INTERNATIONAL CONFERENCE ON EMERGING TRENDS IN NANOMATERIALS AND DEVICES (ICONMD-23)

2nd & 3rd March -2023

Organized by

Department of Physics

Vellalar College for Women (Autonomous)

College with Potential for Excellence

(Re-accredited with 'A+' Grade (IV Cycle) by NAAC & Affiliated to Bharathiar University, Coimbatore - 641 046)

Erode, Tamilnadu, India.

ICONMD

2nd & 3rd March - 2023

Abstracts

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International Conference on Emerging Trends in Nanomaterials & Devices

(ICONMD - 2023)

2nd & 3rd MARCH - 2023

Organized by

Department of Physics
Vellalar College for Women (Autonomous)
Erode-12, Tamilnadu

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President, Vellalar Educational Trust

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Thindal, Erode - 638 012, Tamilnadu.

✆ : 0424 - 2244101 Mob: 99767 51115

e-mail: principalvcw@gmail.com * website: vcw.ac.in

S.D. Chandrasekar, B.A.,
Secretary & Correspondent

27.02.2023

Message

It gives me an immense pleasure in writing this foreward for the Proceedings of the "International Conference on Emerging Trends in Nanomaterials and Devices (ICONMD-23)" being organized by the Department of Physics on 2nd and 3rd March 2023. I am pleased to note that researchers from various Institutes/Universities and from different parts of the international level are presenting their research papers on the current aspects of Nanomaterials and Devices. This event is targeted towards researchers, professionals, educators and students to share innovative ideas, issues, recent trends and future directions in the field of nanomaterials and devices. International conferences 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!!

Secretary & Correspondent

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Thindal, ERODE - 638 012, TAMIL NADU, INDIA.

✆ : 0424 - 2244101 Fax : 0424 - 2244102 Mob : 99767 51115, 94423 50901

e-mail: principalvcw@gmail.com website: www.vcw.ac.in

Dr. (Mrs.) **S.K. JAYANTHI,** M.Sc., PGDCA, M.Phil., Ph.D.,

Principal

27.02.2023

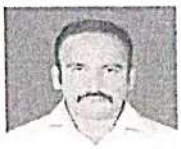
Message

I am extremely happy that Department of Physics has organized a "International Conference on Emerging Trends in Nanomaterials and Devices (ICONMD-23)" on 2nd and 3rd March 2023. This international Conference will focus on the recent advances in the field of nanomaterials and devices. 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 international conference 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 international conference. 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 International Conference.

27/2/23

Principal

Dr. N. DHACHANAMOORTHI M.Sc., M.Phil, Ph.D.,
Assistant Professor & Head
Department of Physics
Staff Incharge (Central Research Laboratory)
Vellalar College for Women
Erode – 638 012
dhachu83@gmail.com
9171823357



Message

I am glad to invite all the delegates to a "International Conference on Emerging Trends in Nanomaterials and Devices (ICONMD-23)" organized by the Department of Physics on 2nd and 3rd March 2023. The objective of this conference is to bring the students, researchers and scientists from across the international on a common platform to share and access the recent trends in the field of nanomaterials and devices and to discuss ways to promote promising societal applications. This conference 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.

75 papers have been selected after peer review by covering wide areas of research in nanomaterials and devices 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 whole heartedly for supporting this conference.

I look forward all the delegates for their active participation.

Head of the Department

Dr.N.DHACHANAMOORTHI M.Sc., M.Phil., Ph.D.,
Head & Assistant Professor
Staff Incharge (Central Research Laboratory),
P.G.Department of Physics,
Vellalar College for Women (Autonomous),
Thindal, Erode - 638 012.

Dr. N. Ponpandian

Professor and Head
Nanoscience and Technology
Bharathiar University
Coimbatore 641 046

February 17, 2023

FOREWARD

I am happy to know that the Department of Physics, Vellalar College for Women, Erode is organizing a two days International Conference on Emerging Trends in Nanomaterials and Devices (ICONMD-23) on March 2 & 3, 2023.

The increased advancement in nanosciences in recent times has led to fascinating innovations. It has potential applications for altering the structural, surface, and physicochemical properties of nano-ranged metamaterials. The adaptable functional properties of the nanoscopic regimes enhance the quality of integrated nanodevices in the area of energy, environment, and biomedical applications. Researchers all over the world are working towards new materials by tuning the size, shape, and surface to attain the best functional properties for the above applications. This conference also leads to providing more information on those topics through expert lectures and other presentations.

I congratulate the Department of Physics, Vellalar College for Women for organizing an international Conference to attain knowledge on the leading research area of Nanomaterials and their technological applications. I hope the interdisciplinary areas of research which are going to be discussed at this conference will be highly beneficial for all the participants. I wish the organizer to make the event successful and memorable.

(N. PONPANDIAN)

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DEPARTMENT OF PHYSICS

Dr. T. Pazhanivel

Assistant Professor

Date: 22.02.2023

I am happy that the Department of Physics, Vellalar college for Women is organizing the international conference on "Emerging Trends in Nanomaterials and Devices (ICONMD-23)"to be held during 2nd and 3rd March 2023.

Advent of nanomaterials moves the current world in an unpresented manner over the past decades. The constant evolution of advanced materials, challenges the existing methods of synthesis, fabrication and characterization techniques and lead to evolution of improved methods. Material scientists and researchers throughout the world are involved in developing efficient materials for the social demands. This conference gathers a large number of researches and eminent scientists from all over the world in related topics of Nanomaterials and Devices. The conference particularly encourage the interaction of research scholars and budding scientists with more established scientific community in such way that it would be golden opportunity to present and to discuss the systematic investigation of structural, morphological and electrical properties of nanomaterials and its application to enable the progressive path to the state of the artwork. I believe that this conference enlighten the participants to understand and interpret the application oriented details of their research materials in a meaningful way in the advance area of technologically versatile fields.

I congratulate the Department of Physics, the convener of this conference Dr. N. Dhachanamoorthi and organizing committee members of ICONMD-2023 for their dedicated work in making this event a great success. Several distinguished scientist are attending this conference and I am sure all the delegates will be benefitted by the deliberations in the conference. I wish the ICONMD-2023 a grand success.

Phone: 0427- 2345766, 2346268, 2346269 Fax: 0427- 2345124

E-Mail: pazhanit@gmail.com

பெரியார் பல்கலைக்கழகம்
PERIYAR UNIVERSITY
SALEM- 636011, TAMIL NADU, INDIA
NAAC 'A++' Grade - State University - NIRF Rank 63- ARIIA Rank 10

Dr. P. Maadeswaran

ASSISTANT PROFESSOR

Department of Energy Science and Technology

Email: maadeswaranp@periyaruniversity.ac.in

Message

Every day, a new challenge and opportunity emerge from new applications and innovations. To support emerging technology research, new computing platforms are required. **The International Conference on Emerging Trends in Nanomaterials and Devices (ICONMD-23)** aim to facilitate the state-of -the-art, research and innovations in nanoscience and technology. The goal of this international conference is to provide a common platform for academia, and nominees from various government and private universities and institutions to sit together and celebrate past accomplishments while also deliberating on future approaches and major bottlenecks. Furthermore, the participants would be familiarized with transcendental growth, recent trends, and innovations in nanomaterial research and its oriented environmental applications through various brainstorming sessions. I am delighted to assure you that it will be an inspiring and memorable conference for all delegates, research scholars, faculty members and students to gain unlimited benefits in technological applications. I whole heartedly congratulate all the Delegate, Organizing Secretaries, and team on their outstanding efforts in organizing this international conference.

P. Maadeswaran
(P. Maadeswaran)

جامعة خليفة
Khalifa University

20-10-2022

Conference message

A two-day Conference on **Emerging Trends in Nanomaterials and Devices (ICONMD-23)**, to be held on March 2 & 3, 2023, is being organized by the Department of Physics, Vellalar College for Women, Erode.

Human society is facing great challenges due to a number of worldwide energy and environmental issues, such as global warming, increased energy consumption, and serious pollution. Several efforts have been made by researchers to solve these problems, including finding clean energy (solar, wind, nuclear), developing energy storage devices (batteries, super capacitors), exploring new technologies for purifying pollution, and using environmentally friendly products rather than overusing natural resources. The development of new materials with intriguing physical and chemical properties will help address the energy and environments. This conference focuses on achieving energy and environmental benefits through nano- and micro-structured materials.

It is a great achievement for Vellalar College for Women's Department of Physics to organize an international conference about nanomaterials and their use in advanced devices. Participants will be able to learn from the conference's interdisciplinary research areas, which I believe will be very beneficial to them. It is my wish that the organizers make the event a memorable and successful one.

Best regards,
Dr. Bharath Govindan

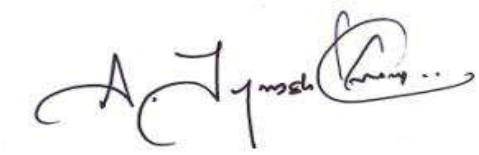
Dr. Bharath Govindan., Ph.D.
Research Scientist
P.O Box 127788, Abu Dhabi, UAE
T+971 (0) 2 312 4150 | bharath.govindan@ku.ac.ae & sribharath7@gmail.com
https://www.ku.ac.ae/college-people/dr-bharath-govindan

Message for Conference Proceedings

I am delighted and acknowledge the international conference on Emerging Trends in Nanomaterials and Devices (ICONMD-23), Organizing Department of Physics, Vellalar College for Women, Erode, Tamil Nadu, India.

This conference will be an opportunity for the exchange of innovative ideas, recent trends, and technical expertise for future directions in the field of nanomaterials and technology for the benefit of researchers, professionals, and students. I have no doubt that the research presentation and deliberation made at the conference will be immensely useful to all the participants and will inspire them to strive for higher excellence in their domain.

I appreciate the organizing committee giving me this opportunity to deliver an Invited lecture. I wish them for their endeavors to spread knowledge. Thanks



Dr. Jagadeesh Kumar Alagarasan

Assistant Professor

School of Chemical Engineering, Yeungnam University, South Korea-38544

Email: jaga.jagadeesh1987@gmail.com

Dr. Upendra Kumar
Department of Applied Sciences
Indian Institute of Information Technology
Allahabad
Prayagraj U.P. India

Message

Message for Conference Proceedings It is a matter of great pleasure for me to welcome you all to the "International Conference on Emerging Trends in Nanomaterials and Devices (ICONMD-23)" to be conducted by the Department of Physics on 02.03.2023 & 03.03.2023 at 9.30 a.m. at Kasturba Kalaiarangam. Education is always a sign of development and learning. It should be research-oriented, helping society create something new. Thinking in an innovative and new way is important to cope with technological changes. This conference provides a forum for scholarly discussion on advanced computing. It is also relevant for investigating and researching various aspects of education using appropriate information technology. The response of contributors and likeminded educational fraternity members showing their keen interest in this conference is highly motivating. The presentation of such research papers is extremely beneficial for research scholars and a stimulating factor for us to organise such conferences frequently in the future. I sincerely offer my earnest gratitude to those who have contributed through their research papers at the conference. I am sure that the conference would achieve its objective by providing a suitable platform for learning about and experiencing the latest advancements in the field of industry. The cohesive efforts of a dedicated and committed team become necessary for organising such conferences. We are fortunate enough to have such a hardworking team with us. I wish for the grand success of the conference

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Dr. Sathish Sugumaran
Associate Professor
Department of Physics

MESSAGE

It is my great pleasure to highlight that "International Conference on Emerging Trends in Nanomaterial and Devices (ICONMD-23)" is conducted in the Department of Physics, Vellalar College for Women, Erode on 2nd& 3rd March 2023. The motto of this conference to connect the academicians and researchers to knowledge transfer among theparticipants. This conference paves to propagate the insight conceptsrelated to advanced level research aspects on nanomaterials and thin films for devices. I believe that this conference will be a platform for the students and research scholars to enrich the resent trends in research.

I am very glad to be a part of this conference.

My best wishes to the Institution/Conference Organizing team to bring this conference a grand success.

Ward Regards

प्रो० देवराज सिंह
निदेशक
प्रो०राजेन्द्र सिंह (रज्जू भइया) भौतिकीय विज्ञान
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of Physical Sciences for Study and Research

वीर बहादुर सिंह पूर्वांचल विश्वविद्यालय,
जौनपुर- 222003 (उ. प्र.)
Veer Bahadur Singh Purvanchal University,
Jaunpur 222003 (U.P.)
E-Mail.:devraj2001@gmail.com
Mob.: +91-9810549461

Message

Welcome to the International Conference on Emerging Trends in Nanomaterials and Devices (ICONMD-23) which takes place in Vellalar College for Women, Erode on 2nd and 3rd- March-2023. It has been a real honor and privilege to serve as the resource person of the conference. The goal of this event is to bring together the technologies and researchers who share interest in Nanomaterials and Devices. Its purpose is to promote discussions of research and relevant activities in the design of new materials. Also, this conference aims at increasing the synergy between academic and industry professionals working in this area. Ultimately, the program (ICONMD-23) provides international forums for scientists and scholars from academia and industry to exchange and share their experiences, research results, and new ideas on hot and emerging topics on this field. The research areas chosen for the conference is of great value in the present contest. I am sure that it would be unique opportunity for the budding scientist to learn the novel ideas on potential areas of Physics and Technology. This initiatives step will encourage the students to choose their future perspective and so I extend my warm greetings to the organizers.

With my best wishes and personal regards

Dr Singh
25.02.23

Prof. (Dr.) Devraj Singh
Professor & Head, Department of Physics,
Director, Prof. Rajendra Singh (Rajju Bhaiya)
Institute of Physical Sciences for Study & Research,
Veer Bahadur Singh Purvanchal University,
Jaunpur-222003, U.P., India

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Dr. J. Vivekanandan
Assistant Professor (level II)
Department of Physics
Email: vivekanandanj@bitsathy.ac.in

Message

I would like to extend a warm greeting to all of you to this "International Conference on Emerging Trends in Nanomaterials and Devices (ICONMD-23)", methodically planned for March 2 & 3, 2023 in Vellalar College for Women, Erode. It's a great honour to be a part of this conference.

This conference offers you an outstanding scientific agenda spanning all areas of Nanoscience. ICONMD-23 is an excellent venue for bringing together leading university researchers, specialists, and representatives from all over the globe to collaborate and share the latest advances, developments, and cutting edge research in all areas of nanoscience and nanotechnology, as well as to find global partners for future research purpose.This two-day comprehensive agenda will allow you to broaden your understanding and view of Nanomaterials and Devices.

I appreciate the organizers of ICONMD-23 for their enormous effort and wish the conference members to reach a prodigious success.

With best wishes

J. Vivekanandan

Dr. J. Vivekanandan

2D Materials : Rising Star for Future Research

N. Ponpandian, Department of Nanoscience and Technology, Bharathiar Universiy, Coimbatore

ABSTRACT

One of the most pressing and important challenges in our modern society today is the energy crisis. Thanks to recent developments in the area of two-dimensional (2D) materials, including both graphene and other layered systems, there is promise for a wide range of energy applications.The family of 2D nanostructures includes a variety of layered ensembles. These include, among others, layered double hydroxides, g-C3N4, transition metal dichalcogenides (TMDCs), phosphorene, and MXenes. The physical and chemical properties, such as band gap, conductivity, optical property, thermoelectric property, photovoltaic property, and superconductivity, can be changed by manipulating 2D materials. To further enhance the electrochemical performances, new geometric imperfections within 2D nanosheets and the construction of three-dimensional hierarchical materials of 2D sheets have been extensively studied. With such alterations, the efficiency of 2D materials for energy conversion and storage may be considerably improved by a wider interlayer distance, which results in more accessible active sites for catalysis and an ion-accessible surface in the interlayer space. These developments in 2D high functionality materials has led to substantial advancements in energy conversion and storage technologies such as solar cells, thermoelectric devices, electrocatalysts, supercapacitors, and rechargeable batteries.

Photocatalyst - Based Platform for the Betterment of Humankind

T. Pazhanivel, Department of Physics, Periyar University Salem

ABSTRACT

Photocatalysis is a branch of physical chemistry which deals with chemical reactions taking place in the presence of light and a photocatalyst. In the recent past, photocatalysis, as a green and sustainable technology, has received a great attention because of its unique characteristics which in turn efficiently enhances the performance of various application processes. For the purpose of obtaining a highly efficient, low-cost and environmental friendly material, various photocatalytic materials have been designed and developed in recent years. Here, we present the recent crucial applications of photocatalysis, including photoelectrochemical water splitting for H2 evolution, photodegradation of pollutants, photoremoval of NOx, and photocatalytic self-cleaning. We hope this can facilitate a deep-level understanding of the subject and provide new opportunities to develop photocatalytic materials with other important applications in the future.

Keywords: hydroxyl radical, Photocatalysis, oxidation, nanocomposites.

Advanced Nano Materials For Energy And Environmental Applications

Dr. P. Maadeswaran, Advanced Nanomaterials and Energy Research Laboratory, Department of Energy Science and Technology, Periyar University, Salem

ABSTRACT

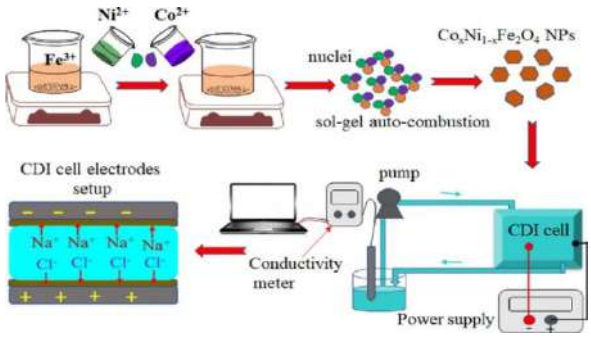
Nanotechnology and its microscopic universe offer gigantic possibilities for contemporary science and industry. The field of nanotechnology, which flourished between the 1960s and 1980s,has exploded in the last two decades, with a booming global market whose value will surpass125,000million dollars in the next five years, claims the Global Nanotechnology Market (by Component and Applications) report by Research & Markets, which offers forecasts for 2024. This field of technology modifies the molecular structure of materials to alter their inherent qualities and obtain new ones with ground-breaking uses. The insightful growth in nanostructure materials has flourished the field of energy-environment-nexus research, especially, solar cells, fuel cells (energy conversion), super capacitors (energy storage), and waste water treatment (environmental remediation) as an answer to worldwide energy issues. At the nanoscale level, numerous physical and chemical mechanisms have been developed that potentially enhance the transmission and processing of energy and environment systems. A new generation of high-performance materials can now be developed and incorporated in the field of energy and environment which includes solar cells, fuel cells, super capacitors, hydrogen energy generation, and wastewater treatment. A range of potential strategies have been explored in order to increase the possibilities in an environment where competition for green energy and clean environment options is expanding. The making of intelligent/smarter devices or systems with greater efficiency using nanostructured materials has demonstrated remarkable potential for addressing the world's expanding energy and environmental concerns. This technology has grown into a multi-billion-dollar industry with a variety of uses in the energy and environmental sectors. In this talk, the insights into nanostructured materials and the potential usage of developed materials in the energy conversion/storage, and environmental remediation will be addressed with the provoke of building green energy and clean environment.

Carbon and Faradaic electrode materials for high performance capacitive deionization

Dr. Bharath Govindan, Research Scientist, Department of Chemical Engineering, Khalifa University of Science and Technology

ABSTRACT

Capacitive deionization (CDI) is an emerging desalination method based on ion electrosorption. The method involves passing saline water between a pair of porous electrodes, which can either be static or flow electrodes and are usually carbon-based. By applying a differential voltage between 1 and 1.4 V to these two porous electrodes, salt ions migrate to the electrical double layers (EDLs) at the carbon/water interface, where desalination occurs.The CDI system offers several advantages over conventional pressure-driven systems (such as RO) or thermal technologies as it does not require high-pressure pumps or heat sources. This process separates salt ions from water, making it suitable for low-salinity feeds. Thus, this method is considered a suitable alternative to RO for brackish water desalination. The CDI process is also used in the treatment of wastewater. A CDI system has successfully removed heavy metal ions from industrial waste water, including lead, arsenic, chromium, etc.Though the concept of CDI was introduced in the 1960s, the extent of its technological implementation has been far from practical in the absence of energy- and cost-efficient electrode materials that offer sufficient ion-storage capacity, fast ion-transport channels and desirable sustainability. Carbon has been ubiquitously employed as the electrode material of choice given its wide availability, chemical stability and physicochemical tenability. Carbonaceous electrode materials for CDI have been generally produced from different types of carbon materials: activated, aerogels, porous and nanomaterials such as nanotubes and graphene nanocomposites.However, the pure porous carbon revealed lower adsorption capacity and limited desalination enactment due to lower interactions level between the charged ions and the electrode surface.Hence, the development of high-performance electrode materials is crucial for CDI. Recently, several efforts have been made toward enhancing the performance of carbon-based electrode materials for CDI via the insertion of metal oxide nanoparticles (NPs) or incorporation. In this talk, various strategies for designing carbon and Faradaic electrodes will be discussed. Furthermore, the CDI performance of materials will be discussed in relation to their structure/functionality. The opportunities and challenges associated with the development of high-performance CDI electrode materials will also be discussed.



Schematic diagram of CDI

Anionic dyes adsorption by $ZnCl_2$ activated *Jatropha* husk carbon: Experimental study combined with a theoretical investigation using DFT- molecular dynamics.

Jagadeesh Kumar Alagarasan[*] and Moonyong Lee[a*]

School of Chemical Engineering, Yeungnam University, Gyeongsan-si - 712-749, South Korea.

ABSTRACT

In this research, the adsorption of direct yellow 12 (DY12) on the *Jatropha* husk by using zinc chloride activated (ZAJHC) as an eco-friendly adsorbent in the batch system was studied. After preparation of ZAJHC, it was characterized using FTIR, XRD and SEM. This micro-size and mesoporous materials were then used to study the DY12 removal from aqueous solution by investigating the effect of pH, adsorbent dose and initial concentration of solution and contact time. Langmuir, Freundlich and Dubinin-Radushkevitch (D-R) isotherm models were checked by adsorption equilibrium data Freundlich model indicated the best consistency with the experimental results. The multi-layer maximum adsorption capacity of ZAJHC was found to be 232.56 mg g^{-1} by using Langmuir isotherm model. In addition, kinetic study was carried out using well-known models, and the results indicated that the DY 12 adsorption by ZAJHC followed the Pseudo-second order model. Also, the examination of adsorption mechanism, intra-particle diffusion and Temkin model was investigated. The theoretical investigation carried out on the Direct Yellow12 structures using the quantum molecular descriptors derived from density functional theory (DFT) calculations have proved that the DY12 dye has reasonable chemical stability and more reactivity. An endothermic and a Spontaneous nature for the adsorption of the DY12 studied were shown from thermodynamic parameters. The objective results support the ability of ZAJHC to be a promising precursor for production of highly porous activated carbon suitable for removal of anionic dyes.

Keywords: Adsorption kinetics, Isotherms, Direct Yellow 12, Porous Carbon, DFT Study and Molecular dynamic simulations

Corresponding authors: jaga.jagadeesh1987@gmail.com

Ruddlesden Popper oxide ceramics and its application

Dr. Upendra Kumar is an Assistant Professor in the Department of Applied Science at Indian Institute of Information Technology Allahabad, Prayagraj, Uttar Pradesh

ABSTRACT

Ruddlesden Popper oxide has been generally characterized by chemical formula $A_{n+1}B_nO_{3n+1}$, where the valency of A and B can be taken as such that the total valency become +8, which can make as neutral from the valency of O. Alkaline earth based RP oxide attracts the attention of researcher as a host materials for phosphor as well as mixed electronic and ionic conductor in energy generation and storage devices. However, the partial substitution of rare earth at the alkaline site improves the electrical, optical, and magnetic properties. The substitution can be done in two manners: (i) Homovalent, (ii) Heterovalent. Through heterovalent substitution the charge compensation process played crucial role in the overall properties of ceramics. Thus, it can be concluded that the Ruddlesden Popper oxide phase materials can be used as multifunctional applications for technological point of view.

Enhancing the solubility of curcumin using nanotechnology

ParimaladeviPalanisamy and Vasanthkumar Kannuchamy, Sean Costello, Gavin Walker

Department of Chemical Sciences, Bernal Institute, University of Limerick, Ireland.
Department of Chemical Engineering, Bernal Institute, University of Limerick, Ireland.
Director, Innopharma Technology, Dublin-D18 K599, Ireland

ABSTRACT

Most of the newly developed active pharmaceutical ingredients (API) have poor water solubility and limited bioavailability which prevents these drugs to reach the market. Solubility of these drugs will be enhanced by nanosizing the particles to < 1 μm as it increases the surface area to volume ratio. Nanosizing of the particles can be carried out by adopting top-down and bottom-up approaches.In our work, we prepared the stable nanoparticles of curcumin. Curcumin is an excellent nutraceutical compound. It has potential antimicrobial and anticancer activities. But the clinical application of this compound is restricted due to its poor aqueous solubility, chemical instability, low permeability, and poor bioavailability. To enhance the solubility and bioavailability of curcumin, the size of particles needs to be reduced to < 1 μm. Aim of our work is to prepare, stabilize and isolate the nanoparticles of curcumin from the supersaturated solution. In this work, we used a novel bottom-up approach to produce nanoparticles of curcumin. Curcumin nanoparticles were produced instantaneously by mixing the curcumin solution with different volumes of aqueous solution of stabilizer. The size and morphology of nanoparticles were analysed through DLS and TEM.

Role of Nanomaterials and Thin Films for Applications

Dr. SathishSugumaran, Department of Physics, MVJ College of Engineering, Bangalore

ABSTRACT

Thin film technology is very fascinating stream for vast applications because of the significant advantages like light weight, flexible, cheap, superior physical, chemical and mechanical properties. The thin film properties are depends on the materials and its preparation methods. Materials are exhibiting a magnificent electrical, magnetic and optical property which paves to vast research areas with day-to-day life applications. Materials are classified into many types such as organic, inorganic, composite***s*** and hybrid***s***. The classifications of material are depends on the size, structure, morphology, band gap, arrangement of atoms, maximum number of electron/hole concentrations and dopants. Each material in the group tables are differ one from another due to owing different properties. To date, materials are playing major roles in various device fabrications and applications such as electronic devices (capacitors and transistors etc.,), optics, opto-electronic devices (light emitting devices, lasers and solar cells) and sensors (gas sensor and biosensor). Besides, thin film devices are needed for military, navy, and medical applications etc. Hence, without the materials, none of the device and development can be made in the science and technology. Now the demand from the researcher is to prepare the thin film based deviceswith highly flexible, sensitive, reliable, faster responsive and better performance/price ratio.The main focus of this talk will provide an overview of various nanomaterials and thin films for vast applications.

Advanced Functional Materials: Perspectives and directions

K. Sakthipandi, Department of Physics, SRM TRP Engineering College, SRM Group of Institutions, Tiruchirappalli

ABSTRACT

Advanced functional materials show a vital character in our modern lives due to their importance in agriculture, energy, and environmental hygiene. Advanced functional materials are at the heart of many technological developments that touch our lives and find applications such as electronic materials for communication and information technology. Functional materials are commonly characterised as those materials which possess particular instinctive properties and functions of their own. For example, ferroelectricity, piezoelectricity, magnetism or energy storage functions. Functional materials are frequently employed in electromagnetic and optical applications from KHz to THz where plasmonic characteristics of metals are important. Functional materials are crucial in energy materials such electro- and magnetocaloric materials, energy storage, and solar energy harvesting.The materials with engineered properties fashioned through the development of specific processing and production technology are known as advanced functional materials, including ceramics, high value-added metals, semiconducting electronic materials, polymers composites, and biomaterials. Biomaterials mean the frequently escalating body of fundamental knowledge about the functioning of biological systems from the macro-level to the molecular and sub-atomic levels, and sub-technologies developed as a result of comprehensions expanded from research advances which add to that body of fundamental knowledge.This presentation is aimed to discuss some current perspectives and directions in the preparation, characterization, manipulation, and interrogation of advanced functional materials, in conjunction with the modeling of the unique structure–dynamics–function relations of nanostructures and their assemblies. Current applications in the dominion of electromagnetic shielding and polythiophene/zinc oxide nanocomposites for chemiresistor organic vapor-sensor are addressed, and other directions are highlighted. Physical and chemical sciences mark a dominant impact on this novel and exciting scientific-technological area.A key objective highlights functional properties of advanced functional materials into new materials and devices.A key objective of the presentationhighlights the functional properties of advanced materials in new materials and devices.

Synthesis, Structure and Conducting Properties of Copolymer Nanocomposites

J.Vivekanandan, A. Mahudeswaran, P.S.Vijayanand

Department of Physics, Bannari Amman Institute of Technology, Sathyamangalam, Erode
Department of Chemistry, Bannari Amman Institute of Technology, Sathyamangalam, Erode

ABSTRACT

A new series of silver nanoparticles embedded in copolymer nanocomposites. It was synthesized by chemical oxidative *in-situ* polymerization method. The characterization of the copolymer nanocomposites was carried out by using UV-visible spectroscopy, FTIR, X-ray diffraction (XRD) and Scanning Electron Microscopy (SEM). The synthesized conducting copolymer shows good solubility in common organic solvents such as DMF and DMSO. X-ray diffraction (XRD) pattern reveals the crystalline nature of the copolymer. The scanning electron microscopic study shows the nanotubular sea coral like granular particles that are agglomerated in nature. The increase in conductivity is also due to the interfacial interaction of Ag nanoparticles with copolymer matrix. The synthesized copolymer nanocomposites are used for the electroactive devices.

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MD1

Synthesis, Morphological and Electrochemical Studies of Co_3O_4 Nanorods for Supercapacitor Applications

A. Karthikeyan[ab], R. Mariappan[b*], R. Bakkiyaraj[c]

[a]Department of Physics, Government College of Engineering, Dharmapuri, Tamilnadu, India - 636704
[b]Department of Physics, Adhiyamaan College of Engineering , Hosur, Krishnagiri, Tamilnadu, India – 635109
[c]Department of Physics, Government College of Engineering, Bargur - 635104

Abstract

The need of renewable energy storage has prompted extensive focus on the energy storage devices, chiefly batteries and super capacitors. Electrodes with nano-architecture arrays are promising candidate to strengthen the storage and recyclability performance of the energy storage devices. In this present work, nano sized Co_3O_4 materials have been prepared by facile coprecipitate technique. The materials were characterized by XRD, FTIR, SEM, EDAX, XPS and HR – TEM. The TEM studies confirmed the existence of nano- rods of length ranges from 50 nm to 150 nm. The electrochemical studies were carried out using three electrode cell setup. The Co_3O_4 nanorodsl exhibited prominent specific capacitance of 373 F g^{-1} at the current density of 1.5 A g^{-1} along with superior cyclic stability of 92% after 1000 cycles. The presence of Co_3O_4 nano rods are attributed to high surface to volume ratio which provides more provisions for active sites and in turn enhances the redox reactions. Also the EIS studies reveal the diffusive charge transfer mechanism that promotes the accumulation of charges. The above results imply that Co_3O_4 nanoparticles would be a promising material for electrodes in supercapacitor applications.

Keywords: Co_3O_4 Nanorods; XRD, FTIR, SEM, EDAX, XPS

E Mail: marijpr@gmail.com

Corresponding Author Name: A. Karthikeyan

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MD2

Molecular Structure and Spectroscopic Study (FTIR, FT-Raman and UV-vis) of 1-Phenyl-1,3-butanedione by Quantum Computations

M. Lawrence[1], E. Isac paulraj[2]

[1]Department of Physics, School of Basic Sciences, VISTAS, Pallavaram, Chennai-600117.
[2]Department of Physics, Loyola Institute of Technology, Palanchur, Chennai-600123.

Abstract

The current world scenario modern spectroscopic techniques are sensitive tools for theinvestigation like infrared and Raman spectroscopic techniques are employed for identification and assignment of common functional groups of compounds. ImportantIn the present work, at first, density functional theory (DFT) calculations were utilized for the molecular design of the derivatives1- Phenyl-1,3-butanedione (1P1 3B) at B3LYP/6-31+G(d) level of theory. The density functional theory basis set B3LYP/6- 311 ++ G(d,p) is used to optimize 1- Phenyl-1,3-butanedione (1P1 3B). The geometrical parameters of the headline molecule as well as the Vibrational (FT-IR, FT-Raman) frequencies with potential energy distribution (PED) are determined and compared to the experimental data. The TD-DFT technique was used to compute the frontier Molecular Orbitals, as well as the HOMO-LUMO energy gap. Using the HOMO-LUMO energy values, further electronic properties and global parameters for 1P1 3B were discovered. Molecular Electrostatic Potential (MEP), Electron Localization Function (ELF), and Fukui calculations were used to estimate the reactive sites. As a result, all electrophilic and nucleophilic regions of the molecule were identified. NBO calculations were used to investigate the delocalization of electron density. The Ramachandran plot is used to study the stability of hydrolase and antibody proteins. The headline molecule is subjected to molecular docking research in order to better understand its biological activities, as well as the minimal binding energy and hydrogen bond interactions. Both the calculated structural parameters and Vibrational frequencies are in good agreement with the available experimental data.

Keywords: 1-Phenyl-1,3-butanedione, FTIR, Condensed Fukui function, UV-Visible

Corresponding Author Name: M. Lawrence

E Mail: lawrenceshlit@gmail.com

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MD3

Annual Effective Dose from Environmental Gamma Radiation

S. Monica

Assistant Professor, Department of Physics, St.Joseph's college for women, Alappuzha, India

Abstract

Indoor and outdoor gamma dose rates were evaluated along the coastal regions of Kollam district, Kerala through direct measurements using a GM based gamma dose survey meter, time integrated measurement using $CaSO_4$:Dy based thermo luminescent dosimeters (TLDs) and gamma spectrometry of soil samples. The mean value of total annual effective dose rate observed were 0.26 ± 0.01mSv/yr , respectively with an indoor to outdoor dose ratio of 0.54. The radioactivity content in the soil samples, the absorbed dose rate, annual effective dose equivalent, radium equivalent activity, internal and external hazard indices , the representative gamma index and alpha index (I_{gamma} and I_{alpha}), the annual gonad dose equivalent (AGDE) and the excess lifetime cancer risk (ELCR) were determined and compared with recommended values. Correlation study showed that the dose estimated from the TLDs is better correlated with that measured directly using the portable survey meter. The results of natural radioactivity levels in the soil samples has been compared with the levels reported in other Indian cities as well as other parts of the world.

Corresponding Author Name:

E Mail: monicakollam@gmail.com

Gamma dose, Thermo luminescence, effective dose

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MD4

Synergistic Modulation of Copper Nickel Tin Sulphide by rGO (CNTS-rGO) for High Performance Electrocatalytic water splitting

I. Sheebha[a], Velusamy Maheskumar[b], Anju Sebastian[a], B. Vidhya*[a]

[a] Department of Applied Physics, Karunya Institute of Technology and Sciences, Coimbatore, 641114, India
[b] Department of Environmental Engineering, Kyungpook National University, Daegu-41566, Republic of Korea

Abstract

Generation of hydrogen using electrocatalytic water splitting technique has gained a prominent engrossment in recent research. One of the most promising approaches to produce outstanding hydrogen evolution reaction (HER) catalytic activity is local reaction environment management by electrochemical activation. Due to the depletion of fossil resources in the environment, the demand for energy has recently increased tremendously. Here, a simple hydrothermal synthesis approach for rGO decorated copper nickel tin sulfide (CNTS-rGO) micro flowers is devised. The preparation of CNTS-rGO is varied by loading various concentration of GO (Graphene Oxide) (10-50mg). The prepared materials were characterized for its structural and optical properties using XRD, FESEM, XPS, HRTEM, Raman studies and UV-DRS respectively. Graphene oxide incorporated CNTS material demonstrates an initial overpotential due to the abundance of active sites. Due to their unique properties, they exhibit intriguing and promising potential as substitute catalysts. A high current density of -140.8 mA/cm, a low Tafel slope of 57 mV dec^{-1} and an outstanding long-term stability is observed for one of the concentrations of rGO in acidic medium.

Keyword: Hierarchical, electrocatalysis, Hydrogen evolution, water splitting and chalcogenides

Corresponding Author Name: B. Vidhya

E Mail: vidhya@karunya.edu

ISBN NO: 9 789395 423458

MD5

Evaluation and Structural Analysis of Hydroxyapatite Doped Zirconium Oxide using Nanocomposite for Biomedical Applications

A. Saranya, [1] A. Nishara Begum[1], S. Aravindan[2]

[1]Department of Physics, Chikkaiah Naicker College, Erode -4, TamilNadu, India
[2] Department of Physics, Chikkanna Government Arts College, Tiruppur-602, India

Abstract

Biomaterials are based on hydroxyapatite an including major inorganic compound form of calcium phosphate is the mineral component of bones and teeth. The assemble of bone defects substructure the human body and second organs and bone tissues. Therefore evolving new biomaterials imitate bone structure proliferate too many degenerative diseases. The body embed should be biocompatible, non-toxic and biodegradable properties should be inert to the body without causing studied by bioactivity applications. Many studies have been carried out in order to preparing hydroxyapatite by various methods. We focused on the preparation of hydroxyapatite nanoparticles by using sol-gel technique. This research aim to prepare and characterize Zr doped nanopowders to determine by (XRD) X-ray diffraction, FTIR results were utilized obtained nanopowders. Now range of FE-SEM results observable the agglomeration of nano range size of hydroxyapatite. An identified to be exploring its MG-63 cell line proliferation with MTT assays analysis. The results demonstrate the stability and structure and properties o nanocomposite samples after immersion tests in buffer saline solution. Antibacterial tests earning of Zr doped exposing the inhibition zone of the viability Bacillus Cereus. More effective Antifungal with different concentration becomes observed fungal tests. The biological properties used for hydroxyapatite doped Zirconium nanocomposite of MCF-7 cell line which evaluating cell live and dead viability applications

Keyword: Hydroxyapatite, MG-63 Cell line, MTT assay, MCF-7 cell line, Bacillus cereus, Cryptococcus neoformans**.**

Corresponding Author Name: A. Nishara Begum

E Mail: anishara@yahoo.com

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MD6

Sphagneticola Trilobata leaf extract Mediated Synthesis and Characterization of Iron oxide Nanoparticles

V.S.Subasini[1], C.Deepa[1]*.

Department of Physics, Vellalar College for Women, Erode-12, Tamil Nadu, India.

Abstract

Green synthesis of metal oxide nanoparticles tends to provide a crucial role in today's world. In the present work, the iron oxide nanoparticles (IONPS) were synthesized by Co-precipitation method using *Sphagneticola trilobata* leaf extract with the precursor of ferric chloride hexahydrate ($FeCl_3.6H_2O$) in different concentrations (0.2,0.4,0.6M). The aqueous extract played the significant role for the preparation of ferric oxide (Fe_2O_3) nanoparticles which act as a reducing agent. The prepared IONPS samples were characterized by X-Ray diffraction (XRD) analysis, Fourier Transform Infrared (FTIR) spectroscopy, Scanning Electron Microscopy (SEM) and Ultraviolet Visible (UV-Vis) spectroscopy.

Keyword: Green synthesis**,** *Sphagneticola trilobata*, Ferric oxide (Fe_2O_3) nanoparticles, Co-precipitation.

Corresponding Author Name: C.Deepa.

E Mail: chinnasamydeepa@gmail.com

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MD7

Gas Sensing Properties of Laser Ablated WO_3 Nanocrystalline and Iso-Epitaxial thin films

A. S. Swapna Smitha[1] and O.M.Hussain[2]

[1]Department of Physics, Government Degree College, Puttur, Tirupati Dist. A.P.

[2] Department of Physics, S.V.University, Tirupati, Tirupati Dist. A.P.

Abstract

From environmental concern, there has been an increasing demand for sensory detection of nitrogen oxides which are typical air pollutants released from combustion facilities and automobiles. Especially, NO_2 is highly toxic to human nerves and respiratory organs, so that, high sensitivity detection of it is desired for air quality monitoring. Also, there is a potential need for an ammonia sensor so as to monitor its concentration in chemical, food processing and power plants where this gas is used or generated. Naturally available ammonia plays a major role in controlling acidic effects, caused by emission of SO_2 and NO_2 in an open space. Tungsten oxide (WO_3) thin films with many interesting physical and chemical properties have been widely considered as good candidates for their use as gas sensors for detecting pollutant gases like CO (carbon monoxide), CO_2 (carbon dioxide), (CH_x) hydrocarbons, NH_3 (ammonia) and (NO_x) Nitrogen oxides . However, the sensitivity, stability and repeatability towards a particular gas are mainly depending on the microstructure, surface morphology and electrical properties of the films which inturn depend on the deposition technique and deposition process parameters. Hence in the present investigation, the gas sensing properties of WO_3 thin films towards NO_2 and NH_3 gases was carried out. The WO_3 thin films were deposited on Polished single crystal (100) strontium titanate ($SrTiO_3$) substrate using pulsed laser deposition technique in temperature range 473 – 873 K and the oxygen partial pressure was maintained in range 50 – 200 mTorr. The WO_3 thin films were systematically characterized by studying composition, structure, morphology and electrical properties for their effective utilization as sensor material for the detection of NO_2 and NH_3 pollutant gases. The gas sensing characteristics were measured in a conventional homebuilt apparatus. The nanocrystalline and iso-epitaxial WO_3 thin films were prepared at a substrate temperature of 673 K in an oxygen partial pressure of 100 mTorr and at a substrate temperature of 873 K in an oxygen partial pressure of 150 mTorr respectively. Both the films were used for NO_2 and NH_3 gas sensing applications. The nanocrystalline WO_3 thin film showed a maximum sensitivity of 16 towards 10 ppm of NO_2 gas at an operating temperature of 623 K and a maximum sensitivity of 2.1 towards 100 ppm NH_3 gas at an operating temperature of 503 K respectively. The iso-epitaxial WO_3 films showed a maximum sensitivity of 15 towards 10 ppm NO_2 gas at an operating temperature of 673 K and a maximum sensitivity of 2.0 towards 100 ppm NH_3 gas at an operating temperature of 523 K respectively. Both the films responded to NO_2 and NH_3 gases reversibly.

Keyword: gas sensing applications, NO_2, NH_3

Corresponding Author Name: A.S.Swapna Smitha

E Mail: sujala.smitha@gmail.com

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MD8

A Study of Thermoelectric Properties of Bilayered Thin Film Deposited by Thermal Evaporation Method

Tamilarasi R, Rajesh S

Department of Applied Physics, Karunya Institute of Technology and Sciences, Coimbatore

Abstract

The world faces many challenges regarding electricity and power consumption. Many nano to micro devices mostly rely on batteries which must be replaced after certain period. One of the alternative sources to batteries is Thermoelectric Generators which converts heat energy to the electrical energy. The thin film thermoelectric generators are paying much attention now a days. Tin selenide and lead Telluride are good temperature dependent materials and the thermoelectric properties of these materials are also investigated. In this work, thin film of bilayered Tin selenide and Lead Telluride of 800nm each was deposited on a glass substrate by physical vapour deposition method. The deposited film was annealed at 523K for 30 minutes. The Structure and Morphology of the bilayered thin films were studied by XRD, SEM and FESEM. Then the Seebeck Coefficient and Electrical conductivity of the SnSe/PbTe thin film were measured simultaneously by Seebeck coefficient measurement system as a function of temperature in a range of room temperature to 773K. The maximum Seebeck coefficient of -2271µV/K is obtained at 673K. The maximum electrical conductivity of 19.77at 773K and maximum power factor of 2.7W/K^{2}m at room temperature was measured. The maximum electronic thermal conducutivity of 0.223x10^{-3}W/mK is obtained.

Keyword: Coefficient, Thermal Conductivity, FESEM

Corresponding Author Name: Rajesh S

E Mail: drsrajesh@karunya.edu

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MD9

Structural and Electrical Properties of Cu/Al-$LaPO_4$/n-Si-Based MIS Schottky Barrier Diode for Optoelectronic Applications

R. Mariappan[a*], R. Priya[a], R. N. Jayaprakash[a]

[a)] Department of Physics, Adhiyamaan College of Engineering, Hosur-635 109

Abstract

The aluminium doped lanthanum phosphate ($LaPO_4$:Al) nanoparticles were synthesized by the simple Co-precipitation technique. The XRD patterns confirm the monoclinic structure with average crystallite size (D) is found to be increased from 13.37 to 17.31 nm with increasing Al concentration. The band gap values are decreased when the dopant concentration is increased and is has found to be varies from 5.46 to 3.93 eV. The effects of I-V electrical performance was methodically investigated in 10% Al-doped $LaPO_4$-basedmetal-insulator-semiconductor (MIS) type Schottky barrier diodes. The experimental results reveal that the observed changes in the barrier height of0.772 eV and the lowest ideality factor of 2.95 were both attained under light irradiation. When compared to the values of the undoped Cu/$LaPO_4$/n-Si and Cu/Al-$LaPO_4$/n-Si Schottky barrier diode, the Al-$LaPO_4$/n-Si Schottky barrier diode has significantly better barrier height (Φ_B) and ideality factor values (n). The 10% Al-included $LaPO_4$ showed better performance when compared to pure $LaPO_4$ at room temperature.

Keyword: Co-precipitation method; Al impurities in $LaPO_4$ as an interfacial layer, MIS Schottky barrier diode; IV characteristics; TE theory;

Corresponding Author Name : Dr. R. Mariappan

E Mail: marijpr@gmail.com

ISBN NO: 9 789395 423458

MD10

A Facile Method of Preparing $LiZnPO_4$ Nanoparticles for Aqueous Lithium-Ion Hybrid Supercapacitors

E. Krishnamoorthy[a], R. Mariappan[a*], R. N. Jayaprakash[a], R. Priya[a]

[a)] Department of Physics, Adhiyamaan College of Engineering, Hosur-635 109

Abstract

The harvesting of renewable energy storage has prompted extensive study on the energy storage devices, chiefly batteries and supercapacitors. A facile method of preparing $LiZnPO_4$ nanoparticles were prepared using a solvothermal route. The materials were characterized by XRD, FTIR, SEM, EDAX, HR - TEM and XPS.The TEM studies confirmed the exsistance of nano rods of length ranges from 20 nm to 500 nm.The influence of the cathodic electrode $LiZnPO_4$ was evaluated by constant-current discharge tests. The $LiZnPO_4$ electrode material exhibited prominent specific capacitance of 373.84 F g^{-1} at the current density of 1 A g^{-1}.The $LiZnPO_4$device maintains 91.2% of the initial capacity after 1000 cycles (at 1 A g^{-1}), which displays high rate performance and long cycle life.The $LiZnPO_4$ are attributed to high surface to volume ratio which results in more provisions for active sites and in turn enhance the redox reactions. Also the EIS studies reveal the diffusive charge transfer mechanism that enhances the accumulation of charges. The $LiZnPO_4$device could be a promising candidate material for the lithium-ion hybrid super capacitors.

Keyword: $LiZnPO_4$nanoparticles; X-Ray diffraction;Supercapacitor; Impedance spectroscopy;

Corresponding Author Name: E. Krishnamoorthy

E Mail: krishnamoorthytpt@gmail.com

ISBN NO: 9 789395 423458

MD11

Deposition and Characterization of Cadmium Selenide Thin Films by Chemical Bath Deposition Technique

R. N. Jayaprakash[a], R. Mariappan[a*],S. Maheswari[a], E. Krishnamoorthy[a]

[a)] Department of Physics, Adhiyamaan College of Engineering, Hosur-635 109

Abstract

Binary compounds of group II and group VI elements are commonly referred as II-VI compounds. These elements are technologically important. One of the compounds that have wide applications is CdSe. CdSe films are widely prepared by the techniques of vacuum thermal evaporation, sputtering, chemical vapor deposition, electro-deposition and spray pyrolysis. Cadmium Selenide thin films were deposited on glass substrates by the method of chemical deposition technique at 80* C from aqueous solution of Cadmium Acetate and Sodium Selenosulphite solution. Hydrozine Hydrate was used as complexing agent. The deposited CdSe thin films were annealed in an oven at temperatures of 200, 250,300,350^{o} C in air for 30 min. Optical properties of absorption co-efficient, extinction co-efficient, refractive index, dielectric constant and band gap energy were determined from transmittance and absorbance data obtained from UV-Vis spectra, particle size, micro-strain and crystal dimensions were determined from XRD data and resistivity by four probe technique. Optical studies revealed that the bandgap energy varies from 1.5 eV to 2.0 eV. XRD shows films are cubic and resistivity is of the order of 2.0 x10^{3} ohm cm.

Keyword: Chemical bath deposition; CdSe thin films; Optical; Electrical properties;

Corresponding Author Name: R. N. Jayaprakash

E Mail: prakashnandhi45@gmail.com

ISBN NO: 9 789395 423458

MD12

Preparation and Characterization of Mn doped ZnO DMS Thin Films through Chemical Route

S. Maheswari[a], R. Mariappan[a], R. N.Jayaprakash[a]

[a]Department of Physics, Adhiyamaan College of Engineering , Hosur, India

Abstract

A novel Sol- Gel technique has been used to synthesize undoped and Mn doped ZnO DMS thin films. All samples were characterized by XRD, FT-IR, PL, SEM with EDAX and VSM, respectively. The XRD pattern represents wurtizite hexagonal structure and also indicated that the grain size of Mn doped ZnO DMS thin films are smaller than those of undoped ZnO films. At lower concentration, a secondary phase of Mn_2O_3exist along with $Zn_{1-x}Mn_xO$ peak. UV/ VIS Spectrometer have been used for the analysis of optical properties. From the optical data optical band gap has been calculated and also it shows that the films are more transparent. The SEM images clearly reveal that the uniform and well grain boundaries. The expected element compositions are initially identified by EDAX. The magnetic behaviour of diluted magnetic semiconducting films has been studied using vibrating sample magnetometer (VSM) at room temperature.

Keywords: Mn Doped ZnO DMS Thin Films, X-Ray Diffraction, Sol-Gel, Magnetic Properties

Corresponding Author Name: S. Maheswari

E Mail: maheswarisec@gmail.com

ISBN NO: 9 789395 423458

MD13

Low-Cost Nebulizer Spray Deposited Conduction Mechanism of Thin Film ZnO Nanoparticles

B. Amudhavallia

Department of Physics, Periyar University PG Extension Centre, Dharmapuri

Abstract

The Zinc Oxide (ZnO) thin films have been deposited on glass substrate at different temperature from 300 to 500 oC by nebulizer spray pyrolysis technique. The prepared films were characterized by X-Ray diffraction (XRD), High resolution scanning electron microscope (HRSEM), Energy dispersive analysis by X-rays (EDAX), Photoluminescence (PL), UV-Vis-NIR spectrometer and impedance spectroscopy, respectively. The XRD confirms that the films are polycrystalline in nature with hexagonal wurtzite crystal structure with (002) plane as preferential orientation. The various parameters such as crystallite size, micro strain, and dislocation density were calculated from X-ray diffraction. HR-SEM images show smooth, tiny grains and dense morphology. The PL studies exhibits two emission peaks one at 389 nm corresponding to band gap excitonic emission and another located at 490 nm due to the presence of singly ionized oxygen vacancies. The UV-Vis-NIR spectrometer confirms the possibility of good transparent ZnO films with an average transmission of about ~85-95% in the visible region and optical band gap shifted from 3.37 eV to 3.2 eV with increase in temperature and which is supported by PL study. The semiconductor bahaviour and activation energy of these films have been confirmed by impedance spectroscopy measurements

Keyword: X-ray diffraction, Surface morphology, Optical Electrical **p**roperties, Activation energy

Corresponding Author Name: B. Amudhavallia

E Mail: amudhavalli9@gmail.com

ISBN NO: 9 789395 423458

MD14

Sn-substituted β-$Cu_2V_2O_7$ for dye degradation under visible light irradiation

[1,2] *Gowrisankar, G., [2]Mariappan, R., [2]Priya, R. and [2,3]Karthikeyan, A.

[1]Department of Physics, Sri Ramakrishna College of Arts and Science, Coimbatore 641 006, India
[2]Department Physics, R&D Center, Adhiyamaan College of Engineering, Hosur-09, India
[3]Department Physics, Government College of Engineering, Dharmapuri 636 704, India

Abstract

In recent decades, nanostructured metal vanadates have piqued the interest of researchers due to their outstanding performance in catalysis, electronic devices, energy storage, and conversion. In this paper, we developed a simple and template-free method for synthesising β-$Cu_2V_2O_7$ and Sn substituted $Cu_2V_2O_7$ nanocomposite and analysed their properties using Powder XRD, FT-IR, SEM, UV-Vis DRS techniques, and PL studies. Copper and vanadium are abundant on Earth, relatively inexpensive, and have a variety of oxidation states that can facilitate a wide range of band energy gaps favourable to photo degradation performance. The photocatalytic degradation of methylene blue (MB) as a model cationic dye under visible light irradiation was used to evaluate the catalytic efficiency of the synthesized nano composite. In the current photo-reduction reaction, the $Cu_2V_2O_7$ and Sn substituted $Cu_2V_2O_7$ nanocomposites demonstrated excellent catalytic performance at room temperature

Keyword: FT-IR, SEM, UV-Vis DRS techniques

Corresponding Author Name: Gowrisankar.G

E Mail: gsankar21@gmail.com

ISBN NO: 9 789395 423458

MD15

Synthesis and Characterization of Strontium Oxide - Titanium Oxide Nanocomposites for Photocatalytic Degradation of Malachite Green Dye

Govindharaj Anandhakumari[1], Palanisamy Jayabal[1*]

[1]Department of Physics, Gobi Arts & Science College, Gobichettipalayam, Erode

Abstract

The structural and optical properties of prepared and calcinated SrO, TiO_2 nanoparticle (NPs), SrO-TiO_2 nanocomposites (ST NCs) were studied using various characterization techniques. The ST NCs were prepared with different mole concentration of Titanium tetra isoproxide (0.2, 0.4, 0.6, 0.8 and 1M) using co-precipation method. The XRD pattern reveals that the nanocomposites are crystalline in nature with cubic structure. The surface morphology revealed that the formations of flake like SrO NPs and agglomerated spherical shaped TiO_2 NPs present in NCs. The EDX spectrum confirms the presence of Strontium, Titanium and Oxygen elements indicates the composite nature of the samples. The band gap values 2.09, 3.30 , 3.19, 3.21, 3.24 , 3.26 and 3.27 eV for SrO, TiO_2, ST- 0.2, 0.4, 0.6, 0.8 and 1M, respectively indicates the increase of bandgap with increase of concentration of wide band gap TiO_2. The Photocatalytic degradation under visible light was studied, the results shows that the ST- 0.4 M exhibits higher Photocatalytic activity than that of SrO, TiO_2 NPs and other NCs.

Keyword: Co-precipitation method ; SrO-TiO_2 Nanocomposites ; Structural properties ; Optical properties ; FT-IR ; Photocatalytic degradation.

Corresponding Author Name: Govindharaj Anandhakumari

E Mail: anandhipriya95@gmail.com

ISBN NO: 9 789395 423458

MD16

Magnetically Recyclable $SnFe_2O_4$/rGO Nanocomposite for the Photocatalytic Degradation of Rhodamine B under Sun Light Irradiation

C. Aruljothi

Research Scholar, Department of Physics, P.K.R Arts College for Women, Gobichettipalayam.

Abstract

Magnetically recyclable $SnFe_2O_4$/rGO nanocomposite with different graphene oxide content was prepared by hydrothermal method and photodegradation performance of nanocomposite was studied under sunlight irradiation. The photocatalytic activity determines that the combination of $SnFe_2O_4$ and rGO reveals an excellent catalytic activity for the degradation of Rhodamine B under sun irradiation. $SnFe_2O_4$ nanoparticles themselves have excellent superparamagnetic properties, which makes the $SnFe_2O_4$/rGO nanocomposite magnetically recyclable in a suspension system. The 10 wt% of GO loaded nanocomposite was showed the best photocatalytic activity and degradation efficiency was significantly improved (87.37% at 160 min). The improved performance was mainly due to the formation of the $SnFe_2O_4$/rGO nanocomposite, which promoted the effective separation of charge carriers and delays the recombination process. The enhanced photocatalytic activity of the $SnFe_2O_4$/rGO nanocomposite can be attracted to the potential candidate for many more industrially important catalytic applications.

Keyword: Reduced graphene oxide, nanocomposite, superparamagnetic, Rhodamine B, photocatalytic

Corresponding Author Name: C. Aruljothi

E Mail: aruljothick@gmail.com

ISBN NO: 9 789395 423458

MD17

TiO_2–rGO Nanocomposite Particles as Photoanode in a Dye-Sensitized Solar Cell with Natural Photo-Sensitizer

[1]Reshma Vasu, [2]Vasuki. T

[1] Research Scholar, Department of Physics P.K.R Arts College for Woman, Gobi-638476,India
[2]Associate Professor in Physics, P.K.R Arts College for Woman, Gobi-638476, Tamil Nādu, India

Abstract

Graphene and its derivatives have certain amazing properties, which have brought a new revolution in the photovoltaic technological world. In the earlier, third generation Grätzel solar cell was constructed using TiO_2, ZnO, SnO_2, Nb_2O_5, etc., but an encapsulation of Graphene and its derivatives with semi-conducting oxide material has improved its power conversion efficiency to the above 12%. FTO Photoanode is fabricated by using Tio_2- rGO nanocomposite particles using the doctor blade method. The prepared substrate is annealed at 450^o C. Natural dye sensitizer is prepared by using a mixture of two natural pigments obtained from the plants. The prepared substrate is allowed to absorb the natural dye and left for a few hours. The counter electrode is prepared by forming a thin layer of graphite. The working electrode is sandwiched with the redox electrolyte and the counter electrode. The structural properties were investigated using UV- VIS spectroscopy, X-ray diffraction (XRD), Transmission Electron Microscopy (TEM), and Scanning Electron Microscopy (SEM). Results reveal that the incorporation of reduced Graphene oxide (rGO) has improved the power conversion efficiency of the dye-sensitized solar cells.

Keyword: reduced graphene oxide (rGO), natural photo-sensitizer, redox electrolyte.

Corresponding Author Name: Reshma Vasu, Dr. Vasuki. T

E Mail: reshmapunardam@gmail.com, vasukitele@gmail.com

ISBN NO: 9 789395 423458

MD18

Facilitated Green Synthesis of Zinc Oxide and Silver Doped Zinc Oxide Nanoparticle using Annoma Muricata (Mulseetha) Fruit Extract

Sri Devi P*, Dhivyabharathi A R

Department of Physics, Vellalar College for Women (Autonomous), Thindal, Erode-12.

Abstract

In the recent years, green synthesis is gaining extreme importance in all the fields focusing on a greener environment. Extensive research work is carried out using the plant parts for nanomaterial synthesis to go for eco-friendly and cost-effective approach. In the present investigation, the synthesis of Zinc Oxide and Silver doped Zinc Oxide (ZnO & Ag: ZnO) nanoparticles using fruit extract of Annona muricata (Mulseetha) by green mediated synthesis. The synthesised samples are characterised and analysed using various techniques and the results are discussed. In XRD analysis reveals the formation of Hexagonal Cubic crystal structure and the highest peak at 31.3 nm has been observed for Ag doped ZnO. The prepared ZnO and Ag: ZnO nanoparticles were examined for their impact on the photocatalytic dehydration of synthetic dye namely Methylene Blue (MB). Antibacterial efficacy has been tested against the two-gram positive bacteria Staphylococcus Aureus & Entercocci and two-gram negative bacteria Escherichia coli & Klebsiella pneumoniae. The antibacterial result shows the strong antibacterial property of Ag: ZnO nanoparticles than pure ZnO nanoparticles. The optical properties have been analysed using UV visible analysis. The structural morphology and elemental composition of synthesised nanoparticle were analysed by SEM and EDAX.

Keyword: Annona Muricata, Methylene Blue, SEM, EDAX, Antibacterial activity.

Corresponding Author Name: Sri Devi P

E Mail: karthisridevi@gmail.com

ISBN NO: 9 789395 423458

MD19

Synthesis and Characterisation of Mgo Nanoparticles using Azadirachta Indica Leaf Extract with their Photocatalytic and Antibacterial Activity

Gowri Manohari N*, Devipriya. A

PG Department of Physics, Vellalar College for Women, Thindal, Erode

Abstract

Synthesis of MgO nanoparticles was prepared by Green Synthesis method by using *Azadirachta Indica* (neem) leaf extract and byWet Precipitation method. Green method is greatly used because of its non-toxic property. The characterization of MgO nanoparticles was analyzed using XRD, FTIR, UV-Vis, SEM with EDAX, Photo catalytic andAnti-bacterial. The size of the crystal for MgO nanoparticle was determined by X-Ray Diffraction (XRD) in the range of 18 to 22 nm. The different vibrating band of MgO nanoparticle was observed using Fourier Transform Infrared Spectroscopy (FTIR) analysis. The absorption peak was analyzed by UV-Visible spectroscopy and their band gap energy was calculated. The morphological structure of the MgO nanoparticle was identified using Scanning Electron Microscope (SEM) and their proportion was determined with Energy Dispersive X-Ray Analysis (EDAX). MgO exhibits good antibacterial and photo catalytic properties. The Photo Catalytic activity is observed by the dye degradation of methylene blue solution. The Antibacterial test was done against both gram positive (*Bacillus cereus, Staphylococcus aureus*) and negative bacteria (*Klebsiella, Pseudomonas*). Due to this property; it is used in drug and food industry.

Keyword: Green Synthesis, MgO nanoparticles, Neem leaves extract, Photo Catalytic and Anti-bacterial activity.

Corresponding Author Name: Gowri Manohari.N

E Mail: gowrimanohariphy@gmail.com

ISBN NO: 9 789395 423458

MD20

Synthesis and Characterization of MgO Nanoparticles using Citrus Aurantium dulis for Antibacterial Activity

***Gowri Manohari. N, Meena.S**

Department of Physics, Vellalar College for Women (Autonomous), Erode-12

Abstract

The green synthesized of MgO was prepared by using *Citrus Aurantium Dulis* and Wet precipitation method. The phase purity and crystalline size were categorised and confirmed by X-ray diffraction (XRD) studies. The average crystal sizefor MgO in the range of 16 to 20nm. The maximum absorbance was observed in the prominent peak by UV visible spectrum. The corresponding band gap energy was5.3eV by using tauc plot for MgO was calculated. Fourier Transform Infrared Spectroscopy (FTIR) used to categories the chemical component production of MgO and their stretching vibration band can be detected. The morphological feature of the synthesized were characterized by Scanning Electron Microscope (SEM) and elemental analysis of syntheses was examined with help of Energy Dispersive X-Ray Analysis (EDAX). The resulting MgO exhibits high efficiency ofPhoto Catalytic activity. The Antibacterial Activity of MgO shows good result against *E-coli, Klebriella, Staphylococcus and Enterococcus*. This approach is safe for the environment and non-toxic also.

Keyword: Green synthesis, MgO nanoparticle, *Citrus Aurantium Dulis* and Antibacterial activity**.**

Corresponding Author Name: Gowri Manohari.N

E Mail: gowrimanohariphy@gmail.com

ISBN NO: 9 789395 423458

MD21

Synthesis and Characterization of MgO Nanoparticles using Piper Betle leaf Extract for Antibacterial Activity

***Gowri Manohari .N, Srividhya.K**

Department of physics, Vellalar College for Women (Autonomous), Thindal, Erode-12.

Abstract

Green synthesis of metal oxide nanoparticles facilitates the production of non-toxic nanoparticles. In this paper, MgO nanoparticles were produced by utilizing extract of *piper betle* leaf as bio-reducing agent. The synthesized MgO nanoparticle subjected to different analytical techniques. The prepared sample was characterized by X-Ray Diffraction (XRD) to investigate the structure and crystalline size was in the range of 18 to 25nm of MgO nanoparticle. The band gap energy of MgO nanoparticle was calculated using UV-Visible spectroscopy. The morphological feature of the synthesized MgO nanoparticle was characterized by Scanning Electron Microscopy (SEM) and Energy-Dispersive X-Ray Spectroscopy (EDAX). Fourier Transform Infrared Spectroscopy (FTIR) investigated to confirm the stretching vibration band and the plant precursor acts as reducing and capping agents. The resulting MgO nanoparticle exhibits high efficient Photo Catalytic activity. The Antibacterial activity of MgO nanoparticle was confirmed.

Keyword: Green synthesis, MgO nanoparticle, Piper betle leaf extract and antibacterial activity.

Corresponding Author Name: Gowri Manohari .N

E Mail: gowrimanohariphy@gmail.com

ISBN NO: 9 789395 423458

MD22

Effective Approach and Property Modification of Polymer-Metal Oxide Hybrid Nanocomposite by Chemical Oxidative Polymerization Method

N.Dhachanamoorthi[1], N.Sweda[2], K.Oviya[3]
Department of Physics, Vellalar College For Women (Autonomous), Erode-12

Abstract

Polyaniline PANI is a conducting polymer and organic semiconductor of flexible family. The novel and cost effective point of view the preparation of polyaniline by using chemical oxidative polymerization method. In this study the roll of metals in manganese oxide (nMnO) nanoparticles has reached a crucial attention of research in recent years. Polyaniline-metal oxide (PANI-nMnO) nanocomposites were prepared by increasing the weight % of metal oxide (nMnO) with the presence of PANI materials. The molecular structure and morphology of pure PANI and PANI-nMnO nanocomposites is characterised by using (FTIR) and analyse to categorize the wave number region, stretching changes pure PANI and (PANI-nMnO) nanocomposites. The FTIR spectrum bands are corresponding to polyaniline salt and confirmed the presence of MnO nanoparticles in the prepared novel nanocomposites material. The optical properties are characterised by using UV-vis spectrum and band gap value of (PANI-nMnO) (25%), (50%), (75%) values are calculated. The band gap values of nanocomposites are reduced while the MnO nanoparticle wt% is raised. The band gap values of pure PANI are 3.285eV and PANI-nMnO nanocomposites (25%, 50% and 75%) is 3.258eV, 3.214eV and 3.205eV. The crystalline properties of pure PANI and nanocomposites were found from XRD pattern. The nature of PANI is amorphous. While raising the impurities of nMnO nanoparticles the amorphous nature of pure PANI nature decreases but the crystalline nature increases with more of nMnO. The FESEM is carried out for surface morphology studies. The surface morphology and elemental analysis of polymers were characterised by the following techniques such as (FESEM) and EDAX respectively. FESEM established the appearance of nMnO nanoparticles in polyaniline matrix and uniform core shell structure are obtained. From the result of antibacterial activity the bacterial growth of inhibition are studied in the nanocomposites of PANI-nMnO nanocomposites (25%, 50%, and 75%). PANI-nMnO nanocomposites are used in wide range of applications such as LED, energy storage devices, solar cells and electrical components and devices.

Keyword: Polyaniline, MnO nanocomposites, Antibacterial.

Corresponding Author: N.Dhachanamoorthi

E-mail:dhachu83@gmail.com

ISBN NO: 9 789395 423458

MD23

Growth and Characterization Non-Linear Optical Crystal of Potassium Hydrogen Phthalate doped with Tin Chloride

M. Jothi, U. Suvathi

PG Department of Physics, Vellalar College for Women, Thindal, Erode

Abstract

An innovative nonlinear optical single crystal of Potassium Hydrogen Phthalate (KHP) doped with Tin chloride ($SnCl_2$) was grown successfully by slow evaporation method using distilled water as a solvent having dimension 16mm*11mm*7mm and volume 116 cm^3. The lattice parameters of the grown crystal have been determined by powder X-ray diffraction studies. The doped material crystallizes in orthorhombic crystal system with space group $Pca2_1$ with cell parameters a=9.662 Å, b=13.301 Å, c=6.532 Å. Presence of various stretching vibration and functional group confirmed from Fourier Transform of Infrared spectrum. Optical absorbance spectrum exhibits good optical transparency in the UV-visible wavelength range of 200-1200 nm and its corresponding optical band gap energy calibrated from Tauc plots is 4.114 eV. The decomposition property of the grown single crystal was deliberated by differential thermal and thermo gravimetric analysis (DTA-TGA). Further, the mechanical strength has been explored by using Vickers micro hardness method. The morphology and composition of chemicals present were analyzed by FESEM and EDAX. The Kurtz and Perry powder second harmonic generation method confirms the Nonlinear Optical property of grown crystals and SHG efficiency was found to be 4.65 eV and 1.5 times greater than KDP crystal.

Keyword: Slow evaporation, Optical transparency, Tauc plot, Vickers Microhardness, Kurtz powder technique

Corresponding Author Name: Dr. M. Jothi

E Mail: jothi.m@vcw.ac.in

ISBN NO: 9 789395 423458

MD24

Polyaniline-Zirconium Oxide Hybrid Nanocomposites with Spherical Core Shell Structure were modified with ZrO_2

N. Dhachanamoorthi[1], A. Kavya[2], K.Oviya[3]
Department of Physics, Vellalar College for Women (Autonomous), Thindal, Erode

Abstract

In the present paper, the Polyaniline-ZrO_2 (PANI- ZrO_2) hybrid nanocomposite is synthesized by chemical oxidative polymerization method, which gives Polymer-metal matrix nanocomposites (PMNs). This method may be adopted as an easy and efficient route for preparation of PMNs. The organic substance polyaniline combined with the inorganic substance ZrO_2 which gives PMNs as application of sensor, energy device, photocatalyst, anti-corrosion, water purification, Solar cell, polymer light emitting diode (POLED). PMNs have been prepared by different weight % of ZrO_2 nanoparticles such as PANI-ZrO_2 (25%, 50% and 75%). The resultant PMNs were characterized by using different techniques XRD, FE-SEM & EDAX, UV-vis, FTIR and antimicrobial activity. The results of the XRD test gave the crystal size and structure orientations were calculated. The crystal size is Pure PANI (19.54 nm), PANI-ZrO_2-25% (13.95 nm), 50% (18.63 nm) and 75% (23.21 nm). The Hybrid nanocomposites of PANI and PANI-ZrO_2 having spherical morphology, highly uniformed in size were resulted by the test of FE-SEM. The result of FTIR peaks of PANI were found to be shifted to higher (or) lower wave number in PANI-ZrO_2 nanocomposites due to formation of bonding. The various electron transitions present in the PANI and PANI-ZrO_2 nanocomposites were determined by UV-vis characterization technique. The comparison of Pure PANI and PANI-ZrO_2 nanocomposites with antimicrobial activity were studied and the growths of inhibition are calculated. The crystalline size, surface morphology & **Energy Dispersive X-Ray Analysis,** optical properties, chemical properties and antimicrobial activities of Nanocompsites were investigated.

KEYWORDS: Polyaniline, PANI-ZrO_2 nanocomposites, Chemical Oxidation

Corresponding author: N. Dhachanamoorthi

Email id: dhachu83@gmail.com

ISBN NO: 9 789395 423458

MD25

Effective of the Optical and Structural Properties of Polyaniline with Nb_2O_5 Metal Oxides Synthesized by Chemical Oxidative Polymerization

N.Dhachanamoorthi[1], P.Swetha[2], K.Oviya[3]

Department of Physics, Vellalar College For Women (Autonomous), Thindal, Erode-12.

Abstract

In this point of view, the preparation of organic-inorganic hybrid nanocomposites materials has received more research applications in recent decades. Polyaniline is basically produced in the form of long-chain polymer nanoparticles. Typically, chemical and electrochemical methods are used in the synthesis of PANI nanoparticles. Polyaniline-Niobium oxide (PANI-nNb_2O_5)hybrid nanocomposites were synthesized by chemical oxidative polymerization method for expanding the weight% of nNb_2O_5 nanoparticles such as 25%, 50% and 75%. The chemical formation of pure PANI and PANI-nNb_2O_5 nanocomposites is revealed by Fourier Transform Infrared Spectroscopy (FTIR) and to analyze the chemical properties and observed wave number region, wavenumber shifting and stretching vibration changes the pure PANI and PANI-nNb_2O_5 nanocomposites. The optical properties are characterized by UV-Visible spectrophotometer and the band gap value of pure PANI and (PANI-nNb_2O_5) (25%), (50%), (75%) are calculated. In generally the UV-vis spectrum of pure PANI there are two bands obtained in the wavelength region ≈330nm and ≈643nm. The band gap and intensity of the peaks of nanocomposites are decreased while the Niobium oxide nanoparticles is incorporate in the polymer matrix with the weight % is increased. The crystalline nature of pure PANI and its nanocomposites were studied by using the X-Ray pattern. Polyaniline has an amorphous nature. The X-Ray diffraction pattern showed sharp peaks due to structure of nanocomposites of Niobium oxide in polyaniline. The results of FESEM images showed that the different morphology from agglomeration to nNb_2O_5nanoparticles in the polyaniline materials. In the elements of C, H and O and Nb the weight % the element composition were characterized using EDAX techniques. Pure PANI and (PANI-nNb_2O_5) (25%),(50%),(75%) nanocomposites were tested for antibacterial activity and were found to illustrate the antibacterial activity against gram absolute as well as gram opposing bacterial strains at micromolar absorption. Polymer-Metal matrix nanocomposites are used in several applications fields such as electrochromic devices, oxygen sensors, electronic conductivity, longer-term stability, LED and solar cell etc.,

Keyword: Nb_2O_5, Polyaniline, FESEM, FTIR, UV-VIS, EDAX, Antibacterial activity

Corresponding Author Name: N.Dhachanamoorthi
E Mail: dhachu83@gmail.com

ISBN NO: 9 789395 423458

MD26

Effect of Titanium Oxide doping with Surfactant on Microstructure, Optical and Photocatalytic properties of Bismuth basic nitrate Nanoparticles Synthesis via Co-precipitation

K.Sujatha, K.S.Manjulaa

Department of Physics, Vellalar College for Women (Autonomous),Thindal, Erode

Abstract

Titanium Oxide doped Bismuth Basic Nitrate (BBN) (Bi_2O_3-N_2O_5-H_2O) nanoparticles, surfactant assisted titanium oxide doped BBN nanoparticles were synthesized using Co-Precipitation method. The samples were characterized using powder X-Ray Diffraction, Scanning Electron Microscope, UV-Visible spectroscopy, photoluminescence and photocatalytic techniques. XRD results reveal that TiO doped BBN and surfactant assisted Titanium Oxide doped BBN are in monoclinic structure and results are in good agreement with standard JCPDS data. SEM studies illustrates that both samples are in thread, spherical shaped morphology with an average diameter of 12-18nm which is in good agreement with an average crystallite sizes calculated using Scherrer's formula. The blue emission was observed through UV visible spectrum with blue shift and the band gap was estimated as 2.6-3.3 eV for SDS assisted TiO doped BBN nanoparticles. The defects in crystal and oxygen deficiencies were analyzed by PL spectra analysis. The Photocatalytic activities of boththe samples were evaluated by the degradation of methylene blue dye in an aqueous solution under UV-visible light radiation.

Keyword: Co-Precipitation; TiO doped –BBN nanoparticles; SDS - TiO doped BBN nanoparticles

Corresponding Author Name: Dr.K.Sujatha

E Mail: drsujiols@gmail.com

ISBN NO: 9 789395 423458

MD27

Influence of Surfactant on the Synthesis of Bismuth Basic Nitrate Nanoparticles by Co-precipition

Dr.K.Sujatha, P.B.Sharvigaa

Department of Physics, Vellalar College for Women (Autonomous), Thindal, Erode-12

Abstract

Bismuth Basic Nitrate nanoparticles were synthesized using co-precipitation method with different surfactants (Sodium Dodecyl Sulphate and Cetyl trimethylammonium bromide).The samples were characterized using X-Ray diffraction, Scanning Electron Microscope, UV-Visible spectroscopy, photoluminescence and photocatalytic techniques. X –Ray diffraction results confirmed that monoclinic structure of BBN nanoparticles for different surfactants and the results are in good agreement with JCPDS data. The average crystalline size of both the samples were found to be around 12-17nm .Surface morphology of BBN nanoparticles were investigated using SEM and the needle shaped structure was obtained for BBN nanoparticles with CTAB. The band gap energy for BBN nanoparticles with CTAB was 4.0702 eV and the band gap energy for BBN nanoparticles with SDS was 1.269 eV. The synthesized BBN nanoparticles with different surfactants were tested for photocatalytic degradation of methylene blue dye under UV radiation. Both samples exhibits an efficient photoluminescence application.

Keywords: SDS-CTAB doped BBN Nanoparticles, Co-Precipitation

Corresponding Author Name: Dr.K.Sujatha

E Mail: drsujiols@gmail.com

ISBN NO: 9 789395 423458

MD28

Green Synthesis and Characterization of Zinc oxide Nano particles using Plectranthus Ambionicus Leaf Extract

R.Radhika, P. Srisathya

Department of Physics, Vellalar College for women (Autonomous), Thindal, Erode

Abstract

Nanoscience and nanotechnology have been established recently a new interdisciplinary science and now a days it is one of the most attractive research area in modern material science. The aim of this work was to investigate the photo catalytic property of Zinc oxide nano particles by using plectranthus ambionicus leaf extract at various concentration. The average crystalline size of the prepared ZnO nanoparticles was calculated in XRD analysis. The UV- visible absorption spectrum indicates the band gap of green synthesis ZnO nanoparticles. The synthesized zinc oxide nanoparticles were subjected to Fourier Transform Infrared spectroscopy (FTIR) analysis to detect the various functional groups associated with the prepared nano particles. The scanning electron microscopy (SEM) analysis to measure the morphological structure of synthesized ZnO Nano particles. Moreover the green synthesized Zno nanoparticles showed a superior photo catalytic performance than chemically synthesized Zno particles.

Keyword: ZnO, plectranthus amboinicus, XRD, UV, SEM, Photocatalyctic effect

Corresponding Author Name: Dr.R.Radhika

E Mail: radhikamsc88@gmail.com

ISBN NO: 9 789395 423458

MD29

Green Synthesis of Calcium Oxide Nanoparticles using Leaves Aqueous Extract of *Cymbopogon Citratus* and Evaluation of their Antibacterial Activities

Aarthe.K.G*, Rashika.R
Department of Physics,Vellalar College for Women(Autonomous), Thindal, Erode

Abstract

Calcium oxide (CaO) has individual catalystic and optical properties which can be synthesized successfully by green synthesis. The present study is to synthesize CaO nanoparticles from the leaf extracts of cymbopogon citratus, commonly known as lemon grass. This method makes use of contamination free chemicals and promotes the use of non-toxic substances, such as water and plant extract. The observation on Morphology of the particles of lemon grass powder was studied through Scanning electron microscope (SEM).The X-ray diffraction studies revealed the Polycrystalline nature of CaO nanoparticles. The optical and functional studies of the CaO nanoparticles was analyzed using UV-Vis ,FTIR studies .The photocatalytic and Anti-Bacterial activity of calcium oxide nanoparticles is also analyzed. The composition of elements was studied by using EDAX.

Keyword: CaO nanoparticles, Cymbopogom citratus leaf, Anti-Bacterial activity, XRD

Corresponding Author Name: Aarthe.K.G.

E Mail: aarthekg@gmail.com

ISBN NO: 9 789395 423458

MD30

Green Synthesis of Cadmium Oxide Nanoparticles using *Syzygium Cumini* Leaf Extract via Antibacterial Activity

Aarthe.K.G*, Janani.T

Department of Physics,Vellalar College for Women(Autonomous),Thindal,Erode

Abstract

Research into green production methods for metal oxide particles (Nps) is initiate to overcome the possible risks of the chemicals in safer environments. The bacterial activity of metal oxide Nps offers extensive opportunities in bioengineering and biomedicines. In this study, the synthesis of simple, environmentally friendly cadmium oxide (CdO) Nps was successfully achieved using naval leaf extract. The Structure and Morphology of CdO Nanoparticles were analyzed by SEM & X-ray diffraction (XRD). The functional groups present in CdO NPS were analyzed by FTIR. The optical studies of CdO Nps analyzed using UV-vis. The composition of the CdO nanoparticles were studied using EDAX. Anti-Bacterial activity was asserted through well diffusion method. Plant-Mediated CdO Nano particles were found to be elliptical and well dispersed in suspension. Cadmium Oxide particles are used in many applications; therefore, these green synthetic CdO Nps are useful as Anti-fungal and Anti-Bacterial agents.

Keyword: CdO nanoparticles, Syzygium Cumini leaf, Antibacterial

Corresponding Author Name: Aarthe.K.G

E Mail: aarthekg@gmail.com

ISBN NO: 9 789395 423458

MD31

Investigation of Structural, Optical, Morphological and Photo catalytic properties of Zinc Sulphide Nanoparticles prepared by Chemical Co-precipitation Method

Muthulakshmi M*, Lavanya N

Department of Physics, Vellalar College for Women(Autonomous), Thindal, Erode-12

Abstract

This project work deals with the preparation of pure ZnS NPs through chemical co-precipitation method by taking Zinc acetate and Sodium sulphide as the starting materials. The prepared NPs were characterized using the powder XRD and the average crystalline size was found to be 17.77nm. The functional groups of the synthesized nanoparticles were confirmed by using FTIR spectrum(400 to 4000 $cm^{-1)}$. The energy gap of the material was investigated by optical analysis(UV) and it was found to be 3.7eV. The morphology and chemical composition were examined by SEM and EDAX analysis respectively. The photo emission property was studied by PL analysis. The photo catalytic activity of the prepared ZnS nanoparticles was evaluated by taking methylene blue (MB) dye and their degradation behaviour have been discussed.

Keyword: ZnS NPs, Precipitation, UV-Vis, Morphology, XRD

Corresponding Author Name: Muthulakshmi.M

E Mail: muthulakshmi.m@vcw.ac.in

ISBN NO: 9 789395 423458

MD32

Optical and Structural Properties of Undoped and Zinc doped Copper Iodide Thin Films Prepared by Silar Method

Sowmyalakshmi K*, Kanishka M

Department of Physics,Vellalar College for Women(Autonomous),Thindal, Erode-12.

Abstract

The thin films were formed on a glass substrate using the Successive Ionic Layer Adsorption and Reaction (SILAR) technique. This method was used to coat the thin films with pure Copper Iodide and Zinc doped Copper Iodide. The prepared material's structural, morphological, optical and elemental composition properties were determined by the following experiments X-Ray Diffractional method (XRD), Fourier Transform Infra-Red (FTIR)Spectroscopy, UV-Visible Spectroscopy, Scanning Electron Microscopy (SEM) and EDAX respectively. The application of the Zn: CuI thin films were investigated by the electrochemical properties of this semiconductor material by Raman and Photoluminescence method. The great attention for the Zinc Oxide nanostructures were given to them due to their better crystallinity, high surface area, improved electrical and optical properties. Copper iodide is a high conductivity molecular crystal semiconductor material.

Keyword: Thin film, Copper Iodide, Zinc Oxide, Successive Ionic Layer Adsorption and Reaction (SILAR) method, Raman and Photoluminescence method

Corresponding Author Name: Sowmyalakshmi K

E Mail: sowmyalakshmi1206@gmail.com

ISBN NO: 9 789395 423458

MD33

Photocatalytic Activity of Tin Sulphide (SnS) Nanoparticles by Chemical Precipitation Method with its Structural, Optical and Morphological studies

Muthulakshmi M*, Nithyadharshini B

Department of Physics, Vellalar College for Women(Autonomous), Thindal, Erode

Abstract

The Nanomaterials were widely studied due to their unique physical and chemical properties. In this work, the Tin sulphide nanoparticles were successfully synthesized employing co-precipitation method and studied their structural and optical properties. The XRD pattern of the synthesized tin sulphide nanoparticles exhibits orthorhombic structure with the average crystalline size of 15.10 nm. The functional groups of the prepared nanoparticles were studied by FTIR analysis. The bandgap energy was found to be 1.4 eV using UV absorption spectroscopy. The optical properties of the synthesized tin sulphide nanoparticles were investigated by photoluminescence spectrum which shows an emission at around 736 nm. The surface morphology is examined by SEM studies. The compositional information of the sample was determined by EDAX spectroscopy. The excellent photo response property of the prepared sample was confirmed by photocatalytic studies with methylene blue (MB) dye under ultraviolet irradiation and the degradation rate was found to be 96 %.

Keyword: SnS, Functional groups, photocatalytic, Tauc plot, Photoluminescence

Corresponding Author Name: Muthulakshmi M

E Mail: muthulakshmi.m@vcw.ac.in

ISBN NO: 9 789395 423458

MD34

Biosynthesis and Characterization of Calcium oxides using Cocos Nucifera Flower extract and their Antibacterial activities

***Jothi .M, Shobana .P.S**

Department of Physics, Vellalar College for Women (Autonomous), Thindal, Erode

Abstract

Green synthesis is a unique technique for the preparation of nanoparticles. Here, Calcium oxide [CaO_2] nanoparticle have been successfully synthesized by Cocos Nucifera flower extract. The structural, morphological, photocatalytic and antibacterial properties were recorded. The X-ray diffraction pattern, confirms the presence of CaO_2 NPS with a cubic crystal system with an average particle size of 4.04 nm. The ultra-violet visible (UV-Vis) absorption spectra exhibit good optical transparency and the maximum peak observed at 279 nm and its corresponding calculated energy band gap value is 3.44eV. Fourier transform Infrared spectrum (FTIR) spectrum indicates the presence of biomolecule with various functional groups. FESEM with energy dispersive X-ray analysis predict the morphological and desired elemental composition of materials. Cubic shaped morphology of CaO_2 NPS has been obtain from FESEM image with grain size around 14-24 nm. The photocatalytic behaviour of synthesized CaO_2 NPs has been examined for Methylene blue dye. Thus, the prepared CaO_2 NPs can be utilized in various fields of medicinal science and research.

Keyword: Cocos nucifera flower extract, Antibacterial property, Photocatalytic, FTIR, FESEM.

Corresponding Author Name: Dr. M. Jothi

E Mail: jothi.m@vcw.ac.in

ISBN NO: 9 789395 423458

MD35

Green Synthesis of Zinc Oxide Nanoparticles using Bride Groom Rice and Black rice

Sowmyalakshmi K*, Dhivya S

Department of Physics, Vellalar College for Women (Autonomous), Thindal

Abstract

In the current study, Zinc Oxide (ZnO) nanoparticles were prepared by Co-precipitation method using rice flour extract. The structural, morphological and optical properties of samples were investigated by X-Ray diffraction (XRD), Scanning Electron Microscopy (SEM), Fourier Transform Infra-Red (FTIR) and UV-Visible absorption. The X-Ray Diffraction pattern exhibits a hexagonal structure. The shape of the ZnO nanoparticle was identified using SEM images, EDAX results revealed that elemental composition of ZnO. The bandgap energy of ZnO (3.26eV) was inferred using UV. The percentage of the dye degradation was estimated from the concentration of the methylene blue dye values shown by photocatalytic activity of ZnO. The antibacterial activity of ZnO nanoparticles was tested agar well diffusion method.

Keyword: Rice flour, Dye degradation, Methylene blue and Antibacterial activity

Corresponding Author Name: Sowmyalakshmi K

E Mail: sowmyalakshmi1206@gmail.com

ISBN NO: 9 789395 423458

MD36

Effect of Tin(Sn) on the Structural, Optical, Morphological and Photo Catalytic Properties of ZnS Nanoparticles Synthesized by Chemical Precipitation Method

Muthulakshmi M *, Pradeepa S

Department of Physics, Vellalar College for Women (Autonomous), Thindal

Abstract

In this present paper, the pure ZnS and role of tin (Sn) on ZnS nanoparticles were synthesized by Chemical Co-precipitation method. The prepared nanoparticles were characterized by XRD, FTIR, UV-Vis, SEM, PL, EDAX and Photo catalytic studies. The structural properties were studied using XRD analysis .The functional groups present in the prepared nanoparticles were analysed by FTIR studies. The UV-Vis studies were performed for the determination of band gap of the samples. The morphological features of synthesized nanoparticles were determined by SEM studies. The emission properties were studied using PL studies. The EDAX studies give the information about various compositional rate of photo catalyst. The photo catalytic activity of synthesized nanoparticles was determined by methylene blue (MB) as model pollutants and their corresponding degradation behaviour were discussed. The tin doped ZnS nanoparticles displayed excellent photo degradation rate of 95 % for MB dye when compared to the degradation rate of 91% of pure ZnS nanoparticles.

Keyword: ZnS NPs, optical bandgap, MB dye, Tauc plot, SEM study

Corresponding Author Name: Muthulakshmi M

E Mail: muthulakshmi.m@vcw.ac.in

ISBN NO: 9 789395 423458

MD37

Green Synthesis of Copper Doped Zinc Oxide using Leaf and Fruit Extract of Morindia Citrifolia

Sri Devi P*, Santhiya B

Department of Physics, Vellalar College of Women (Autonomous), Thindal, Erode–12.

Abstract

Green synthesis has recently gained extensive attention as reliable protocol for synthesizing wide range of nanomaterials. In present study, Eco-friendly green synthesis approach has been employed for the formation of Copper doped Zinc Oxide (Cu: ZnO) nanoparticle using Morindia citrifolia leaf and fruit extract. The structural and surface morphological studies have been carried using X-ray diffraction (XRD) analysis and scanning electron microscope (SEM). EDAX confirms the elements present in the synthesized nanomaterial and the presence of functional groups are identified using FTIR. The optical property of green synthesized Cu: ZnO has been analyzed by UV visible analysis. Photocatalytic activity was tested using methyl blue dye degradation under UV irradiation. Crystalline nature of Cu: ZnO NPs structure without any impurities has been confirmed in XRD Analysis. Antibacterial activity of synthesized sample has been tested against two- gram positive and two-gram negative bacteria. This result indicates that aqueous leaf and fruit extract of Morindia citrifolia (Noni) acts as effective reducing agent for green synthesis of Copper doped Zinc oxide with significant in antibacterial potential. Thus, synthesized Cu: ZnO nanoparticles act as good candidates for future Phyto therapeutic application.

Keyword: Photocatalytic, Morinidia Citrifolia, SEM, EDAX, Antibacterial Activity

Corresponding Author Name: Sridevi P

E Mail:karthisridevi@gmail.com

ISBN NO: 9 789395 423458

MD38

Green Synthesis of Tin Oxide Nanoparticles using the Flower Extract of Cocus nucifera and their Characterization, Photocatalytic and Antimicrobial Activities

M.Jothi, P.Sri Sathiya

Department of Physics, Vellalar College for Women (Autonomous), Thindal, Erode-12.

Abstract

Green synthesis, which is a reliable, sustainable and eco-friendly technique to synthesis and characterize nano sized material that have significant application in various fields.Bio-fabrication of nano particles (NPs) have potential need, since it utilizes the eco friendly method, non-toxic, cost-effective, harmless than any other chemical and physical methods. So far, a variety of NPs particles like Cadmium, Cerium, Titanium, Magnesium, Copper, Nickel, Iron, Zinc, Silver, Gold have been synthesized. In the present study, Tin oxide[SnO_2] nanoparticles has been prepared by utilizing Cocos Nucifera flower extract as a biological reducing, capping, stabilizing agent. Thus, the obtained SnO_2 NPs have been characterized by the Physio-chemical analysis such as XRD, that exposes the crystalline morphology of grown SnO_2 NPs with average crystalline size is about 14.8 nm. Fourier Transform Infrared Spectroscopy (FTIR) confirms the active functional groups and different mode of interaction which are due to the components present in the bio extracts. The UV-Vis Spectrophotometric studies exhibits a surface plasmon resonance peak at 0.385 and the calculated bandgap energy 2.92 eV. Photocatalytic and photolumious activities have been predicted. Further, the morphological images from FESEM of SnO_2NPs showed almost spherical structure. The antibacterial effects of synthesized NPs were tested using agar well diffusion method against Gram-positive (S.Pyogene and S.aureus) and Gram-negative bacteria (K.pneumonia and E-Coli).

Keyword: XRD, FESEM, Photo-luminous, Photocatalytic, Antibacterial activity.

Corresponding Author Name: Dr. M. Jothi

E Mail: jothi.m@vcw.ac.in

ISBN NO: 9 789395 423458

MD39

Biological Activity and Characterization of Nickel oxide Nanoparticles using Abutilon Indicum Leaf Extract

K.G.Aarthe, T.Dharani

Department of Physics, Vellalar College for Women (Autonomous), Erode-12.

Abstract

Green synthesis of nanomaterials is advancing due to its ease use of synthesis, non-toxicity, inexpensiveness and renewability. The present work encompasses the novel green synthesis of Nickel oxide nanoparticles utilizing Abutilon indicum leaf extract by co-precipitation method. The synthesised Nickel oxide nanoparticles were characterized by employing special techniques such as XRD, SEM-EDX, FTIR and UV-VIS. The photocatalytic and antibacterial activity of synthesised NiO particles were also examined. The XRD configuration indicated the crystalline nature of NiO NPs.SEM images displayed the synthesised nanoparticles have spherical morphology. The results of EDX confirmed the elemental composition of prepared sample. The UV-VIS and FTIR analysis of green synthesis were further carried out to determine absorption maxima and different functional groups of the biological molecules of A.indicum leaf extract. The photocatalytic activity of synthesised NPs against methylene blue dye degradation under visible light was studied. The NiO NPs were further evaluated for antibacterial activity and it was found that NiO NPs were against positive bacteria. Moreover, the green synthesised NiO NPs demonstrated excellent bio-compatibility compared to chemically synthesised NiO nanoparticles.

Keyword: Abutilon indicum, Nickel oxide, Green synthesis, Antibacterial, Photo-catalytic.

Corresponding Author Name: K.G.Aarthe

E Mail: aarthekg@gmail.com

ISBN NO: 9 789395 423458

MD40

Biological and Photocatalytic Application of Copper oxide Nanoparticles using Dabur honey and Horn honey

Sowmyalakshmi K*, Kavithashri V

Department of Physics, Vellalar College for Women (Autonomous), Erode-12.

Abstract

Copper oxide (CuO) nanoparticles are obtained using the Co-precipitation method. Two comparable honey extracts are used in the green synthesis medium to produce the CuO nanoparticle. By using X-Ray Diffraction (XRD), Fourier transform infrared (FTIR) spectroscopy, UV-Visible spectrum analysis, and Scanning Electron Microscopy (SEM-EDAX), the copper oxide nanoparticle is recognized. The structure of CuO nanoparticle is assumed to be monoclinic through XRD, and the crystalline size of CuO nanoparticle is determined. The chemical structure and functional group of CuO nanoparticle is estimated by Fourier transform infrared spectroscopy (FTIR). Scanning electron microscopy (SEM) shows the surface of copper oxide nanoparticles. According to UV-Visible spectral study, the band gap energy of a CuO nanoparticle is 3.44eV. The CuO nanoparticles undergo different application like photoluminescence, photocatalytic and biological activity. The synthesized CuO nanoparticle shows good result in antibacterial activity against Klebsiella pneumonia, Escherichia coli, Staphylococcus, and Enterococcus. The degradation of methylene blue (MB) dye is carried out for photocatalytic activity of CuO nanoparticle. Finally, the result gives excellent photocatalytic activity because of its purity.

Keywords: Green synthesis, Co-precipitation method, Copper oxide, Honey, Photocatalytic activity, Antibacterial activity

Corresponding Author Name: Sowmyalakshmi K

E Mail: sowmyalakshmi1206@gmail.com

ISBN NO: 9 789395 423458

MD41

Green mediated Synthesis of Zinc oxide and Silver doped Zinc oxide nanoparticles using Morinda Citrifolia fruit extract

Sri Devi P*, Anandhavarshini.V.S

Department of Physics, Vellalar College for Women (Autonomous), Erode-12.

Abstract

In recent years, green synthesis of nanomaterials has received more attention in worldwide as the methods are simple, eco-friendly and biocompatible. Green synthesis aims to minimize the toxic waste and to implement sustainable process. In the present study, Zinc oxide (ZnO) and Silver doped Zinc oxide (Ag: ZnO) nanoparticles are prepared using fruit extract of Morinda citrifolia which have been synthesized by eco-friendly green synthesis method. The resulting nanoparticles are examined using XRD, FTIR, UV-visible, SEM, EDAX, Photocatalytic Activity and Antibacterial analysis. FTIR spectra reveals the presence of functional peaks of ZnO and Ag: ZnO nanoparticles. In XRD analysis the formation of hexagonal crystal structure confirms the crystalline nature of the green synthesized nanoparticles. The optical properties are examined for green synthesized ZnO & Ag: ZnO using UV visible analysis. Photocatalytic activity shows the synthesized ZnO & Ag: ZnO nanoparticle acts as photocatalyst for the UV-induced methylene blue degradation (MB). Photodegradation of MB has been studied as the function of time and pH of the dye solution. The synthesized ZnO & Ag: ZnO nanoparticles were tested against the two-gram positive bacteria like Staphylococcus Aureus & Enterococci and two-gram negative bacteria like Escherichia Coli & Klebsiella pneumoniae. The antibacterial results show the synthesized nanoparticles has high potential antibacterial property. The structural morphology and the elemental composition are studied using SEM and EDAX.

Keyword: Morinda Citrifolia, Optical property, Photodegradation, Antibacterial Activity, Biocompatible.

Corresponding Author Name: Sri Devi P

Email: karthisridevi@gmail.com

ISBN NO: 9 789395 423458

MD42

Optical Properties of Calcium Oxide Nanoparticles Doped with Triton x-100(surfactant) using Co-precipitation Method.

K.Sujatha, S.Vishnu Priya

Department of Physics, Vellalar College for Women(Autonomous), Erode-12

Abstract

CaO nanoparticles were successfully synthesized using co-precipitation method by using triton x-100 as surfactant. The Calcium oxide nanoparticles were characterized using X-Ray diffraction, Scanning Electron microscope, UV-visible Spectroscope, Photoluminiscence and Photocatalytic techniques. XRD results revealed that both the sample prepared with and without surfactant crystallize is in cubic structure. SEM pictures depict that Cluster shaped morphology with an average diameter of 19-22 nm, which is well matched with crystalline size calculated from XRD results. A considerable blue shift in the absorbance edge was found in Triton doped sample. The Optical properties of CaO was different for Triton X-100 doping which is confirms the PL spectra analysis. The photocatalytic activity study showed that photocatalytic performance for the degradation of Methyl Blue dye.

Keyword: CaO nanoparticle, Triton X-100, Optical properties, Precipitation method.

Corresponding Author Name: Dr.K.Sujatha

E Mail: drsujiols@gmail.com

ISBN NO: 9 789395 423458

MD43

Structural Morphology and Electrochemical behaviour of Nanostructural $MgCo_2O_4$ for Supercapacitor Applications

D.Iniyaraja[a], S.Deepika[a], T.Jothilakshmi[a] , S.M.Senthilkumar[bc],N.Sivakumar[a*].

[a]PG & Research Department of Physics,Chikkaiah NaickerCollege(NAAC 'A'), Erode-04,TamilNadu.
[b]Materials Electrochemistry Division ,CSIR-Central Electrochemical Research Institute, karaikudi-03, TamilNadu.
[c]Academy of Scientific and Innovative Research(AcSIR), CSIR-Central Electrochemical Research Institute , Karaikudi-630 003, TamilNadu.

ABSTRACT

A pure composite of $MgCo_2O_4$cathode material has been prepared by the low cost method(Hydrothermal) for thesupercapacitor applications. Further,the synthesized material have been characterized by using X-ray diffraction(XRD), Scanning electron microscopewith energy dispersive X-ray spectroscopy (SEM/EDAX), Raman spectroscopy and cyclic voltammetry(CV).From the XRD-studies, the structural behavior has been confirmed and also grain size (15nm) was calculated by using Debye-Scherrer's formula. From the scanning electron microscope, the morphological image shows spherical in shape for prepared sample. The composite delivers the specific capacitance in the cyclic voltammetry (CV).With the help of cyclic voltammetry, the specific capacitance was determined and the observed value indicates the better performance compared to its bulk material (µm).

Keyword: Supercapcitor; Hydrothermal synthesis; $MgCO_2O_4$; Nanomaterial

Corresponding Author Name: S. Dharanya

E Mail: nskdnp@gmail.com

ISBN NO: 9 789395 423458

MD44

Role of TiO_2 on Co_3O_4 Positive Electrode for Energy Storage Applications

S. Deepika , T.Jothilakshmi , R. Kalaivani , N.Sivakumar *

PG & Research Department of Physics, Chikkaiah Naicker College, Erode, Tamilnadu,India.

Abstract

Co_3O_4 is known as a high-quality positive material for supercapacitor applications due to its virtuous electrochemical performance. Pure Co_3O_4 cathode material is prepared by hydrothermal method. TiO_2has been coated on Co_3O_4 through solid state method with difference ratios in order to increase the performance of pure Co_3O_4.. Structure nature and morphology of prepared samples were characterized by XRD and FE-SEM techniques respectively. The XRD pattern shows the well crystalline nature of Co_3O_4 and the Co_3O_4 phase without impurity. The FE-SEM result indicates the plate-like morphology is formed in the prepared sample. FTIR analysis shows the functional group of the samples. The initial capacity of the pure Co_3O_4 is 197 F/gand $0.1TiO_2@Co_3O_4$is 333 F/g and more over $0.3TiO_2@Co_3O_4$ exhibit the initial specific capacitance is 422 F/g. The electrochemical results shows that $0.3TiO_2@Co_3O_4$ exhibits a higher specific capacitance of 422 F/g compared with pure Co_3O_4 and $0.1TiO_2@Co_3O_4$ samples. In the conclusion, it is conformed that $0.3TiO_2@Co_3O_4$ high-efficiency positive electrode for future energy storage applications.

Keyword: Supercapacitor ;$TiO_2@Co_3O_4$;Positive electrode ; Hydrothermal method

Corresponding Author Name: S.Deepika

E Mail: nskdnp@gmail.com

ISBN NO: 9 789395 423458

MD45

Synthesis, Characterization, Antimicrobial, Antioxidant and Anticancer Property of 6,6'-(2-methyl-1,3-phenylene)bis(azan-1-yl-1-ylidene)bis(methan-1-yl-1-ylidene)bis(2-methoxyphenol) ligand of Copper and Nickel complexes

R. Gandhimathi[1,2] and S. Anbuselvi[1],

1. PG and Research Department of Chemistry, Sri Sarada College for Women, Salem-636016, India
2. Department of Chemistry, Chikkaiah Naicker College, Erode-638004, India

Abstract

Cu(II) and Ni(II) complexes of the Schiff base derived from suitable aldehyde and amine were synthesized. The Schiff base ligand and its complexes were well characterized with support of elemental analysis, FT-IR, ^{1}H and ^{13}C NMR, UV-Visible, ESR, Mass, magnetic moment, molar conductance. All the characterized technique influences the formation of imine and metal coordination with metal ions were authentically reported. The electronic spectra enunciates and offer the geometry is octahedral complex for both copper and Nickel complex. Further the complexes possess greater antimicrobial property than free ligand. Similarly, Nickel complexes possess good antioxidant and anticancer characteristic as per their report by spending DPPH radical scavenging activity and MTT assay respectively. Subsequently all the complexes and Schiff base ligand shows good anticovid property with SARS-CoV-2 protein and compounds using molecular docking with binding energy about -7.6 and 6.8 Kcal/mol for Cu(II) and Ni(II) complexes respectively.

Keyword: FT-IR, ^{1}H and ^{13}C NMR, UV-Visible, ESR, Mass, magnetic moment, molar conductance

Corresponding Author Name: S. Anbuselvi

E Mail: selvisarachem80@gmail.com

ISBN NO: 9 789395 423458

MD46

Current-Voltage Measurements of Au/Methylene Blue (MB)/n-Ge Schottky Contact in a Wide Temperature Range

M. Pavani[1,*], A. Ashok Kumar[1,*], V. Rajagopal Reddy[2], V. Janardhanam[3],Chel-JongChoi[3]

[1,*]Department of Physics, YSR Engineering College of YVU, Proddatur, Andhra Pradesh, INDIA
[2]Department of Physics, Sri Venkateswara University, Tirupati, Andhra Pradesh, INDIA
[3] Semiconductor Physics Research Center (SPRC), School of Semiconductor and Chemical Engineering, Jeonbuk National University, Jeonju 54896, Korea

Abstract

Electrical properties of Au/Methylene Blue (MB)/n-Ge Schottky contacts were investigated in a wide temperature range from 125K to 400K. The device parameters such as barrier height, ideality factor and series resistance were determined using thermionic emission (TE) model and Cheung's method. The barrier height and ideality factor (n) values of the Schottky contact was determined from the current-voltage measurements and found to be 0.29 eV and 2.71 at 125K and 0.93 eV and 1.04 at 400K respectively. In the presence of inhomogenity at the metal-semiconductor contact, the barrier height found to be decreased and ideality factor found to be increased with the decrease of temperature. From the Cheung's plot, the series resistance (R_s) was found to be decreased with increase of temperature.The barrier inhomogeneties has been elucidated by using the thermionic emission theory based on the assumption of gaussian distribution of Schottky barrier heights.However, the divergence in Schottky barrier heights of Au/Methylene blue/n-Ge Schottky contacts evaluated from current-voltage measurements indicates the deviation from the thermionic emission theory. The conventional Richardson plot between $\ln(I_o/T^2)$ vs. 1000/T gives an activation energy of 0.31 eV and Richardson constant (A*) of $1.14x10^{-9}$ $Acm^{-2}K^{-2}$. The modified Richardson plot evaluated by assuming gaussian distribution of barrier shows an enhanced activation energy of 1.15 eV and Richardson constant(A*) of209.28 $Acm^{-2}K^{-2}$ which is close to theoretical value of n-Ge. Current conduction mechanisms of Au/MB/n-Ge contact in a wide temperature range are resolved into four linear regions (Region-I to Region-IV) with different slope factors. This shows that the interfacial layer (MB) significantly influences the electrical properties of the Au/n-Ge contacts measured in a wide temperature range.

Keywords: Methylene blue,n-Ge, Schottky contact, Electrical properties, Current transport mechanisms, Barrier Inhomogeneity, Temperature Dependent

Corresponding Author Name: M. Pavani

Email: marripallipavani1995@g

ISBN NO: 9 789395 423458

MD47

Facile Synthesis of Porous Carbon Derived is Nanocomposite For Long cycle-Life Asymmetric Supercapacitors

M.Beemarao[a] P.Periyannan [a],N.Senguttuvan[a] , K.Ravichandran[a]*

[a]Department of Physics, Kandaswami Kandar's College, Velur, Namakkal

Abstract

The integration of two transition metals with carbon materials provides a great potential to boost the catalytic and electrochemical properties of supercapacitor. However, a scalable fabrication of such composite materials remains a challenge.In this paper, NiS nanoparticles had been successfully loaded on porous carbon(PC) from sodium lingo sulfonate via hexa decyltrimethyl ammonium bromide assisted hydrothermal method. Due to synergistic effects of PC and NiS nanoparticles, the conductivity of the NiS/PC electrode is significantly improved, and the composite electrode exhibits a high specific capacity (1177 F/g at 0.5 Ag^{-1}) and excellent rate performance. Moreover, an asymmetric supercapacitor (ASC) device was assembled with the NiS/PC composite as positive electrode and the AC as negative electrode to evaluate the electrochemical performance of NiS/PC composites in practical applications. The ASC device achieves a maximum energy density of 48.6 Wh/kg at a power density of 598.5 W/kg, and excellent cycling stability with 94.6% of capacitance retention after 10,000 cycles. The electrochemical performance suggests that NiS/PC composites have great application prospect as electrode materials for supercapacitors.

Keywords: NiS/PC composites; Supercapacitors; Asymmetric supercapacitor;One-step hydrothermal method, High energy density

Corresponding Author Name: **M.Beemarao**

E Mail: kravichandran05@gmail.com

ISBN NO: 9 789395 423458

MD48

Electrical Properties of ZnPc/n-Geheterostructures

S.Guru Swathi[1,*], S.Ramesh[1,*], A.Ashok kumar[2], V.Rajagopal Reddy[3], V.Janardhanam[4], Chel-Jong Choi[4]

[1]Department of Physics,GSS,Gitam deemed to be University,Vishakhapatnam,530045
[2]Department of Physics,YSR Engineering college of YVU,Proddatur,A.P,India
[3]Department of Physics, Sri Venkateswara University, Tirupati,A.P, India.
[4]Semiconductor Physics Research Center(SPRC),School of Semiconductor and Chemical Engineering, Jeonbuk National University,Jeonju 54896, Korea.

Abstract

The electrical properties of Au/n-GeSchottky contacts with Zinc Pthalocyanine (ZnPc) interfacial layer isanalysed using current-voltage (I-V) properties.TheSchottky barrier parameters such as barrier height(Φ_b),ideality factor(n), was measured for the contacts using the I-Vcharacteristics at low forward bias voltages (V<3kT/q) based on thermionic emission model. The barrier height and ideality factor of the Au/n-Ge contact shows 0.57 eV and 1.29 and 0.72 eV and 1.21 for Au/ZnPc/n-Ge contacts respectively. Series resistance of the contacts was also evaluated using Cheung's and Norde method. A high series resistance of 718Ω is observed in dV/dlnI versus I plot for Au/ZnPc/n-Ge contacts than compared to 280Ω in the case of Au/n-Ge contacts. Large increase of shunt resistance (R_{sh}) from 17.27 KΩ (Au/n-Ge) to 3.89 MΩ (Au/ZnPc/n-Ge) is observed. The current conduction mechanisms of the contacts were analysed using logarithmic I-V plot. Three distinct linear regions were observed for Au/n-Ge contacts and the slope factor (m~2) of these linear regions confirms the ohmic conduction mechanism. In the case of Au/ZnPc/n-Geheterostructures, four distinct regions (region-I to region IV) are observed and the slope factor of region-I (m~2) shows ohmic conduction mechanism and space charge limited current (SCLC) is observed in region-II (m>2). The slope factor of region III (m~4) signifies the current conduction mechanism is due to Trap charge limited current conduction mechanism. Finally, the current conduction mechanism in region-IV ((m>2) indicates trap free SCLC mechanism. Analysis of electrical properties of ZnPc/n-Geheterostructures is very essential to use these devices in different applications like organic light emitting diode, photo-generated charges, organic field effect transistors, gas sensors, and especially in photovoltaic devices.

Keywords: n-Ge, Schottky contacts, Heterostructures, ZnPc, Electrical properties, Current conduction mechanism

Corresponding Author Name: S.Guru Swathi[1]

E Mail: sguru@gitam.in

ISBN NO: 9 789395 423458

MD49

Enhanced Photodiode Properties of Sn-Doped $LaPO_4$ as an Interfacial layer of Cu/Sn-$LaPO_4$/n-Si type Schottky Barrier Diode

R. Priya[a], R. Mariappan[a*], R.N. Jayaprakash[a]

[a)] Department of Physics, Adhiyamaan College of Engineering, Hosur-635 109, Tamil Nadu, India.

Abstract

In this present work, Cu/Sn-$LaPO_4$/n-Si MIS Schottky barrier diode (SBD) with a 10% Sn doping has been successfully fabricated, and their photodiode properties were investigated. At the same calcined temperature, various characterization approaches are used to investigate the structural, morphological, and optoelectrical characteristics. Furthermore, an X-ray diffraction (XRD) investigation of the powdered Sn-$LaPO_4$ sample demonstrated the monoclinic to hexagonal transformation with increasing Sn concentration, it was observed that the average crystallite size increased. The existence of the phosphate group was confirmed by IR spectroscopy in the ν_3 and $\nu_4$regions. Field emission scanning electron microscopy (FESEM) reveals that the Sn-$LaPO_4$NPs whole surface is covered in irregularly spaced agglomerates that resemble facets.The presence of Sn and the binding peak with a spin-orbit on the $LaPO_4$ nanoparticles have been confirmed by the XPS spectrum. UV-DRS spectra have been used to evaluate the optical direct energy band gap of Sn-$LaPO_4$.TheI-V forward and reverse bias curves determine the photodiode parameters such as barrier height, ideality factor, and saturation currents from the thermionic emission theory.The results of the experiments with 10% Sn-$LaPO_4$ SBDs showed a linear decrease in the ideality factor (n) up to 2.31 and 1.74, respectively, with a small increase in the effective barrier height (Φ_B) of0.744 and 0.806 eV in dark and light conditions these results signify their use in optoelectronic industries.

Keyword: Co-precipitation; Schottky barrier diode; Sn-$LaPO_4$; Interfacial layer; Photodiodes

Corresponding Author Name: **R. Mariappan**

E Mail: marijpr@gmail.com

ISBN NO: 9 789395 423458

MD50

A Review on Recent Advances in Synthesis and Applications of Conducing Polymer Nanocomposites

N. Dhachanamoorthi[1], S.R. Gaaviyaa[2]

[1]Assistant Professor & Head, Department of Physics, Vellalar College for Women, Erode-12, Tamilnadu, India.

[2]Ph D Scholar, Department of Physics, Vellalar College for Women, Erode-12, Tamilnadu, India.

Abstract

Polymer nanocomposites (PNCs) are a class of composite materials that have attracted significant attention due to their unique physical and chemical properties. Polymers are the combinations of monomers with flexible and light weight property, while the inorganic nanomaterials have high thermal stability, good electrical properties with high modulus. The addition of inorganic compounds at nanoscale to the polymer matrix can enhance the mechanical, thermal and electrical properties of resulting PNCs. The polymer nanocomposites can be prepared by various methods, including melt blending, solution casting and In-situ Ex-situ polymerization. The properties of polymer nanocomposites are dependent on the size, shape, surface area and chemical composition of the nanoparticles and the interactions between the nanoparticles and polymer matrix during synthesis. The unique properties of polymers nanocomposites arise from the high surface area to volume ratio of the nanoparticles, which provide a large interfacial area with the polymer matrix leading to desired properties. Due to such potential properties polymer nanocomposites have widespread interest for applications including the field of aerospace, capacitors, electrodes, semiconductors and LEDs etc.,These polymer nanocomposites are stable at high temperatures when compared to the conventional molecules for industrial and domestic applications.This abstract provides an overview of polymer nanocomposites including their structure, properties and potential applications as well as some of the challenges and opportunities associated with their development and commercialization.

Keywords: Nanocomposite, Synthesis, Properties, Application.

E Mail: dhachu83@gmail.com

Corresponding Author Name: N.Dhachanamoorthi

ISBN NO: 9 789395 423458

MD51

Green Synthesis and Characterization of Magnesium oxide Nanoparticle using Psidium guajava

Boomathi. R[1*], Kalaiselvi. V [1], Yasotha. P[1], Blessymol. B[1]

[1]Department of Physics, Navarasam arts and science College for Women, Erode

Abstract

In the present study on the green synthesis of magnesium Oxide (MgO) by using Psidium guajava. The magnesium oxide nanoparticles were synthesised by sol-gel method. Magnesium oxide nanoparticles widely applicable for toxic waste remediation, removal of industrial pollution and anti-cancer applications. In the present study MgO nanoparticles were successfully prepared by using green synthesis method with Psidium guajava leaf extract. The synthesized magnesium oxide were characterized Using an X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM), Electron Dispersive X-ray Analysis (EDAX), Ultraviolet Visible Spectroscopy (UV-Vis), and Fourier Transform Infrared (FTIR) Spectroscopy and anti-cancer activity.

Keywords: Magnesium oxide nanoparticles, Psidium guajava, FTIR and EDAX

E Mail:boomathirasu@gmail.com

Corresponding Author Name: Boomathi. R

ISBN NO: 9 789395 423458

MD52

Structural Analysis of Gallic acid ($c_6H_2(OH)_3CO_2H$) Through Density Functional theory (DFT)

Priya.C[1*], Sheeba Veronica[2], Kalaiselvi.V[3]

[1,2]Assistant professor, Department of Physics, Navarasam Arts and Science College for Women, Arachalur, Erode
[3]Head of the Department, Department of Physics, Navarasam Arts and Science College for Women, Arachalur, Erode

Abstract

Gallic acid is also known as 3,4,5 trihydroxybenzoic acid with formula of $C_6H_2(OH)_3CO_2H$. It is belongs to Phenolic acid group. In this study, the structure of Gallic acid can be analyzed through Bond Dissociation Energy (BDE), Ionization Potential(IP), Molecular descriptors, HOMO-LUMO and Molecular Electrostatic Potential(MEP surface) using density functional theory. The structural investigations are done using Gaussian 16 software. The level of theory used for structural calculations is B3LYP with 6-31G(d) basis set. It is well-known for its antioxidant, anticarcinogenic properties and scavenger activity. These theoretical studies can be useful to enhance the practical application of Gallic acid.

Keywords: Gallic acid, HOMO-LUMO, DFT.

E Mail: priyapriya1367000@gmail.com

Corresponding Author Name: Kalaiselvi.V

ISBN NO: 9 789395 423458

MD53

Theoretical Studies of Benzoic Acid(C_6H_5COOH) using Density Functional Theory(DFT)

C.Divyabharthi[1*], Sheeba Vetonica[2], Kalaiselvi.V[3]

[1,2]Assistant Professor, Department of Physics, Navarasam Arts and Science College for Women, Arachalur
[3]Head of Department, Department of Physics, Navarasam Arts and Science College for Women, Arachalur

Abstract

Benzoic acid is a white solid organic compound with formula C_6H_5COOH whose structure contains of benzoic ring with a carboxyl substituent. In this study the structure of benzoic acid is explored through Bond Dissociation Energy(BDE), Ionization Potential(IP), Molecular Descriptors, Molecular Electrostatics Potentials(MEP surface). The potential health benefits of Benzoic acid are antimicrobial, anti-obesity, and antioxidant properties. The major advantage is that it can be used in cancer treatment as well as in the improvement of brain health. The structural investigations are done through DFT method using Gaussian 16 software.B3LYP-6-31 G(d) level of theory was implemented during the theoretical calculation. It has better antiviral, antibacterial and antifungal activities.

Keyword: Benzoic acid, Capilalize, Ionization potentials, Density Functional Theory
E Mail: divyabharathibharathi13553@gmail.com
Corresponding Author Name: C.Divyabharthi

ISBN NO: 9 789395 423458

MD54

Green Synthesis and Characterization of Mgo/Zno Nano Composite used for Breast Cancer Applications

Divyashree .D[1*], Kalaiselvi. V[1], Blessymol. B, [1]Yasotha. P[1]

[1] Department of Physics, Navarasam arts and science college for women, Erode.

Abstract

The present study focus done the green synthesis and characterization of magnesium oxide/zinc oxide nanocomposite by using sol gel method. Nanocomposites have toughness with high strength and parallel elasticity. The green synthesis of MgO/ZnO was synthesized with aqueous solution of hibiscus rosa sinensis collected from Tamil Nadu. The synthesized nanoparticles were characterized by Scanning electron microscopy (SEM), X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), Energy dispersive X-ray spectroscopy. Hibiscusrosasinensis (flower) extract, has been reported to have many medicinal and anti cancer properties due to its antioxidant and hypolipidemic effects.

Keyword: Nano composites, Solgel Method, XRD, SEM, FTIR, Breast Cancer

E Mail: divya422002@gamil.com

Corresponding Author Name: Divyashree .D

ISBN NO: 9 789395 423458

MD55

Green Synthesis of Titanium dioxide (TiO_2) Nanoparticles using Leucas Aspera Leaf Extract

Hemapriya.E [1,],Blessymol.B[1,*],Yasotha.P[2,]

[1,2]Department of physics ,Navarasam arts and science college for women ,Arachalur,Erode.

Abstract

In this present work the green synthesis of Titanium dioxide nano particles using Leucas aspera leaf extract was synthesized. The Titanium dioxide are widely used in biomedical fields such as antibacterial application. The TiO_2were synthesized aside using sol gel method. The synthesized nanoparticles of Titanium dioxide were characterized by X-Ray Diffraction, Fourier Transform Infrared Spectroscopy (FTIR), and Energy dispersive X-Ray Diffraction Analysis, Ultra violet visible Spectroscopy (UV), Scanning Electron Microscope (SEM) techniques and antibacterial applications. The characteristics of Titanium dioxide (TiO_2) nanoparticle are revealed by these characterization techniques. TiO_2 have got good potential exposure in antibacterial application.

Keyword: Leucas aspera leaf extract , green Synthesis, antibacterial, SEM, FTIR,UV Visible spectroscopy

E Mail: blessyphy607@gmail.com

Corresponding Author Name: Hemapriya.E

ISBN NO: 9 789395 423458

MD56

Synthesis and Characterization of Hydroxyapatite Nanoparticle by using the Coleus amboinicus leaf extract

Varshi KC, Kalaiselvi V, Blessymol B, Yasotha P

Department of Physics, Navarasam arts and Science college for Women, Arachalur, Erode.

Abstract

Nanotechnology contributes a compact place and emergent field with its applications in Medical Sciences and Healthcare for the purpose of manufacturing new Antigents and Drug Delivery. In the present study HYDROXYAPATITE (HAP) Nanoparticles were prepared by using the COLEUS ANBOINICUS leaf Extract. The obtained sample extract of Hydroxyapatite nanoparticles were Characterized by Ultra violet- visible spectroscopy(UV), Fourier Transmission Infrared Spectroscopy (FTIR), Scanning Electron Microscope (SEM), X-ray Diffraction (XRD), Energy Dispersive X-ray (EDX), Photo Luminance (PL) and ANTI-CANCER. The UV Visible Spectroscopy used for determining Absorbance and Band gap energy. The functional group of nano particles showed by Fourier Transmission Electron Microscope (FTIR). Xray Diffraction (XRD) calculates the Crystalline size of the prepared sample. The particle Shape, Size and Morphology are investigated with the help of Scanning Electron Microscope (SEM). This works presents an efficient route of Green synthesis for HYDROXYAPATITE (HAP) nanoparticles with a vast range in the Medical field.

Keyword: Hydroxyapatite, Coleus Amboinicus, Drug Delivery, Morphology.

E Mail: kc.varshi@gmail.com

Corresponding Author Name: Varshi KC

ISBN NO: 9 789395 423458

MD57

Green Synthesis and Characterization of Zinc oxide Nanoparticles using Allium sativum

Kirubasri M[1], Vishalatchi P[1]

Department of Physics, Navarasam Arts and Science College for women, Arachalur, Erode

Abstract

The present study focused on the green synthesis of Zinc oxide nanoparticle from different concentrations of Allium sativum extract using zinc nitrate as predecessor material. They synthesized by nanoparticles were characterized using X-ray diffraction spectrometer, Scanning Electron Microscope (SEM), Fourier Transform Infrared Spectroscopy (FTIR), U-V visible spectrometer. It is scientifically proven that garlic is effectively used in cardiovascular diseases as a regulator of blood pressure, with dropper effects on glycaemia and high blood cholesterol, against bacterial, viral, mycotic and parasitic infections. It's also known that garlic is a wonderful plant having the properties of empowering immune system, anti-tumor and antioxidant effects. It's declared that garlic, as an anti-bacterial agent, is effective against many more gram negative and gram-positive bacteria like Helicobacter pylori, Escherichia coli (E. coli), and Lactobacillus cases.

Keyword: Garlic (Allium sativum), X-ray diffraction, FTIR, SEM, U-V spectrum, Zinc nitrate, Antibacterial activity.

E Mail: kirubasri20596@gmail.com

Corresponding Author Name: Kirubasri M

ISBN NO: 9 789395 423458

MD58

Green Synthesis of Magnesium oxide (MgO) Nanoparticles using Clitoria ternatea Flower Extract

Sathyadevi P[1], Kalaiselvi V[1], Blessymol B[1], Yasotha P[1]

Department of Physics, Navarasam Arts and Science College for Women, Arachalur, Erode.

Abstract

Nanotechnology is science, Engineering and technology conducted at the nanoscale which is about 1 to 100 nanometers**.** Clitoria Ternatea flower (CL) Family Fabaceae commonly known as "Butterfly Pea" a traditional medicine from ancient time clitoria ternatea flower as a antistress and anxiolytic. The application in food coloring and cosmetics. Nanoparticles (MgO) is formed by using clitoria ternatea flower as a green synthesis method. The prepared Magnesium Oxide (MgO) were characterized by XRD, SEM, FTIR and UV visible spectroscopy and antimicrobial activity. The X-ray Diffraction (XRD) is a provide about the analysis for crystal structure. The SEM (Scanning Electron Microscope) was analysed by using morphology. The FTIR (Fourier Transform Infrared Spectroscopy) was analysed represent the prepared sample. The present of UV (Ultra violet) refer to absorption spectroscopy or reflectance spectroscopy in the part of the ultra violet. The antimicrobial activity against selected microorganism is using a leaf, flower and steam.

Keyword: Magnesium Oxide (MgO) , Clitoria Ternatea Flower, XRD, SEM, FTIR

E Mail: psathyadevi237@gmail.com

Corresponding Author Name: Sathyadevi . P

ISBN NO: 9 789395 423458

MD59

Green Synthesis of Copper Oxide (CuO) Nanoparticles using Radish Extract

Pavithra R[1],Kalaiselvi V[1], Blessymol B[1] , Yasotha P[1]

Department of Physics, Navarasam Arts and Science college for women, Arachalur, Erode.

Abstract

In the present study copper oxide nanoparticles has been synthesized in the greenby Raphanin Sativus extract. The copper oxide was synthesized by the wet chemical method in the radish plant extract. Hence it is used in anticancer. The synthesized in nanoparticles were characterized by scanning electron microscope (SEM), X-ray diffraction (XRD), Photo Luminance (PL), Energy Dispersive X-ray Spectroscopy, Fourier Transform infrared Spectroscopy (FTIR).

Keyword: Wet Chemical method, Radish, XRD, SEM, FTIR.

E Mail: paviramani206@gmail.com

Corresponding Author Name: Pavithra. R

ISBN NO: 9 789395 423458

MD60

Green Synthesis of Hydroxy Apatiten Nanoparticles using Mentha piperita Leaf Extract

Sangavi.P[1] , Kalaiselvi.V[1], Yasotha P[1], Blessymol B[1]

[1]Department of Physics, Navarasam Arts & Science College for Women, Arachalur, Erode.

Abstract

Nanotechnology is one of the most dynamic fields in advanced material science. The green synthesis is more advantageous over chemical and physical method as it is cost coefficient and eco-friendly. Hydroxy Apatite (HAP) is widely used in antimicrobial activities. In the present study synthesis of Hydroxy Apatite nanoparticle using leaf extract of Mentha Piperita has been used. The prepared Hydroxy Apatite nanoparticles were characterized by X-Ray Diffraction (XRD), Scanning Electron Microscope (SEM), Fourier Transform Infrared Spectroscopy (FTIR), Ultraviolet Visible Spectroscopy (U-Vis), Energy Dispersive X-ray Analysis (EDAX) and antimicrobial activity.

Keyword: Hydroxy Apatite, Mentha Piperita, X-Ray Diffraction, Scanning Electron Microscope

E Mail: perumalsangavi2@gmail.com

Corresponding Author Name: Sangavi.P

ISBN NO: 9 789395 423458

MD61

Characterization of Sol gel Synthesis MgO/CuO Nano composite for Photo catalytic activity

Soundarya.T[1,*], Kalaiselvi. v[1],blessymol.B[1], Yasotha. P[1]

[1]Department of Physics, Navarasam Arts and Science college for women, Arachalur, Erode

Abstract

In this present work we discussed about the synthesis and characterization of Magnesium oxide/ Copper oxide nanocomposite and its application. The nano composite is a multiphase material one of the Phase has one, two or three dimensions of less than 100 nanometers (nm). The MgO/CuO composite were synthesized by the solgel method. The synthesized magnesium oxide/Copper oxide nano composite were characterized by X-Ray diffraction, Fourier Transform Infrared Spectroscopy, Energy Dispersive X-Ray Analysis, Ultraviolet-visible Spectroscopy and Scanning Electron Microscope techniques and photo catalytic activity. Then a nanocomposite has unprecedented flexibility and improvement in their physical properties.

Keyword: Nanocomposite, sol-gel method, MgO/CuO nanocomposite, SEM, EDX,

E Mail: soundaryathangavel2001@gmail.com

Corresponding Author Name: Soundarya.T

ISBN NO: 9 789395 423458

MD62

Green Synthesis and Characterization of ZnO Nanoparticle using Sesbania Gandiflora Leaf extract

Vanishree S[1*], Vishalatchi M[1]

[1]Department of Physics, Navarasam Arts and Science college for women, Arachalur, Erode

Abstract

The present study of green synthesis of Zinc Oxide Nanoparticle using Sesbania grandinora leaf extract using Zinc acetate as precursor material and synthesized nanoparticle were characterized by Ultra Violet- Visible Spectroscopy (UV), Fourier Transform Infrared spectroscopy (FTIR), Scanning Electron Microscopy (SEM). The antibacterial activity as investigated for gram positive (staphylococcus aureus) and negative (Escherichia coli) bacteria ZnO can be applied with medical Field.

Keyword: Zinc oxide, Sesbania grandiflora, Antibacterial activity, SEM, FTIR

E Mail: vanisris378@gmail.com

Corresponding Author Name: Vanishree S

ISBN NO: 9 789395 423458

MD63

Comparitive Studies of Antibactirial Activity of Ixora red and Clitoria ternatea by using Tio_2 Nanoparticles

Vishnupriya.M [1], Blessymol B[1*],Yasotha.P[2]

[1]Department of Physics, Navarasam Arts and Science college for women, Arachalur, Erode

Abstract

In this present study the green synthesis of TiO_2 nanoparticles using Ixora Red and Clitoria Ternatea leaf extract by using sol gel method. The Ixora Red and Clitoria Ternatea leaf extracts are used for antibacterical applications. In the current study TiO_2 nanoparticles have been synthesized by using Clitoria Ternatea leaf extract. The prepared samples were characterized by X-Ray diffraction (XRD), Scanning Electron Microscopy (SEM), Fourier Transform infrared Spectroscopy (FTIR), UV-Visible Spectroscopy, Energy Dispersive X-Ray Analysis (EDX) and antibacterial activity. The review will highlight the medical importance of Clitoria Ternatea and Ixora Red.

Keyword: TiO_2, Green Synthesis, Antibacterial,Clitoria Ternatea and ixora Red.

E Mail: blessyphy607@gmail.com

Corresponding Author Name: Vishnupriya.M

ISBN NO: 9 789395 423458

MD64

Ammonia Gas Sensing Properties of DC Magnetron Sputtered Vanadium Oxide Thin Films

A.Paramesvaran *[1] M.Balachandramohan[2]

[1]SriVasavi College,Erode-638316 Tamil Nadu India
[2]Erode Arts and Science College,Erode-638009 Tamil Nadu India

Abstract

In this study, we report the synthesis of vanadium oxide thin films prepared by DC Magnetron sputtering. VOx of the deposited film was studied with Optical, Electrical X-ray diffraction, scanning electron microscopy (SEM), and Raman spectroscopy, respectively. The VOx film surface morphology was examined by Scanning Electron microscopy. The mechanistic steps responsible for the gas-induced resistance changes of polycrystalline metal-oxide sensors have been investigated. Results are presented for VOx gas sensing films. The VOX films experience a decrease in resistance upon exposure to Ammonia. Reduction of surface oxygen is proposed as the dominant mechanism for the increase in conductance in VOx sensing films upon exposure to ammonia. The relative resistance change ($\Delta R/R$) when the sensor was exposed to Vanadium oxide thin films was measured. The film sensors achieved their maximum response values toward NH_3 at room temperature and the optimal concentration at the concentration of 100 ppm. The responses at room temperature were found as 46% for mixed VOx thin films. At room temperature, the sensor exhibited higher gas response, good repeatability and excellent selectivity characteristics toward NH_3 gas due to its high specific surface area, special structure, and large amounts of oxygen vacancies. A suitable operating temperature, sensitivity, response and recovery time of VOx gas sensor was studied for sensing ammonia. The VOx gas sensor exhibited high response and high selectivity to NH_3 against acetone, ethanol, methanol, toluene carbon dioxide, and acetylene at room temperature. Sensors operating at room temperature are especially important for commercial applications.

Keyword: DC Magnetron sputtering, Ammonia sensing, operating temperature
E Mail: paramesvaran_bu@rediffmail.com
Corresponding Author Name: A.Paramesvaran

ISBN NO: 9 789395 423458

MD65

Structural and Optical Properties of Pure and Ni Doped SnO_2 Nanoparticles

A.Priyadharsini[a*] M.Saravanakumar[a], N.Dharanipriya[b]

[a]Assistant Professor of Physics, Gobi Arts & Science College, Gobichettipalayam
[b]II M.Sc., Physics, Gobi Arts & Science College, Gobichettipalayam

Abstract

The chemical co-precipitation method is employed in the preparation of pure and Ni doped SnO_2 nanoparticles. The structural and optical parameters are studied by X-ray diffraction Analysis, EDAX, UV –Visible spectroscopy and Fourier Transform IR Spectroscopy. The casseterite rutile tetragonal phase is confirmed from XRD analysis and also the grain size as 30 nm and 22nm for pure and Ni doped SnO_2 nanoparticles respectively. EDAX reveals the purity of the prepared samples. The direct bandgap values from the tauc plot are found to be decreased for Ni doped SnO_2 nanoparticles than the pure one indicates the enhancement of bandgap energy while adding the dopant. FTIR spectroscopy represents the presence of O- Sn –O stretching and OH bonds.

Keyword: SnO_2, X-ray diffraction Analysis, EDAX, UV-Vis and FTIR

E Mail: priyadharsini.arumugam@gmail.com

Corresponding Author Name: A.Priyadharsini

ISBN NO: 9 789395 423458

MD66

Green Synthesis of TiO_2 using Malabar nut (adhatoda) Leaf Extract for Antimicrobial and Anti fungal Applications

Poongavi.V[1], Blessymol.B*[1], Yasotha.P[2]

[1,2]Department of Physics, Navarasam Arts and Science for Women, Arachalur, Erode

Abstract

The science which involved the manipulation and manufacture of materials and devices on the scale of nanometers is called nanotechnology. Titanium Dioxide (TiO_2) is also called as Titania, a white naturally occurring mineral. Titanium Dioxide Nanoparticles are employed in the preparation of fabrics, windows, and anti-fogging automobile mirrors because of their self-changing and anti-fogging properties. This work illustrates the synthesis and characterizations of Titanium Dioxide (TiO_2) Nanoparticles by green synthesis method using Malabar nut (Adhatoda) extracts. The Malabar Nut (Adhatoda) leaves used in the treatments of cough, colds, asthma etc.., The synthesized nanoparticles were characterized by using X-ray Diffraction(XRD), Scanning Electron Microscopy(SEM), Fourier-Transform Infrared Spectroscopy (FTIR), Ultra Violet-Visible Spectroscopy (UV), Photo Luminance(PL), Energy Dispersive X-ray(EDX), Anti Microbial and Antifungal. Titanium dioxide nanoparticles revealed high potential in Medical Application

Keyword: TiO_2-NPs, Green Synthesis, XRD, SEM, FTIR, Malabar Nut.

E Mail: Email.Id: blessyphy607@gmail.com

Corresponding Author Name: Poongavi.V

ISBN NO: 9 789395 423458

MD67

Recent Advances of Nanocomposites Co_3O_4-rGO for High Performance Electrode for Super capacitor Application

Revahi.P, Vasuki.T

Department of Physics, PKR Arts College for Women, Gobichettipalayam

Abstract

In recent years, the development of energy storage devices has received much attention due to the increasing demand for renewable energy. Super capacitors have emerging significant attention created as energy storage devices due to their high specific power, fast charge–discharge rate and extended cycling stability. Recent research focuses on the search for new electrode materials to enhance the specific capacitance of super capacitors. MOs exhibit easy availability, variable oxidation states and possess high specific capacitance, but they are somewhat difficult to process ,at the same time providing new opportunities for future energy storage technologies. The latest achievements in the production modeling and characterization of super capacitor elements (electrode materials, electrolytes and supporting elements) whose parameters are optimized for long-term self-supply of low power consumers (low voltage, high energy density, and low leakage current,etc.) are considered. Recent studies have shown that there are many new advancement in electrode materials for super capacitors. In this study, we focused on the recent advancement in the cobalt oxides, reduced graphene oxides, and their nano composites as an electrode material for super capacitor.

Keyword: Nanocomposites, Supercapacitor, Electrical Properties, Graphene Oxide, Reduced Graphene oxide, Cobalt Oxide

E Mail: revadhi.krishnan@gmail.com

Corresponding Author Name: Revahi.P

ISBN NO: 9 789395 423458

MD68

Modeling of a 250MHz ST-X Quartz SAW Delay Line Device for Potential Sensor Applications

Banu Priya R[a], Thamaraiselvan.N[b*]

[a]Department of Physics, Gobi Arts and Science College,Gobi
[b*]II M.ScPhysics, Gobi Arts and Science College,Gobi

Abstract

SAW based gas sensing devices have extensive physical and chemical parameters, including surface mass, stress, strain, liquid density, viscosity, permittivity and conductivity. These SAW devices were developed for identification of Chemical Warfare Agents (CWA) like nerve agents, tear agents and etc., The advantages of SAW sensors are their miniaturized size, low cost, highly sensitive and accessibility in remote wireless system. This paper presents the frequency response of a 250 MHz ST-X Quartz SAW delay line device fabricated with uniform IDTs. SAW device design parameters like piezoelectric substrate, structure of IDT, number of finger pairs, device frequency and etc., are optimized and its frequency response studied based on Equivalent Circuit Model via a unique custom made MATLAB algorithm. The results obtained are analyzed to ultimately help in the effective design, development and modelling of such devices for potential applications in specific sensors. Analysis and modelling will provide insight into the influence of the device design parameters on the sensor performance and help in practical design and optimization of SAW based chemical sensor systems. Modelled results are also compared with experimental results and the validation study performed presents good agreement between model and experiment.

Keyword: Surface Acoustic Wave, Interdigital Transducer, Equivalent Circuit Model

E-Mail: rithubanu@gmail.com

Corresponding Author Name: Banu Priya R

ISBN NO: 9 789395 423458

MD69

Synthesis and Characterization of Polyaniline-Aluminium Oxide Nanocomposite($PANI/AL_2O_3$) Using Chemical Oxidative Polymerization

N. Dhachanamoorthi[1], S.R. Gaaviyaa[2], K. Rakhi[3], A.K. Neeraja[3], C. Monika[3]

[1]Assistant Professor & Head, Department of Physics, Vellalar College for Women, Erode-12
[2]PhD Scholar, Department of Physics, Vellalar College for Women, Erode-12, Tamilnadu, India
[3]II M.Sc. Physics, Department of Physics, Nandha Arts and Science College, Erode-52, Tamilnadu

Abstract

The development of high-performance materials with enhanced mechanical and thermal properties is an area of intense research. Metal oxide nanocomposites are materials composed of metal oxide nanoparticles dispersed in a matrix of another material. The matrix material can be a polymer, ceramic, or another metal oxide. By controlling the size, shape, and distribution of the metal oxide nanoparticles in the matrix, it is possible to tailor the properties of the nanocomposite material to specific applications. The addition of metal oxide nanoparticles to a polymer matrix can improve its mechanical strength, thermal stability, and electrical conductivity. Polyaniline can be doped with protonic acids depending on its oxidation states. $PANI/Al_2O_3$ nanocomposites have potential applications in various fields such as electronics, energy, catalysis, and biomedicine. . Several methods for synthesizing aluminium oxide, including sol-gel, hydrothermal, and combustion methods and oxidative polymerization. In this study, we synthesized metal oxide nanocomposites by incorporating aluminium metal oxide nanoparticles (NPs) into a polymer matrix by chemical polymerization method. The developed absorbent was characterized using various analytical techniques such as UV-visible absorbance spectroscopy, Fourier Transform Infrared Spectroscopy (FTIR), and Antimicrobial property. The results showed that $PANI/Al_2O_3$ nanocomposite were proven to exhibit excellent absorbance nature and the antimicrobial property for various microbes with the finger prints of vibrating molecules.

Keyword: $PANI/Al_2O_3$nanocomposite, Synthesis, Characterization

E-Mail: dhachu83@gmail.com

Corresponding Author Name: N. Dhachanamoorthi

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MD70

Significance and incorporation of Nb_2O_5 nanoparticles in polymer matrix: Property modificationof Nanocomposites

N.Dhachanamoorthi[1], P.Swetha[2], K.Oviya[3]

[1]Assistant Professor & Head, Department of Physics, Vellalar College for Women, Erode-12
[3]II M.Sc. Physics, Department of Physics, Nandha Arts and Science College, Erode-52, Tamilnadu
[2]PhD Scholar, Department of Physics, Vellalar College for Women, Erode-12, Tamilnadu, India

Abstract

In this point of view, the preparation of organic-inorganic hybrid nanocomposites materials has received more research applications in recent decades. Polyaniline is basically produced in the form of long-chain polymer nanoparticles. Typically, chemical and electrochemical methods are used in the synthesis of PANI nanoparticles. Polyaniline-Niobium oxide (PANI-nNb_2O_5)hybrid nanocomposites were synthesized by chemical oxidative polymerization method for expanding the weight% of nNb_2O_5 nanoparticles such as 25%, 50% and 75%.The chemical formation of pure PANI and PANI-nNb_2O_5 nanocomposites is revealed by Fourier Transform Infrared Spectroscopy (FTIR) and to analyze the chemical properties and observed wave number region, wavenumber shifting and stretching vibration changes the pure PANI and PANI-nNb_2O_5 nanocomposites. The optical properties are characterized by UV-Visible spectrophotometer and the band gap value of pure PANI and (PANI-nNb_2O_5) (25%), (50%),(75%) are calculated. In generally the UV-vis spectrum of pure PANI there are two bands obtained in the wavelength region ≈330nm and ≈643nm. The band gap and intensity of the peaks of nanocomposites are decreased while the Niobium oxide nanoparticles is incorporate in the polymer matrix with the weight % is increased. The crystalline nature of pure PANI and its nanocomposites were studied by using the X-Ray pattern. Polyaniline has an amorphous nature. The X-Ray diffraction pattern showed sharp peaks due to structure of nanocomposites of Niobium oxide in polyaniline. The results of FESEM images showed that the different morphology from agglomeration to nNb_2O_5nanoparticles in the polyaniline materials. In the elements of C, H and O and Nb the weight % the element composition were characterized using EDAX techniques. Pure PANI and (PANI-nNb_2O_5) (25%),(50%),(75%) nanocomposites were tested for antibacterial activity and were found to illustrate the antibacterial activity against gram absolute as well as gram opposing bacterial strains at micromolar absorption. Polymer-Metal matrix nanocomposites are used in several applications fields such as electrochromic devices, oxygen sensors, electronic conductivity, longer-term stability, LED and solar cell etc.,

Keyword: Nb_2O_5, Polyaniline, FESEM, FTIR, UV-VIS, EDAX

E-Mail: dhachu83@gmail.com

Corresponding Author Name: N. Dhachanamoorthi

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MD71

Synthesis and Characterization of Ni Doped Iron Oxide Nanoparticles by Simple Hydrothermal Method

R.Viji, L.Chandra, R.Kalaivani

Department of Physics, Nandha Arts and Science College, Erode-638 052,TamilNadu.
PG & Research Department of Physics, Chikkaiah Naicker College (NAAC 'A'), Erode
PG & Research Department of Physics, Chikkaiah Naicker College (NAAC 'A'), Erode

Abstract

Iron oxide nanostructures have been considered very promising material as electrode in electrochemical energy storage devices because of their lower cost of synthesis and high theoretical charge storage capacity. Iron oxide nanoparticles and their nanocomposites have performed excellent in super capacitor. Firstly, Iron oxide (Fe2O3) nanoparticles were synthesized by a simple hydrothermal synthesis method using only $Fe(NO_3)_3$, H2O and NaOH as raw materials. The main problems associated with iron oxide based electrodes are their poor electrical conductivity and cycle stability. In order to increase their Electrochemical performance, we added Nickel Nitrate Ni(NO3)2. The above synthesized material have been characterized by using X-ray diffraction (XRD) and specific capacitance can be calculated in the cyclic volt ammetry (CV) study. The observed value indicates that the better theoretical capacitance value.

Keyword: Super capacitor, Hydrothermal synthesis, Fe_2O_3

E-Mail: l.chandra123@rediffmail.com

Corresponding Author Name: L.Chandra

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MD72

An Effective Nanocomposite of Poly (O-Toluidine) -Manganese (II) Oxide Preparation, Characterizations, and its Applications of Antibacterial Activity

S. Tamilselvan[1], R.Thiyagarajan[2] , N. Dhachanamoorthi [3]

[1]Research Scholar, PG & Research Department of Physics, Chikkaiah Naicker College, Erode
[2]Assistant Professor, PG & Research Department of Physics, Chikkaiah Naicker College, Erode
[3]Assistant Professor, PG Department of Physics, Vellalar College for Women, Erode

Abstract

Conductive Poly (o-toluidine) (POT) was synthesized by insitu chemical oxidative polymerization in the presence of sulfuric acid (H_2SO_4) as the dopant and ammonium per sulfate (APS) as the oxidant. POT-MnO nanocomposites with different contents of MnO(10%, 25%, 50%, 75% and 90wt %) were prepared via mechanical mixing method. In this study, the POT-MnO nanocomposites synthesized by mechanical mixing method with different amounts of the MnO nanoparticles. The structural optical, crystalline, surface morphology and elemental analysis of the as synthesized POT-MnO were studied. The prepared samples were characterized using techniques such as Fourier transforms infrared (FTIR), UV-Visible spectroscopy (UV-Vis), X-ray diffraction(XRD), Scanning electron microscopy (SEM) &Energy dispersive X-ray analysis (EDAX). Moreover, the antibacterial activity properties of the nanocomposites were investigated. FTIR spectra revealed to the formation of some interactions between POT macromolecule and the MnO nanoparticles, The energy band gaps as calculated through the Tauc relation were found to be gradually decreased with the increasing the amount of MnO in POT-MnO nanocomposites. The XRD analysis ensures that POT-MnOhave a single phase cubic structure. The crystalline size analysis revealed that the size changed with increasing MnO amount in the POT-MnO, because of the aggregation effect. The XRD and the SEM images of the nanocomposites showed different aggregations for the different Manganese contents. The agglomerated nanoscale spherical shell like structure of the pure POT is converted into more uniform core-shell morphology containing MnO. EDAX results confirmed that the MnO were successfully incorporated in the POT matrix. Finally the antibacterial activity revealed the zone of inhibition of two bacteria, *Escherichia coli* and *staphylococcus aureus* activity were selected. The zone of inhibition is increased with increasing the concentration of the MnO nanopaticles; this effect is very useful in medical field application.

Keyword: Poly (o-toluidine) (POT), POT-MnO, Sulfuric acid, Ammonium Persulfate, Antibacterial activity

E-Mail: tamilpriyan001@gmail.com

Corresponding Author Name: S. Tamilselvan

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