffusion method against different infective agents. The green synthesized silver nanoparticles can be used in the field of medicine due to their high antibacterial activity. The composed Ag nanoparticles can be used for its therapeutic purpose and for large scale synthesis in food industries for food preservation (or) packaging.

Keyword: Green Synthesis, nanoparticles, XRD, SEM, FTIR, EDAX, UV

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MS9

Synthesis, Characterization and Antibacterial activity of Copper Oxide Nanoparticles

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Abstract

Copper oxide nanoparticles were synthesized by Chemical Precipitation Method using Copper Chloride dihydrate ($CuCl_2.2H_2O$), Sodium hydroxide (NaOH) as a precipitating agent. The Synthesized Copper Oxide nanoparticles were characterized by X-ray diffraction (XRD), Scanning Electron Microscope (SEM), Energy Dispersive X-ray (EDX) Spectroscopy, Fourier Transform Infrared Spectroscopy (FTIR). The Antibacterial activity of copper Oxide nanoparticles was tested against both gram positive and negative bacteria. In XRD, the crystal size and dislocation density of Copper Oxide nanoparticles were calculated, Element's purity was determined by EDX spectra. The SEM imagesconfirms the presence of homogeneous spherical distributionofcopper oxide nanoparticles. The nanoparticles showsinteractions between copper and oxygen atoms were supported by FTIR studies. Copper Oxide nanoparticles exhibits antibacterial activity against Klebsiella pneumonia,Escherichia coli, Staphylococcus, Bacillus cereus.

Keyword: Copper oxide, precipitation method, antibacterial activity, nanoparticle

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MS10

Annealed Effects of Poly- O- Toluidine (POT) Nanomaterial at Different Temperatures

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Abstract

Poly-o-toluidine(POT) nanomaterials was prepared by using chemical oxidative polymerization method. The polymerization process was carried out using the monomer o-toluidine (1M), ammonium peroxydisulphate (APS) (0.5M) as oxidant and the dopant sulphuric acid (3M). The resultant polymer materials are heat treated at various temperature such as200 ℃, and 400 ℃. The prepared POT materials are characterized by using different Spectroscopic techniques, Fourier Transform Infrared Spectroscopy (FTIR), Ultraviolet Visible (UV-VIS) Spectrometry, Particle Size Analyser (PSA), and biological application like Anti-Bacterial activities. The FTIR studies shows the various functional groups in POT. The optical properties of prepared polymer material band gap, electron transition are calculated by using UV-VIS techniques. The PSA studies are revealed that the measurement of the size distribution of individual particles in a POT nanomaterials.The antibacterial activity of the POT nanomaterials are indicates that the several microorganisms. These POT nanomaterials are used to examines that the Chemical, optical, size of the nanomaterials and antibacterial activity for different Bactria.

Keyword: POT (Poly O-Toluidine), Polymerization, ammonium, peroxydisulphate, antibacterial activity, micro organisms

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MS11

A Study on Trilaurin assisted synthesis of nanohydroxyapatite using SBF via Ultrasound method

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Abstract

Trilaurin plays an important role in drug delivery system by utilising calcium nitrate tetrahydrate and diammonium hydrogen phosphate as precursor materials. We report in this paper, a strategy to prepare hydroxyapatite (HAP) material based on the distribution of hydroxyapatite (HAP) into trilaurin using an ultrasound at nano scale by means of 1.5 concentrated SBF solution. A hydroxyapatite substrate was soaked in simulated body fluid(SBF) for 15 days with an ionic concentration nearly equal to those of human blood plasma. The FTIR spectra of nanohydroxyapatite with trilaurin matrix designates the substantial intermolecular interaction between the various vibrational modes resembles to hydroxyl and phosphate groups. The results of XRD, SEM suggests its crystallinity and surface morphology.

Keyword: Hydroxyapatite, Simulated Body Fluid, Ultrasound

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MS12

Biosynthesis of Magnesium Oxide Nanoparticles using the extracts of Puniga Granatum Peels and Brassica Oleracea

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Abstract

Nanotechnology brings the enormous application in the field of medicine, agriculture and aquaculture technologies, which is shifted from the chemical based solutions. The current work concerned on green synthesis of Magnesium oxide nanoparticle from the extracts of pomegranate peels and cauliflower, in which the magnesium sulphate heptahydrate has been act as a precursor. Because of its high hardness property of Magnesium oxide, it is used as fire retardant in plastic tubes and chemical fibre. The various analytical studies and morphological characteristics were taken for MgO nanoparticles such as XRD, SEM, FTIR, EDS, UV-Vis and Antibacterial activity. From the XRD, the crystallinity of MgO particles were found out. From the FTIR and UV-Vis spectrum, the powdered composition of the samples and their optical properties were determined. SEM predicts the morphological structure of MgO nanoparticles and their elemental composition where determined in the EDS analysis. Antibacterial activity for MgO nanoparticle exhibited good results against gram positive and gram negative bacterials.

Keyword: Magnesium oxide, Antibacterial, Nanoparticles, Pomegranate, Cauliflower

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MS13

Green Synthesis of Iron Oxide Nanoparticles using the Leaf extract of Phyllanthus Niruri

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Abstract

In recent years, nanotechnology has emerged as a start-of-the-art, with multifarious applications in a wide array of fields. Studies on green synthesis of nanoparticles moves forward these days. The present work involves the green method of synthesizing Iron oxide nanoparticles [Fe_2O_3] by Phyllanthus niruri leaf extract and NaOH which acts as a precipitating agent.Furthermore, the green synthesized Iron oxide nanoparticles were characterised and its antibacterial activity was investigated.As this plant extract is more beneficial, it is energy efficient, low cost and environmentally friendly process than the bio-hazardous chemical synthesis.Iron oxide nano particles are gaining importance for their uses in environmental remediation technologies. The characterisation of nano particles includes the IR, UV-Vis, and Size determination using SEM and XRD.The average crystalline size of the ironoxide nanoparticles was calculated by Debye's Scherrerformula,d = 12.34nm. The analytical studies revealed that the synthesized Iron oxide nanoparticles, almost have the identical size and morphology. Thus, theabove studiesconcluded, the synthesized materialwas Iron oxide nanoparticles.

Keyword: Iron oxide, Phyllanthus niruri, Antibacterial, Nanoparticle, XRD

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MS14

Synthesis and Characterization of Polyaniline nanomaterials with different Molar Ratio of Monomer

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Abstract

Formation of polymer nanomaterial are achieved by the process of polymerization and there was an availability of different methods such as chemical oxidative polymerization, electro chemical polymerization,In-situ oxidative polymerization and emulsion polymerization etc., Many monomers combine to form polymers under certain conditions by chemical reactions between the monomers. The chemical oxidative polymerization was most commonly used method to synthesize PANI and the synthesis process involved various molar ratio of aniline (0.1M, 0.2M, 0.3M) in which APS was used as an oxidant with dopant of HCl. This study revealedthat the properties changed based on their initial conditions. The prepared aromatic polyaniline was characterized by FT-IR,UV-VIS, Particle size analyzer techniquesandanti-bacterial activity of the sample was analyzed. FT-IR spectroscopy gives deep view of many functional groups that were present in a system by measuring vibrational frequencies of chemical bonds involved. UV-VIS was a good tool to identify, characterize and to study the optical properties of nanomaterial. In particle size analyzer, the size of a particle was measured using the instrument laser diffraction particle size analyser (SALD-2300). The synthesized polyaniline had the tendency to resist the growth of both gram positive and gram negative bacteria. These organic conducting polymers were sometimes called “smart polymers” and have varies application in medical, OLED, solar cell, batteries and sensor etc.,

Keyword: Aniline, chemical oxidative polymerization, polyaniline

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MS15

Influence of annealing temperature on Optical, Chemical and Particle Size Properties of Polyaniline Nanomaterial

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Abstract

Polyaniline is a representative conducting polymer because of its high electrical conductivity in doped state and it's used in various fields of science and engineering because of its unique characteristics. Polymers are playing a dominant role in many areas such as material sciences, textile industries and chemical industries. Monomers of aniline are combined together to form a polymer of polyaniline by chemical oxidative polymerization method. The process of synthesis includes 1.5 M of aniline (C_6H_5N) as main reagent which causes chemical reaction, Sulfuric acid (H_2SO_4)as a dopant which alter its original electric and optical properties and Ammonium Peroxydisulfate (APS) as an oxidant which has the ability to oxidize and accept electrons. The synthesized nanoparticles are subjected to heating process at two different temperatures (200˚C and 400˚C). The prepared polymer material is characterized by UV-Visible Spectroscopy, Fourier Transform Infra-Red Spectroscopy, Particle Size Analyzer and antibacterial activity. The electron transition from ground state to excited state was revealed by UV-Vis Spectroscopy. Polymeric materials are identified using FTIR spectroscopy and it also exhibits the chemical bonds and structure of the sample. Particle Size Analyzer represents the mean size of the polyaniline sample. The overwhelming potential application of polyaniline includes manufacturing of circuit board, corrosion resistance, fabrication of smart textiles.

Keyword: Material sciences, Ammonium Persulfate, FTIR spectroscopy, UV-Vis Spectroscopy, Antibacterial activity

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MS16

The Effect of Copper on Structural, Optical and Magnetic behavior in Strontium Stannate Nanostructures

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Abstract

Nanostructured materials are currently being explored as activecomponents in a wide range of technological applications such as chemical sensors,biomedicine, optoelectronicsand energy based applications. Among these perovskite structured compounds are studied intensively for interesting physio-chemical properties. In the present work, pure and Cu doped $SrSnO_3$ compounds were synthesized by simplechemical precipitation method. The analysis of X-ray diffraction confirms the formation of orthorhombic crystal structure with considerable variation in their lattice parameters, which evident that thedopant (Cu) introduced in the host lattice. Scanning electron Micrograph images shows poly-dispersed aggregated particles along with rod like particle for Cu doped samples. Optical absorption spectra exhibit the excellent optical behaviour in the UV region. Modification in the optical bandgap values shows the interaction between the dopant with host lattice.Photoluminescence studies showed an interesting violet- blue emission suggests the presence of vacancies/ defect in the prepared compounds. Magnetization measurements at room temperature demonstrated the ferromagnetic signature of all the samples, the origin of weak ferromagnetism in non-magnetic oxides may be understood in terms of oxygen vacancies present in the samples.

Keyword: Perovskite, $SrSnO_3$, Chemical precipitation, Ferromagnetism

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MS17

EDTA Assisted Synthesis of HA Nanoparticles and Cobalt - HA Nanocomposites

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Abstract

Nano biomaterials such as polymers, ceramics and metals are widely used in bone for regenerative therapies, bone grafts and tissue engineering as well as for temporary or permanent implants to stabilize fractures and replace joints. Bioceramics are specifically developed to replace parts of living system due to its biocompatibility. Hydroxyapatite (HA) $Ca_{10}(PO_4)_6(OH)_2$ used as a bone substitute material with stoichiometric composition i.e., Ca/P(ratio) 1.67, which is similar to the mineral phase of the human bone. In this present work, (EDTA) ethylene diamine tetra acetic acid assisted as a capping agent for the synthesize of nano hydroxyapatite and cobalt substituted hydroxyapatite nanocomposites by sol gel method. The synthesized nano-HA powder and Co-HA nanocomposites are further characterized by using FTIR, XRD, SEM, EDAX and Anti-bacterial activity. XRD analysis of HA Nanoparticles and Co-HA Nanocomposite, shows the strongest 2θ values at 32.1°, 25.91° and at 32.1°, 10.1°, 16.6° respectively. SEM morphology predicts an elongated spherical morphology for HA Nanoparticles and Co-HA Nanocomposites. The elemental composition was confirmed with EDAX analysis and the FTIR spectrum indicates the functional groups of the synthesized compounds. The antibacterial activity was analyzed for both the gram-positive and the gram-negative bacteria.

Keyword: Bioceramics, Biocompatibility, Nanocomposites, HA, EDTA, Anti-bacterial

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MS18

Characterization of Iron Oxide Nanoparticles from the Leaf Extract of Piper Betle by Green Synthesis Method

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Abstract

In this present study, Iron oxide nanoparticles was synthesized by using Green method. For this synthesis on Iron oxide, the leaf extract of piper betle was used as a reducing agent and $FeCl_3$ as a precursor. Thus, they were characterized by XRD, SEM, EDX and FTIR. The parity of FeO nano particles was confirmed by EDX. The crystalline size of Iron Oxide nano particles is analyzed using X-ray Diffraction (XRD) spectrum. The functional groups are identified in Fourier Transform Infrared Spectroscopy (FTIR). The surface morphology of the Iron Oxide Nano particles is found from Scanning Electron Microscopy (SEM). The optical properties are determined by using UV-Visible Spectroscopy. Thus the so-formed nanoparticles were FeO.

Keyword: Iron oxide, Nanoparticles, Green synthesis, XRD

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MS19

Synthesis and Characterization of Magnesium Oxide Nanoparticle By Sol-Gel Method

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Abstract

Magnesium oxide was hygroscopic solid mineral that occurs naturally as periclase.Magnesium oxide had high thermal conductivity, it get heated when the electricity was passed through it. Magnesia crucible had a stability of 2400°C in air,1700°C in reducing atmosphere. Magnesium oxide nanoparticle was obtained from the mixture of magnesium nitrate as precursor and sodium hydroxide as precipitating agent by sol-gel method. Finally, the resultant white crystalline powder of MgO was annealed at various temperatures of 80°C, 135 °C and 180° C. The analytical study reveals the morphological characterization of MgO nanoparticles. As Scanning Electron Microscopy (SEM) indicates the structures of MgO nanoparticles. The crystal size of MgO nanoparticle was obtained by X-Ray Diffraction (XRD). The optical properties of the sample were obtained by UV- Visible spectroscopy. Fourier Transform infrared microscopy indicates powdered composition of the sample. EDAXindicates elementary composition of the MgO nanoparticles.

Keyword: FTIR, Sol-Gel, UV, XRD, SEM, EDAX

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MS20

Synthesis, Structural, Optical and Morphological Properties of Mn doped Co_3O_4 Nanoparticles

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Abstract

Recently, the transition metal oxide nanostructures have attracted much interest in many areas of chemistry, physics, environmental science and material science. Among the various transition metal oxides, Co_3O_4 is an important p-type semiconductor widely used as heterogeneous catalyst, anode material in lithium ion batteries, gas sensor, electrochemical device, solar energy absorber and magnetic material where their properties are strongly dependent on their size and morphology. The manganese doped Co_3O_4 nanoparticles were synthesized by chemical precipitation method. The synthesized nanoparticles were characterized using X- ray diffraction, Fourier Transform Infrared Spectroscopy, Ultraviolet- Visible Spectroscopy, Photoluminescence spectroscopy and Scanning Electron Microscopy. The structural investigations were done by X- ray diffraction which confirmed the formation of face centered cubic structure. FTIR spectra identified the functional group present in molecular structure. The band gap energy was calculated from ultraviolet visible spectroscopy. PL study was carried out to know the occurrence of emission peaks. Morphological study done by SEM showed the presence of spherically agglomerated particles.

Keyword: Spinel, Nananosize, Chemical precipitation, Luminescence

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MS21

Predicting the Characteristics of Copper Oxide Nanoparticles using Nyctanthes Abortristis flower extract Via Antibacterial Study

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Abstract

Copper oxide (CuO) is an inorganic compound with monoclinic crystal structure. CuO nano particles attracted considerable attention because copper is one of the most important metal with numerous applications in the field of optical, catalytic, mechanical, organic dye degeneration, biomedicine, pharmaceutics, cosmetics and different medical purposes. In the present study, copper oxide nanoparticles have been prepared by biological method using the flower extract Nyctanthes abortristis as a reducing agent. The resulting samples were characterized using X-ray diffraction (XRD), Scanning Electron Microscopy (SEM), Fourier Transform Infrared Spectroscopy (FTIR), Energy Dispersive analysis of X-rays (EDX), UV-Visible Spectroscopy(UV) and Antibacterial activity. From XRD studies, the average crystalline size of the obtained sample was calculated by Debye-Scherrer Equation and it was found to be 33.13 nm. The band gap energy of the synthesized nano particle was estimated from UV studies and its value is 1.19 eV. The morphological characteristics were absorbed by SEM studies. The EDX and FTIR studies confirm the presence of Copper Oxide nano particles. The antibacterial activity of CuO-nano particles on selected bacteria was done using agar diffusion method.

Keyword: Nyctanthes abortristis, CuO nano particles, FTIR, Antibacterial activity

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MS22

Optimization and Thermal Effects Of Polyaniline Nanomaterial Synthesized By Chemical Oxidative Polymerization Method

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Abstract

Scientific zone has a great attention to the polyaniline (PANI) nanomaterial which is an organic, conductive and a conjugated polymer. It has variety of applications such as in batteries, microelectronics displays, antistatic coatings, electromagnetic shielding materials and actuators. PANI was synthesized by using chemical oxidative polymerization method. The preparation process carried out by the main reagent aniline (C_6H_7N) with the ammonium peroxydisulpate (APS) ($(NH_4)_2S_2O_8$) which act asan oxidant and hydrochloric acid (HCL) as a dopant in an ambient temperature. The synthesized polymer materials are annealed at different temperature such as 200°C, 300°C and 400°C. After annealed treatment, the weight percentage of polymer material are changed were decreases with increase the temperature of pure PANI (0.441g), 200°C(0.172g), 300°C(0.147g),400°C(0.105g). Then the obtained polymer materials are characterized by FTIR, UV-Visible, Particle size analysis (PSA) and Antibacterial analysis.FTIR is used to determine the functional group of polymer nanomaterial. UV-Visible exhibits the quantitative information about the polymer nanomaterial by using its band gap. The size of the individual particles and the size distribution range of the respective samples are determined by the Particle Size Analyzer (PSA). Antibacterial activity is used to find the polymer nanomaterial which kills bacteria, or bacteriostatic, which slow down the growth of bacteria. These profiling techniques are used to find the properties like functional group, quantitative information, particle

Keyword: Polymer material, FTIR, UV-Vis, Antibacterial activity

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MS23

Exploring the Characteristics of the Nickel Oxide Nanoparticles Via Sol – Gel Method

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Abstract

Nickel Oxide (NiO) is an important transition metal oxide with cubic lattice structure. NiO is thermally stable that is suitable for tremendous applications in the field of optic, ceramic, glass, electro-chromic coatings, plastics, textiles, nanowires, nanofibers, electronics, energy technology, bio-medicine, magnetism and so on. In this present study, NiO Nanoparticles were successfully synthesized by sol-gel technique. Nano-sols were prepared by dissolving Nickel-Chloride [NiCl2.6H2O] in NaOH solvent and were converted into Nanostructured gel on precipitation. A systematic change in preparation parameters like calcination temperature, time, pH value has been noticed in order to predict the influence on crystallite size. Then the prepared samples were characterized by the X-ray Diffraction Spectroscopic (XRD), UV-VIS Spectroscopy, Fourier Transform Infra-Red Spectroscopy (FTIR), Energy Dispersive X-ray Spectroscopy (EDX), Scanning Electron Microscopy (SEM) and Particle Size Analyzer (PSA). From XRD, the average crystalline-size has been calculated by Debye-Scherrer Equation and it was found to be 12.17 nm and the Band gap energy of Nickel oxide (NiO) from UV studies reveals around 3.85 eV. Further, EDX and FTIR studies, conform the presences of NiO Nanoparticles. The SEM study exhibits the spherical like morphology of Nickel oxide (NiO). Further from PSA, the mean value of NiO nanoparticles has been determined.

Keyword: Nano-sols, Sol-gel, XRD, FTIR, EDX

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MS24

Appraisal of Innovative Phytosynthetic CdO NP's from Leaf extract of Ocimum Sanctum and their Bactericidal Activity against different strains

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Abstract

The phytosynthesis of n-type Cadmium Oxide Nanoparticles reduces the toxicity of the substance and makes it Eco-friendly. This Eco-friendly biosynthesis of CdO NP's was synthesized for the first time from the Queen of herbs, Ocimum Sanctum (holy basil). The biosynthesized Cadmium oxide was prepared using Ocimum leaf extract as a reductant and Cadmium Chloride and Ammonium hydroxide as cadmium and oxide source materials by Co-Precipitation method. Thus obtained Cadmium Oxide Nanoparticles were characterized by different techniques such as X-raydiffraction(XRD), Fourier Transform infrared spectroscopy(FTIR), Scanning electron microscope(SEM),Energy dispersive X-ray spectroscopy(EDAX) to study the structural and morphological properties.

XRD pattern exhibited the formation of face centered cubic structure of CdO NP's with an average crystalline size of 11.5nm .The chemical bond formation of CdO NP's were confirmed by FTIR spectrum in the range of (400-4000cm^{-1}). The SEM micrographs revealed the predominant formation of Cauliflower shape with a particle size in the range of 61-142nm. The high purity of the biosynthesized nanoparticles was confirmed by EDAX analysis. Further it was tested against gram positive and gram negative bacterial strains and showed significant antibacterial activity. This biosynthetic research study opens an innovative window to progress our understanding of how CdO NP's shows resistance to different bacterial strains.

KEYWORDS: Bio Synthesis, Ocimum Sanctum, CdO NP's, XRD, Bactericidal activity.

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MS25

Acalypha Indica Mediated MgO NP's : A Novel Approach In Greener Route With It's Antibacterial Activity Against Pathogens

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Abstract

The interest in miniaturization of particles revealed the hidden applications of metal oxides. The potential applications of the particles may vary when the size of the particle is reduced. One of the alternative routes to the conventional approach is the use of plant extract for the synthesis of metal oxides NP's. In the framework of this study, the eco-friendly MgO Nanoparticle were synthesized using *AcalyphaIndica* leaf extract, functioning as reducing and capping agent by co-precipitation method. The predecessor taken here was Magnesium Nitrate.The biologically synthesized MgO NP'swas characterized by various techniques like X ray diffraction(XRD), Fourier Transform infrared spectroscopy(FTIR), Scanning electron microscope(SEM) with Energy Dispersive X-ray spectroscopy(EDAX) profile and its antibacterial activity is evaluated against causative organisms.

XRD studies confirmed *the face centered* cubic crystalline structure of MgO NP's and the average crystalline size of MgO NP's calculated using Scherrer's formula was found to be 13nm. FTIR spectrum shows a significant Mg-O vibrational band. Purity, surface morphology and chemical composition of elements were confirmed by SEM with EDX. The SEM result shows the fine spherical morphology with the grain size range between 43nm to 62nm. Antimicrobial assay of MgO NP's was examined against gram positive and negative bacteria. Appreciated activity was observed on the *Staphylococcus aureus* bacterial species. In general, the renewed attempt of this facile approach gave the optimum results of multifunctional MgO NP's.

Keyword: MgO NP's, greener route, X-RD, antibacterial activity

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MS26

Facile Synthesis of Calcium Oxide Nanoparticles from the Carica Papaya Leaf Extract with the significantly enchanced Antibacterial Activity

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Abstract

The conventional methods for the synthesis of metal oxides intake large amount of hazardous chemicals, the best promising alternative is the use of plant extracts. In this work, Calcium oxide nanoparticles of 16nm size with the cubic shape were synthesised using the papaya leaf extract by the simple greener route using calcium chloride as a source material by co-precipitation method. By using the XRD (X-Ray Diffraction), FTIR (Fourier Transform Infrared Spectroscopy), SEM (Scanning Electron Microscope) and EDAX (Energy Dispersive X-ray Analysis), the structural, surface morphology, functional group and the antibacterial activity of the synthesised calcium oxide nanoparticles were analysed. The XRD pattern of the CaO NPs was well matched with the standard value and the crystalline size obtained using the Scherer formula was 16nm. The elemental composition of the prepared sample was confirmed by the EDAX result. The presence of the functional groups of the synthesized CaO nanoparticles was confirmed by the FTIR analysis (4000-400cm^{-1}). The cubic morphology was identified from the SEM image and the grain size ranges from 125-218 nm. The CaO NPs were further evaluated for their antibacterial activity against *Staphylococcus aureus* and *klebsiella pneumonia* and from the result it was found that CaO NPs was active against both gram positive and gram negative bacteria. Therefore, it may be an emerging platform for new medicines.

Keyword: CaO NPs, Green synthesis, XRD, antibacterial properties

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MS27

Characterisation of undoped ZnS and $FeCl_3$ doped ZnS Nanoparticles are Synthesied by Chemical Precipitation Method

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Abstract

Nanoparticles of Ferric chloride ($FeCl_3$) doped Zinc Sulphide (ZnS) and Undoped Zinc Sulphide (ZnS) had been synthesized successfully by simple chemical precipitation method. Particle sizes have been calculated from X-ray diffraction (XRD) analysis which confirms the nano structure of the samples. The Molecular structure of the compound was determined by the Fourier transform infrared spectroscopy (FTIR) analysis and the different vibrational bands confirmed the functional groups present in the sample. The bandwidth of the absorbance is examined by using (UV)-Visible Spectroscopy. The Morphological structures have been confirmed by using Scanning Electron Microscope (SEM). Energy Dispersive analysis of X-ray (EDAX) shows the composition of elements present in the nanoparticles. The applications of ZnS were used in the field such as Field Emitting Diodes (FET), sensors (gas sensors, biosensors), Flat panel displays, Electroluminescence.

Keywords: XRD, FTIR, UV, SEM, EDAX

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MS28

Synthesis and Characterization of Zinc doped Copper Oxide Nanocrystals by Chemical Precipitation Method

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Abstract

Zinc doped copper oxide nanoparticles were synthesized by chemical precipitation method. Copper acetate act as a precursor and sodium hydroxide will act as a reducing agent. The prepared nanoparticles were characterized by X-ray diffraction (XRD) which reveals the simple monoclinic structure. The Fourier Transform Infrared Spectroscopy confirms the functional groups present in the nano powders. The morphological Structure of the prepared crystals are analyzed by Scanning Electron Microscopy (SEM) were showed that the products were flaky in nature. The Bandwidth of the synthesized sample was calculated by UV-Visible spectrum. The presence of compounds in nano powders were confirmed by Energy Dispersive X-ray diffraction method (EDX). Copper oxide has applications as a P-type semiconductor, because it has a narrow band gap of energy of 1.2 e V. Zinc doped copper oxide has applications in the wide variety of fields such as medicine, industries, sunscreens, agriculture etc.

Keyword: XRD, SEM, FTIR, UV, EDX

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MS29

Effect of Cu doping concentration on structural and Optical properties of WO_3 nanoparticles

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Abstract

This article focuses the effect of Cu doping on the crystal structure and optical properties of Cu_xWO_3 nanoparticles with nominal composition (where x=0, 2, 4, 6 and 8 mol. %) were synthesized by precipitation route followed by calcinations at 400° C. The XRD analysis of the WO_3 nanoparticles reveals the formation of tetragonal crystal structure for all samples which confirm the incorporation of Cu^{2+} ions into the WO_3 lattice. The bandgap energy of the samples were determined from the ultraviolet-visible absorption spectrum as well as Kubelka – Munk plot which infers that the energy gap decreases with the increase of copper content. The presence of functional groups and chemical bonding has been verified through FTIR.

Keyword: Nanoparticles, calcination, FTIR

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MS30

Synthesis , Characterization and Antibacterial Studies of Copper Sulphide Nanoparticles By Chemical Precipation Method

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Abstract

In this present study the non toxic CuS nanoparticles was synthesized by the reaction of copper acetate, thiourea along with the precipitating agent NaoH under chemical precipation method. The final product CuS nanomaterial was dried at room temperature for better growth of nanoparticle. The size and growth of the crystal depends on the temperature also on the addition of reagent. The resultant nanocrystal were characterized using various techniques like X ray diffraction reveals the particle size, Scanning electron microscope determines the morphology of crystal, Energy dispersive X ray spectroscopy investigate the elemental composition of nanoparticle, U-Vis spectroscopy examine the presence of metallic ion, Fourier transform infrared spectroscopy inspect the existence of functional group. The antibacterial activity of hexagonal structured copper sulphide nanomaterial against gram positive and gram negative bacteria were also analysed for their wide applications.

Keyword: CuS nanoparticles,Chemical precipitation., XRD, Antibacterial activity

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MS31

Synthesis and Characterization of Iron Oxide (Hematite) Nanoparticles by Sol-Gel Method

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Abstract

Iron oxide nanoparticles have excellent biomedical applications because of its large surface area. It can be used in drug delivery, cell separation, tissue repair and MRI. Fe_2O_3 nanoparticles is synthesized chemically by sol-gel method. This method uses Ammonium hydroxide and Ethanol as a precursor for forming Fe_2O_3 nanoparticles.Thus Fe_2O_3 nanoparticles are characterized by X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), Scanning electron microscopy (SEM), Energy dispersive X-ray spectroscopy (EDAX) and UV Spectroscopy. All the structural parameters such as lattice constants, unit cell volume, density, crystalline size, micro strain are calculated from the XRD results using Debye Scherrer's formula. When annealing temperature increased from 400^oC to 1000^oC the average crystalline size of the Fe_2O_3 nanoparticles are increased from 18nm to 22nm. FTIR technique also confirms functional groups of the synthesized Fe_2O_3 nanoparticles. The SEM image indicates that Fe_2O_3 nanoparticlesis approximately spherical in shape. Bandgap of the Fe_2O_3 nanoparticles is founded using UV Spectroscopy and it is reported in paper.

Keyword: Fe_2O_3 nanoparticles, Sol-gel method, XRD, SEM, FTIR

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MS32

Synthesis, characterisation and Antibacterial activities of Calcium Oxide Nanoparticles by Precipitation Method

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Abstract

Calcium oxide (caO) nanoparticles were comprehensively used as a catalyst in biodiesel production. Calcium oxide nanoparticles were prepared by using calcium hydroxide (Ca$(OH)_2$)and ethylene glycol ($C_2H_6O_2$) as precursor through precipitation method. The resultant calcium oxide nanoparticles were characterized by various techniques like, X-Ray diffraction (XRD) reveals the average size of calcium oxide nanoparticles is found to be 19nm using Debye-Scherrer equation. Scanning electron microscopy (SEM) image displays that calcium oxide nanoparticles have hexagonal morphology. Energy- dispersive X-Ray analysis (EDAX) exhibit the various concentration of calcium oxide. Fourier-transform infrared spectroscopy (FTIR) confirms the functional group of calcium oxide nanoparticles. The UV-Vis spectroscopy determines the bandgap of calcium oxide nanoparticles and also the calcium oxide nanoparticles shows excellent antibacterial activity due to its degradation property.

Keyword: CaO nanoparticles, precipitation, XRD, Antibacterial

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MS33

Synthesis and Characterization of Nanosized Cobalt Oxide by Co-Precipitation Method

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Abstract

In the present work , Cobalt Oxide Nanoparticles were prepared by using Co-Precipitation Method. The Cobalt Nitrate[$CO(NO_3)_2$] and Ammonium Oxalate [$C_2H_8N_2O_4$] were used as precursors for the synthesis of Cobalt Oxide Nanoparticles and the resultant product was Calcinated at 400˚c for 2h . The synthesized Nanoparticles were characterized by X-Ray Diffraction (XRD), Fourier Transform Infrared Spectroscopy (FTIR),Scanning Electron Microscope(SEM),Energy Dispersive X-Ray Spectroscopy (EDAX) to analyze the structural and morphological properties.The XRD pattern of the synthesized Cobalt Oxide Nanoparticles exhibits cubic structure with the average crystalline size of 8.06nm.The Functional groups of the synthesized nanoparticles were confirmed by using FTIR spectrum in the range of 400 to 4000 cm^{-1}. The presence of Cobalt and Oxide in the synthesized sample and it's purity were confirmed from EDAX spectrum. The surface morphology of the synthesizedCo_3O_4 nanoparticles shows spherical morphology. The optical properties of the synthesized cobalt oxide nanoparticles were investigated by photoluminescence spectrum which shows a minor emission at around 440nm.

Keyword: Cobalt Oxide Nanoparticles, Co-Precipitation , XRD, FTIR, SEM, EDAX and photoluminescence

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MS34

Green Synthesis of Iron oxide nanoparticles using Bio reduction method

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Abstract

Iron oxide nanoparticles were synthesized by simple bio-reduction method. Aqueous leaf extract of Tinospora cordifolia was used as a reducing agent and it shows great capability to synthesis Iron oxide nanoparticles at optimum temperature conditions. Ultraviolet–Visible absorption spectroscopy was used to monitor the dye removing ability of iron oxide nanoparticles. Also, iron oxide nanoparticles were characterized by particle size analysis (PSA), Fourier transform infrared (FT-IR) spectroscopy. In addition, the synthesized nanoparticles show good antibacterial activity against the tested pathogens. Thus, it could be concluded that Tinospora cordifolia leaf extract can be used efficiently in the production of iron oxide NPs for commercial applications in environmental fields.

Keyword: Tinospora cordifolia, particle size analysis, bio-reduction method

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MS35

Synthesis and Chacterization of Magnesium Oxide Thin Films Prepared By Dip Coating Method

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Abstract

In the current paper Magnesium oxide (MgO) thin films have been deposited on glass slide substrates and easily controlled method, proceeding large area films, using the dip coating method. The reactive substances used to obtained the MgO layers were $Mg(CH\ COO)_2.4H_2O$ methanol, Nitric acid and distilled water for different concentration and dipping times, at constant room temperature. The structure was determined by X -ray diffraction studies. The surface morphology and crystallite sizes were determined by Scanning electron microscope measurements. The electronic structure of materials were carried out the photo luminescence Spectroscopy. The functional groups were characterized by the Fourier Transform infrared spectroscopy and EDAX measurements. The optical properties determined by Ultra violet spectroscopy. The thickness of these films was controlled by changing dipping times and concentrations of the solution.

Keyword: MgO, thin films, Dip coating, Structure, Optical properties

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MS36

Structural activity and insilico analysis of Casteliferol and Castillcetin – A Theoretical approach

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Abstract

Flavonoids are of particular interest in secondary metabolites as they safe guard us against cell ageing, cardiovascular diseases, carcinogenic agents, oxidative stress etc., The structure of the flavonoids determines their superiority in scavenging the free radicals. In the present work two flavonoids (Casteilferol and Castillcetin) of same parental connectivity are been considered for theoretical investigation of the structural activity and their nomination towards the pathogenic targets. The geometry of the two flavonoids are been optimized with the help of Density functional theory equipped with Beckes three parameters along with the functions of Lee-Yang and Parr using the triple zeta valence basis set 6-311G(d,p). Thermochemical calculations (frequency) is carried out under room temperature with 1 atmospheric pressure. In order to understand the occupied orbital levels frontier molecular orbital analysis (FMO) is done and corresponding energy gap E_{gap} between the energy levels is found. Electron donating capability and accepting capability of two flavonoids are been investigated with the help of molecular electrostatic potential (MEP). The results visualized from MEP depicts that the hydroxyl units present in the A-ring is highly active for both compounds. Further insilico analysis was carried out for the compounds to understand the probability to be active and probability to inactive against the disease causing agents

Keyword: Density functional theory, Flavonoids, Structural activity

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MS37

Ethylene Glycol – Assisted Synthesis of N-HAP and Magnesium HAP Nanocomposite

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Abstract

Biomaterials were derived from nature and also it can be synthesized by chemical processes which can be utilized as metallic components, ceramics or composite materials. Nano Hydroxyapatite [n-HAp], a milky white coloured powder with calcium and phosphate ions stoichiometric ratio is 1.67. It was mainly used as bone and teeth fillers. The n-HAp [Ca_{10} $(PO_4)_6(OH)_2$] was prepared by sol-gel method, as it is known to be a simple economic technique which suits for industrial or large scale production. During precipitation, the grain growth may occur. In order to avoid this, Ethylene Glycol (EG) was used as a capping agent in synthesis of HAp nanoparticles and Magnesium HAp nanocomposites. The synthesised n-HAp and Magnesium HAp nanocomposites were characterised using SEM, XRD, EDAX and FTIR in order to analyse its structure, elemental composition and functional group. XRD analysis shows the strongest 2Θ peaks of n-HAp and Magnesium HAp nanocomposite at 32.1°, 25.9°, 49.7°and 10.2°, 32°, 18.9°respectively.

Keyword: Biomaterial, Capping agent, n-HAp, grain growth, Sol-Gel Method

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MS38

Green synthesis of silver nano particles from " Plectranthus Amboinicus" leaf extracts and its microbial potential.

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Abstract

In material science "green synthesis" has gained extensive attention as a reliable sustainable and eco-friendly protocol for synthesizing a wide range of Nanomaterials Including metal nanomaterials, hybrid materials and bio-inspired materials. We Report the synthesis of silver nanoparticles (AgNps) from the leaf extracts of "Plectranthus Amboinicus" from the "Lamiaceae" family. We explore the role of biological components essential phytochemicals (flavonoids, alkaloids, terpenoids, amides, aldehydes) as reducing agents and solvent systems. The compounds responsible for silver ions and the functional Groups Present in plant extract were identified and Investigated by FTIR technique. The Two Dimensional image, external morphology chemical composition orientation of materials in nature are done by SEM analysis. The study of the crystal structure and the identification of crystalline phases is done by XRD analysis. The results show that green synthesized silver Nano particles using "Plectranthus Amboinicus" leaf extract have a potential to inhibit the growth of bacteria

Keyword: Plectranthus Amboinicus, green synthesis, FTIR, phytochemicals

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MS39

Electrochemical Performance Assisted Treatment of Reactive Yellow Synthetic Dye Effluent

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Abstract

One of important contaminant that can create health hazard in water bodies is the dye effluents. Many important technologies are currently available for treating wastewater from the textile industry like biological treatment, chemical precipitation, ultrafiltration, carbon adsorption, and oxidation with ozone. But they generally lack the broad scope treatment efficiency required to reduce all the diverse pollutants present in textile wastewater. Electrochemical technology has shown that many of the major chemical components in textile industry wastewater can be effectively and economically removed. The target may be the reduction of COD, requiring the complete oxidation of dyes to carbon dioxide or the removal of colour. In the present study, synthetic dye effluent containing 500 ppm reactive yellow 107 was electrolysed under galvanostatic condition using APLAB model (SPECTRA LAB) wherein the current was controlled with a precision of ± 1%. Electrolyses were carried out using graphite anodes at various pH from 1.0 to 13.0 and NaCl was used as supporting electrolyte. The current density, pH were optimized. To ascertain the removal of dye during electrolysis, UV-VIS was carried out. The dye solution showed absorption at 235 and 387 nm. The first absorption is sharp, arising due to □□□* absorptions of benzene rings. The second absorption is broad and it may be assigned for the through resonance possible in the molecule. The complete decolourisation of the effluent and the absence of absorption peaks were noticed which suggest complete destruction of the dye and this does not produce any smaller organic units.

Keywords: electrolysis, destruction of dye, COD reduction, effluent treatment, electrochemical treatment

Keyword: electrolysis, destruction of dye, COD reduction, effluent treatment, electrochemical treatment

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MS40

Synthesis of Silver/Hydroxyapatite Nanocomposites for Biological Applications

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Abstract

The usage of Silver nanoparticles (AgNPs) in biomedical industry has been greatly enhanced due to its excellent antimicrobial activity against several pathogenic bacteria. The synthesis of silver nanoparticles using different plant parts is considered as a significant green technology. The plant extracts are cost-effective and eco-friendly in nature. Bone is vulnerable to fracture and this has been replaced by a class of biomaterials Hydroxyapatite (HAP) which is an inorganic component of bone and it has been widely used in bone replacement applications. However, there is a bacterial infection in post-surgery which aggravated the pain associated with surgery. In order to troubleshoot this disturbance, Silver/Hydroxyapatite nanocomposite were synthesized in the present study. The synthesis of silver nanoparticles was done using the *Mentha arvensis* extract with Silver Nitrate. The terpenoids and alkaloids and polyphenols present in the *Mentha arvensis* extract was acted as reducing agent for Ag^{2+} to Ag^{0}. Further for the synthesis of HAP, Calcium Nitrate [$CaNO_3.4H_2O$] (0.05 M) and Diammonium Hydrogen Phosphate [$(NH_4)_2\ HPO_4$] were used as precursors. To the precursors, various concentration of as-synthesized Ag nanoparticles was incorporated in order to study the better antibacterial activity. The as-synthesized Silver/HAP composite were characterized by UV-Visible, FT-IR, XRD, SEM, TEM and antimicrobial studies. The composite mixture can act a suitable biomaterial for bone replacement ailments and in post-surgery.

Keywords: Silver/Hydroxyapatite, antibacterial, Biomaterials

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MS41

Kinetic and Isotherm studies on Adsorption of Direct Blue 71 using Nanocarbon Spheres

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Abstract

Nanocarbon spheres were prepared from the stems of *Alternanthera sessilis*. Their characterization studies were performed and the application of nanocarbon spheres for the adsorption of direct blue 71 from the aqueous solution was studied. Effect of pH of effluent, effect of initial direct blue 71 concentration and the effect of solution temperature were analyzed. Pseudo-first order model, pseudo- second order model, Elovich model, Intra-particle diffusion model, Langmuir model, Freundlich model and thermodynamic parameters were used to evaluate the percentage and the amount of direct blue 71 dye removed. The kinetics follows multi-order and Langmuir type of isotherm. The ΔG, ΔH and ΔS parameters which relate to sorption energy were also evaluated. The outcome of the study indicates that nanocarbon sphere is a potential material for the sorption of direct blue 71 with good efficiency.

Keyword: Nanocarbon Spheres, dye, diffusion model, Elovich model

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MS42

Structural, Optical and Photocatalytic Properties of Ca Doped ZnO Nanoparticles

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Abstract

In the present work, Ca doped ZnO ($Zn_{0.85}Ca_{0.15}O$) nanoparticles were synthesised using chemical precipitation method. The prepared nanoparticles were characterized by X-Ray Diffraction (XRD), Diffuse Reflection Spectroscopy (DRS UV), Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray Spectroscopy (EDAX) analysis. Photocatalytic activity is also investigated under UV irradiation. XRD spectrum reveals that prepared nanoparticles shows well formed wurtzite structure and its crystallite size and lattice parameters are determined. From the absorbance spectrum, a significant change in energy bandgap has been observed after the incorporation of Ca in ZnO nanoparticles. The morphological properties were characterized by SEM and the elemental composition in prepared samples were identified by EDAX analysis. In photocatalytic activity, the degradation of dye was better in Ca doped ZnO nanoparticles compared with Pure ZnO.

Keyword: Ca doped ZnO, DRS UV analysis, Photocatalytic activity

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MS43

InsituPolymerization of Polymer – Nano Composite: Synthesis and Characterization

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Abstract

Nanotechnology is gaining tremendous impetus in the present century due to its capability of modulating metals into their nanosize. Research in nanotechnology highlights the possibility of green chemistry pathway to produce technologically important nanomaterials. The present study deals withgreen synthesis of copper nanoparticles by using leaf extract of *AzadirachtaIndica*.It acts as reducing as well as capping agent for the nanoparticles. PANI –Cu (polyaniline copper) composite was then prepared by in-situ microwave assisted method of polymerization using Cu nanoparticles as addition agent .The obtained polymer were then characterized by UV - Visible ,FI - IR , XRD and SEM. The effect of copper on the structure and property of polyaniline was studied showing an excellent in its property compared to the polymer.

Keyword: Cu nanoparticles, polyaniline copper composite, microwave assisted synthesis

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MS44

Eco-friendly synthesis of metal nanoparticles using plant leaves extract of *AcalyphaIndica*

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Abstract

In the emerging field of nanotechnology, a goal is to make nanostructures or nano arrays with special properties with respect to those of bulk or single particle species. The development of reliable, sustainable, and ecofriendly protocols for manufacturing a wide range of metal and metal oxide nanoparticles became a necessary one. Biosynthesis of MO NPs using leaf extracts is rich in bioactive compounds, they are considered as an excellent source for nano particle biosynthesis. The plant source extracts are believed to act as both reducing and stabilizing agents in nano particle synthesis, considered as simple, green and cost-effective methods. In the present work, plant mediated synthesis of metal nanoparticles and characterization and find out the potential applications. ZnO nanoparticles were prepared by using plant leaves extract of*AcalyphaIndica*. The phytochemicals present in the plants reduces zinc chloride into ZnO nanoparticles. From the UV- visible spectrophotometric analysis, the band observed around 374nm was identified as "surface Plasmon resonance band" and this band is ascribed to excitation of valence electrons of ZnO arranged in the nanoparticles (nanocrystal/ nanosphere).The size of particles formed were around 90 nm to 110 nm as studied by the particle size analyzer. SEM images of the ZnO sample shows that agglomeration has been taken place. The particle shape is to some extend spherical and the zeta potential measured shows that the surface potential of NPs is about 25mV.

Keyword: ZnO nanoparticles, phytochemicals, SEM

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MS45

Na FeO_2 and Ti Doped Na FeO_2 Composite Cathode Material for Sodium Ion Batteries

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Abstract

Large Scale Industries were extremely demanding for fabrication and assembly of an assortment of electrochemical energy storage devices, including lithium-ion batteries and sodium-ion batteries with elongated in commission life and high energy swap over efficiency, have achieved hurried growth in past three decades, which formulate finest preference for large scale storage application. Currently, sodium ion batteries have been proposed as the most shows potential solution for the large-scale energy storage systems because of the enormous abundant and low cost of sodium resources. An innovative class of Na FeO_2 and Ti doped Na FeO_2 composite successfully fabricated and investigated to challenges for uses of cathode material as sodium ion batteries. Fabricated composite were used to X- Ray diffraction method confirms Crystalline Structure and its space groups. As fabricated composite were worn to getting morphological characterization and surface analysis confirms it's under comes the categories of nanometre. Supposed that, solid state method gives better results so probably go for it. Na FeO_2 and Ti doped Na FeO_2 shows better electrochemical performance, Includes admirable rate capacity retention. Na FeO_2 and Ti doped Na FeO_2 composite were delivers well-brought-up discharge capacity. These structural and behaviour of this composite material were methodically explained by variety of analytical and surface tools in conjunction with electrochemical techniques.

Keyword: Na FeO_2 composite, X- Ray diffraction method, electrochemical techniques

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MS46

Properties Modification of Typical Polyaniline Nanoparticles and Its Effects of Monomer

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Abstract

Polyaniline (PANI) nanoparticles were synthesized using sulfuric acid (H_2SO_4) as a dopant and ammonium peroxydisulphate (APS) as an oxidant through chemical oxidative polymerization method. In this work, PANI was prepared in five different molarities (PANI 0.5M, PANI 1M, PANI 1.5M, PANI 2M, PANI 2.5M). The synthesized powders were examined by using Fourier Transform Infrared Spectroscopy (FTIR), UV-Vis Spectroscopy, Particle Size Analyzer, X-Ray Diffraction (XRD) and Antibacterial activity. FTIR analysis used to determined the presence of functional groups. In this work, the synthesized PANI with different molarities are done using KBr pellets. This study confirms the formation of functional groups in the prepared PANI samples. In UV analysis the band gap energy of PANI with different molarities and corresponding electron transition are measured, dissolved in DMSO solution for the analysis. UV study shows the PANI molarity increases the band gap value for each molarity also increases. A particle size analyzer is used to find the particle size distribution for the prepared samples. Particle size analyzer shows the PANI molarity increases as the percentage of normalized particle amount (cum) value is also increased. The mean value of the PANI (0.5M), PANI (1M), PANI (1.5M), PANI (2M) and PANI (2.5M) is 3.745, 12.631, 20.472, 10.175, 10.722. XRD analysis is used to determined the crystalline nature of the prepared samples. XRD study confirms the obtained samples have crystalline size under 1 – 100 nm. The PANI samples with different molarities are tested for antibacterial activity against two gram positive bacteria (Bacillus cereus, Staphylococcus aureus) and two gram negative bacteria (Escherichia coli and Klebsiella pneumonia) by using Agar well diffusion method. The synthesized PANI shows greater effect for fungal culture and utilized for biomedical applications such as biosensors, drug delivery devices, tissue engineering, antimicrobial therapy, nerve regeneration.

Keyword: Polyaniline nanoparticles, XRD, UV, Antibacterial activity

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MS47

Morphological modification polyaniline / tungsten oxide nanocomposites and their antibacterial applications by Agar Diffusion Method

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Abstract

Polyaniline/Tungsten oxide (PANI/WO_3) hybrid nanocomposites are prepared by in situ polymerization method. SEM analysis showed that the PANI/WO_3 hybrid nanocomposites have a strong effect on the spongy pattern of bulbous microstructure. The elemental analysis result indicates the presence of Carbon, Sulphur, Tungsten and oxide in the formed hybrids. The synthesized PANI and PANI:WO_3 nanocomposites are tested for antibacterial activity *via.*, gram positive, sporulating, and facultative Bacillus subtilis strains using Agar - well diffusion method. Inoculums of bacterial strain are plated using sterile swabs onto petri dishes containing approximately 25 ml of luria bertani (LB) broth agar, where 7 mm wells were made and filled with 50 µl (microlie) of all the samples (50 µg concentration) and DMSO is used as control. Bacillus subtils and the results indicated that the synthesized nanocomposites have significant antibacterial activity with clear zone of inhibition (around 11-13 nm). Antibacterial efficacy reveals that the PANI / WO_3 nanocomposites against one gram-positive human the gastrointestinal tract of ruminants and humans.

Keyword: Polyaniline, Nanocomposite, Antibacterial activity, Tungsten oxide
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