Indo-South Korea-Thailand 2nd International e-Conference on Nanoscience and Nanotechnology for Energy, Environment and Biomedical Applications (iNEEBA-2022)

iNEEBA-2022

Jointly Organized by

24th-25th November, 2022

Vinayaka Mission's Kirupananda Variyar Arts and Science College
A Constituent College of
Vinayaka Mission's Research Foundation
(Deemed to be University under Section 3 of the UGC act, 1956)
NAAC Accredited, ISO 21001 : 2018 Certified Institution

CORE Core-Facility Center for Photochemistry & Nanomaterials
GYEONGSANG NATIONAL UNIVERSITY

Chula Chulalongkorn University

zoom

24-25, NOVEMBER 2022
STARTS AT
09.00 AM (IST)

+91-9698475699
+91-8600673023
ineebavmkvasc@vmu.edu.in

Important Dates

Abstract Submission Starts	: 15/09/2022
Last Date for Abstract Submission	: 15/10/2022
Abstract Acceptance Intimation	: 19/10/2022
Manuscript Submission Starts	: 20/10/2022
Last Date for Manuscript Submission	: 31/10/2022
Early Bird Registration	: 02/11/2022
Registration Deadline	: 20/11/2022

About *i*NEEBA 2022

For Registration : https://forms.gle/jep81gSKuybCd9yJ7
For Payment Information : https://forms.gle/dJK3CFYXhTDBGSax7

The second international e-conference on **Nanoscience and Nanotechnology for Energy, Environment and Biomedical Applications (iNEEBA-2022)** will be held during **November 24th-25th, 2022**. This conference includes keynote lectures from eminent scientists across the world, oral presentation and poster presentation of various aspects Nanoscience and Nanotechnology. The goal of this e-conference is to create a platform for materials scientists/physicists/chemists from academic institutions and industries around the world to present breakthroughs in their disciplines and foster a virtual atmosphere favourable to exchanging ideas and scientific information. The iNEEBA 2022 invites abstracts and full-length manuscripts in the thematic areas of materials science and biomaterials for oral/poster presentations and peer-reviewed publications.

Conference Themes

www.ineebavmkvasc.com

01 Thin films & Coatings
02 Photovoltaics / Thermal & Photocatalysis
03 Batteries & Supercapacitors
04 Nanocomposites, Biomaterials, Magnetic Nanomaterials
05 Biomedical devices
06 Food & Agriculture
07 Healthcare
08 Corrosion

Events ...

Keynote Lectures | Oral Presentations | Poster Presentations | Technical Discussions

Publication

iNEEBA 2022 invites full-length original articles from research scholars, faculties, scientists, and industry professionals from India and across the world. The selected papers will be peer-reviewed and published in the following journals.

Keynote Speakers

Prof. Dr. MYONG YONG CHOI
Director of Core-Facility Center for
Photochemistry and Nanomaterials, GNU, South Korea

Prof. Dr. SOORATHEP KHEAWHOM
Department of Chemical Engineering
Faculty of Engineering, Chulalongkorn University, Thailand

Invited Speakers

Prof. Anongnat Somwangthanaroj
Associate Dean,
Dept. of Chemical Engineering
Faculty of Engineering,
Chulalongkorn University, THAILAND

Prof. S. Anandan
Nanomaterials & Solar Energy
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Department of Chemistry,
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DELEGATE FEE (ONLINE PAYMENT)

ACCOUNT NAME	Principal Vinayaka Mission's Kirupananda Variyar Arts & Science College
ACCOUNT NUMBER	999012328
IFSC CODE	IDIB000P221
SWIFT CODE	IDIBINBB
BRANCH CODE	2409
Bank, Branch & Address	Indian Bank, Periyaseergapadi, Salem - 636308.

Registration and Participation Fee

Category	01st Nov 2022	After 01st Nov 2022
Indian Delegate Students/Scholars	INR 500	INR 600
Staff/Scientist/Faculties	INR 700	INR 800
Staff/Scientist from Industry	INR 1000	INR 1200
Participation only	INR 200	INR 250
Foreign Delegate	USD 25	USD 30
Foreign Participation only	USD 15	USD 20

Note : Additional charges applicable for publishing full-length article as per the journal's norms.

About Vinayaka Mission's Research Foundation

Vinayaka Missions had its inception in the year 1981 with the establishment of the Thirumuruga Kirupananda Variyar Thavathiru Sundara Swamigal (TKVTSS) Medical Educational and Charitable Trust. Not far from then, in 1982, the Founder-Chairman, Dr. A. Shanmugasundaram instituted the Vinayaka Mission's College of Pharmacy in Salem, the pioneer institution of Vinayaka Missions. In the year 2001 the "Deemed to be University" status was conferred on Vinayaka Missions by The Ministry of Human Resources Development, Government of India, with the recommendations of the UGC Under Section 3 of the UGC Act, 1956 as an acknowledgement of its excellence, satisfaction of the highest level of academic standards and best infrastructural facilities provided to achieve preeminence in education and by virtue of this recognition Vinayaka Missions trascended to becoming Vinayaka Mission's Research Foundation (VMRF) as the 48th University in India.

The conducive environment provided by the University helps every student to achieve excellence in their chosen field of specialization. Nearly 15,000 students are studying in the various constituent colleges, and every year approximately 2000 medical, dental, homoeopathy, paramedical, engineering and management professionals besides arts & science graduates graduate from the VMRF campuses successfully. The dynamic environment created by the Trust helps every student to develop his/ her rational, critical and creative powers, thereby enabling the fullest possible intellectual and personal growth.

Close to 5000 staff members including renowned Faculty, technical and other experts serve our student community to achieve excellence in education and to make studying at VMRF institutions an extremely pleasurable and rewarding experience. The success of VMRF lies in its highly qualified and experienced faculty who are competent and dedicated to provide excellent education. VMRF takes pride in being the only one of its kind in India that has established three medical colleges, one dental college, and two engineering colleges apart from other nursing and homoeopathy colleges.

About Vinayaka Mission's Kirupananda Variyar Art & Science College

Vinayaka Mission's Kirupananda Variyar Arts and Science College (VMKVASC), a Constituent College of Vinayaka Mission's Research Foundation Deemed to be University, Salem, serves the rural society by offering top quality education and inculcating the research and development attitude among student community. VMKVASC was started in 1995 as an affiliated college to the University of Madras. Later, it was affiliated to Periyar University, Salem in the year 1997. VMKVASC became a constituent college of Vinayaka Mission's Research Foundation Deemed to be University in 2004 and has been Accredited with 'A' Grade by the National Accreditation and Assessment council. Currently the Institution offers 7 Undergraduate Courses, 7 Post Graduate Courses and Ph.D. Programme in Chemistry, Computer Science and Physics. The Institution is ISO 21001:2018 Certified Institution and recognized as top performing nodal centre for Virtual lab. The Institution has constituted Rural Entrepreneurship Development Cell and serving the rural community for the betterment of their business or enterprises by providing the technical knowledge. VMKVASC is collaborating with institution of national importance for research and development activities. The Institution serves the Society with its best Education System, Excellent Infrastructural facilities, Laboratories, Information Resource Centers etc., especially for the poor and the down trodden rural people in and around the geographical surroundings of the Institution.

To develop advanced research in the fields of nanoscience and nanotechnology, the Centre for Research and Development was established in January 2022 on the college campus. Vinayaka Missions Kirupananda Variyar Arts and Science College is responsible for the center's establishment. The primary research areas are in the fields of nanoscience, nanotechnology, nanomaterials. The major equipment's include Ultra Performance Liquid Chromatography (UPLC), Gas Chromatography (GC), DC power supply, etc.., The centre not only conducts research but also conducts workshops, conferences at the national, and international levels, as well as training and awareness programmes on the latest developments in nanoscience as they relate to a variety of issues of national significance.

About GNU

Gyeongsang National University (GNU) is the leading National University representing Gyeongnam in South Korea that creates a better future for mankind with the pioneering spirit of challenge and creativity. GNU is recognized for its world-class research capabilities in the fields of Life Sciences, Aerospace & Mechanical Engineering, and Nano & Advanced Materials, and is implementing various national projects. It also provides a high level of education through a systematic curriculum and creative convergence classes.

In particular, in the Department of Chemistry, "Graduate School for Molecular Material Chemistry" has been selected as a research platform in the 4th stage Brain Korea 21 (BK21) project that aims to support and develop creative and future-oriented professionals who can promote regional development and the prestige of the country at the international level. By strengthening joint research inside and outside the project groups with domestic and excellent international researchers, GNU-Chem derives international-level research results in the fields of eco-friendly nano-bio materials, medical diagnosis, catalysis, and optoelectronic materials. GNU-Chem also aims to cultivate high-quality graduate students who will contribute to the development of national and regional science and technology. GNU is a global University that fosters outstanding talent through new ideas and innovative research, and as a National University that leads a regional innovation platform for a hopeful future for all.

About the Core-Facility Centre

Gyeongsang National University's (GNU) Core-Facility Centre specialized in photochemistry and nanomaterials is a leading research infrastructure facility. The primary focus of the Centre is to provide world-class and highly sophisticated analytical instruments for advanced nanomaterials researches. The GNU Core-Facility Centre, supported by the Ministry of Education, Government of Korea, strengthens the R&D capacity of research institutes, creates an efficient research-oriented ecosystem, promotes joint research among researchers in the future, and further strengthens basic science research capacity. It also provides solutions necessary for all research including the pretreatment process, data collection, and data analysis, and serves as a mentor for systematic analysis and research for users. The Centre has created an independent space according to the characteristics of the equipment. There are more than 20 instruments related to photochemistry and nanomaterials, including X-ray diffraction, X-ray photoelectron spectroscopy, Raman spectroscopy, BET surface area analyzer, TGA/DTA thermal analyzer, GC-mass, High-performance liquid chromatography, field-emission scanning electron microscope equipped with energy-dispersive X-ray spectrometer, ultra-low temperature laser fluorescence analyzer, laser ablation systems, etc.. Through the Core-Facility center, we will create a technological synergy to cope with the fourth industrial revolution in the future and contribute to innovative research.

ABOUT CHULALONGKORN UNIVERSITY

Founded in March 1917, Chulalongkorn University is Thailand's first institution of higher learning. The groundwork and preparation for the university's establishment, however, took place almost half a century earlier. The worldwide economic, social, and political changes in the late nineteenth century compelled Siam, as Thailand was officially called until 1939, to adapt in order to avoid Western colonization. King Chulalongkorn (Rama V) introduced a royal policy to strengthen and improve the government so that the country could successfully resist the tides of colonialism. One of the major parts of this policy was to improve the Siamese educational system to produce capable personnel to work in both the public and private sectors. To this end, a school was founded in 1871 at the Royal Pages Barracks within the Grand Palace compound. Then, in 1882, King Chulalongkorn upgraded the school and gave it the name “Suankularb”. In the same year, the King also established other schools, including the Army Cadet School, the Cartographic School, the School for Princes and the School for Dhamma Studies.

“All of our subjects, from our royal children down to the lowest commoners, will have the same opportunity to study – be they royals, nobles or commoners.”

This quote, taken from King Chulalongkorn's royal speech to members of the royal family and civil servants, is confirmation of His Majesty's belief in equal educational opportunity. The King granted the policy to set up schools throughout the kingdom, together with institutions of higher learning, and declared, “…education in our country must have the highest priority, which I am determined to develop.” Recalling the original intention of his late father, King Chulalongkorn, to establish an institution of higher learning, King Vajiravudh (Rama VI) ordered that the Royal Pages School be elevated into an institution of higher education and named it The Civil Service College of King Chulalongkorn on January 1, 1911. In the beginning, the course of study focused on government. Eventually, the curriculum expanded to meet the needs of the kingdom and included more disciplines, such as law, international relations, commerce, agriculture, engineering, medicine and teacher education. The Civil Service College then used proceeds donated by members of the royal family, government officials and ordinary citizens to commission a statue of King Chulalongkorn the Great. Once completed, about 800,000 baht of the collected funds remained in the Royal Treasury Ministry. With interest, the sum accumulated and King Vajiravudh then gave it to the college, to be used as the original capital. Furthermore, he graciously donated the palace of his brother, the late Crown Prince Vajirunhis, as the site of the college and gave around 520 acres of the King's private land adjacent to the palace for the college's future expansion. Soon after, the Administration Building was constructed as the college's first building in January 1915. After several years of operation, King Vajiravudh knew that the Civil Service College was now ready for its next transformation. On March 26, 1917, His Majesty declared that the college become Chulalongkorn University, in memory of his father. The newly founded university was under the supervision of the University Affairs Department, Ministry of Education, and Phraya Anukijwithoon was the first principal (the title was changed to Rector in 1935). There was a University Council, which was responsible for policy making, planning and advising on the affairs of the university. Prince Damrong Rajanupab was the Chairman of the Council, and the principal of the university was the Secretary. When it was first founded, the university had 380 students, four faculties, and two campuses. The Faculty of Medicine was located at Siriraj Hospital, the Faculties of Public Administration and Engineering were housed in the Administration Building, and the Faculty of Arts and Science was in Prince Vajirunhis' palace in Patumwan district. The Law School was under the responsibility of the Ministry of Justice until the university was ready to take over, and the Teachers' Training School was handed over to the Ministry of Education.

In 1923, the university accepted high school graduates to study in the Faculty of Medicine and received support from the Rockefeller Foundation to organize a Bachelor's degree program in medicine. Five years later, the first group of 18 graduates completed their studies and were awarded the first medical degrees in the kingdom. By 1929, the Faculty of Public Administration became the Faculty of Law and Political Science. In 1933, a year after the establishment of the constitutional monarchy, the government transferred the faculty to Thammasat University, which was established in 1934. From 1934 to 1958, the university focused on the improvement of undergraduate education; thus, more faculties were established. In 1961, the university established the Graduate School followed by numerous research centers and institutes.

The history of Chulalongkorn University is one of transformation and development. This has not changed. Over the century, the university has continuously worked for excellence in education and research, befitting itself to the name of a beloved monarch, King Chulalongkorn the Great.

About Department of Chemical Engineering

Chemical engineering discipline started at the Faculty of Engineering, Chulalongkorn University, as an Industrial Chemistry major under the administration of the Department of Industrial Engineering in 1961. In the 1970s, to complement Thailand's vibrant agriculture-based economy, the Thai industrial sector strategically expanded into the petroleum and petrochemical industry. The Faculty had the foresight to formally set up the Department of Chemical Engineering in 1975: the department would provide a complete and up-to-date undergraduate curriculum and produce engineers qualified to meet many challenges of the up and coming industry. The department began to offer a Master's program in 1976 and, as one of its major milestones, the country's first Doctoral curriculum in 1989. The department's activities have continued to evolve, bringing many recognitions over the years. Our undergraduate curriculum was one of the firsts to be certified by the Thailand Accreditation Body for Engineering Education (TABEE) in 2017. The department has been acclaimed as a premier department in less than 5 decades, being ranked by the QS World University Ranking in both 2019 and 2020 to be the top Chemical Engineering Department in Thailand, the Top 5 in ASEAN, and the Top 101-150 in the world.

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&

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iNEEBA-2022
Conference Proceedings

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Dr. J. Theerthagiri
Dr. R. Ganesamoorthy
Dr. C. Karthik Kumar

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November 24-25, 2022

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Chancellor

Message

It is a great pleasure to note that Vinayaka Missions Kirupananda Variyar Arts and Science College, Salem is jointly organizing the second international e-conference on "**Nanoscience and Nanotechnology for Energy, Environment and Biomedical Applications (iNEEBA-2022)**" along with **Core-Facility Centre for Photochemistry & Nanomaterials, Gyeongsang National University, Republic of Korea, Department of Chemical Engineering, Chulalongkorn University, Thailand** during November 24-25, 2022. It is indeed a unique event to bring this special topic on energy, environment and biomedical research with the support from scientists of **Malaysia, United Arab Emirates, Republic of Korea and Taiwan.**

The International event aims for the incorporation of pioneering ideas on Nanoscience and Nanotechnology which has become the prime focus for the past three decades. Recent development in nanomaterials through nanotechnology and advances in science and technology have aided in the progression towards energy, environment and biomedical applications. I would like to take this opportunity to congratulate and thank the organizers, and every member of the event committee for their constant effort to bring out emerging field to the forefront of global discussion. It is also worthy to know that this conference will be an exact platform to young researchers, students, scholars to make presentation about their innovative ideas and learn from experiences of senior scientists.

I whole heartedly congratulate the conveners, organizers and all the committee members for their sincere and dedicated contribution in releasing a high-quality souvenir book based on input from delegates from all around the world. I extremely offer my sincere appreciation to the distinguished speakers from India and other countries, who sacrificed their time to share their expertise and impart their knowledge to the delegates of iNEEBA-2022.

I wish the conference a great success.

Dr.A.S. Ganesan

VINAYAKA MISSION'S
RESEARCH FOUNDATION
(Deemed to be University under section 3 of the UGC Act 1956)

Dato' Seri. Dr.S. Sharavanan
Pro-Chancellor

Message

I'm very happy the Vinayaka Mission's Kirupananda Variyar Arts and Science College, Salem in collaboration with Core-Facility Center for Photochemistry & Nanomaterials, Gyeongsang National University, South Korea and Department of Chemical Engineering, Chulalongkorn University, Thailand, is organizing "The Indo-South Korea-Thailand 2nd International e-conference on Nanoscience and Nanotechnology for Evergy, Environment and Biomedical Applications (INEEBA 2022) on 24th and - 25th November 2022 through virtual mode.

Organising such conferences, especially with the participation of other countries will greatly help the students for exchange of technical knowledge and to know the advancements in technolgy achieved in those countries. This will also facilitate our students to gain friendship of foreign students and also the faculty team of those institutions, which will greatly help them for further studies and employment opportunities ina foreign country.

I wish all the students and the faculty team of our institution to actively participate in this conference and make it a grand success.

Dato' Seri Dr.S. Sharavanan

VINAYAKA MISSION'S
RESEARCH FOUNDATION
(Deemed to be University under section 3 of the UGC Act 1956)

Mr.N.V. Chandrasekar
Vice President

Message

It is quite gratifying to note that, Vinayaka Missions Kirupananda Variyar Arts and Science College, Salem is organizing the second international e-conference on "**Nanoscience and Nanotechnology for Energy, Environment and Biomedical Applications (iNEEBA-2022)**" in association with **Core-Facility Centre for Photochemistry & Nanomaterials, Gyeongsang National University, Republic of Korea, Department of Chemical Engineering, Chulalongkorn University, Thailand** during November 24-25, 2022. It is very happy to know that the conference has a special emphasis on application of nanoparticles in the field of energy, environment and biomedical research.

Organizing such a conference at this point of time reinforces our objective of developing nanomaterials through nanotechnology for the exchange of ideas towards technological developments. I wish the conference would be able to focus on current issues of national and international relevance, particularly in the field of nanoscience and nanotechnology for its application in the field of energy, environment and biomedical research.

I am very happy to know about the energy is the key theme of this international conference. I also understand that the iNEEBA-2022 will also converse with new avenues involved in nanoscience and technologies related to synthesis of energy, biomaterials, conservation of energy, advanced materials for energy, environment and biomedical applications, etc. I am sure that this conference will provide an affable environment for the researchers and students to freely exchange the views on nanoscience-related fields such as energy, environment, and biomedical research with others. I convey my wishes and greetings to the organizing committee and the participants and extend my heartiest wishes for the success of the conference.

This conference will provide an excellent oppurtunity for young researchers to interact with professionals from many India and other countries to share their expertise about new advancements in the field of energy, environment & biomedical research.

I wish the International Conference a great success.

N.V. Chandrasekar

VINAYAKA MISSION'S
RESEARCH FOUNDATION
(Deemed to be University under section 3 of the UGC Act 1956)

Prof. Dr. P.K. Sudhir
Vice-Chancellor

Message

I am happy to note that Vinayaka Missions Kirupananda Variyar Arts and Science College, Salem is jointly organizing an International Conference on "**Nanoscience and Nanotechnology for Energy, Environment and Biomedical Applications (iNEEBA-2022)**" with **Core-Facility Centre for Photochemistry & Nanomaterials, Gyeongsang National University, Republic of Korea, Department of Chemical Engineering, Chulalongkorn University, Thailand** during November 24-25, 2022. I'm pleased to remark that scientists from **Malaysia, United Arab Emirates, Republic of Korea, Thailand and Taiwan** are participating and delivering invited lectures.

Over the past 200 years, several research studies have been carried out on the synthesis of novel functional materials based on metals, ceramics, polymers, and advanced materials. The enormous range of technological applications made available by biomaterials, nanomaterials, sensors, green catalysts, solar energy harvesters, supramolecules, and other cutting-edge materials make them more enticing. Due to their ability to change some of their physical properties, nanomaterials serve as the foundation for the most cutting-edge hybrid devices that are now available. iNEEBA-2022 focuses on a wide variety of smart materials are being studied in nanoscience, along with their properties and potential uses. As a result, it gives researchers a forum to debate their results and develop understanding in the field of nanoscience and nanotechnology.

I express my special thanks and gratefulness to the Conveners, Organizing Committee of iNEEBA–2022 and I wish them very best for the success of the event.

Prof. Dr. P.K. Sudhir

VINAYAKA MISSION'S
RESEARCH FOUNDATION
(Deemed to be University under section 3 of the UGC Act 1956)

Prof. Dr. B. Jaykar
Registrar

Message

In recent years, there has been a lot of interest in smart and responsive materials. These materials have been used in the development of active devices and sensors in advanced sectors, particularly those devoted to small-scale applications, because they have the ability to generate autonomous functions or offer a desired reaction to external activities.

Nanotechnology has greatly improved the performance of biosensors; the inclusion of nanomaterials like nanoparticles, nanowires, carbon nanotubes, and graphene. The meso- or macroscopic arrangement of the constitutive elements, as well as the chemistry underlying their microstructure, can be designed to provide such responsiveness. Indeed, when molecular responsiveness is appropriately arranged, the nanoscale reaction may be recognized collectively at the macroscale, resulting in a responsive material.

The emerging discipline of nanotechnology at the boundary of life sciences and chemistry offers a wide range of prospects within a number of fields like fabrication and characterization of nanomaterials, supramolecular chemistry, targeted drug supply and early detection of disease related biomarkers.

iNEEBA-2022 is an excellent chance for scholars from all around the world to share their perspectives on the rapidly evolving subject of Nanoscience and technology. I congratulate and thank the organizers and committee members for their outstanding contributions towards the event.

My congratulations and best wishes.

B. Jaykar

Prof. Dr. B. Jaykar

Message From Organizing Committee

As the organizing committee of the conference, we are delighted to extend a heartfelt greeting to all of the delegates of "**Nanoscience and Nanotechnology for Energy, Environment and Biomedical Applications (iNEEBA-2022)**" along with **Core-Facility Centre for Photochemistry & Nanomaterials, Gyeongsang National University, Republic of Korea, Department of Chemical Engineering, Chulalongkorn University, Thailand** during November 24-25, 2022. Biomaterials have embarked in a technological revolution that has benefited millions of people throughout the world. The increased accessibility of modern technology combined with improvements in our understanding of disease opened up new possibilities for the use of biomaterials in unimaginable ways. iNEEBA-2022 has received more than 150 research papers and were divided into oral and poster sessions. The invited talks of the speakers from India and abroad are also included. highlights major areas of emerging biomaterials such as composite materials, nanobiomaterials, surface engineering, implant coatings, smart materials, and their latest applications in innumerable biomedical fields.

In order to connect with one another and exchange their research efforts, eminent researchers, scientists, and technicians from national laboratories, research centres, and academic institutions from across India and overseas convened on a same platform on this auspicious occasion. Hope all the participants will be benefitted from the conference with the efforts of all members supported directly and indirectly to make the event a grand success.

Organizing Secretaries

Prof. Dr. V. Anbazhagan	**Dr. C. Karthik Kumar**	**Dr. M. Jeyakanthan**	**Dr. R. Ganesamoorthy**
Principal, VMKVASC	Assistant Professor	Assistant Professor	Assistant Professor
Salem, India	VMKVASC, Salem	VMKVASC, Salem	VMKVASC, Salem

About Vinayaka Mission's Research Foundation

Vinayaka Missions had its inception in the year 1981 with the establishment of the Thirumuruga Kirupananda Variyar Thavathiru Sundara Swamigal (TKVTSS) Medical Educational and Charitable Trust. Not far from then, in 1982, the Founder-Chairman, Dr. A. Shanmugasundaram instituted the Vinayaka Mission's College of Pharmacy in Salem, the pioneer institution of Vinayaka Missions. In the year 2001 the "Deemed to be University" status was conferred on Vinayaka Missions by The Ministry of Human Resources Development, Government of India, with the recommendations of the UGC Under Section 3 of the UGC Act, 1956 as an acknowledgement of its excellence, satisfaction of the highest level of academic standards and best infrastructural facilities provided to achieve preeminence in education and by virtue of this recognition Vinayaka Missions trascended to becoming Vinayaka Mission's Research Foundation (VMRF) as the 48th University in India.

The conducive environment provided by the University helps every student to achieve excellence in their chosen field of specialization. Nearly 15,000 students are studying in the various constituent colleges, and every year approximately 2000 medical, dental, homoeopathy, paramedical, engineering and management professionals besides arts & science graduates graduate from the VMRF campuses successfully. The dynamic environment created by the Trust helps every student to develop his/ her rational, critical and creative powers, thereby enabling the fullest possible intellectual and personal growth.

Close to 5000 staff members including renowned Faculty, technical and other experts serve our student community to achieve excellence in education and to make studying at VMRF institutions an extremely pleasurable and rewarding experience. The success of VMRF lies in its highly qualified and experienced faculty who are competent and dedicated to provide excellent education. VMRF takes pride in being the only one of its kind in India that has established three medical colleges, one dental college, and two engineering colleges apart from other nursing and homoeopathy colleges.

About Vinayaka Mission's Kirupananda Variyar Art & Science College

Vinayaka Mission's Kirupananda Variyar Arts and Science College (VMKVASC), a Constituent College of Vinayaka Mission's Research Foundation Deemed to be University, Salem, serves the rural society by offering top quality education and inculcating the research and development attitude among student community. VMKVASC was started in 1995 as an affiliated college to the University of Madras. Later, it was affiliated to Periyar University, Salem in the year 1997. VMKVASC became a constituent college of Vinayaka Mission's Research Foundation Deemed to be University in 2004 and has been Accredited with 'A' Grade by the National Accreditation and Assessment council. Currently the Institution offers 7 Undergraduate Courses, 7 Post Graduate Courses and Ph.D. Programme in Chemistry, Computer Science and Physics. The Institution is ISO 21001:2018 Certified Institution and recognized as top performing nodal centre for Virtual lab. The Institution has constituted Rural Entrepreneurship Development Cell and serving the rural community for the betterment of their business or enterprises by providing the technical knowledge. VMKVASC is collaborating with institution of national importance for research and development activities. The Institution serves the Society with its best Education System, Excellent Infrastructural facilities, Laboratories, Information Resource Centers etc., especially for the poor and the down trodden rural people in and around the geographical surroundings of the Institution.

To develop advanced research in the fields of nanoscience and nanotechnology, the Centre for Research and Development was established in January 2022 on the college campus. Vinayaka Missions Kirupananda Variyar Arts and Science College is responsible for the center's establishment. The primary research areas are in the fields of nanoscience, nanotechnology, nanomaterials. The major equipment's include Ultra Performance Liquid Chromatography (UPLC), Gas Chromatography (GC), DC power supply, etc.., The centre not only conducts research but also conducts workshops, conferences at the national, and international levels, as well as training and awareness programmes on the latest developments in nanoscience as they relate to a variety of issues of national significance.

About GNU

Gyeongsang National University (GNU) is the leading National University representing Gyeongnam in South Korea that creates a better future for mankind with the pioneering spirit of challenge and creativity. GNU is recognized for its world-class research capabilities in the fields of Life Sciences, Aerospace & Mechanical Engineering, and Nano & Advanced Materials, and is implementing various national projects. It also provides a high level of education through a systematic curriculum and creative convergence classes.

In particular, in the Department of Chemistry, "Graduate School for Molecular Material Chemistry" has been selected as a research platform in the 4th stage Brain Korea 21 (BK21) project that aims to support and develop creative and future-oriented professionals who can promote regional development and the prestige of the country at the international level. By strengthening joint research inside and outside the project groups with domestic and excellent international researchers, GNU-Chem derives international-level research results in the fields of eco-friendly nano-bio materials, medical diagnosis, catalysis, and optoelectronic materials. GNU-Chem also aims to cultivate high-quality graduate students who will contribute to the development of national and regional science and technology. GNU is a global University that fosters outstanding talent through new ideas and innovative research, and as a National University that leads a regional innovation platform for a hopeful future for all.

About the Core-Facility Centre

Gyeongsang National University's (GNU) Core-Facility Centre specialized in photochemistry and nanomaterials is a leading research infrastructure facility. The primary focus of the Centre is to provide world-class and highly sophisticated analytical instruments for advanced nanomaterials researches. The GNU Core-Facility Centre, supported by the Ministry of Education, Government of Korea, strengthens the R&D capacity of research institutes, creates an efficient research-oriented ecosystem, promotes joint research among researchers in the future, and further strengthens basic science research capacity. It also provides solutions necessary for all research including the pretreatment process, data collection, and data analysis, and serves as a mentor for systematic analysis and research for users. The Centre has created an independent space according to the characteristics of the equipment. There are more than 20 instruments related to photochemistry and nanomaterials, including X-ray diffraction, X-ray photoelectron spectroscopy, Raman spectroscopy, BET surface area analyzer, TGA/DTA thermal analyzer, GC-mass, High-performance liquid chromatography, field-emission scanning electron microscope equipped with energy-dispersive X-ray spectrometer, ultra-low temperature laser fluorescence analyzer, laser ablation systems, etc.. Through the Core-Facility center, we will create a technological synergy to cope with the fourth industrial revolution in the future and contribute to innovative research.

ABOUT CHULALONGKORN UNIVERSITY

Founded in March 1917, Chulalongkorn University is Thailand's first institution of higher learning. The groundwork and preparation for the university's establishment, however, took place almost half a century earlier. The worldwide economic, social, and political changes in the late nineteenth century compelled Siam, as Thailand was officially called until 1939, to adapt in order to avoid Western colonization. King Chulalongkorn (Rama V) introduced a royal policy to strengthen and improve the government so that the country could successfully resist the tides of colonialism. One of the major parts of this policy was to improve the Siamese educational system to produce capable personnel to work in both the public and private sectors. To this end, a school was founded in 1871 at the Royal Pages Barracks within the Grand Palace compound. Then, in 1882, King Chulalongkorn upgraded the school and gave it the name “Suankularb”. In the same year, the King also established other schools, including the Army Cadet School, the Cartographic School, the School for Princes and the School for Dhamma Studies.

“All of our subjects, from our royal children down to the lowest commoners, will have the same opportunity to study – be they royals, nobles or commoners.”

This quote, taken from King Chulalongkorn's royal speech to members of the royal family and civil servants, is confirmation of His Majesty's belief in equal educational opportunity. The King granted the policy to set up schools throughout the kingdom, together with institutions of higher learning, and declared, “…education in our country must have the highest priority, which I am determined to develop.” Recalling the original intention of his late father, King Chulalongkorn, to establish an institution of higher learning, King Vajiravudh (Rama VI) ordered that the Royal Pages School be elevated into an institution of higher education and named it The Civil Service College of King Chulalongkorn on January 1, 1911. In the beginning, the course of study focused on government. Eventually, the curriculum expanded to meet the needs of the kingdom and included more disciplines, such as law, international relations, commerce, agriculture, engineering, medicine and teacher education. The Civil Service College then used proceeds donated by members of the royal family, government officials and ordinary citizens to commission a statue of King Chulalongkorn the Great. Once completed, about 800,000 baht of the collected funds remained in the Royal Treasury Ministry. With interest, the sum accumulated and King Vajiravudh then gave it to the college, to be used as the original capital. Furthermore, he graciously donated the palace of his brother, the late Crown Prince Vajirunhis, as the site of the college and gave around 520 acres of the King's private land adjacent to the palace for the college's future expansion. Soon after, the Administration Building was constructed as the college's first building in January 1915. After several years of operation, King Vajiravudh knew that the Civil Service College was now ready for its next transformation. On March 26, 1917, His Majesty declared that the college become Chulalongkorn University, in memory of his father. The newly founded university was under the supervision of the University Affairs Department, Ministry of Education, and Phraya Anukijwithoon was the first principal (the title was changed to Rector in 1935). There was a University Council, which was responsible for policy making, planning and advising on the affairs of the university. Prince Damrong Rajanupab was the Chairman of the Council, and the principal of the university was the Secretary. When it was first founded, the university had 380 students, four faculties, and two campuses. The Faculty of Medicine was located at Siriraj Hospital, the Faculties of Public Administration and Engineering were housed in the Administration Building, and the Faculty of Arts and Science was in Prince Vajirunhis' palace in Patumwan district. The Law School was under the responsibility of the Ministry of Justice until the university was ready to take over, and the Teachers' Training School was handed over to the Ministry of Education.

In 1923, the university accepted high school graduates to study in the Faculty of Medicine and received support from the Rockefeller Foundation to organize a Bachelor's degree program in medicine. Five years later, the first group of 18 graduates completed their studies and were awarded the first medical degrees in the kingdom. By 1929, the Faculty of Public Administration became the Faculty of Law and Political Science. In 1933, a year after the establishment of the constitutional monarchy, the government transferred the faculty to Thammasat University, which was established in 1934. From 1934 to 1958, the university focused on the improvement of undergraduate education; thus, more faculties were established. In 1961, the university established the Graduate School followed by numerous research centers and institutes.

The history of Chulalongkorn University is one of transformation and development. This has not changed. Over the century, the university has continuously worked for excellence in education and research, befitting itself to the name of a beloved monarch, King Chulalongkorn the Great.

About Department of Chemical Engineering

Chemical engineering discipline started at the Faculty of Engineering, Chulalongkorn University, as an Industrial Chemistry major under the administration of the Department of Industrial Engineering in 1961. In the 1970s, to complement Thailand's vibrant agriculture-based economy, the Thai industrial sector strategically expanded into the petroleum and petrochemical industry. The Faculty had the foresight to formally set up the Department of Chemical Engineering in 1975: the department would provide a complete and up-to-date undergraduate curriculum and produce engineers qualified to meet many challenges of the up and coming industry. The department began to offer a Master's program in 1976 and, as one of its major milestones, the country's first Doctoral curriculum in 1989. The department's activities have continued to evolve, bringing many recognitions over the years. Our undergraduate curriculum was one of the firsts to be certified by the Thailand Accreditation Body for Engineering Education (TABEE) in 2017. The department has been acclaimed as a premier department in less than 5 decades, being ranked by the QS World University Ranking in both 2019 and 2020 to be the top Chemical Engineering Department in Thailand, the Top 5 in ASEAN, and the Top 101-150 in the world.

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NAAC 'A'Grade, ISO 21001:2018 Certified Institution

Core-Facility Center for Photochemistry & Nanomaterials, Gyeongsang National University, *South Korea*

Department of Chemical Engineering, Faculty of Engineering, Chulalongkorn University

Programme Schedule - Technical Session Details

DAY I: 24-11-2022 **Time : 11.00AM – 6.30PM**

TECHNICAL SESSION–I - Parallel Session – I

Please click the Zoom link below to join the Parallel Session – I:

https://us06web.zoom.us/j/85694653092?pwd=MmhkTEZCWG5tdExWZ3RtdGRDdzh2UT09

or

Webinar ID : 856 9465 3092 **Pass code: VMKVAS@2**

11.00AM–11.45AM	Keynote Lecture-I **Prof. MYONG YONG CHOI, Director, Core-Facility Center for Photochemistry & Nanomaterials, Gyeongsang National University, Republic of Korea.** Title: *Insights on Pulsed Laser Synthesis of Advanced Materials for Diverse Photocatalytic and Electrocatalytic Applications* Chairperson: Dr. R. Ganesamoorthy, Assistant Professor, Department of Chemistry, Vinayaka Mission's Kirupananda Variyar Arts and Science College, Salem, India
11.45AM–12.30PM	Keynote Lecture-II **Prof. SOORATHEP KHEAWHOM, Professor, Department of Chemical Engineering, Faculty of Engineering, Chulalongkorn University, Thailand** Title: *Challenges and design strategies for nonaqueous zinc ion batteries.* *Chairperson:* Dr. S. Anusuya, Professor & Head, Department of Pharmaceutical Engineering, Vinayaka Mission's Kirupananda Variyar Engineering College, Salem.

12.30PM–01.15PM	**Invited Talk-I** **Prof. ANONGNAT SOMWANGTHANAROJ, Associate Dean, Department of Chemical Engineering, Faculty of Engineering, Chulalongkorn University, Thailand** **Title:** ***High Ion Conductivity Cation Exchange Membrane and Anion Exchange Membrane for Zinc-Based Redox Flow Battery.*** **Chairperson: Dr. Rajendiran Venugopal, Assistant Professor, Department of Chemistry, Central University of Tamilnadu, Thiruvarur, Tamilnadu.**
01.15PM–02.00PM	**Invited Talk-II** **Dr. JITTI KASEMCHAINAN, Research Professor, Department of Chemical Technology, Faculty of Science, Chulalongkorn University, Thailand.** **Title:** ***Operando Characterization of Zn Interface in Zn Based Batteries*** **Chairperson: Dr. Daniel Thanabalan, Assistant Professor, MVJ College of Engineering, Bengaluru, India**
02.00PM – 06.30PM	**ORAL PRESENTATIONS & POSTER PRESENTATIONS**
DAY I: 24-11-2022 **Time : 11.00 AM – 6.30 PM** **TECHNICAL SESSION–II - Parallel Session – II** **Please click the Zoom link below to join the Parallel Session – II:** https://us06web.zoom.us/j/82955583022?pwd=MnV2QmQ0YlhuVG5HMXNVcHducGM2QT09 **or** **Webinar ID : 829 5558 3022** **Pass code: NEEBA22**	
11.00AM–11.45AM	**Invited Talk -III** **Prof. PAU-LOKE SHOW, Director of Sustainable Food Processing Research Centre, Co-Director of Future Foods Malaysia, University of Nottingham, Malaysia** **Title:** ***Latest Development of Microalgae Technology*** **Chairperson: Prof. Dr. S. Suriyanarayanan, Deputy Director (Research), Vinayaka Mission's Research Foundation, Salem**
11.45AM – 12.30PM	**Invited Talk-IV** **Prof. ROJANA PORNPRASERTSUK, Research Professor, Department of Materials Science, Faculty of Science, Chulalongkorn University, Thailand.** **Title:** ***Zn and Mn Recycle Process from Spent Primary batteries and their Re-utilization in Zn-ion Battery Application*** **Chairperson: Dr.Divya Krishnamoorthi, Associate Professor, Department of Prosthodontics and Crown & Bridge, Vinayaka**

	Mission's Sankarachariyar Dental College, Salem
12.30PM–01.15PM	Invited Talk-V **Dr. JIAQIAN QIN, Research Professor, Metallurgy and Materials Science Research Institute (MMRI), Chulalongkorn University, Thailand.** Title*: Toward High-Performance Aqueous Zinc Ion Batteries* **Chairperson:** Prof. Dr. A. Sam Thamburaj, Principal, Vinayaka Mission's College of Physiotherapy Professor, Vinayaka Mission's Research Foundation, Salem
01.15PM–02.00PM	Invited Talk-VI **Prof. LEANDRO M.C. PINTO, Universidade Federal de Mato Grosso do Sul, UFMS, Campo Grande, MS, Brazil** Title*: Modeling Oxygen Reactions from First Principles* **Chairperson:** Dr. T. Silambarasan, Assistant Professor, Department of Microbiology, School of Allied Health Sciences, Vinayaka Mission's Research Foundation, Salem
02.00PM – 06.30PM	**ORAL PRESENTATION & POSTER PRESENTATION**
DAY I: 24-11-2022	**Time : 11.00AM – 6.30PM** **TECHNICAL SESSION–III - Parallel Session – III** **Please click the Zoom link below to join the Parallel Session – III:** https://us02web.zoom.us/j/86537549892?pwd=MXkxWWlnRWYzRExpQkcwZGNPMkZkUT09 or **Webinar ID : 865 3754 9892** **Pass code: iNEEBA2022**
11.00AM–11.45AM	Invited Talk-VII **Prof. SIVAKUMAR MANICKAM, Deputy Dean (Research), Faculty of Engineering, University of Technology Brunei (UTB), Brunei** Title*: Greener and Energy-efficient Cavitation-Assisted Process Intensification for the Generation of Nanomaterials* **Chairperson:** Dr. A. Kathiravan, SERB Research Scientist, Vel Tech Rangarajan Dr. Sagunthala R&D Institute of Science and Technology, Chennai.
11.45AM–12.30PM	Invited Talk-VIII **Prof. SOUGATA GHOSH, Visiting Professor, Department of Physics, Kasertsart University, Thailand. & Department of Microbiology, School of Science, RK University, Rajkot, India** Title*: Exploring Natural Resources for Sustainable Fabrication of*

	Nanomedicine **Chairperson: Dr. M. Asha Jhonsi, Assistant Professor, B. S. Abdur Rahman Crescent Institute of Science and Technology, Chennai.**
12.30PM–01.30PM	**Invited Talk-IX** **Dr. M. Asha Jhonsi, Assistant Professor, B. S. Abdur Rahman Crescent Institute of Science and Technology, Chennai.** **Title***: Scrap–to–Score; Nanostructured Carbonaceous Material for Energy, Environment and Biomedical Applications* **Chairperson: Dr. M. Prakash, Professor & Head, Department of Computer Science, Vinayaka Mission's Kirupananda Variyar Arts and Science College, Salem**
01.30PM-06.30PM	**ORAL PRESENTATION & POSTER PRESENTATION**

DAY II: 25-11-2022 **Time : 10.00AM – 4.45PM**

TECHNICAL SESSION–IV

Please click the Zoom link below to join the Session:

https://us06web.zoom.us/j/85694653092?pwd=MmhkTEZCWG5tdExWZ3RtdGRDdzh2UT09

or

Webinar ID : 856 9465 3092 **Pass code: VMKVAS@2**

10.00AM–10.45AM	**Invited Talk-X** **Prof. S. ANANDAN, Professor of Chemistry, Centre for Solar Energy Research, NIT-Trichy** **Title:** ***Fabrication of Dye-sensitized solar cells using 2D transition metal dichalcogenides as counter electrodes.*** **Chairperson: Dr. E. Shinyjoy, Assistant Professor, Department of Chemistry, Vinayaka Mission's Kirupananda Variyar Arts and Science College, Salem, India**
10.45AM–11.30AM	**Invited Talk-XI** **Dr. M. L. ARUNA KUMARI, The Oxford College of Science, Bangalore, India** **Title:** ***Titania Based Ternary Heterojunctions in Photocatalytic Applications*** **Chairperson: Dr. M. Sridevi, Professor & Head, Department of Biotechnology, Vinayaka Mission's Kirupananda Variyar Engineering College, Salem**
11.30AM–12.15PM	**Invited Talk-XII** **Dr. AHREUM MIN, Research Professor, GNU, South Korea** **Title:** ***A Spectroscopic Study of the Biologically-relevant Molecules in the Gas Phase*** **Chairperson: Dr. S. Britto, Assistant Professor, Department of Chemistry, St. Joseph's College, Tiruchirappali**
12.15PM–01.00PM	**Invited Talk-XIII** **Dr. J. THEERTHAGIRI, Senior Scientist-Brain Pool Fellow, GNU, South Korea** **Title:** ***Pulsed Laser Assisted Synthesis of Nanomaterials for Energy Conversion*** **Chairperson: Dr. D. Vinod Kumar, Professor & Head, Department of Biomedical Engineering, Vinayaka Mission's Kirupananda Variyar Engineering College, Salem.**

01.00PM–02.00PM	**Invited Talk-XIV** **Dr. MOHD HAMDI BIN ALI @ BURAIDAH, Department of Physics, Faculty of Science, University of Malaya, Malaysia** **Title:** ***Poly(acrylamide-co-acrylic acid) based polymer electrolytes for quantum dot sensitized solar cells*** **Chairperson: Dr. B. Arul, Professor & Head, Department of Pharmacy Practice, Vinayaka Mission's College of Pharmacy, Salem**
02.00PM-04.00PM	**ORAL PRESENTATION**
04.00PM–04.45PM	**VALEDICTORY FUNCTION**

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INSIGHTS ON PULSED LASER SYNTHESIS OF ADVANCED MATERIALS FOR DIVERSE PHOTO AND ELECTROCATALYTIC APPLICATIONS

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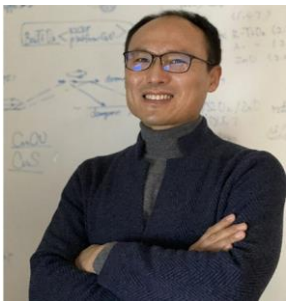

High purity and functionality-driven nanomaterials demand diverse applications in energy and environment-related fields, which have become an intensive research topic of interest. The production of novel electro- and photo-active nanomaterials is significantly subjected to the synthetic routes that make the development of surface and crystalline-tuned advanced materials possible. The significant size and tailored textural properties of materials synthesized by the interaction of laser with matter have emerged as a promising synthetic technique. Pulsed laser-assisted synthesis of nanomaterials in liquids, powered by high-power laser offers many degrees of parameter control (i.e., pulsed laser power, wavelength, reaction time duration, laser pulse repetition rate, and solvent) and owns numerous advantages over traditional physical and chemical synthetic methods such as high purity, no byproducts, simple, non-toxic, no need of surfactants and reducing agents. In this talk, I focus on the fundamental insights into the mechanism of pulsed laser techniques in depth by considering various experimental conditions to accelerate hypotheses that are appropriate for the production of efficient nanomaterials. Later, I will focus on my group research toward the advancement of electro- and photo-active nanomaterials through pulsed laser synthetic technologies unveiling detailed mechanistic and textural properties along with effective applications in energy and environmental processes.

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CHALLENGES AND DESIGN STRATEGIES FOR NONAQUEOUS ZINC ION BATTERIES

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Different rechargeable battery technologies are receiving more attention as we move closer to more ambitious decarbonization goals. Zinc-based batteries, an outdated technology with renewed attention, are edging closer to commercialization by utilizing their special flexibility to be tailored for different applications. Furthermore, compared to lithium-ion batteries, zinc-based batteries can sometimes be up to 50% less expensive while also being safer and more eco-friendly. The prospects for zinc-based batteries now seem substantially more optimistic thanks to recent research successes. Zinc-ion batteries (ZIBs) are becoming more and more popular because of their high energy density and affordable price. In reality, though, problems with hydrogen evolution, zinc dendrite growth, corrosion, and passivation still exist. It is challenging to totally mitigate such problems. Numerous methods, such as the inclusion of inhibitors, solid electrolyte interphase (SEI), and Zn electrode modification, have been suggested as solutions to these problems. These issues are thought to be substantially resolved by the use of non-proton donor electrolytes or nonaqueous electrolytes. Herein, the efforts to apply nonaqueous electrolytes such as organic electrolytes, room-temperature ionic liquids, and deep-eutectic solvents to ZIBs are described. An understanding of the mechanisms of nonaqueous ZIBs (NZIBs) regarding zinc plating/stripping and intercalation/deintercalation is also highlighted. Importantly, research gaps are identified in order to pave the way for future studies. In addition, an attempt is made to offer a viewpoint on critical topics as well as a benchmarking and enhancement of NZIB technologies.

Keywords: non-proton donor electrolyte; deep eutectic solvent; organic; ionic liquid.

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HIGH ION CONDUCTIVITY CATION EXCHANGE MEMBRANE AND ANION EXCHANGE MEMBRANE FOR ZINC-BASED REDOX FLOW BATTERY

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Here, cation exchange membrane (CEM) or anion exchange membrane (AEM) with high ion conductivity and high stability is urgently needed to apply in redox flow batteries (RFBs), however, general ion exchange membrane is incapable of preventing cross over of active species between two electrolytes and is instable in extremely electrolyte condition resulting in low cycling stability and efficiencies in RFBs. Thus, the objectives of this research were to develop porous cation exchange membrane (CEM) with selective layer to use in zinc-triiodide redox flow battery (ZIFB), and to develop anion exchange membrane (AEM) to apply in zinc-air redox flow battery. For porous CEM, poly ether sulfone (PES) was blended with sulfonated poly ether ether ketone (sPEEK) with 4:1 ratio and followed by dipped-coating polyamide made from 2.0%wt. m-phenylene diamine (MPD) and 0.16%wt. tri mesoyl chloride (TMC) in which the membrane showed low permeability of triiodide ion and promising proton conductivity with a value of 2 x 10^{-6} cm s^{-1} and 0.02 S cm^{-1}, respectively. Coulombic efficiency (CE) of porous CEM with selective layer tested in ZIFB showed high value of 89%. While AEM was developed by 10%wt. of chitosan particles together with 0.5%wt. of two-dimensional exfoliated molybdenum disulfide (2D-MoS 2) embedded into quaternized polyvinyl alcohol (QPVA) polymer matrix. These developed AEM had ion exchange capacity, hydroxide conductivity and electrolyte uptake with a value of 2.33 mmol g^{-1}, 0.032 S cm^{-1} and 143%, respectively. The high obtaining CE in ZIFB assembled by the developed porous CEM with selective layer and the high value of hydroxide ion conductivity of the developed AEM may be due to size sieving-exclusion effect together with Donnan-exclusion effect. These developed porous CEM and AEM are seemingly ion exchange membrane for large scale energy storage system.

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OPERANDO CHARACTERIZATION OF Zn INTERFACE IN ZINC-BASED BATTERIES

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Zinc-based batteries are among the energy-storage options that have overwhelmingly drawn attention of research and development, with advantages like safety, chemical stability, low cost, and availability of constituent materials. Still, the batteries are less desirable to developers and manufacturers since their Technology Readiness Level is not mature enough for commercialization. Like in any batteries, the battery performance and efficiency are strongly governed by the reaction and degradation mechanisms correlating to the electrochemical and/or chemical reactions initiated from the relevant components. As for the Zn-based batteries, such mechanisms are yet not well-understood and not well-defined, in particular the phenomena at the interface between the Zn electrodes and the electrolyte solution. For these reasons, it is crucial to keep up with expanding a new frontier of "operando" characterization by optical microscope, combined with some "ex-situ" techniques like FTIR. Both will underpin the typical electrochemical tests like galvanostatic cycling or electrochemical impedance spectroscopy (EIS) to unravel what is happening inside the zinc-ion batteries in the real time. The formation and the growth of Zn dendrite, the gas evolution, as well as the passivation the Zn electrode/electrolyte interface is the main focus in this work. The influence of zinc salts ($ZnSO_4$ and $Zn(OTf)_2$) and an additive ($MnSO_4$) on the interfacial phenomena is to be clarified. The characterization outcomes will be applied for better improving the efficiency and performance of the Zn batteries, so that it is possible to achieve the in real-world applications.

Keywords: Zn batteries; electrode-electrolyte interface; operando characterization; Zn dendrite; gas evolution

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LATEST DEVELOPMENTS IN MICROALGAE BIOREFINERY

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In recent year, Liquid Biphasic System (LBS) has become a proven tool used in separation and purification technology for circular bioeconomy in microalgae biorefinery. The application of Internet of Things (IoT) in LBSs in clarification, partitioning and partial purification of biomolecules and bioproducts had showed the rapid development. This method is able to give high recovery yield and high purity in a single step. The LBS shows characteristics of high selectivity and is easily to scale up. Therefore, LBS offers an attractive alternative that meets the requirements of the high demand in industry processes and it is also beneficial in terms of economic and environmental protection. This presentation aims to share on the recent literature works in the development of different type of LBSs and their applications in novel separations and purifications of biomaterials. Hopefully this presentation will able to build solid research collaborations among industry players and researchers.

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Zn AND Mn RECYCLE PROCESS FROM SPENT PRIMARY BATTERIES AND THEIR RE-UTILIZATION IN Zn-ION BATTERY APPLICATION

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The Zn and Mn extraction processes from spent alkaline and Zn-C batteries by hydrometallurgical route and the synthesis of recycled Zn film and MnO_2 for Zn-ion battery application were developed in the project. The Zn and Mn extraction process involved the acid leaching of Zn and Mn ions from the spent alkaline and Zn-C battery electrodes in the lab-scale were initially investigated using various leaching conditions. The acid leaching using 0.5-2 M HCl and H_2SO_4 at ambient temperature providing Zn extraction efficiencies in a range of 72.3-95.3%. By introducing an inexpensive reducing agent namely sodium sulfide (Na_2S), sodium metabisulfite ($Na_2S_2O_5$) or hydrogen peroxide (H_2O_2) in 2M H_2SO_4, the Mn extraction efficiency for Mn was increased from 21.9% (no reducing agent) up to 48.4%, 82.8% and 98.9%, respectively. The upscale leaching study was subsequently performed in a 100-L pilot scale reactor demonstrated the Zn and Mn extraction efficiencies of 71% and 65%, respectively. Using the leaching/washing solutions from the upscale hydrometallurgical route, Zn-film deposition on the stainless steel/Cu substrates and the MnO_2 synthesis via hydrothermal, reflux and electrodeposition techniques were performed. Both recycled Zn and MnO_2 were subsequently used as the anode and cathode main components in the CR2032 rechargeable Zn-ion battery, which in turn providing specific capacity more than 150 mAh/g and working performance more than 1,000 cycles.

Keywords: Spent primary battery; Recycle process; Zn-ion battery

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TOWARD HIGH-PERFORMANCE AQUEOUS ZINC ION BATTERIES

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Lithium-ion batteries (LIBs) have been widely studied and almost dominated the secondary battery market due to their higher energy density. Although the commercialization of LIBs has brought us great convenience, the availability and price of lithium (and cobalt) resources and the security risks stemmed from the flammable nature of organic electrolyte make them noncompetitive in large-scale applications. In recent years, the rechargeable aqueous zinc-ion batteries (ZIBs) are recognized as promising candidates for large-scale energy storage application in the post-LIBs era, because of the abundant reserves (75 parts per million in earth's crust), high theoretical capacity (819 mA h g-1) and low redox potential (-0.763 V vs. standard hydrogen electrode (SHE)) of zinc, as well as the non-flammable and high ion conductivity (1 S cm-1) of aqueous electrolyte. In a typical prototype, ZIBs consist of zinc metal anodes, (in)organic cathodes, neutral or slightly acidic aqueous electrolytes and separators. However, they are plagued by the lack of suitable cathode, electrolyte, separator, and the corrosion, hydrogen evolution reaction and dendrites growth in the Zn anode side, which limit their further development to meet commercial requirements. To be truly competitive with other rechargeable batteries, the efforts have been made toward the exploration of cathodes, anodes, electrolytes, and separators in recent years. Here, we present our strategies of improvement, including materials coupling [1], doping engineering [2,3], defect engineering [4] and novel cathodes in cathodes [5], interfacial modification and zinc-free in anodes [6], electrolyte additives [7], and separator design [8-10], that enables the dendrite-free, high energy and power densities, long lifespan zinc ion batteries. Importantly, the gel polymer electrolytes were also applied for the pouch cell ZIBs during the practical application evaluation, which also displays a great deal of potential to fabricate flexible and wearable devices for future applications. Considering their distinctive merits of low-cost, environmentally benign, and high security, it is strongly believed that aqueous ZIBs possess enormous prospects and will be taken into application soon.

Keyword: Battery; anode; separator; cathode; electrolyte

References:

(1) J .Cao, D. Zhang, X. Zhang, S. Wang, J. Han, Y. Zhao, Y. Huang, J. Qin, Appl. Surf. Sci., 534 (2020) 147630.
(2) D. Zhang, J. Cao, Y. Yue, T. Pakornchote, T. Bovornratanaraks, J. Han, X. Zhang, J. Qin, Y. Huang, ACS Appl. Mater. Interfaces, 13 (2021) 38416-38424.
(3) D, Zhang, J, Cao, X, Zhang, N, Insin, S. Wang, J. Han, Y. Zhao, J. Qin, Y. Huang, Adv. Funct. Mater., 31 (2021) 2009412.
(4) J. Cao, D. Zhang, Y. Yue, X. Wang, T. Pakornchote, T. Bovornratanaraks, X. Zhang, Z. S. Wu, J. Qin, Nano Energy, 84 (2021) 105876.
(5) K. Songmueang, D. Zhang, J. Cao, X. Zhang, S. Kheawhom, C. Sriprachuabwong, A. Tuantranont, P. Wangyao, J. Qin, Chem. Comm., 57 (2021) 7549-7552.
(6) J. Cao, D. Zhang, Y. Yue, X. Wang, A. Srikhaow, C. Sriprachuabwong, A. Tuantranont, X. Zhang, Z. S. Wu, J. Qin, Chem. Eng. J., 426 (2021) 131893.
(7) J. Abdulla, J. Cao, D. Zhang, X. Zhang, C. Sriprachuabwong, S. Kheawhom, P. Wangyao, J. Qin, ACS Appl. Energy Mater., 4 (2021) 4602-4609.
(8) J. Cao, D. Zhang, X. Zhang, M. Sawangphruk, J. Qin, R. Liu, J. Mater. Chem. A, 8 (2020) 9331-9344.
(9) J. Cao, D. Zhang, C. Gu, X. Wang, S. Wang, X. Zhang, J. Qin, Z.-S. Wu, Adv. Energy Mater., 11 (2021) 2102199.
(10) J. Cao, D. Zhang, C. Gu, X. Zhang, M. Okhawilai, S. Wang, J. Han, J. Qin, Y. Huang, Nano Energy 89 (2021) 106322.

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MODELING OXYGEN REACTIONS FROM FIRST PRINCIPLES

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The need for efficient, cheap, and robust catalysts still limits the dream of effective fuel cell implementation. One of the problems with fuel cells is the slow reduction of oxygen. The oxygen reduction reaction is faster in alkaline media than in acid solutions and does not require expensive transition metals as catalysts. Despite this, from the experimental point of view, acid fuel cells are better developed because of the polymer membrane. Following the trend in fuel cell development, theoretical oxygen reduction investigations have focused almost entirely on acid solutions. Although density functional theory is the predominant method for studying electrochemical processes at the atomic level, it has significant problems in treating ions and charge transfer. Both the reactant and product are neutral in acid solutions. On the other hand, in alkaline solutions, the reaction proceeds through a series of steps with charged intermediates. In this work, DFT calculations are used to introduce helpful information about the oxygen reactions in acid and alkaline media.

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GREENER AND ENERGY-EFFICIENT CAVITATION-ASSISTED PROCESS INTENSIFICATION FOR THE GENERATION OF NANOMATERIALS

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Much effort is currently being devoted to studying nanomaterials, mainly due to their wide applications. Particularly, nanoparticles have generated a large research effort because their properties differ markedly from those of their bulk counterparts. Many different approaches have been applied to the fabrication of nano-entity, such as co-precipitation, microemulsion, supercritical sol-gel processing, hydrothermal synthesis, or high-energy ball milling. Directed to the problems of these conventional methods, new synthetic methods have received increased attention in recent years. Cavitation, an approach for synthesizing various compounds at milder conditions, is already the rage in materials engineering. The major advantage of this new method is that it affords a reliable and facile route for controlling both the synthetic process and nanostructure in advanced materials. Also, this process provides chemical homogeneity and reactivity through atomic-level mixing within the precursor system, and phase pure crystalline materials can be prepared by annealing at reduced temperatures. Various nanomaterials and nanodispersions have been generated using this technique to develop biosensors and other applications. More importantly, novel carbon materials such as Graphene and Fullerene have been exploited for the functionalization and the development of nanocomposites to be employed in the sensors.

References

1. Sze Shin Low, Maxine Yew, Chang Nong Lim, Wai Siong Chai, Liang Ee Low, Sivakumar Manickam, Beng Ti Tey, Pau Loke Show, Sonoproduction of nanobiomaterials – A critical review, *Ultrasonics Sonochemistry, 82, 105887, 2022*
2. Jayachandrabal Balachandramohan, Randeep Singh, Thirugnanasambandam Sivasankar, Sivakumar Manickam, Sonochemical Synthesis of Highly Efficient Ag_3PO_4-Guar Gum Nanocomposite with Photo-oxidation Property under Visible Light Irradiation, *Chemical Engineering and Processing: Process Intensification, 168, 108549, 2021.*

3. Renu Geetha Bai, Kasturi Muthoosamy, Meifang Zhou, Muthupandian Ashokkumar, Nay Ming Huang and Sivakumar Manickam, Sonochemical and Sustainable Synthesis of Graphene-Gold (G-Au) Nanocomposites for Enzymeless and Selective Electrochemical Detection of Nitric Oxide, *Biosensors and Bioelectronics, 87, 622-629, 2017*

4. Sadia Afreen, Kasturi Muthoosamy, Sivakumar Manickam and Uda Hashim, Functionalized Fullerene (C_{60}) as a potential Nanomediator in the fabrication of highly sensitive Biosensors, *Biosensors and Bioelectronics, 63, 354-364, 2015*

5. Renu Geetha Bai, Neethu Ninan, Kasturi Muthoosamy and Sivakumar Manickam, Graphene: A Versatile Platform for Nanotheranostics and Tissue Engineering, *Progress in Materials Science, 91, 24-69, 2018*

6. Sadia Afreen, Ken Kokubo, Kasturi Muthoosamy and Sivakumar Manickam, Hydration or Hydroxylation: Direct Synthesis of Fullerenol from Pristine Fullerene (C60) via Acoustic Cavitation in the presence of Hydrogen Peroxide, *RSC Advances, 7, 31930-31939, 2017*

7. Renu Geetha Bai, Kasturi Muthoosamy, Fiona Natalia Shipton, Alagarsamy Pandikumar, Perumal Ramesh Kumar, Nay Ming Huang and Sivakumar Manickam, The Biogenic Synthesis of Reduced Graphene Oxide-Silver (RGO-Ag) Nanocomposite and its Dual Applications as Antibacterial Agent and Cancer Biomarker Sensor, *RSC Advances, 6(43), 36576-36587, 2016*

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EXPLORING NATURAL RESOURCES FOR SUSTAINABLE FABRICATION OF NANOMEDICINE

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Nanoscale materials with exotic shape and size with tunable physico-chemical and opto-electronic properties can be fabricated in the laboratory using various physical and chemical methods. However, hazardous reaction conditions and toxic chemical reagents used in these methods render the synthesized nanoparticles unsuitable for biomedical applications. Hence, several environmentally benign biological routes have been designed to synthesize gold, silver, platinum, palladium, copper and bimetallic nanoparticles using virus, bacteria, fungi, algae and medicinal plants. As a part of our growing interest in the novel nanomedicine, we have developed methods to used various medicinal plants found in nature like *Dioscorea bulbifera, Gnidia glauca, Plumbago zeylanica, Barleria prionitis, Gloriosa superba* and many more for synthesizing nanospheres, nanohexagons, nanotriangles, and nanorods. Careful optimization of time, temperature, pH, concentration of metal salts may help in the synthesis of nanomaterials with well defined shape and size. Further, naturally occurring bioactive principles like curcumin, diosgenin, etc. may stabilize and enhance the anticancer, antioxidant, antidiabetic, antimicrobial, and antibiofilm activities of the biogenic nanoparticles. In view of the background, it can be concluded that there is huge scope for further research towards translation of the biogenic nanoparticles as potential nanomedicine in future.

Keywords: Nanoparticles, biological synthesis, medicinal plants, functionalization, biomedical applications.

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SCRAP – TO – SCORE; NANOSTRUCTURED CARBONACEOUS MATERIAL FOR ENERGY, ENVIRONMENT AND BIOMEDICAL APPLICATIONS

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Recycling of waste and used materials is one way to accomplish resource maintenance, which could be executed towards sustainable development. Carbon nanomaterials are unavoidable in this current trend in advanced research. Carbon based nanomaterial that consists of a graphitic core and an amorphous shell with an average particle size of less than 10 nm, which shows good water solubility, low toxicity, fluorescence property and photostability. Carbonaceous nanomaterials are widely used as an alternative for organic fluorophores and heavy metal-containing semiconductor quantum dots in biomedical, photovoltaic and sensing applications. There is lot of research work is ongoing in the field of nanocarbon to derive structurally and enriched properties of nanocarbon forms via sustainable and less expensive methods towards understanding their role in multifarious applications. Carbon matrixes exhibit large surface area, high mechanical strength, and fast electron transfer rate, good thermal and electrical conductivities. The doping of heteroatoms is an effective strategy to modulate the chemical features of carbon framework as catalyst.

Fluorescence analysis is one of the excellent analytical tools owing to sensitivity, selectivity and fast acquisition of data. Herein, carbon based nanomateirals derived from waste scraps via simple oxidative acid treatment in view of converting waste materials into value added products will be discussed. The derived carbon dots were effectively used for photoinduced interaction studies, detection of toxic compounds present in real samples and biological applications using various analytical and spectroscopic studies.

References:

1. Yuan, T.; Meng, T.; He, P.; Shi, Y.; Li, Y.; Li, X.; Fan, L.; Yang, S. Carbon quantum dots: An emerging material for optoelectronic applications. J. Mater. Chem. C 2019, 7, 6820−6835
2. Lim, S. Y.; Shen, W.; Gao, Z. Carbon quantum dots and their applications. Chem. Soc. Rev. 2015, 44, 362−381
3. V. Srinivasan, A. Kthiravan, M. Kathiresan, G. Krishnan, M. Asha Jhonsi, J. Photochem. Photobiol. A: Chem. 403 (2020) 112855.

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FABRICATION OF DYE-SENSITIZED SOLAR CELLS USING 2D TRANSITION METAL DICHALCOGENIDES AS COUNTER ELECTRODES

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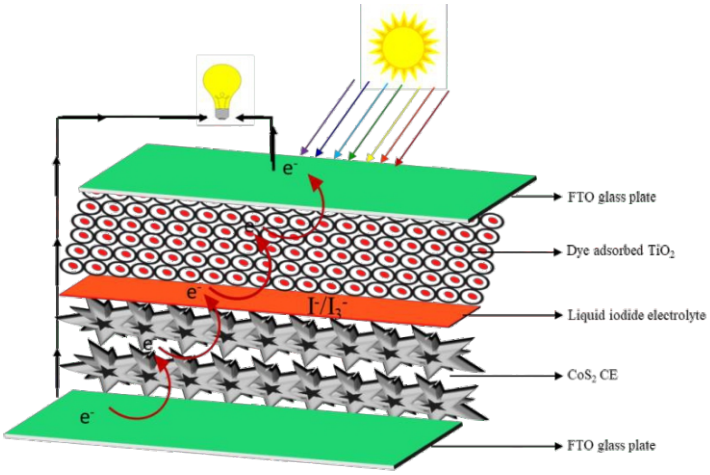
Dye-sensitized solar cells (DSSCs) have received great interest in the research community after their discovery in 1991. DSSCs are gaining much attention mainly because of the ease of fabrication and the materials employed are low-cost, environmentally friendly. The key components of DSSCs include photoanode, light absorber (dye), electrolyte (commonly liquid iodine/iodide), and counter electrode (CE). In general, the Pt electrode is used in conventional DSSCs. 2D transition metal dichalcogenides (TMDCs) are of MX_2 type semiconducting materials where M denotes Mo, W, or Zr and X denotes S, Se, or Te have been extensively studied because of their attractive physical and electronic properties. In this chapter, a broad overview of TMDCs based counter electrodes for DSSCs is discussed. Of which, MoS_2 has been primarily studied and used as CEs in DSSCs. However, there are a few reports available on the MoS_2 modified photoanode. So, mainly focus on the MoS_2 and its composites as counter electrode material towards DSSCs applications. Importantly, the influence of morphology on the performance of the devices is summarized. Further, in the context of CEs, the importance of electrochemical investigation and electrochemical stability of the electrodes were also discussed.



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POLY (ACRYLAMIDE-CO-ACRYLIC ACID) BASED POLYMER ELECTROLYTES FOR QUANTUM DOT SENSITIZED SOLAR CELLS

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Quantum dot sensitized solar cell (QDSSC), introduced as sandwich solar cell, contains a quantum dot (QD) sensitizer, a wide bandgap oxide semiconductor, an electrolyte and a counter electrode. Electrolytes serve as the pathway for ion transport and QD regeneration in QDSSC. These effects are accomplished through redox couple in the electrolyte. An ideal electrolyte requires high ionic conductivity to ensure smooth electron transfer between the counter electrode and photoanode. Most electrochemical solar cells used liquid electrolytes for better ionic conductivity and high efficiency. However, major challenges with liquid electrolytes include evaporation and leakage. Polymer electrolytes have been developed to improve long-term stability to ensure the persistence of device. Poly(acrylamide-co-acrylic acid) (PAAm-PAA) exhibits high transparency in films. PAAm-PAA has aroused great interest among researchers because its copolymers are of high popularity in various electrochemical device applications. PAAm-PAA copolymers have the advantages of electrolyte retention, gelatinization performance, high absorption, and easy cation coordination with common salts. The copolymers can interact with salts to form polymer-salt complexes and exhibit ionic conductivity due to their amide and carboxylate groups. A PAAm-PAA based solid polymer electrolyte (SPE) will be implemented. In this work, we attempt to study the electrical and chemical properties as well as crystallographic structure of the developed SPE via electrochemical impedance spectroscopy (EIS), Fourier transform infrared (FTIR) spectroscopy and x-ray diffraction (XRD), respectively. In addition, the effect of SPE on the photovoltaic performance of QDSSC will be studied.

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A SPECTROSCOPIC STUDY OF THE BIOLOGICALLY-RELEVANT MOLECULES IN THE GAS PHASE

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Conformational structures of biomolecules play crucial roles in many physical and chemical processes, including molecular recognition and hydrogen bonding in the biological systems. Particularly, the formation of an intra- and inter- molecular hydrogen bond of small biomolecules plays a pivotal role in vivo due to its pronounced effects on biomolecular structure and properties. Thus, acetanilide and indole derivatives are quite interesting because they have a hydroxy group that can easily form a hydrogen bond with adjacent substituents. Here, we investigated the conformational structures of small biomolecule and their water clusters through experimental and theoretical studies of the jet-cooled target molecules in the gas phase. Small biomolecules were jet-cooled in the molecular beam by supersonic jet expansions and investigated using a combination of quantum chemical calculations and various laser spectroscopic techniques, such as mass-selected one-color resonance two-photon ionization (R2PI), UV-UV hole-burning (UV-UV HB), and IR-dip spectroscopy. In my talk, the introduction of gas phase spectroscopy will be introduced, and the results of structural analysis of specific conformational structures of jet-cooled biomolecules and their water cluster in the gas phase system.

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PULSED LASER ASSISTED SYNTHESIS OF NANOMATERIALS FOR ENERGY CONVERSION

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During the last decades, nanomaterials are becoming industrialized. Current theoretical and experimental investigations focused on to further increase the effect that the nanomaterials can play in industrial advances. High purity and functionality driven nanomaterials demand for diverse applications in energy and the environment related fields which become an intensive research topic of interest. The production of novel electro- and photo-active nanomaterials significantly subjected to the synthetic routes that make possible the development of surface and crystalline tuned advanced materials. The significant size and textural tailored properties of materials synthesized by the interaction of laser with matter has emerged as a promising synthetic technique. The pulsed laser techniques have emerged as an advanced synthetic technique to deliver metal nanoparticles and its derivatives in a short time interval with high purity. The traditional synthetic methodologies such as hydrothermal and solvothermal are often energy- and time-consuming processes, mostly require expensive precursor materials, involve ligand exchange reactions, and generate or use toxic by-products/surfactants or stabilizing agents. In this talk, I mainly focus on the fabrication of innovative pulsed laser-induced nanomaterials with fascinating properties for advanced catalysis applications, especially on the hydrogen fuel production.

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TITANIA BASED TERNARY HETEROJUNCTIONS IN PHOTOCATALYTIC APPLICATIONS

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The fundamental principles of photocatalysis rely on the utilization of photogenerated charge carriers. To enhance the photocatalytic efficiency the photogenerated charge carriers (electron-hole pairs) should be separated efficiently and to restrain the recombination and they have to move across the surface/interface. In this regard the electronic coupling of two different bandgap semiconductors to form heterojunction are in spotlight because of their unique properties arising from the interfacial interaction that is not present in the pure counterparts. In this talk, I focus on different Titania based ternary heterojunctions which are prepared for the ball milling process and their structural characterization using various analytical techniques. The theoretical relative band edge positions predictions and their photocatalytic activity. Finally, the factors controlling the photocatalytic activity of the ternary heterojunctions will discussed by integrating the physico-chemical and photocatalytic properties with a tentative mechanism.

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OP-ESC-01

MOVING BEYOND MXene/Pt TO Pt-DECORATED TiO_2@TiC CORE-SHELL COMPOSITES VIA PULSED LASER WITH SUPERIOR HYDROGEN EVOLUTION PERFORMANCE IN ALKALINE CONDITION

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ABSTRACT:

Materials with a 2D structure are expensive or complicated to make, so research to improve them is being actively conducted. Among of them, MXene, a titanium carbide/nitride 2D structural nanosheet, has excellent physical durability, electromagnetic wave shielding, energy storage capacity and thermal conductivity. Because of its effect of the internal multi-reflection from the multi-layered structure. We synthesized MXene/Pt composites using the pulsed laser irradiation (wavelength 532 nm and power 90 mJ). The laser synthesis method is an eco-friendly method that does not generate by-products and sufficiently improve the limitations of the two-dimensional structure. From a variety of analytical techniques such as SEM, TEM, XRD, XPS and ICP and soon, we observed reshaping Pt/TiO_2@TiC/Pt core-shell from MXene/Pt composite via pulsed laser irradiation. Furthermore, we tried to measure the electro-conversion efficiency as catalysts with controlling the laser irradiation time.

Keywords: Mxene, Pt-decorated TiO_2@TiC core-shell, Pulsed laser irradiation, Hydrogen evolution reaction

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OP-ESC-02

Ir, Pd, and Ru DECORATED CuO NANORODS FOR ELECTROCHEMICAL FUFRURAL OXIDATION REACTION

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ABSTRACT:

Furfural is a promising molecule that could be utilized as a renewable platform for the production of value-added chemicals such as furoic acid and furfuryl alcohol. Electrochemical valorization of furfural can take place in presence of transition metal-based electrocatalysts such as CuO, which is well-known for its selectivity towards C-products and highly oxidative behavior. Herein, we have utilized single metal decorated CuO nanorods fabricated via pulsed laser ablation in liquid (PLAL) in methanol as electrocatalyst for electrochemical furfural oxidation (FOR) to furoic acid, respectively. The intrinsic physicochemical properties of CuO catalysts were confirmed using UV-Vis, Raman, X-ray diffractometer (XRD), field emission scanning electron microscopy (FE-SEM), and high-resolution transmission electron microscopy (HRTEM). FOR was run for 2 hours, and products were analysed by high performance liquid chromatography (HPLC) with a UV-Visible detector. Selective behaviour and a high yield of value-added products with moderate Faraday efficiency were observed.

Keywords: CuO; Pulsed laser ablation in liquid; Electrocatalysis; Electrochemical furfural oxidation

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OP-ESC-03

FREE-STANDING SYNTHESIS OF NANOPARTICLES VIA ACOUSTIC LEVITATOR COUPLED WITH SPECTROSCOPY TECHNIQUES FOR IN-SITU REACTION MONITORING

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ABSTRACT:

Levitator enables container less processing of single free-standing droplets. This can avoid complex effects that occur at the contact surfaces of materials, such as reaction vessels, and increase the sensitivity of spectral detection techniques such as Raman spectroscopy or Ultraviolet -Visible (UV-Vis) spectroscopy. Herein, we design an in-situ multispectral analyzer equipment containing various spectroscopic analysers attached to the acoustic levitator. The acoustic levitator was connected to a spectroscopic probe of high-sensitivity Raman and UV-Vis spectrometer using fiber optics to illustrate the physical and chemical changes of the suspended nanoparticles/molecules in real time. In this study, we observed a real time photoreduction of gold (Au) and silver (Ag) ions into nanoparticles in a levitated droplet using pulsed laser irradiation technique. This shows that newly developed instrumental setup is very suitable and sensitive for real-time monitoring of the physical and chemical reaction processes.

Keywords: Ultrasonic acoustic levitation; Pulsed laser irradiation; in situ spectroscopy; Gold and silver nanoparticles

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OP-ESC-04

SYNTHESIS OF AuPtCu ALLOY USING PULSE LASER AS AN ACTIVE CATALYST FOR THE FORMIC ACID OXIDATION REACTION

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ABSTRACT:

Liquid organic hydrogen carrier (LOHC), which uses a liquid organic compound as a hydrogen carrier, is economical because it has a high hydrogen storage capacity and does not require any additional equipment for transportation. Formic acid is stable because there is no possibility of combustion or explosion, so many studies are conducted on LOHC. Formic acid oxidation is mainly decomposed into carbon dioxide and hydrogen gas in two ways. There is an indirect pathway that forms CO and a direct path that does not form CO. We prepared a catalyst using a pulsed laser without reducing agents in this study. The produced material was analyzed using UV-vis, X-ray diffractometer (XRD), scanning electron microscopy (SEM), and transmission electron microscopy (TEM), and electrochemical properties were analyzed through cyclic voltammetry (CV) and chronoamperometry (CA). We prepared a catalyst in which formic acid is decomposed in a direct route by controlling the ratio of AuPtCu and a trigger with better activity than commercial Pt/C.

Keywords: Formic acid oxidation reaction; pulse laser; AuPtCu alloy

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OP-ESC-05

RAPID PRODUCTION OF CoPd ALLOYS VIA PULSED LASER ABLATION FOR ENERGY-EFFICIENT HYDROGEN FUEL PRODUCTION INTEGRATED WITH HYDRAZINE OXIDATION

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Optimization of the structure and component is a prevailing strategy to boost electrocatalytic energy saving H_2 fuel production. Electrocatalytic water splitting for H_2 generation is one of the sustainable and proficient approaches but still limited by the kinetically sluggish oxygen evolution reaction (OER). An effective approach to significantly decrease the electricity utilization of water electrolysis is to substitute the OER with anodic hydrazine oxidation reaction (HzOR) due to the lower standard oxidation potential of −0.33 V. The semiconductor and absorption characteristics of Co, interlacing by Pd^{2+} solution on the Pd surface by pulsed laser ablation (PLA) in methanol, are modified selectively to optimize cathodic hydrogen evolution reaction (HER) and anodic HzOR performance through alloying. Compared to the conventional method, an additional surfactant or reducing agent is not required in PLA technique. The synthesized CoPd alloys were characterized using various techniques such as FE-SEM, XRD, ICP-OES, HR-TEM and XPS. Subsequently, the prepared electrocatalytic was directly used as electrocatalysts for hydrazine electrolyzer and the performance was investigated by various electrochemical techniques such as cyclic voltammetry, linear sweep voltammetry and electrochemical impedance techniques. The present report advances the competent CoPd alloys as a multifunctional electrocatalysts via HzOR-assisted energy-efficient electrolyzer for H_2 fuel production.

Keywords: Pulsed laser ablation, CoPd alloy, Hydrazine oxidation reaction, Hydrogen energy

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OP-ESC-06

CHEMICAL TRANSFORMATION OF METAL–ORGANIC FRAMEWORK INTO LAYERED DOUBLE HYDROXIDE

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ABSTRACT:

Layered double hydroxides (LDHs) are ionic layered compounds that have intermediate regions containing anions in positively charged brucite-like layers. LDHs have shown high electrochemical activity in energy conversion systems. In this work, we develop a hybrid nanostructure composed of metal–organic frameworks (MOFs) and gold nanoparticles, which are further transformed into a hybrid LDH structure with respect to Ni concentration in the synthesis. Structural transformation from MOFs to LDHs are investigated in the hybrid nanostructure. Elemental composition of the products is also examined by inductively coupled plasma measurement and elemental mapping in electron microscopy. Our hybrid nanocatalysts will be evaluated for electrochemical activity and selectivity.

Keywords: Layered double hydroxide; Metal–organic framework; Gold nanoparticle; Structural transformation

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OP-ESC-07

DEVELOPMENT OF CORE-SHELL NANOSTRUCTURE WITH QUANTUM DOTS AND METAL–ORGANIC FRAMEWORKS

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ABSTRACT:

Quantum dots (QDs) provide great photoluminescence with a high quantum yield for display and sensing applications. Surface modification of QDs with nanoporous networks can allow size-selective chemical sensing through modulating the photoluminescence of QDs by surface adsorbents. However, precise control in the number of QDs inside as well as the dimension of nanoporous networks has not been realized, which will eventually help efficient sensing. In this study, we attempt to precisely control the outer shell thickness of QDs with metal–organic frameworks. Their optical properties are characterized by UV-visible absorption and fluorescence spectroscopy. The core-shell structure is examined by electron microscopy.

Keywords: Quantum dot; Metal–organic framework; Photoluminescence; Sensing.

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OP-ESC-08

A COMPARATIVE STUDY OF STRUCTURE, MORPHOLOGY, AND FLUORESCENCE PROPERTIES OF $SrAl_4O_7$ NANOPHOSPHORS BY SOL-GEL METHOD

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ABSTRACT:

Monoclinic $SrAl_4O_7$ nanophosphors with different weight percentages of aluminium (2 wt.% and 12 wt.%) were efficiently synthesized with the sol-gel method. The phase composition, morphology, and fluorescence properties of the prepared $SrAl_4O_7$ phosphors were analyzed by X-ray diffraction (XRD), scanning electron microscopy (SEM), Fourier Transform Infrared Spectroscopy (FTIR), and PL techniques respectively. The crystalline size obtained was 48 nm and 61 nm for 2 wt.% and 12 wt.% respectively. The particle size obtained was 50 nm and 71 nm for 2 wt.% and 12 wt.% respectively which shows that particle size rises with rise in aluminium concentration. The $SrAl_4O_7$ phosphor emits a high blue emission due to exciton transitions. Upon UV excitation wavelength of 240 nm, two distinct band peaks can be seen at 484 nm (blue region) and 723 nm (red region) for 2wt. % and 454 nm (blue region) and 683 nm (red region) for 12 wt.% respectively. The prepared nano phosphors had high brightness and fluorescence properties which could be efficiently applied in a variety of potential light-emitting applications.

Keywords: XRD, SEM, FTIR, Fluorescence, Sol-gel

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OP-ESC-09

NOVEL CARBON DOTS AS EFFICIENT GREEN CORROSION COATING FOR MILD STEEL IN HCl SOLUTION

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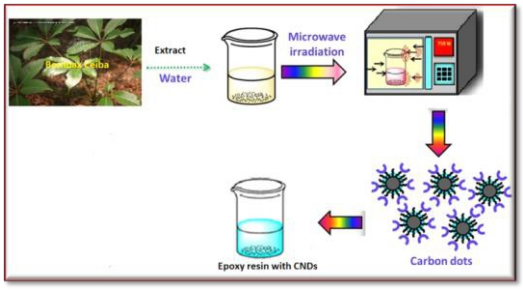
ABSTRACT:

In the oil and gas sector, corrosion of metallic alloys in acidic, saline, and microbiological conditions is a persistent issue. Carbon nanodots (CNDs) are a very effective and environmentally friendly approach for corrosion protection due to their outstanding antibacterial qualities, superior water solubility, biocompatibility, low toxicity, chemical stability, high thermal activity, and non-flammability. In this research work, low-cost, biodegradable and water-soluble carbon nanodots were synthesised from *Bombax ceiba* leaf extract using a one-step microwave assisted synthesis method[1], characterized and applied as corrosion mitigator by coating mild steel with BC-CNDs in an aggressive acid medium. By using the FT-IR, UV-Vis, and fluorescence emission spectrums, BC-CNDs' spectral characteristics were determined. By measuring mass loss, electrochemical impedance spectroscopy, and potentio-dynamic polarisation, the inhibitory effect of BC-CNDs coating was assessed[2]. The Langmuir adsorption isotherm is followed by the adsorption of BC-CNDs on the MS surface. SEM and AFM investigations were used to compare the surface morphology of MS specimens with and without a BC-CNDs coating. The findings from the aforementioned studies show how the BC-CNDs coating acts as a reliable corrosion barrier.

Graphical Abstract:



Keywords: Adsorption, *Bombax ceiba*, Carbon Nanodots, Corrosion, Inhibitor, Morphology.

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OP-ESC-10

SIMULATION AND FEASIBILITY STUDY OF TWIN TOOL HORIZONTAL MACHINING CENTER FOR STONE CARVING TO IMPROVE PRODUCTIVITY

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ABSTRACT:

The main objective is to simulate and investigate the feasibility of productivity enhancement through modification of subsystems in an existing Computer Numerical Controlled (CNC) machining centre PJT 3018–US1 used for stone engraving.using twin tool design to increase the overall efficiency of the CNC machine. The overall design of the proposed CNC machine depends on a novel way of holding the stone workpiece on a horizontal machining centre (HMC) configuration and using two tools and carving out the two lateral sides on the left and right of the stone by the axial movements of the CNC system.Earlier literature has indicated that the dynamic characteristics of machine tools, especially operational parameters, have significant influence on the cutting process and cutting accuracy in general.Hence it was proposed to have the subsystem of cutting fluid supply and coordinated movement of the tool head in order to increase machine utilisation.The design, motion analysis simulation were done using the Solidworks package. The investigation of the parameters was carried out to identify the improvements in operations.This modification in the structure is implemented for providing the capability for high speed, high levels of machining complexity, high levels of machining accuracy and enhanced levels of productivity. This kind of development also has potential for the inclusion of automation of handling the stones to facilitate and satisfy production requirements.

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OP-ESC-11

CARBON STEEL CORROSION INHIBITION BY NATURAL SURFACTANT-(*ACACIA CONCINNA)*

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ABSTRACT:

The efficiency of Acacia Concinna (Seekakai) a natural surfactant as a carbon steel corrosion inhibitor in bore well water has been evaluated. The corrosion rates were determined using the gravimetric (mass loss) and surface analytical techniques. The results obtained in the absence and presence of Acacia Concinna extract and Zn 2+ ion were used to calculate the inhibition efficiency (%) and to propose thesuitable inhibition mechanism. The obtained results showed that the inhibition efficiency increased with the increase in concentration of Acacia Concinna extract and the combination of Acacia Concinna extract-Zn 2+ shows higher inhibition efficiency. Surface analytical techniques like UV-visible and Fluorescence spectroscopic methods confirms the presence of a protective film on the metal surface. FT-IR spectroscopy confirms the formation of Acacia Concinna extract-Zn 2+ complex on the metal surface. AC-impedance and Polarization methods explains the nature of protective film formed on the metal surface.

Keywords: Carbon steel, Acacia Concinna, UV-visible and Fluorescence spectroscopy, AC-impedance, Polarization, FT-IR spectroscopy.

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OP-ESC-12

INVESTIGATIONS ON STRUCTURAL, ELECTRICAL AND OPTICAL PROPERTIES OF SPUTTERED MOLYBDENUM OXIDE FILMS DEPOSITED ON CADMIUM SULPHATE FOR MEASUREMENT OF PHOTOCHROMIC PROPERTIES WITH DIFFERENT SOURCES

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ABSTRACT:

Molybdenum oxide is a well-known transition metal oxide and has been intensively studied due to its interesting physical, electrical transport and optical properties. Because of its interesting applications, Molybdenum oxide (MoO_3) films were deposited by sputtering of molybdenum target under different physical parameters using DC magnetron sputtering technique under optimized parameters on As-deposited CdS on glass and silicon substrates. The core level binding energies, morphological, electrical and optical properties of the (MoO_3) films were studied for sub-stoichiometric and stoichiometric films MoO_3/CdS/Glass. From XPS analysis, it is clear that MoO_3 films were sub-stoichiometric in nature until the substrate temperature reaches to 473 K. At particular temperature MoO_3 films shows stoichiometric behaviour with oxidation state Mo^{6+} The valence band spectra of the films showed the strong X- ray photoemission peaks at about 5.47, 7.50 and 22.23 eV are related to the Mo 4d, O 2p and O 2s orbital's respectively. Above parameters were optimized for MoO_3 films to deposit on CdS films which were deposited on glass substrates. Surface morphological studies shows that, MoO_3/CdS films roughness varies from 8.2 nm to 72.0 nm due to grain growth and mechanical stress development within the films. The sub-stoichiometric MoO_3/CdS/CdS films are able to generate more colour centers with monochromatic source compared tungsten filament lamps.

Key Words: DC sputtering, molybdenum oxide, cadmium sulphide, thermal evaporation, core level binding energies, photochromic properties.

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OP-ESC-13

A GREEN APPROACH FOR THE SYNTHESIS OF FLUORESCENT CARBON QUANTUM DOTS FROM BANANA PEELS

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ABSTRACT:

Green synthesis of carbon quantum dots (CQDs) from natural sources always remains attractive due to their superior optical properties. In this work, highly fluorescent CQDs were synthesized from different banana peels {poovan banana (yellow), Robusta (Green) and small yellow banana} using a simple one-step hydrothermal process, at 180° C for 12 h, without using any oxidizing agent or inorganic salt. The proposed method offers good quantum yields 18.06%,13.06%, and 7.72% respectively compared to other reported CQDs derived from natural sources. The optical and luminescent properties of different banana peels were also compared. The resulting CQDs can be utilized for bioimaging and sensing applications due to their strong fluorescence, good fluorescence stability, and biocompatibility.

Keywords: Carbon quantum dots**;** Hydrothermal process; Fluorescence; Bioimaging

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OP-ESC-14

EFFECT OF LIGAMENT DIAMETER ON MECHANICAL PROPERTIES OF DYSPROSIUM DOPED NANOPOROUS Au PRODUCED BY ELECTROCHEMICAL CORROSION

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ABSTRACT:

Nano-porous metallic materials are a new class of human made engineering materials which have become attractive because of their potential use in a number of applications, such as energy absorbers, mechanical actuators, sensors and catalysts. Here, we report the effect of ligament diameter dependence on mechanical properties of Dysprosium (Dy) doped nanoporous gold (Au) system, synthesized by electrochemical corrosion from Arc melted polycrystalline $Ag_{75}Au_{24}Dy_1$ master alloy. Microstructure investigations of the scanning electron microscopy reveal that the Dy doped nanoporus Au samples exhibit the ligament and pore diameters in a length scale of 5 - 10 nm. The ligaments and pores in the skeletal assembly are bicontinuous in nature, consising of nanometer sized open porosity with three-dimenaional metallic ligament networks. The XRD results confirm that Dy atoms are atomically dissolved in $Ag_{75}Au_{24}Dy_1$. The electrochemical impedance results reveal that the sample contains a new charge transfer low resistive component as compared to conventional Au and larger ligament sized (above 50 nm) nanoporous counterparts. Post-synthesis annealing temperature noticiably influences the Vickers hardness H_V value of Dy doped nanopours Au. As the ligament diameter L decreases, the H_V increases and tends to reach to a maximum 220 ± 3 MPa, which is close to the H_V value 244 MPa reported for bulk pure Au.

Keywords: Nanomaterials; Nanoporous; Corrosion; Metallic; Mechanical Property.

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OP-ESC-15

EXPLORATION OF TWO DIMENSIONAL MoO_3-Fe_2O_3 NANOCOMPOSITE FOR THE FABRICATION OF HIGH ENERGY DENSITY SUPERCAPACITOR APPLICATIONS

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ABSTRACT:

Two dimensional materials with excellent electrochemical property have been extensively studied to fabricate the high-performance supercapacitor electrodes for future energy storage applications. In this present work, 2D MoO3 nanoplates were fabricated and their electrochemical performances were enhanced by introduction of Fe2O3 NPs. The MoO3- Fe2O3 NC also has a high specific capacitance of 908 F/g at 10mV/s, according to the cyclic voltammetry (CV) investigation. The solution resistance (Rs) and charge transfer resistance (Rct) of MoO3-Fe2O3 NC electrochemical impedance spectra (EIS) are 0.48Ω and 0.01Ω respectively. The MoO3-Fe2O3 NC possesses long charge-discharge and high-rate capabilities were revealed by Galvanostatic charge-discharge (GCD) investigation. Even after 3000 cycles, the cyclic stability of MoO3-Fe2O3 NC provides outstanding capacitive retention of 88.8 percent. The asymmetric supercapacitor (ASC) device based on MoO3-Fe2O3//AC produced an energy density of 43.3 Wh/kg and power density of 600 W/kg. Furthermore, even after 2000 charge-discharge cycles, the ASC maintains a cyclic stability of 81.17 percent.

Keywords: Supercapacitor, Two dimensional Materials, Energy density, Specific Capacitance.

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OP-ESC-16

DOWNCONVERSION SIGNIFICANT LUMINESCENT ENHANCEMENT AND STRUCTURAL CONFINEMENT OF A DICHROMATIC NANOPHOSPHOR FOR POTENTIAL APPLICATIONS IN NUV-TRIGGERED COOL PC-WLEDS

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ABSTRACT:

Trivalent rare-earth ions activated phosphor-converted white light emitting diodes (pc-WLEDs) have gained a lot of interest as a source of light to replace incandescent light bulbs and compact fluorescent lamps (CFLs) owing to their advantages of low energy consumption, high efficiency, extended lifetime, and eco-friendly nature. Herein, we prepared a sequence of single-phase Gd_2O_3:4at.%Dy^{3+},xLi^{+} (x = 0, 0.5, 1.0, 1.5, 2.0, 2.5 at.%) cool white-emitting nanophosphors employing chemical co-precipitation techniques. X-ray diffraction (XRD) shows nanophosphor has a pure single body-centered cubic (I) phase with point group symmetry m-3 (Number 206, Z = 16). The crystal structures were modeled using the Rietveld refinement crystallographic data for both centrosymmetric and noncentrosymmetric sites of the host matrix. The photoluminescence excitation (PLE) spectrum shows a prominent band centered at 350 nm along with other weak bands due to the 4f-4f transitions of the Dy^{3+}. The PL emissions spectra exhibit two dichromatic prominent emission peaks at 486 (blue) and 574 nm (yellow) due to the $^4F_{9/2}\rightarrow{}^6H_{15/2}$ magnetic dipole (MD) transition and $^4F_{9/2}\rightarrow{}^6H_{13/2}$ forced electric dipole (ED) transitions respectively. Intriguingly, the addition of Li^{+} enhances the PL emission intensity that maximum at 1.5 at.% and then begins to decline due to the concentration quenching effect. The asymmetry ratio (A_{21}) for the 900 °C annealed nanophosphor was found to be greater than unity, whereas it is lesser in the case of 600 °C annealed nanophosphor. Furthermore, lifetime measurements were carried out for 486 and 574 nm emissions peak under 350 nm excitation using the bi-exponential fitting method. Eventually, the International Commission on Illumination (CIE) chromaticity coordinates under excitations at 324, 350, 364, and 385 nm were determined and were positioned in the white region of the visible spectrum. The correlated color temperature (CCT) is found to be higher than 4000 K, whereas the color purity (CP) for samples with concentrations of xLi^{+}= 2.0% (λ_{ex} = 350 nm) was determined to be 4.0%. This acquired significantly enhanced luminescent intensity as well as excellent CCTs and CP, suggests that the prepared nanophosphor is a promising candidate for near ultraviolet (NUV) triggered cool pc-WLEDs.

Keywords: Crystal structure; Luminescent; Nanophosphor; pc-WLEDs.

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OP-ESC-17

SYNTHESIS OF TITANIA-ZnO NANOCOMPOSITES OF DIVERSE MORPHOLOGY FOR DSSC APPLICATIONS

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ABSTRACT:

Nanocomposite flowers of Titania-ZnO (with molar ratio 2:1) along with nanocomposite particles of Titania-ZnO (with molar ratio of 3:1) were synthesized employing a modified sol-gel method. The prepared nanocomposites were characterized employing X-ray diffraction (XRD), scanning electron microscopy (SEM), energy dispersive X-ray analysis (EDAX), UV and, BET analysis. The crystallinity and morphology of the nanostructures were compared for varying molar concentrations. The nanostructures thus synthesized were used as photoanode semiconductor materials in the fabrication of Dye-Sensitized Solar Cells (DSSC). The DSSC developed with the photoanode of Titania-ZnO with molar ratio 3:1 exhibited better photovoltaic performance with an efficiency of 0.77% and a current density of 3.89 mA/cm^2 than the DSSC with nanocomposites of TiO_2-ZnO with molar ratio 2:1.

Keywords: Nanocomposite flowers, photoanode, Titania-ZnO, photovoltaic performance, DSSC

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OP-ESC-18

RENEWABLE ENERGY BASED SMART HOME ENERGY MANAGEMENT SYSTEM

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ABSTRACT:

Now a day's home energy use is increasing and renewable energy systems are deployed, home energy management system (HEMS) needs to consider both energy consumption and generation simultaneously to minimize the energy cost. In this paper a smart HEMS architecture is used for both energy consumption and generation simultaneously. ZigBee-based energy measurement modules are used to monitor the energy consumption of home appliances and lights. A micro controller based renewable energy gateway is used to monitor the energy generation of renewable energies. The home server gathers the energy consumption and generation data, analyzes them for energy estimation, and controls the home energy use schedule to minimize the energy cost. The remote energy management server aggregates the energy data from numerous home servers, compares them, and creates useful statistical analysis information. By considering both energy consumption and generation, the proposed (HEMS) home energy management architecture is expected to optimize home energy use and result in home energy cost saving one.

Keywords: Home energy management system, Energy consumption, ZigBee-based energy.

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OP-ESC-19

SYNERGISTICALLY MODIFIED 2D INORGANIC–ORGANIC HYBRID COMPOSITE ELECTRODES ENABLE HIGH SPECIFIC CAPACITANCE IN SYMMETRIC SUPERCAPACITOR

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ABSTRACT:

Today's modern world is heading fast towards a severe energy crisis. It is now a high time to implement new environment friendly initiatives to overcome the approaching crisis. Supercapacitors are one of the most promising energy storage devices owing to their intrinsic performance advantages. 2D WS_2 Transition metal dichalcogenides are considered promising constituents in energy storage devices due to their large surface areas, high theoretical capacitance and occurrence of efficient redox reactions at their surfaces. Here we designed a nano flower like morphology based WS_2 via a facile and effective hydrothermal method, without adding any dopants or composites. An exceptional high performance super capacitor behaviour were found for the nano-flower like structure WS_2 flexible two-electrode supercapacitor based device. Here in this study WS_2 and polymer based composite material were synthesized and fabricated supercapacitor. The inorganic-organic hybrid device shows an outstanding performance compared to bare WS_2 based device.

Keywords: Transition metal dichalcogenides; Energy storage; Specific capacitance; symmetric capacitor

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OP-ESC-20

SYNTHESIS AND CHARACTERIZATION OF NITROGEN DOPED GRAPHENE/Ta_2O_5 NANOCOMPOSITE BY MICROWAVE IRRADIATION METHOD FOR SUPERCAPACITORS APPLICATIONS

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ABSTRACT:

In this work, a facile approach for synthesis of Nitrogen doped Graphene/Ta_2O_5 nanocomposites by Microwave Irradiation Method. This approach aims to realize a one spot preparation of Ta_2O_5 nanoparticles decorated into Nitrogen doped Graphene sheets. The structural properties and the crystalline behavior of the prepared Ta_2O_5 were determined by using X-ray diffractometer studies. The surface morphology and growth kinetics were analysed by Scanning electron microscope (SEM). The vibrational and structural properties of the materials were investigated by using Raman studies. Functional groups and thermal behavior of the nanocomposites were analysed by using FT-IR and TG-DTA analysis respectively. The prepared Nitrogen doped Graphene/ Ta_2O_5 nanocomposite was utilized for fabricating supercapacitor electrode and the electrochemical studies was investigated intensively.

Keywords: Microwave Irradiation; Graphene sheets; Nanocomposite; Electrochemical.

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OP-ESC-21

OPENING AND MANIPULATING THE GAP IN GRAPHENE

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ABSTRACT:

Graphene- the charismatic material of 20th century has drawn a great amount of attention from researchers across different fields. Its two dimensional structure and unusual electronic band structure, high carrier mobility, high electrical and thermal conductivity make it a perfect material for many applications in electronics, optoelectronics and sensors. But the absence of the energy gap prevents application of graphene in its pristine form in switching devices. A number of techniques have been developed for opening and manipulating band gap at the so called Dirac point in graphene. This review summarizes the developments in different methods to introduce a band gap in graphene in detail.

Keywords- graphene, band gap, doping, nanoelectronics

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OP-ESC-22

RATIONAL DESIGNING OF PEG CAPPED PANI/TiO_2/CuO COMPOSITE FOR HIGH-PERFORMANCE SUPERCAPATTERY

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ABSTRACT:

The energy sources currently in use are almost on the verge of depletion, and many of them engender a lot of environmental issues. The increasing demand for energy requirements forces scientists to explore profoundly innovative and environmentally friendly energy storage devices that can meet the necessity of human beings. Polyaniline (PANI), a conducting polymer, is widely used in many applications because of its large surface area, good redox capacity, high electroactivity, and tunable band gap. Incorporating mixed metal oxides into the polymer will enhance its catalytic activities and can be used as electrodes for supercapacitance studies. Synthesis of a binary metal oxide composite TiO2/CuO using a capping agent is carried out and is incorporated into PANI through in situ polymerization method to produce a PEG capped PANI/TiO2/CuO (PTC) ternary composite. The characterization studies of the synthesized PANI, TiO2/CuO, and PTC composites are done using XRD, FT-IR, BET, FE-SEM, and HR-TEM analysis. The ternary PTC composite is used for electrochemical studies in a three-electrode system using 3 M KOH. The galvanostatic charge-discharge studies show that the PTC composite acts as a good hybrid capacitor with a specific capacity of 1595.15 C/g at 1 A/g, which is very high compared to PANI and TiO2/CuO composites and other reported PANI based composites. The charge transfer resistance of the hybrid PTC composite is comparatively lower than that of the PANI and TiO2/CuO composite. The PTC composite also shows high energy density and power density with specific capacity retention of 90% up to 3000 cycles. The electrochemical studies show that the prepared PTC composite can be used for fabricating an efficient hybrid capacitor for energy storage applications. The extraordinary electrochemical performance of the ternary PTC nanocomposite can be attributed to its well-designed nanostructure and the synergistic effects of the individual components.

Keywords: Hybrid supercapacitor; Polyaniline; Polymer-based mixed metal oxide; PANI/TiO_2/CuO.

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OP-ESC-23

Ni-MOF DERIVED NiO/r-GO NANOCOMPOSITE AS A NOVEL ELECTRODE FOR HIGH-PERFORMANCE ASYMMETRIC SUPERCAPACITOR

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ABSTRACT:

Ni-MOF-derived NiO nanoparticles growing on r-GO have been successfully synthesized by a hydrothermal method followed by a calcination procedure (400^{o}C at Ar atmosphere) with different mass ratios of Ni-MOF and GO (1:0.1, 1:0.5, 1:1). The influence of GO addition with different mass ratios could enhance the electrochemical performance of Ni-MOF derived NiO nanoparticles as the electrode material were highlighted in detail. For the three-electrode test system, Ni-MOF derived NiO/r-GO composite was subjected to calcination at 400^{o}C in the Ar atmosphere. The mass ratio of (1:0.5) demonstrated the highest specific capacity (649.22 C g^{-1}at 3 A g^{-1}) and maintained 81.1% of its initial value after 5000 cycles at 20 A g^{-1}. The assembled asymmetric supercapacitors (ASC) with Ni-MOF derived NiO/r-GO composite and r-GO as the anode and cathode also displayed outstanding electrochemical performance. The value of maximum energy density reached 39.59 W h kg^{-1} and the maximum power density of 8.25 kW kg^{-1}. All these results confirm that the MOF-derived NiO/ rGO composite should be a potential electrode material for supercapacitors.

Keywords: Ni-MOF, Asymmetric Supercapacitor, Hydrothermal, High Energy Density

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OP-ESC-24

INFLUENCE OF HYDROTHERMAL REACTION TIME ON THE GROWTH OF Sb_2S_3 THIN FILMS

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ABSTRACT:

Antimony Chalcogenides have drawn extensive attention over the last few years in photovoltaic technology because of their suitable band gap, low toxicity, Phase stability, and earth abundance. In the present study, antimony sulfide (Sb_2S_3) thin films were prepared using a simple and viable hydrothermal route. The polycrystalline Sb_2S_3 films were prepared at autoclave temperature of 120 ^oC for different time periods ranging from 10 hours to 14:30 hours with an interval of 30 minutes. The as prepared Sb_2S_3 films are annealed on hot-plate at 200 ^oC for 90 minutes. The annealed Sb_2S_3 films were analyzed using x-ray diffractometer (XRD), scanning electron microscope (SEM), energy dispersive analysis of x-rays (EDS), Raman spectrometer, photoelectron spectroscopy (XPS) and UV-Vis-NIR double beam spectrophotometer. Prior to annealing, Sb_2S_3 films are found to be amorphous in nature. XRD analysis of annealed Sb_2S_3 films reveals Orthorhombic phase crystallization with predominant (310) plane with lattice parameters, a=11.3114 Å, b=3.8375 Å, c=11.2624 Å. The crystalline sizes of annealed Sb_2S_3 were found to increase with hydrothermal reaction time (10:30 h to 13:30 h), 422-740 nm and decreases thereafter. The five Raman peaks appeared at 156 cm^{-1}, 190 cm^{-1}, 232 cm^{-1}, 278 cm^{-1} and 303 cm^{-1} further confirms the formation of Sb_2S_3 films. The oxidation states of Sb and S were found to be (+3) and (-2) for Sb_2S_3 films formed at 120 °C for 13:30 h indicating the single-phase formation of Sb_2S_3. SEM and EDS analysis showed significant changes in morphology and stoichiometric ratios of Sb and S elements. The Sb_2S_3 films formed at 120°c for 13:30 h showed stoichiometric atomic percentage of Sb and S at 120 °C for 13:30 h is 42 and 58 % respectively. All the films showed an optical absorption coefficient of ~ 10^5 cm^{-1} with direct transition of energy band gap varied in the range from 1.27 to 1.49 eV. The comprehensive analysis showed that the Sb_2S_3 films prepared at 120 °C for 13:30 h followed by annealing found to be best for the preparation of Solar cells.

Keywords: Antimony sulfide; Hydrothermal method; Raman analysis; x-ray photoelectron spectroscopy

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OP-ESC-25

ENERGY ACTUALIZATION OF FUEL CELL APPLICATION WITH FULLERENE NANOMATERIAL

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ABSTRACT:

The surge in energy requirement has created a vacuum for the technological advancement in the energy sector. Government and private players have actively participated to achieve the global demand and addressing the energy conflicts. Fuel cell technology has evolved along these years and had hit the energy market amidst the electrical-battery revolution. The hydrogen fuel cell is one of the important clean energy alternatives. The Fullerene (C60) utilisation in the fuel cell application has the greater possibility in green energy actualisation. The implication of nano architectonics technology in development of novel fullerene (C60) materials would serve as a better source in electrocatalyst support and in gas diffusion layer (GDL). The development of fullerene with structural and design modification offers better electrical conductivity and higher mechanical stability. The reduction in carbon footprint is also evident with increase in carbon utilisation. The percentage loading of precious metals like Pt, Ru, Ir and Pd with carbon is highly preferred as a binary and tertiary carbon support would also be evidenced. The incorporation of the C60 onto the Membrane electrode assembly (MEA) is to be investigated in the electrocatalyst, GDL, bipolar plates and electrodes. This work potentially elucidates the use of carbon nanomaterials in fuel cell application and its greater interest to the renewable energy market.

Keywords: Fuel cells; Nano architectonics; Green Energy; Fullerene

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OP-ESC-26

OPTICAL CHARACTERISTICS OF Mg-BASED (Mg/Co & Mg/Mn) TF FOR HYDROGEN STORAGE APPLICATIONS

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ABSTRACT:

This study has proposed and analyzed the role of hydrogen gas on optical characteristics of Mg-based Mg/Co and Mg/Mn bilayer structures. Thermal evaporation at a pressure of 10-5 torr was used to synthesize these Thin Films (TF), which were then effectively deposited onto glass substrates. To obtain homogenous structure, prepared TF were annealed at 500K. Hydrogen gas was injected into the chamber at various pressures to observe how hydrogenation influenced TF (10-40 psi). Using a Hitachi-330 spectrophotometer, the UV-Vis transmission spectra were recorded in visible range of wavelength(300-800nm). TF' optical transmission was reduced, and it was revealed that the energy band gap increased as hydrogen pressure increased. It implies that hydrogen absorption in TF can be used to tailor the energy band gap. An optical micrograph of a hydrogenated Mg/Mn bilayer TF that has been annealed reveals a dark black state. The variation in energy band gap due to hydrogen and increasing value of the film resistance are evidence for the phase shifts caused on by hydrogenation from metal to semiconductor.

Keywords: Optical transmission, Energy band gap, Optical micrograph, Resistivity.

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PP-ESC-01

EFFECT OF Cu AND Al DOPED TiO_2 NANOPARTICLES: A COMPARATIVE STUDY ON ITS PERFORMANCE AS PHOTOANODE FOR DSSC APPLICATIONS

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ABSTRACT:

Different concentrations (0.1M, 0.2M) of copper and aluminum doped TiO_2 nanoparticles were prepared separately using sol gel method. The structural, morphological and optical properties of the prepared nanoparticles were analyzed by various techniques such as XRD, SEM, UV-visible and Photoluminescence spectrometer. Both Cu doped and Al doped TiO_2 nanoparticles exhibited different properties when compared to each other. The Cu doped TiO_2 nanoparticles experienced a phase change at 0.2M concentration, whereas Al doped TiO_2 nanoparticles maintain its stability in anatase phase for both the concentrations. The reduced electron-hole recombination of Al:TiO_2 comparing to Cu:TiO_2 was confirmed from PL spectra. The doped nanoparticles with desirable properties were used as a photo electrode for the fabrication of dye sensitized solar cells (DSSC). The photovoltaic properties of the devices were analysed using solar simulator. Comparing to DSSC made using Cu:TiO_2, DSSC made using Al:TiO_2 yielded greater efficiency.

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PP-ESC-02

DESIGN OF N-DOPED GRAPHENE QUANTUM DOTS INCORPORATED COBALT FERRITE/GRAPHENE OXIDE HIERARCHICAL HYBRID COMPOSITE AS AN ELECTRODE MATERIAL FOR HIGH-PERFORMANCE SUPERCAPACITORS

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ABSTRACT:

The fast-growing markets for portable electronic devices and their development trend of being small, lightweight, and flexible have brought about an ever-rising and urgent demand for environmentally friendly electrochemical energy storage and conversion systems. Among them, supercapacitors or ultracapacitors have a remarkable application because of rapid charging–discharging rates and long lifecycle. Here, we design a composite electrode material for supercapacitor applications made of N-doped graphene quantum dots (NGQD), cobalt ferrite, and graphene oxide (GO). The distinct crystalline phases of each component are visible in the composite's XRD patterns. The hydrothermal method is used to prepare cobalt ferrite, which is supported by two-dimensional structures such as GO and NGQD. The prepared catalyst is analysed using various physicochemical methods like XRD, FT-IR, SEM-EDS, HR-TEM, and XPS techniques. The NGQD/cobalt ferrite/GO exhibits a superior specific capacitance of 1712.3 F g-1 at 3 A g-1 current density when compared to cobalt ferrite, and cobalt ferrite/GO binary composite. The device retains its cycling stability with 90% capacitance retention after 3000 charging-discharging cycles. With an energy density of 100.47 Wh kg-1 and a power density of 977.5 W kg-1, this material performs much better than other reported ones because of the synergistic effects of the individual components. As a result, it has been demonstrated that the composite electrode designed in this work can be used as an electrode material for high-performance energy storage systems.

Keywords: Supercapacitor; N doped graphene quantum dots; Cobalt ferrite; Graphene oxide.

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PP-ESC-03

CELLULOSE ACETATE/PEG BASED Mg ION CONDUCTING POLYMER MEMBRANES FOR EDLC APPLICATIONS

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ABSTRACT:

Biopolymer electrolyte based on Cellulose acetate (CA) as the host polymer with Magnesium Triflate $(MgTf)_2$ as ionic provider was prepared through solution casting technique. Different concentrations of PEG were successfully incorporated in to the CA-$(MgTf_)_2$ electrolyte system which was tested for energy storage electrochemical double-layer capacitor application. Highest conductivity of 2.35 x 10^{-4} S/cm was recorded for the electrolyte incorporated with 30wt% of plasticizer. The crystalline/amorphous nature of CA with different concentrations of $(MgTf)_2$ salt and further with PEG was studied by X-ray diffraction analysis. The complexation and interaction of polymer electrolyte components are studied using the FTIR spectra. The dielectric and electrochemical properties have been examined using electrochemical impedance spectroscopy for all the samples. The electrochemical stability of 2.7V was observed for the highest ionic conducting polymer electrolyte by linear sweep voltammetry. The electrolyte with maximum conductivity value was used as electrodes separator in the electrochemical double-layer capacitor applications and the cyclic voltammetry response shows the behaviour of the capacitor is non-Faradaic where no redox peaks appear.

Keywords: Cellulose acetate, Polyethylene Glycol, Magnesium Triflate, EDLC

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PP-ESC-04

CAPPING AND DOPING OF CuO NANOSTRUCTURES FOR THE FABRICATION OF EFFICIENT PHOTODETECTORS

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Nanostructures with well-defined shape and inner structure have attracted great interest due to their novel properties and diverging applications. Semiconducting metal oxide nanostructures having a tailored architecture are of importance in the field of nanotechnology research area. Among them cupric oxide (CuO) is a useful material with diverse applications to gas sensors, battery electrodes, materials for memory devices and field effect transistors. A simple hydrothermal process was used to synthesis pristine and doped nanoparticles (CuO NPs). The effect of doping and capping Ag with CuO NPs is investigated in detail. The influence of Ag doping and capping on structural, optical, morphological and elemental properties were analysed using X-ray diffractometer, UV-Vis spectrometer, photoluminescence spectrometer, Raman spectrometer, scanning electron microscope and energy dispersive spectrometer. The photoresponse of the fabricated photodetector with the synthesized nanostructures was examined by studying the I-V characteristics with source measure unit under different light ambience. The investigations imply that capping of Ag in CuO nanostructures posses better photodetecting characteristics compared to doping.

Keywords: CuO; nanoparticle; doping; capping; hydrothermal; photodetector.

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PP-ESC-05

2D MXENE/TiO_2 NANOSTRUCTURES-BASED PHOTOELECTROCHEMICAL CELLS FOR HIGHLY EFFICIENT SOLAR HYDROGEN GENERATION

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ABSTRACT:

Increasing exploitation of non-renewable sources for energy production and their limited reserves have aroused the need to develop methods for harvesting renewable and sustainable energy. In this direction, the approach of water splitting to generate hydrogen fuel using abundant solar energy has proved to be promising and environment-friendly [1]. However, the exploration of a low-cost yet highly efficient light-driven photocatalyst is still a challenge. Here, we present a facile strategy to design a photoanode based on two-dimensional (2D) MXene incorporated TiO_2 composites to fabricate quantum dots (QDs) and employed them in photoelectrochemical cells (PEC) for boosting photocatalytic hydrogen generation [2]. The incorporation of 2D MXene layers facilitated the swift charge transfer due to their metal alike conductivity combining the benefit of the scattering phenomenon by distributing incident light photons on a larger surface. The as-obtained MXene/TiO_2 composites-based photoanode showed a highly enhanced photo-conversion efficiency of 0.39% compared to the undoped TiO_2-based photoanode. Also, the doped TiO_2 delivered a high photocurrent density of 1.8 mA/cm^2 at 1.23V vs RHE, which is four times greater than the undoped sample. Therefore, this work demonstrates that doping of MXene can greatly alleviate the PEC performance and thus higher solar H_2 production.

References:

[1] S. Rajaambal, M. Mapa, C.S. Gopinath, $In_{1-x}Ga_xN$@ZnO: a rationally designed and quantum dot integrated material for water splitting and solar harvesting applications, Dalt. Trans. 43 (2014) 12546–12554..

[2] X. Li, Y. Bai, X. Shi, N. Su, G. Nie, R. Zhang, H. Nie, L. Ye, Applications of MXene ($Ti_3C_2T_x$) in photocatalysis: a review, Mater. Adv. 2 (2021) 1570–1594.

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PP-ESC-06

SOLVOTHERMAL SYNTHESIS OF *IN-SITU* CARBON DOPED ZINC COBALTITE MICROSPHERES FOR SUPERCAPACITOR APPLICATION

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ABSTRACT:

The rational design and development of nanostructured hybrid energy materials possessing unique structural and superior electrochemical activity is urgently required for achieving ultra-high supercapacitive performance. To meet the current needs various electrode materials combining both carbonaceous and metal oxide compound are explored and their performance are evaluated towards supercapacitor application. Zinc cobaltite (ZCO) is a capable material for energy storage application, but it suffers from low electrical conductivity and cyclic stability. In this work, a novel material, C@ZCO peanut like microspheres structure, is fabricated by a solvothermal followed by a calcination method. *In-situ* carbon (C) doping is achieved by the pyrolysis of metal ethylene glycol (EG) percussor solution in the solvothermal procedure. Here EG behaves as the both dopant source and structure director in the preparation of C@ZCO to prevent the agglomeration of the ZCO nanoparticles. The improved performance can be ascribed to the hybrid nature of the prepared material, where doped C amplifies the stability and conductivity and the ZCO enhances the charge storage capacity owing to its pseudo capacitive nature. The nanohybrid delivers the specific capacitance of 506 $F.g^{-1}$ at 2 $mV.s^{-1}$ and stable until 3000 cycles. This finding will shed a new light towards design of the engineered metal oxides for various highly efficient electrocatalytic applications like battery, supercapacitor, and sensing.

Keywords: Doping; Carbon; EDLC; Pseudo-capacitance.

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PP-ESC-07

INCORPORATION OF PHOTONIC MATERIAL BNNT INTO THE PANI@MgO MATRIX TO BOOST ENERGY DENSITY FOR SUPERCAPACITOR APPLICATION

Sakaray Madhuri

ABSTRACT:

Renewable resources fosters to fill the void in case of energy conversion and storage. Hybrid supercapacitor mimic a pivotal role in energy storage sector. In this work, the fabrication of magnesium oxide (MgO) nanoparticles decorated with boron nitride nanotubes (BNNTs) incorporated with polyaniline (PANI) through three step chemical route through which in-situ oxidative polymerization to amalgamate these nanostructures is reported. This work punctuates to amend the energy density and specific capacitance using these ternary nanocomposites. PANI/MgO/BNNTs active material was synthesized solely and interpolated with different proportions of BNNTs. These composites were characterized with X-Ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), Field Emission Scanning Electron Microscopy (FESEM), Cyclic Voltammetry (CV), Galvanostatic Charge Discharge (GCD) and Electrochemical Impedance Spectroscopy (EIS). The supercapacitive behavior of the active material was analyzed in a three-electrode system using 6M KOH. The results indicate that the composite delivered high specific capacitance showing potential electrode materials for high performance supercapacitor application. In this work, samples were indicated as PANI:MgO:BNNT. The average crystallite size of samples A (1:1:1), B(1:1:2), C(1:1:3) and D(1:1:4) are 26nm, 22nm, 20nm and 18nm having the specific capacitance of 437 Fg^{-1}, 1609 Fg^{-1}, 1695 Fg^{-1} and 2105 Fg^{-1} with energy density of 10.1Wh/Kg, 19.3Wh/Kg, 32.2Wh/Kg and 42.9Wh/Kg respectively. The morphology of the ternary composites showed as particles of MgO uniformly spread over the accordion stacked composite with petal like structure, nanotubes and granular structures.

Keywords: BNNTs, Ternary composite, capacitive performance, Supercapacitor

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PP-ESC-08

BANDGAP ENGINEERING OF TiO_2 NANOPARTICLES BY DOPING VANADIUM METAL IONS

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ABSTRACT:

A simple promising strategy to modify TiO_2 bandgap was achieved via dopant incorporation which influences photo responsiveness. Pristine (TiO_2) and Vanadium doped titanium dioxide nanoparticles (TiO_2:V NPs) of different concentrations were synthesized via hydrothermal method. The pristine and TiO_2:V NPs were characterized by XRD, UV-Vis, PL, SEM, EDAX and Raman spectroscopy. XRD pattern indicate that the TiO_2 NPs were confirmed to be tetragonal anatase phase. The optical property results show that V-doping cause a significant shift of TiO_2, which promotes light absorption in the visible region. The band gap of pristine was calculated to be 3.2 eV. After V enters the lattice, it will introduce impurity level in the TiO_2 bandgap and reduce the bandgap of TiO_2.The photoluminescence and Raman scattering results well accord with the UV-Vis analysis. SEM analysis confirms the formation of nanostructures in the case of both pristine and TiO_2:VNPs. EDAX spectra confirmed the presence of Ti, O and V ions in the TiO_2 lattice. The photodetection analysis confirms the visible light detection of the synthesized TiO_2:V NPs.

Keywords: TiO_2; vanadium doping; band gap engineering; photodetection.

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PP-ESC-09

INFLUENCE OF RAPID THERMAL ANNEALING ON THE STRUCTURAL AND ELECTRICAL PROPERTIES OF Au/CoPC/n-GE SCHOTTKY BARRIER DIODES

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Abstract

The rapid thermal annealing temperature effects on the structural, morphological and electrical properties of cobalt pthalocyanine (CoPc) films on n-Ge are investigated. CoPc films were deposited on n-Ge substrate and the surface roughness is highly increases with the increase of annealing temperature due to aggregation of native grains. The electrical and current transport mechanisms of fabricated Au/CoPc/n-Ge Schottky barrier diodes are explored at different annealing temperatures by I-V characteristics. The results shows that the estimated barrier height is slightly decreases with the increasing of annealing temperature and could be ascribed to the diffusion of Au atoms into CoPc films transferring the negative charges to the molecule indicating n-type doping of organic film. From the forward log(I)-log(V) plot the Au/CoPc/n-Ge Schottky barrier diode indicating the carrier transport mechanism by ohmic contact in the lower bias and by the space-charge-limited (SCLC) transport mechanism at the higher bias regions irrespective of annealing temperatures this might be related to the additional traps initiating from CoPc. The Poole-Frenkel emission shows the current transport in the reverse bias regardless of the annealing temperature.

Keywords: n-Ge; Cobalt pthalocyanine heterostructure; Surface morphology; Current transport mechanism

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PP-ESC-10

DIMENSIONALLY MIXED REDUCED GRAPHENE OXIDE/MULTIWALLED CARBON NANOTUBES/COBALT OXIDE TERNARY NANOCOMPOSITE FOR SUPERCAPACITORS

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ABSTRACT:

Dimensionally mixed ternary nanocomposite of two-dimensional (2D) reduced graphene oxide, one dimensional (1D) multiwalled carbon nanotubes and zero-dimensional (0D) cobalt oxide nanoparticles (rGO/MWCNT/Co_3O_4) was synthesized by a facile one pot hydrolysis method based on the concept of nanoarchitechtonics. The good electrical conductivity and remarkable carrier mobility of rGO and MWCNTs make them a suitable matrix for hybrid supercapacitors and their composites with metal oxides exhibit enhanced electrochemical properties due to the advantages of synergistic contribution and the integration of different dimensionalities. Inclusion of MWCNT function as a spacing material and reduces the restacking of rGO and enhances the conductivity of GMC. Whereas, the presence of pseudocapacitive Co3O4 increases the specific capacitance value. The electrochemical performance of the ternary composite rGO/MWCNT/ Co_3O_4 GMC is studied in 1M H_2SO_4. The rGO/MWCNT/ Co_3O_4 composite is proven to be a promising electrode material for supercapacitors with a remarkable specific capacitance of 926 Fg^{-1} at 1 A g^{-1} with an excellent capacitance retention of 95% across 2000 cycles.

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PP-ESC-11

ELECTRICAL CONDUCTION PROPERTIES OF AU/METHYLENE BLUE/n-Ge HETEROSTRUCTURES

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ABSTRACT:

Au/Methylene Blue (MB)/n-Ge Schottky diode fabricated using low cost spin coating method and investigated its electrical and interfacial properties. Various analysis techniques such as forward I–V, C–V, Cheung's, and Norde's methods were used to extricate the interfacial properties including barrier height (BH), series resistance (R_s), ideal factor(n)and interface state density (NSS) with and without interlayer. It has been found that the introduction of methylene blue interlayer to Au/n-type Ge contact led to a significant reduction in series resistance (from 3027Ω to 38 Ω), with consistent barrier height (0.63ev) of Au/Ge contact because the MB dye layer creates the physical barrier between the Au and the n-Ge junction. Therefore, Methylene Blue is more stable and predictable in modifying metal/semiconductor interfaces in various optoelectronic applications. The current transport mechanism signifies the transition of conduction mechanism from ohmic to trap assisted SCLC conduction mechanism at moderately high voltages. This may be attributed to the exponential distribution of traps or defects located at the interface between dye and semiconductor. The C-V characteristics of the n-Ge contact modified with and without Methylene blue dye clearly shows the distribution of interface states significantly influenced the inversion and depletion regions. A sharp transition of capacitance from depletion to accumulation region is observed in Au/MB/n-Ge contact than its reference at high frequency (1MHz).

Keywords: n-Ge, Methylene Blue, heterostructure, Current transport mechanism, Schottky contact, Electrical Properties.

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OP-EN-01

PHOTOCATALYTIC PERFORMANCE OF TiO_2 NANOPARTICLES USING PULSED LASER SYSTEM

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ABSTRACT:

TiO_2 (titanium dioxide) has excellent durability and abrasion resistance and is economically advantageous as a photocatalyst used in the environment and energy fields. However, general TiO_2 shows light activity only in the ultraviolet (UV) region, which accounts for only 4 to 6% of the solar radiation, so the problem of efficiency has been continuously raised. Therefore, various studies are being conducted on activity in the visible light region and ultraviolet light through metal and non-metal doping. This study synthesizes black TiO_2 in an easy, fast, and eco-friendly way using the recently studied PLIL (Pulsed Laser Irradiation in Liquid) and PLAL (Pulsed Laser Ablation in Liquid) and identifies the photocatalytic properties and reaction mechanism for energy and environment. It is intended to suggest the direction of applied research to solve problems in the field.

Keywords: Air pollution; UV-visible region; Photocatalyst; Black TiO_2

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OP-EN-02

CATION MODULATED CoFe-LDH GENERATED VIA PLAL AS A ROBUST ELECTROCATALYST FOR OVERALL WATER SPLITTING

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ABSTRACT:

The development of non-precious, highly active, durable, and bi-functional electrocatalysts are in huge demand for electrocatalytic water splitting applications. Among the various electrocatalysts, layer double hydroxide (LDH) has been promissing towards oxygen evolution reaction (OER). We made an attempt to synthesize two dimensional CoFe-LDH nanostructure employing pulsed laser ablation (PLA) technique in aqueous medium containing carbonate (CO_3^{2-}) as an intermediate anion. During the exfoliation of LDH samples creates coordinatively unsaturated metal atoms which improves the intrinsic electronic conductivity of the material and results effective towards water electrolyzer reactions. The ablation time is a decisive factor to tune atomic ratio of cobalt (Co) and iron (Fe). Formation of the materials and their chemical compositions were characterized using XRD, FESEM, and HRTEM analyses. During the half-cell oxygen evolution reaction in alkaline medium, $Co_{0.50}Fe_{0.50}$-LDH showed highest activity with the lowest overpotential of 270 mV at 10 mA/cm^2. Similarly, the other half reaction of hydrogen evolution has been higher in the case of $Co_{0.25}Fe_{0.75}$-LDH samples with the overpotential of 365 mV at 10 mA/cm^2. Finally, an alkali-electrolyzer containing $Co_{0.25}Fe_{0.75}$-LDH II $Co_{0.50}Fe_{0.50}$-LDH as cathode and anode electrode could achieve a voltage of 1.89 V at the current density of 10 mA/cm^2. Along with higher activity, samples also showed significant chemical and structural stability for long run cycles. Additionally, our findings demonstrate the promising electrocatalytic activity of LDHs for scale-up alkaline water splitting.

Keywords: Pulsed laser ablation; Water splitting; CoFe-LDH; HER; OER

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OP-EN-03

FABRICATION OF Ir/NiFe-LAYER DOUBLE HYDROXIDES NANO STRUCTURES BY PULSED LASER TECHNIQUE FOR ELECTROCATALYTIC OXYGEN EVOLUTION REACTION

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ABSTRACT:

As an ideal technology for the H_2 fuel production, the electrochemical overall water splitting (OWS) is considered as a clean and promising technique to generate H_2 fuel. The production of this clean energy source can be obtained from OWS, which consists of two half-electrochemical reactions of oxygen evolution reaction (OER) and hydrogen evolution reaction (HER). We have studied an interface engineering strategy to fabricate an effective bifunctional material of NiFe-layered double hydroxides (NiFe-LDHs) electrocatalyst via pulsed laser technique. Owing to its earth abundance, low kinetic overpotential, and superior stability, NiFe-layered double hydroxides (NiFe-LDHs) has emerged as a promising electrocatalyst for catalyzing water splitting, especially oxygen evolution reaction (OER), in alkaline solutions. Unfortunately, hydrogen evolution reaction (HER) activity of the NiFe-LDHs was rather poor in alkaline environment. The introduction of Ir into NiFe-LDHs could efficiently reduce the energy barrier, eventually accelerating its HER kinetics as well as OER accelerating. The optimal proportion of Ir introduced NiFe-LDHs exhibited a low OER overpotential of 197 mV at 10 mA cm^{-2} and low HER overpotential of 339 mV at 10 mA cm^{-2} in 1.0 M KOH electrolyte. Benefitting from its outstanding HER activity and remained excellent OER activity, the Ir/NiFe-LDHs was shown to be a highly effective catalyst for overall water splitting.

Keywords: Layered double hydroxides (LDHs), Ir/NiFe-LDHs, Pulsed laser technique, Electrocatalyst

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OP-EN-04

IN SITU RAMAN STUDIES OF REACTIVE SPECIES DRIVING WATER SPLITTING OVER Co-BASED ELECTROCATALYSTS FABRICATED VIA PULSED LASER ABLATION

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ABSTRACT:

Herein, we produced Co-based (cobalt phosphate ($Co_3(PO_4)_2$), cobalt oxide (Co_3O_4), and cobalt sulfide (Co_9S_8) electrocatalysts via pulsed laser ablation in liquids (PLAL) technique to explore the synergy of anion modulation on phase-selective active sites in electrocatalytic HER and OER. The $Co_3(PO_4)_2$ displays an ultralow overpotential of 230 mV at 10 mA cm^{-2} with a 48.5 mV dec^{-1} Tafel slope which outperforms the state-of-the-art Ir/C in OER owing to its high intrinsic activity. Whereas, the Co_9S_8 exhibits the highest HER performance among synthesized Co-based catalysts with the lowest overpotential of 361 mV at 10 mA cm^{-2} with a small Tafel slope of 95.8 mV dec^{-1} in alkaline medium and produces H_2 gas with ~500 mmol g^{-1} h^{-1} yield rate under the fixed -0.45 V vs. RHE potential. Thus, the identified surface reactive intermediates over in-situ EC-Raman spectroscopy revealed that cobalt (hydr)oxides with higher oxidation states of Co cation forming under oxidizing potentials on the electrode-electrolyte surface of $Co_3(PO_4)_2$ facilitate the OER, and $Co(OH)_2$ facilitate the HER. Notably, the fabricated two-electrode water electrolyzers using $Co_3(PO_4)_2$, Co_3O_4, and Co_9S_8 electrocatalysts can deliver the cell potential of 2.01 V, 2.11 V, and 1.89 V, respectively, at current densities of 10 mA cm^{-2}. This work not only shows PLAL synthesized electrocatalysts as promising candidates for water splitting but also provides an underlying principle for advanced energy conversion catalysts and beyond.

Keywords: Puled laser ablation in liquids; Co-based electrocatalysts; In-situ Raman spectroscopy; Overall water splitting.

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OP-EN-05

ONE-POT SYNTHESIS OF TRANSITION METAL CARBIDES USING PULSED LASER ABLATION FOR OVERALL WATER SPLITTING IN ALKALINE MEDIUM

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ABSTRACT:

Electrochemical water splitting provides a promising strategy for effective and sustainable hydrogen production, and one of the immediate challenges is the availability of low-cost and efficient electrocatalysts for the hydrogen evolution reaction (HER). Among the non-noble metal catalysts, transition metal carbides (TMC) attract more interest due to their unique surface reactivity and catalytic properties resembling noble metals. In this study, we could able to synthesis a series of TMCs (Co_3C, Fe_3C, TiC, and MoC) materials via a facile pulsed laser ablation (PLA) technique in liquid medium without adding additional carbon sources. The intrinsic physical and chemical characteristics of the synthesized materials was characterized by various analytical techniques such as XRD, FE-SEM, EDS, and HRTEM. The electrocatalytic performance towards half-cell HER, OER and overall water splitting were systematically investigated. As a result, Co_3C exhibits an excellent OER performance while MoC high HER activity. The fabricated two electrode electrolyzer using Co_3C as both anode and cathode exhibited an excellent efficiency for the hydrogen fuel production when compared with other carbides. This work provides facile and advanced strategy in the preparation and modulation of TMC electrocatalysts for energy-saving efficient hydrogen fuel generation.

Keywords: Transition Metal carbide, Hydrogen evolution reaction, Oxygen evolution reaction, Overall water splitting

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PP-EN-06

IMPROVING SUNLIGHT-PHOTOCATALYTIC ACTIVITY OF UNDOPED AND PHOSPHORUS DOPED MnO_2 WITH ACTIVATED CARBON FROM BIO-WASTE WITH NANORODS MORPHOLOGY

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ABSTRACT:

Based on the contributions of phosphorus and Activated carbon (AC) and their composite species are great advances in photocatalytic degradation performance. The evenly distributed Phosphorus and Activated Carbon have good contact with MnO_2. The activated carbon was made from Manikara zapota peel by chemical activation KOH, and by hydrothermal method P-MnO_2/AC, nanorods were prepared. The evenly distributed AC has good contact with P-MnO_2. X-ray diffraction (XRD) and Fourier transform infrared spectroscopy (FTIR) were used to analyze the samples. Morphology of AC, MnO_2, and P-MnO_2/AC was studied using SEM, FESEM, and TEM. UV-visible diffuse reflectance spectroscopy (UV-Vis DRS) was used to characterize the bandgap values. The bandgap values of MnO_2, PMAc (1.0), (3.0), and (5.0) of P-MnO_2/AC are 2.48eV, 1.99eV, 1.76eV, and 1.62eV, respectively. They confirmed that increasing the quantity of AC reduced the bandgap values. The photocatalytic efficiency of the MnO_2 and P-MnO_2/AC samples are studied using the photodegradation of MO and RhB dyes under sunlight. The best photocatalytic degradation performance was obtained by P-MnO_2/AC for MO and RhB dye, which are excellent degradation efficiency of 96.31% and 97.57%, respectively. Furthermore, within 180 minutes, the optimal TOC removal approached 56.4, 80.3, and 87% for MnO_2, PMAc (5.0) MO, and RhB, respectively. Moreover, Trapping experiments were characterized by RhB dye PMAc (5.0) of P-MnO_2/AC. In addition, IPA had the smallest degrading efficiency (11.46%) with $^{\bullet}OH$ radicals haveing a substantial role. Furthermore, PMAc (5.0) of P-MnO_2/AC doping was successfully used for five photodegradation cycles with no notable change in activity or crystalline properties by RhB dye. Furthermore, the mechanism of catalytic performance enhancement was addressed. These nanoparticle materials could be used in high-performance photocatalytic applications.

Keywords: Phosphorus, Manikara zapota peel, Natural sunlight, Photocatalysis.

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OP-EN-07

ENZYME IMMOBILIZED CONDUCTING POLYMER-BASED BIOSENSOR FOR THE ELECTROCHEMICAL DETERMINATION OF THE ENDOCRINE DISRUPTOR NONYLPHENOL

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ABSTRACT:

A facile and efficacious biosensor was developed by immobilizing laccase over electropolymerized poly anthranilic acid on carbon fiber paper (CFP) electrode (Lac/PAA/CFP) for the detection of nonylphenol (NYP). NYP is a persistent endocrine disruptor and a harmful eco toxic pollutant. The Physico-chemical characterization of the fabricated electrode was carried out by X-ray photoelectron spectroscopy (XPS), Field emission scanning electron microscopy (FESEM) with energy-dispersive X-ray spectroscopy (EDS), Optical profilometer, Raman spectroscopy and Fourier transform infrared spectroscopy (FTIR). The electrochemical studies were performed using Cyclic voltammetry (CV), Electron Impedance spectroscopy (EIS), and Differential pulse voltammetric (DPV). Cyclic voltammetric studies divulged that the prepared sensor has 2.4 times higher catalytic activity when compared to the bare CFP electrode. Effect of the supporting electrolyte, pH and scan rate was scrutinized for modified electrode. Under optimized conditions differential pulse voltammetric studies were used for the quantification and the results revealed that the biosensor has low limit of detection (LOD) and limit of quantification (LOQ) of 2.34 nM and 8 nM respectively with a broad linear dynamic range of 8 nM to 400 nM. In the presence of interferants the developed biosensor exhibited good selectivity towards the electrochemical detection of NYP. Further, the developed biosensor was accessed for its practicality in real samples collected from lake water.

Keywords

Nonyl phenol, laccase, biosensor, poly- anthranilic acid, endocrine disruptor, phenolic pollutant

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OP-EN-08

ROBUST WETTABILITY GRADIENTS ON SOFT SUBSTRATES: NOVEL FABRICATION METHOD AND DIRECTIONAL WATER HARVESTING FROM FOG

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ABSTRACT:

Properties and applications of soft substrates depend decisively on the characteristics of their surfaces. Physical features and chemical functionality of the soft surfaces control their interactions with the surroundings thereby deciding their responses to various surface phenomena. A gradient of such surface features i.e., a gradual directional change in a chemical or physical characteristic across a surface will result in a gradual change in the response of the surface to its surroundings in the same direction. The resolution and stability of large-scale surface gradients with controlled directionality enable their applications in the fields of microfluidics, sensing, optics, and biology. Wettability gradients are prominent classes of gradients which are constituted by gradual increase or decrease of hydrophobicity/ hydrophilicity across a surface. Currently existing fabrication techniques for the fabrication of wettability gradients rely on sophisticated instrumentation, complex experimental setups, and expensive reagents. Also these methods are limited in terms of robustness of the gradients produced. Here, a simple, inexpensive, scalable, and reproducible strategy, making use of differential thermal curing of partially cured polydimethylsiloxane (PDMS), is presented. These wettability gradient exhibit efficient fog water collection and cell adhesion. The simplicity and general applicability of the method presented here is expected to establish a promising pathway toward the formation of wettability gradients in other elastomeric systems also, facilitating important applications in various fields.

Keywords: Soft surfaces, wettability, surface gradients, water harvesting

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OP-EN-09

ENHANCED PHOTOCATALYTIC PERFORMANCE OF C-ZnO/$BiVO_4$ NANOCOMPOSITE

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ABSTRACT:

The disposal of organic pollutants and toxic contaminants from the industries to the nearby water bodies which leads to environmental pollution. Several research works have carried out to overcome these problems via photocatalysis rather than conventional methods. In the present study, the composite formation of carbon doped ZnO with ternary metal oxide semiconductor $BiVO_4$ for hindering the limitations of both ZnO and $BiVO_4$ in the photocatalysis application. In this regard, the different weight % (5, 15 and 25) of $BiVO_4$ have used for the formation of composite by the ultrasonication method. The monoclinic scheelite structure of $BiVO_4$ and the hexagonal wurtzite structure of ZnO in the C-ZnO/$BiVO_4$ composite have confirmed from structural analysis. The optical absorption of the ZnO has tuned into the visible region by doping with carbon as well as a composite formation with visible light active material $BiVO_4$. The chemical states and the valence of the species in the C-ZnO/$BiVO_4$ composite have confirmed by XPS analysis. The nanocomposite exhibited enhanced catalytic activity with a higher degradation rate constant compared with their counterparts. Further, detailed investigations have made to understand the influence of various photocatalytic reaction parameters. The variable parameters are the pH of the dye solution, the concentration of dye and the dosage of photocatalyst over the degradation of organic dye.

Keywords: $BiVO_4$; photocatalysis; nanocomposite; methylene blue dye

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OP-EN-10

PHOTOCATALYTIC ACTIVITY OF GREEN SYNTHESIZED SILVER NANOPARTICLES

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ABSTRACT:

The synthesis of silver nanoparticles (AgNPs) using *Andrographis paniculata* has been studied. *Andrographis paniculata* leaves extract was treated with silver nitrate solution for the synthesis of silver nanoparticles. Synthesized nanoparticles were characterized with the help of analytical tools like UV, FTIR, X-ray, and SEM and used as a photocatalyst for the removal of Methylene blue (MB) dye. The photocatalytic activity of the biosynthesized silver nanoparticles was studied by degradation of MB dye under solar irradiation. Green synthesized silver nanoparticles were effectively degrading the dye nearly 97% at 72 h of exposure time.

Key words: Green synthesis, Silver nanoparticles, XRD, *Andrographis paniculata*, Photocatalytic activity

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OP-EN-11

ECO-TECHNOLOGICAL APPROACHES FOR TEXTILE DYE EFFLUENT TREATMENT AND CARBON DIOXIDE CAPTURE USING UNICELLULAR MICROALGAE *CHLORELLA VULGARIS* RDS03

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ABSTRACT:

The present study employed a pilot scale treatment of textile dye effluent and carbon dioxide sequestration using unicellular microalga *Chlorella vulgaris RDS03*. The 15 days treatment of textile dye effluent with *Chlorella vulgaris* RDS03 was achieved a textile dye biosorption capacity (qmax) rate of 98.84%. The Langmuir and Freundlich isotherm kinetics model was predicted R_2 value of 0.98. The microalga *Chlorella vulgaris* RDS03 captured 96.68% of the carbon dioxide, produced 465 gL^{-1} of biomass, 189.26 gL^{-1} of carbohydrates, 233.89 gL^{-1} of lipid, 4.3 mLg^{-1} of bioethanol and 4.9 mLg^{-1} of biodiesel. A fatty acid methyl ester (FAME) profiling using gas chromatography mass spectrometry (GCMS) identified 40 types of biodiesel compounds, including myristic acid, pentadecanoic acid, octadecanoic acid, palmitic acid, and oleic acid. Bioethanol was validated and analysed using high performance liquid chromatography (HPLC).

Keywords: Biosorption kinetics, CO_2 capture, Bioethanol, Biodiesel

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OP-EN-12

METAL OXIDES FROM GREEN TEMPLATES AS ENVIRONMENTAL CATALYSTS

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ABSTRACT:

For environmental applications, Iron oxide nanoparticles (INPs) is highly preferable to their bulk counterpart owing to their high surface area and photocatalytic efficiency with free radical generating property, notably Reactive Oxygen Species (ROS), under visible light irradiation. The study reports the Templated-synthesis of INPs using banana flower perianth (an agro-waste) as a physical template. The templated method circumvents the setbacks of physical and chemical strategies involving sophisticated equipment requirements and usage and generation of toxic chemicals. Thermal decomposition of the perianth soaked with the metal precursor yielded monodisperse INPs. Characteristic peaks for Fe and O in XRD and EDAX analyses confirmed the formation of INPs. Decolourization of methylene blue, a thiazine dye, validated the catalytic efficacy of INPs to be 98.95 % for 100 ppm dye concentration with an optimal catalyst dose of 800 ppm at its native pH and room temperature. Photocatalysis expressed higher decolorization efficiency than adsorption. Treatment of Air-Conditioner water, as a model water system with high loads of microbial pollution, with INPs for 60 min under visible light resulted in complete microbial load reduction. A comparative study with commercial nanoparticles and reusability test substantiated the photocatalytic and economic efficiency of the template synthesized INPs (TINPs). Thus, the study reports the potential of TINPs as an augmenting photocatalytic agent for industrial wastewater treatment and filtration applications as anti-fouling agents.

Keywords: Template synthesis, green chemistry, iron oxide NPs, wastewater treatment and microbial load reduction.

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OP-EN-13

REMOVAL OF HEAVY METAL FROM AQUEOUS MEDIUM BY USING SYNTHESISED LOW-COST CHITOSAN DERIVED ACTIVATED CARBON- A COMPILATION STUDY OF EQUILIBRIUM KINETICS AND THERMODYNAMIC

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ABSTRACT:

In this present work, the removal of Cr (VI) from aqueous solutions by chitosan coated saw dust activated carbon (CCSDAC) was investigated. The higher percentage removal of Chromium ions from aqueous solutions was observed in the presence of saw dust activated carbon in CCSDAC when compared to that of former adsorbent of SDAC. The mechanism of adsorption was studied by conducting pH and kinetic studies. Batch adsorption experiments were performed to evaluate the effect of adsorbent dose, initial concentration and temperature on the removal of Cr (VI) using SDAC and CCSDAC. When compared to SDAC, the adsorbent of CCSDAC has higher adsorption at the range of pH 4.0. The results of equilibrium and kinetic adsorption studies were demonstrated using pseudo first- order kinetic and Langmuir isotherm models.

Keywords: Removal, SDAC, CCSDAC, Kinetics, Adsorption, Langmuir isotherm Thermodynamics, pH and kinetic studies.

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OP-EN-14

4-ACETAMIDO TEMPO MEDIATED ELECTROCHEMICAL SYNTHESIS OF PIPERONAL USING COELECTRODEPOSITED MnO_2-Pi-rGO MODIFIED ELECTRODE

Roopa Margaret Rodrigues

ABSTRACT:

MnO_2-Pi-rGO-CFP electrode was developed through the concurrent deposition of MnO_2-Pi and reduced graphene oxide (rGO) on carbon fiber paper (CFP). Cyclic voltammetry (CV) and electrochemical impedance studies (EIS) were applied for the electrochemical properties of the electrode. X-ray diffraction spectroscopy (XRD), raman spectroscopy, scanning electron microscopy (SEM), transmission electron microscopy (TEM) and optical profilometry (OP) were employed to study the physiochemical properties. Furthermore, the modified electrode was used as an electrocatalyst for the oxidation of piperonyl alcohol mediated by 4-acetamido-2,2,6,6-tetramethylpiperidine1-oxyl (4-acetamido TEMPO or 4-ACT). The reaction was carried out using potentiostatic bulk electrolysis in an undivided cell equipped with three electrode system to obtain piperonal with 82% yield. The product obtained was further characterized by GCMS, ^{1}HNMR and ^{13}CNMR. The turnover frequency of 4-ACT were studied at different concentration of the reactant and the reaction parameters were also optimized using statistical tool design of experiment. This methodology has proven to be economic, environmentally benign and highly efficient to obtain piperonal as it is carried out under milder reaction conditions at room temperature.

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OP-EN-15

INVESTIGATING THE EFFECTIVE DEGRADING PROPERTY OF Bi_2S_3 NANOPARTICLES: A CONCISE DISCUSSION ON STRUCTURAL, OPTICAL AND PHOTOCATALYTIC DEGRADATION OF PICRIC ACID IN THE PRESENCE OF UV-VISIBLE LIGHT

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ABSTRACT:

Bi_2S_3 nanoparticles were synthesized through co-precipitation technique. The synthesized Bi_2S_3 nanoparticles were characterized by X-ray diffraction (XRD) revealing out the crystal structure of the material to be Orthorhombic and the crystallite size was estimated to be 32nm determined using the Scherrer formula. Morphology of the synthesized sample was found to be spherical shape examined using scanning electron microscopy (SEM). Fourier transformed infrared spectroscopy (FT-IR) explains about the occurrence of functional group. UV-Vis Absorption spectroscopy shows the optical property of the material having a suitable band gap of 1.5eV for an excellent photocatalytic behaviour. Hence the efficiency of photocatalytic degradation by Bi_2S_3 nanoparticles towards picric acid degradation was analysed under UV, Visible-light and Sun light irradiation. The results show that, Bi_2S_3 nanoparticles has a potential degradation rate of 100% under visible light with 30 min. These results suggest that Bi_2S_3 nanoparticles a valuable material for environment pollution treatment.

Keywords: Bismuth sulphide; XRD; Picric Acid; Photocatalytic.

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OP-EN-16

GREEN SYNTHESIS OF CuO/ZnO NANOCOMPOSITES USING LEAF EXTRACT OF *CIMBOPOGAN CITRATUS* AND ITS PHOTOCATALYTIC DEGRADATION OF METHYLENE BLUE UNDER SUN LIGHT IRRADIATION

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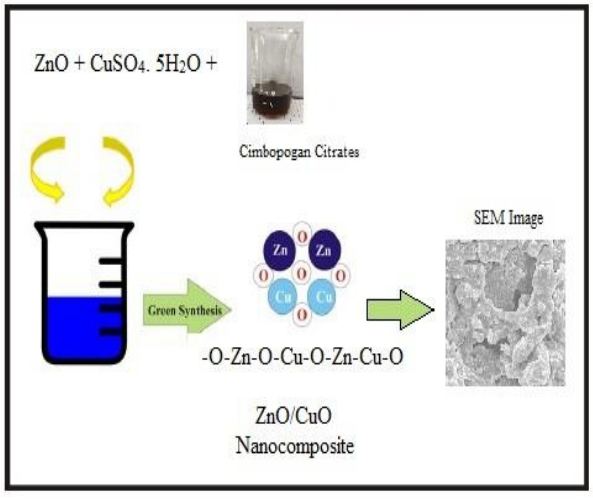
ABSTRACT:

Green synthesis of copper oxide coated zinc oxide (CuO/ZnO) nanocomposite by using leaf extract of *Cimbopogan Citratus* (CC) with chemical method. This CuO/ZnO nanocomposite was characterized with various instrument techniques such as as UV-visible spectroscopy (UV-Vis), Fourier Transform-Infrared spectroscopy (FT-IR), X-ray diffraction pattern (X-ray) and Scanning electron microscope (SEM). This nanocomposite was tested for the photocatalytic activity for the degradation of methylene blue (MB) under the sunlight irradiation and it was confirmed by UV-vis spectroscopy. CuO/ZnO nanocomposite was shown the higher photocatalytic degradation efficiency than the both ZnO and CuO. The degradation rate constant was evaluated by using pseudo first order kinetic. CuO/ZnO nanocomposite was delivered the fast degradation rate than both ZnO and CuO. This CuO/ZnO nanocomposite photocatalyst was necessary used in treatment of waste water samples.



Keywords: Green synthesis; ZnO/CuO nanocomposite; Cimbopogan Cittates; Methylene Blue.

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OP-EN-17

ANALOGY OF SOIL ESSENTIAL NUTRIENTS USING ORGANIC AND CHEMICAL FERTILIZERS

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ABSTRACT:

The Main objective of this article is to study about the essential nutrients of the soil by the access of the organic and chemical fertilizers. It also correlates the assorted soil properties using organic and chemical adoption to soil. An Investigation was governed at Sarah Tucker College which is located at 8.6988' latitude and 77.740' longitude at Tirunelveli District of Tamil Nadu, South India in 2022 to appraise the effects of fertilizer for soil. The spectrum analyses such as CV, FTIR are also premeditated for Cigna radiation and Vigna Mungo Cultivation. The treatment of this study were exercised on the soil after 21 days, the soil was collected in pot and analysed in soil testing laboratory. From the infrared spectrum, the nutrients are identified from the location or band position of peaks with the help of available literature. The performed analysis provided useful information about the mineralogical composition such as Nitrogen, potassium and phosphorus of the sediments. The presence of intermediates in oxidation-reduction reactions and the reversibility of a reaction, cyclic voltammetry can be used to study qualitative information about electrochemical processes.

Keywords - FTIR, CV and Organic amendment.

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OP-EN-18

EFFECT OF DOPED MAGNETIC NANO PARTICLE AND NON-DOPED NANOPARTICLE IN PHENOLIC WASTE WATER TREATMENT

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ABSTRACT:

study concentrated on the preparation of magnetic nanoparticle by condensation method. Various techniques were employed to confirm the formation of doped magnetic nanoparticles. The magnetic nanoparticle used to treat the phenolic effluent like o- cresol, 2-chlorophenol, 2, 6-dichlorophenol. Magnetic nanoparticle like γ-Fe_2O_3 alone give 80.75% of removal after 4 hrs, when it doped with Ti and Mg the result is remarkable it gives 94.14% removal in 1hr.

Keywords: Magnetic Nanoparticle, XRD, UV, Waste water treatment, phenolic effluent.

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OP-EN-19

SURFACE ENGINEERING OF CARBON QUANTUM DOTS USING PYRENE DERIVATIVE FOR DUAL EMISSION RATIOMETRIC SENSING OF CADMIUM ION

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ABSTRACT:

Cadmium (Cd^{2+}), a heavy metal ion used in numerous industries, has toxic adverse effects on the environment; it is crucial to develop a quick and reliable method for Cd^{2+} determination. Fluorescent biomass-derived carbon quantum dots (WCD) with rich carboxyl groups on the surface were synthesized using *water amaranth* leaves by hydrothermal method with a 12.1% quantum yield. The surface of WCD was further modified with 1-pyrene carboxaldehyde (PC) to synthesize pyrene carboxaldehyde-carbon quantum dots (PC-WCD). This study developed a fluorescent ratiometric nanosensor using a covalently functionalized WCD with pyrene derivative and demonstrates highly selective identification capability towards Cd^{2+} over competing metal ions. The Nanosensor has significant selectivity towards Cd^{2+} in an excellent linear range of 10-70 µM with a detection limit as low as 15 nM and demonstrates excellent water solubility and biocompatibility. Transmission electron spectroscopy (TEM), Fourier Transform infrared spectroscopy (FT-IR), and X-ray photon spectroscopy (XPS) were used to identify the surface functionalization of PC-WCD. Finally, the developed ratiometric sensor was used for detecting Cd^{2+} metal ions from various water effluents.

Keywords: Ratiometric fluorescence sensor, Biomass-derived, carbon quantum dots, Cadmium, Pollutant

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OP-EN-20

FABRICATION OF METAL-ORGANIC FRAMEWORK COMPOSITES FOR REMEDIATION OF WATER CONTAMINATED WITH HEAVY METALS

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ABSTRACT:

Metal-organic frameworks (MOFs) have received great attention in recent years, due to their fascinating architectures and topologies as well as their potential applications and properties such as gas storage, magnetism, luminescence, catalysis, gas separation, drug delivery, water remediation etc. The present work demonstrates a simple and ultrafast method for the synthesis of a metal-organic framework Cu-BTC-SLS MOF. Here, a cooperative template strategy was used in which ZnO and sodium lauryl sulphate (SLS) were simultaneously introduced. The advantage of this method is that the synthetic procedure was accomplished in a very short time. The synthesized MOFs were then used to make composite beads with polystyrene. These beads were further used for heavy metal removal studies. The synthesized products were characterized and their structures were elucidated using various characterization methods. The products were found to be highly porous with micro- and meso-pores in them. The presence of micro- and meso-pores enable these structures ideal candidates for trapping guest molecules which enable their reaction or transformation in their cavities. The synthesized products have proved to be excellent heavy metal adsorbing agents which could be applied in large scale remediation of polluted water.

Keywords: Metal-organic frameworks (MOFs); polystyrene; composite beads

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OP-EN-21

SYNTHESIS AND CHARACTERIZATION OF Cd–DOPED ZnO NANO-PARTICLES OF HIGH PHOTO DEGRADATION FOR ENVIRONMENTAL STUDIES

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ABSTRACT:

The zinc oxide (ZnO) nanoparticle on a 2-electron oxygen reduction reaction is a particularly promising candidate for in-situ application. Herein, we prepared the zinc oxide doped cadmium ions composites (Cd@ZnO) through a simple hydrothermal method. The X-ray analysis has been carried out to confirm the structure and size of the nanomaterial. The optical absorption and energy gap of the prepared nanoparticles have been identified by UV–vis–NIR studies. Photoluminescence studies on the synthesized nanomaterials confirm the characteristic existence of blue and green emission bands. Fourier transform infrared spectroscopy has been studied on the ZnO nanoparticles to analyze the OH and CO-O vibrations. The structural and surface morphology analysis was inferred by SEM, TEM, and EDAX techniques. Zinc oxide nanoparticles are environmentally friendly and can be utilized to quickly remove contaminants from wastewater. The findings from the adsorption equilibrium fit the Brunauer–Emmett–Teller (BET) Model very well, showing multi-layer adsorption. The Photo-degradation studies on ZnO NPs were carried out, which is an advanced oxidation process widely used for methylene blue removal. The higher photo catalytic performance revealed that ZnO with Cd nanoparticles could be a promising photocatalyst for environmental remediation applications.

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OP-EN-22

CARBON NANODOT SUPPORTED PHOTOCATALYSIS FOR EFFICIENT DEGRADATION OF METHYLENE BLUE IN WATER

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ABSTRACT:

Aquatic pollution is particularly dangerous since all life forms are directly linked to it. Each year tons of industrial and domestic pollutants make their way into aqueous systems. Efficient removal/degradation of these pollutants is of prime importance for the sustainable future. Among many technologies, photodegradation is an emerging and promising method for the successful removal of aqueous pollutants since it is powered by abundant solar light. The ease of synthesis of carbon dots at low cost also contributes hugely to their utilizations as an efficient photocatalyst for the degradation of aqueous pollutants. This study aims to synthesize CNDs from *Carica papaya* seed to be used as photocatalysts for the photodegradation of Methylene blue dye (M.B). The degradation of the dye methylene blue (M.B) under UV light irradiation was used to investigate the possible use of CNDs as photo-catalysts (100 W). In order to create a highly effective photocatalyst for the photo-degradation of organic dyes in wastewater treatment, this research shows a sustainable method.

Keywords: *Carica papaya* seed, carbon nanodots, photodegradation, Aquatic Pollution, Methylene blue

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OP-EN-23

THE GREEN SYNTHESIS OF NANO PARTICLES USING *COSTUS PICTUS* LEAF EXTRACT BLENDED WITH PAINT AND ITS POTENTIAL APPLICATIONS

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ABSTRACT:

Nanoparticles are important due to their unique properties that may lead to new and exciting applications. Green synthesis has many advantages amongst physical and chemical methods of nanoparticle synthesis since the method is simple, inexpensive, and environmentally friendly. This research work describes the synthesis of carbon nanoparticles using leaf extract of *Costus pictus* and the characterization studies were carried out by Fourier Transform Infra-Red and Ultra Violet-Visible spectrophotometry. Incorporation of the nanoparticles of *Costus pictus* leaf extract into the paint formulation increases the corrosion protection properties. The inhibitive effects were investigated using weight loss, polarization, and impedance studies. The surface analysis techniques of Scanning Electron Microscope and Atomic Force Microscopy were used to investigate the morphology study. Findings prove that the synthesised nanoparticles incorporated with paint act as more efficient and thermally stable agents, which serve as an alternative eco-friendly anticorrosion additive for industrial cleaning and pickling operations than the crude extract.

Keywords: *Costus pictus*, corrosion, nanoparticles, anti-corrosive paint

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OP-EN-24

A STUDY OF Cu_2O NANOPARTICLES PREPARED THROUGH GREEN ROUTE USING CITRUS LIMON

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ABSTRACT:

Green route synthesis provides an extensive, reliable, sustainable, cost-effective and eco-friendly protocol for synthesizing metal & metal oxide nanoparticles. In this work, a straightforward green synthesis technique using citrus Limon (lemon) for the preparation of Cu_2O nanoparticles is employed. The prepared Cu_2O nanoparticles are characterized using X-ray diffractometer which confirms the crystalline face centered cubic phase. The UV-Vis absorption spectrum shows two absorption peaks at 311 nm and 383 nm, confirming the formation of Cu_2O nanoparticles. SEM micrographs reveal well defined spherical shaped nanoparticles having higher tendency for agglomeration. FTIR supports the presence of L-ascorbic acid, which play a significant role in reduction of copper ions. Thus, the prepared Cu_2O NPs have good physical characteristics which can be further taken for biological studies.

Keywords: Green route, Metal Oxides, Nanoparticles and Spherical

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OP-EN-25

INVESTIGATION OF RESISTIVE SWITCHING OF La:BFO FOR NON-VOLATILE MEMORY DEVICES

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ABSTRACT:

With the rapid advances of electronic devices, the demand for memory devices with energy efficiency, dense storage, and fast switching speed is required. Non-volatile memory (NVM) has relatively long-term storage, and no external power is required to store the information. Silicon (Si)-based non-volatile memory devices has seen a very fast growth due to the increasing demand for mobile phones, tablet computers, and digital camera. However, Si-based non-volatile memory devices have been dominated due to several drawbacks such as scaling issues, relatively slow operation speed, and high voltage for program/erase operations. To overcome such detriments, several novel concepts for alternative memory devices were proposed such as resistive random access memory (ReRAM). The resistive switching (RS) devices are one of the most promising candidates that attracted great attention due to their potential application in the next generation of nonvolatile memory (NVM) devices. The RRAM devices possess a series of superior characteristics such as low cost, high endurance, simple device structure, low power consumption, and long retention time. In RRAM devices, the data can be stored and read by switching the device from a high resistance state (HRS) to a low resistance state (LRS) is called the "SET" process. Conversely, the switching result from LRS to HRS is called the "RESET" process.

In the present research work reports on resistive switching (RS) bahaviour of Lanthanum (La)-doped : BFO layers. Spray Pyrolysis methods were used to deposit La (2 and 10 %) doped BFO thin film layers. In the presence of higher concentrations of La doping in BFO, the prepared La:BFO thin films display significant distortions from rhombohedral to tetragonal. The analyses of the morphology showed that all thin films of La:BFO were cracked free. The X-ray photoelectron spectroscopy (XPS) analysis reveals that the prepared La:BFO thin films have lower oxygen vacancies and higher Fe^{3+}/Fe^{2+} ratio which enriches the ferroelectric properties in La:BFO layers. The polarization-electric field (P-E) and RS characteristics of the fabricated La:BFO-based RS device were examined. It was observed that the La (10 at%) doped BFO RS device shows large remnant polarization (P_r) of 0.31 $\mu C/cm^2$ and stable RS characteristics with high ON/OFF ratio.

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OP-EN-26

STUDIES ON STRUCTURAL, OPTICAL, THERMAL, AND ELECTRICAL CONDUCTIVITY OF THE CRYSTALLINE POLYMER ELECTROLYTES WITH ADDED Li^+ ION FOR LITHIUM BATTERIES

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ABSTRACT:

Polymer electrolytes are the subject of intensive study, in part because of their potential use as electrolytes in all-solid-state rechargeable lithium batteries. These materials are formed by dissolving a Li_2SO_4 salt in a solid host polymer such as poly (ethylene oxide) and be prepared by using the solution casting method. The structural properties were examined by XRD studies. The variation in film morphology is examined by scanning electron microscopy (SEM) micrographs indicating that the salt particles were dispersed and embedded well within the polymer matrix. The absorption spectra were measured in the wave range from 200-800 nm at 303 K. The optical band gaps (E_g) for allowing direct transition decrease to increase the concentration of lithium sulfate. The optical activation energy was evaluated using the Urbach-edges method. The thermal properties of these films were investigated by differential scanning calorimetry (DSC). The emission spectrum of the PEO emerged at 359 nm. The 50 wt% showed an emission peak at 384 nm, 25 nm red-shifts than that of the PEO. The rise of the conductivity is significant with increased concentration of Li_2SO_4; this is meant a decrease in the degree of crystalline and an increase in the degree of amorphosity. This suggests that Li^+ is a good dopant to improve electrical properties, the maximum conductivity was found to be 2.25×10^{-5} S/cm.

Keywords: Polymer electrolytes; XRD; Optical energy gap; Clusters; SEM; Conductivity; Thermal stability.

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OP-EN-27

DOUBLE CHARGE CARRIER MECHANISM THROUGH 2D/2D INTERFACE ASSISTED ULTRAFAST H_2 EVOLUTION OVER ARCHITECTING S, P CO-DOPED g-C_3N_4/ZnCr LDH PHOTOCATALYST

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ABSTRACT:

The designing of a constructive heterostructure and thus induced 2D/2D interfacial phase signifies a titanic importance for semiconductor based photocatalysts. The energetic electrostatic force of attraction between positive charge 2D ZnCr LDH nanosheet and negative charge 2D S, P co-doped g-C_3N_4 helps to form robust heterostructure. The simultaneous insertion of S and P element into the matrix of g-C_3N_4, the band positions have been easily modified for broad range of visible light harvestation as compared to pure g-C_3N_4. This innovative 2D/2D S, P co-doped g-C_3N_4/ZnCr LDH heterostructure interface that further provides high surface area and suitable redox potentials for various photocatalytic reactions. The as-fabricated S, P-g-C_3N_4/ZnCr LDH heterostructure display considerably enhanced photocatalytic performance for the H_2 evolution (1319 µmol/2h) under visible light illumination as compared to pure material (g-C_3N_4, S, P-g-C_3N_4 and LDH nanosheet) and the mono doped heterostructure. The heightened photocatalytic activity can be ascribed to the loading of ZnCr LDH nanosheet onto the surface of S, P co-doped g-C_3N_4 which allows the effective interfacial charge mobility and shipment through intimate 2D/2D interfacial contact. In addition, co-doping also introduces some defect sites in the heterostructure, which further acts as the trapping centres for photo-produced charge pairs and the excess unpaired electrons of S and P atom delocalized in the π-conjugated triazine ring, constructing a rich-electron state, which is beneficial for the photocatalytic process. XRD, FTIR and TEM studies of reused composite show that the heterostructure hybrid material is very stable and can be reutilised many times.

Keywords: 2D/2D interface, H_2-evolution, g-C_3N_4, Doping

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OP-EN-28

AN INSIGHT TO BAND-BENDING MECHANISM OF POLYPYRROLE SENSITIZED B-rGO/$ZnFe_2O_4$ p-n HETEROJUNCTION WITH DYNAMIC CHARGE TRANSFER FOR PHOTOCATALYTIC H_2-EVOLUTION

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ABSTRACT:

Developing a highly desirable multicomponent photocatalytic system for water-splitting is needed for current societal development. A visible active B-rGO/$ZnFe_2O_4$ photocatalyst was synthesized through the hydrothermal technique and to further magnify its electronic properties, the binary hybrid is modified with polypyrrole. The designed ternary hybrid (2BG/ZnF@PPY) utilizes the combining benefits of photo-sensitizer and interfacial charge transfer mechanism that ultimately boost its photocatalytic efficiency. The construction of p-n heterojunction via band-bending mechanism between p-type B-rGO nanosheets and n-type $ZnFe_2O_4$ nanoparticles was validated from photo-density in the opposite directions and upturned V-shaped Mott-Schottky plots. The optimal photocatalyst i.e. 2BG/ ZnF@20PPY exhibits the highest photocatalytic H_2 evolution of 598 µmol/h. The enhanced activity can be ascribed to the combining impact of photo-sensitizer and effective charge separation between B-rGO and $ZnFe_2O_4$ through the formation of p-n heterojunction. Effective charge separation in 2BG/ZnF@20PPY is well supported by PL, TRPL, EIS, transient-photocurrent, and donor density calculations. The strong contact among the constituents in 2BG/ZnF@20PPY is well-correlated with XPS and Raman characterization.

Keywords: B-rGO, $ZnFe_2O_4$, H_2-evolution, p-n heterojunction

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OP-EN-29

EXPERIMENTAL AND THEORETICAL INVESTIGATION OF SPIRO HETEROCYCLIC COMPOUND AS POTENTIAL INHIBITOR FOR MILD STEEL IN ACID MEDIA

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ABSTRACT:

The corrosion inhibition performance of spiropyrazoline was explored for mild steel corrosion in 1M HCl and 0.5M H_2SO_4 using weight loss, potentiodynamic polarization and electrochemical impedance. Inhibition efficiency of the inhibitor increased with increase in concentration of all the studied concentration within the range of 1-9 ppm. Spiropyrazoline inhibitor showed better inhibition performance of 92.6%, 97.7% in 1M HCl and 0.5M H_2SO_4 respectively, at 9ppm concentration by forming protective layer on the metal surface. Electrochemical impedance spectroscopy analysis (EIS) revealed an increase in polarization resistance due to the adsorbed inhibitor molecules. Potentiodynamic polarization analysis reveals that spiropyrazoline behaved as a mixed type inhibitor. The adsorption of the inhibitor on the metal surface found to obeying Langmuir and Temkin adsorption isotherm at room temperature. Surface morphology of the protective layer was examined by FTIR, scanning electron microscopy and atomic force spectroscopy. The inhibition mechanism of the inhibitor molecule was proposed in the light of the quantum chemical calculations using DFT.

Keywords: Mild steel; spiropyrazoline; corrosion inhibition; FTIIR spectroscopy; SEM; AFM.

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OP-EN-30

SYNTHESIS, SWELLING AND RESPONSIVE PROPERTIES OF CHITOSAN BASED COMPOSITE HYDROGELS WITH PVA AND STARCH

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ABSTRACT:

In this study, chitosan based composite hydrogels were prepared using PVA and Starch with biodegradable and eco-friendly properties to examine the swelling and responsive properties. The prepared hydrogels were characterized using ultra-visible spectroscopy, Fourier transform spectroscopy to predict the formation of composite hydrogels. The morphology and the thermal behavior of the composite hydrogels were analyzed using Scanning electron microscopy and thermogravimetric analyzer. The composite hydrogels were found to have stimuli-sensitive sequences and remarkable phase behavior in the solutions. Hence, the responsive behavior of these hydrogels in relative to specific external stimuli, such as salt solution, pH and physiological solutions were studied. The reversible swelling-deswelling behaviour of the hydrogels in two different pH solutions was also examined. These hydrogels can be recommended for use in biomedical applications.

Keywords: Chitosan, hydrogels, pH responsive, biomedical application

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OP-EN-31

SYNTHESIS, SPECTRAL, STRUCTURAL AND BIOLOGICAL EVALUATION OF 2-AMINO-2- ETHYL PYRIDINIUM PICRATE CRYSTAL

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ABSTRACT:

Single crystal of 2-amino-2-ethyl pyridinium picrate (AEPP) was synthesized by employing slow evaporation technique. FT-IR spectroscopic results showed the formation of $N^{+}H$ group at 3163 cm^{-1} which confirms the proton transfer in AEPP crystal. Transparency of the crystal was studied using UV-Vis-NIR spectral data and revealed AEPP has no absorption in the entire visible region. The blue light emission capacity of the crystal was confirmed using photoluminescence studies. The TG/DTA analysis showed the crystal is withstanding up to 180^{o}C. The molecular structure of the AEPP crystal ascertained through single crystal XRD. The crystal belongs to triclinic system with space group P-1. The inhibition activity against microbes was evaluated using disc diffusion method and showed better antimicrobial activity with increase in concentration.

Keywords: Single crystal, FT-IR, Proton Transfer, XRD, Antimicrobial activity

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OP-EN-32

GREEN SYNTHESIS CHARACTERIZATION AND ANTIOXIDANT PROPERTIES OF NICKEL OXIDE NANOPARTICLES USING ROOT EXTRACT OF *WITHANIA SOMNIFERA*

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ABSTRACT:

The present study nickel oxide nanoparticles (NiO-NP) were synthesized using root extract of *Withania somnifera*. The formation of NiO-NP was confirmed by UV- Visible spectroscopy and FTIR analysis. The morphology of NiO-NP was determined scanning electron microscopy and other physico-chemical properties were studied by XRD and EDX. The antioxidant property was investigated by radical scavenging (DPPH) assay and the results suggested that NiO-NP has potential antioxidant.

Keywords: NiO-NP, Spectral analysis, SEM, antioxidant.

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OP-EN-33

DETERMINATION AND ELIMINATION OF FLUORIDE FROM AQUEOUS ENVIRONMENT USING BIOSORBENT

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ABSTRACT:

The core of the sustainable world and living thing is water. Fluoride is identified as one of the major inorganic chemical contaminants found in drinking water and it has long been recognized as a constituent of bones, teeth, soft tissues and body fluids though adequacy and tolerance limit for fluoride. Fluoride was estimated by complexometric titration. The pollutant removal was predominantly governed by the chemisorption mechanisms. Defluoridation contaminated water was carried out by biosorbent. Nano particle through green synthesis are used as biosorbent. A low-cost and highly efficient biosorbent was prepared through green synthesis and was tested for the ability to remove fluoride from drinking water.

Keywords: Defluoridation, Biosorbent, Nano particle, Green synthesis.

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PP-EN-01

CORRELATION OF TENSILE STRAIN AND UREA ELECTROLYSIS SELECTIVITY ON Pd@Ni NANOCUBES

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ABSTRACT:

Since urea-rich wastewater has a detrimental effect on the environment, proper management and treatment are important. Among urea treatment methods, urea oxidation reaction (UOR) has been receiving much attention because it can extract eco-friendly and value-added compounds. Ni has been known as the most promising catalyst for UOR than other noble metals, which allows high current density and low overvoltage. In this work, we study product selectivity for UOR by lattice strain effect from a core-shell nanocatalyst. We perform epitaxial growth of different thicknesses of Ni shell on the surface of Pd nanocube. As the Ni shell becomes thinner, the Ni lattice spacing increases due to the lattice mismatch between Pd and Ni. The Pd@Ni shows an increase in the current density for UOR as the Ni shell becomes thinner. Also, when the Ni shell was thin enough, more NO_2^- was formed in UOR. It is attributed to oxygen adsorption strength increased by the tensile strain of the thin Ni shell. Through these results, it is concluded how the characteristics of the catalyst surface can affect UOR, which would help design a rational catalyst for better UOR selectivity.

Keywords: Electrocatalyst, Urea oxidation reaction, Core-shell structure, Lattice strain

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PP-EN-02

EXPLORING THE PERFORMANCE OF THE OXYGEN EVOLUTION REACTION IN Cu-Ni- BDC BIMETAL ORGANIC FRAMEWORK SYSTEM

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ABSTRACT

The production of oxygen and hydrogen from renewable energy is an emerging technic in materials science. The best method for producing oxygen gas in a perfect and sustainable way is water electrolysis. The oxygen evolution reaction (OER) is the cornerstone for many important energy conversion devices, and discovering advanced electrocatalysts for water splitting is important. Metal organic frameworks (MOFs), a crystalline microporous material with unique properties like high crystallinity, large surface area, and pore size, have been an emerging catalyst with a greater potential for efficient OER electrocatalytic activity. Herein, we present a single-step solvothermal approach for the fabrication of bimetallic MOFs employing Cu and Ni as metal donors and benzene dicarboxylic acid (BDC) as a linker. From the structural and morphological studies, Cu-Ni-BDC MOFs appeared to have a crystalline nature with clear crystal formation. Electrochemical impedance spectroscopy (EIS), bulk electrolysis, and linear sweep voltammetry (LSV) were all used to comprehensively analyze the electrocatalyst operating under OER conditions. The outcome showed that Cu-Ni-BDC MOFs has improved OER catalytic activity at onset potential and overpotential of 1.87 V and 417 mV with a lower Tafel slope of 50 mV/dec. Hence, the synthesized Cu-Ni-BDC MOFs is an efficient catalyst for sustainable oxygen evolution reactions.

Keywords: Bimetal organic framework; oxygen evolution reaction; Cu-Ni-BDC

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PP-EN-03

SUSTAINABLE E-WASTE MANAGEMENT: AN EMERGING HEALTH ISSUE

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ABSTRACT:

The electronic waste (E-waste) which is hazardous one is rapidly growing environmental problems of the world. E-waste is the electronic products that are unwanted, damaged or near to their end. Now a day product such as mobile, computer is increasing at faster rate which results in e-waste as the most rapidly growing waste problem in the in India. E-waste is hazardous waste and can be harmful to the environment and human health; hence it should be recycled safely for sustainable development. E-waste contains heavy metals like, lead, cadmium, chromium and flame-retardant plastics, glass etc., which is toxic and hazardous to the human health, if not managed properly. The workers in e-waste disposal sector are should be protected against the risk of it. The contact with them again and again can damage the brain, nervous system, lungs and produces skin problem, Gastric diseases due to slow-poisoning. Therefore, there should be regulations, initiatives and research work on e-waste management. The informal sector has great collect e-waste from houses shops but in small amount. Their methods of recycling it is hazardous for their health and environment. The formal recyclers are few and are not capable of recycling using the best available technologies leading to better environment management practices. Hence it is important to look at the sustainable e-waste management. This paper attempts to develop a method and possible system for all the people so as to collect e waste, its recycling and safe disposal so as to minimize your e-waste for sustainable development. India needs an urgent need to plan a preventive strategy in relation to health hazards of e-waste.

Key words: E-waste management, sustainable development, hazardous waste, human health, formal recyclers

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PP-EN-04

CORROSION MITIGATION OF CARBON STEEL BY A NATURAL SURFACTANT-BASED GREEN CORROSION INHIBITOR IN AQUEOUS MEDIUM

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ABSTRACT:

The purpose of this research is to investigate the inhibition efficiency (IE) of ethanolic extract of natural surfactants for carbon steel (C-steel). The medium applied for this experiment is 3.5% Sodium chloride solution. The corrosion inhibition efficiency (IE) and corrosion rate (CR) were evaluated for natural surfactants over a range of concentrations from 50 – 400 ppm, using the Weight loss method (Gravimetric analysis), Electrochemical Impedance Spectroscopy (EIS), and Potentiodynamic Polarisation (PDP). The Inhibition efficiency of the compound increased with an increase in the concentration of inhibitor up to 200 pm with IE of 98%. However, with a further increase in concentration, the IE decreased. Gas Chromatography–Mass Spectrometry (GC–MS) analysis was used to identify the phytochemicals of ethanolic extract of natural surfactant-based green corrosion inhibitor. Fourier Transform-Infrared spectroscopy (FT-IR) was used to investigate the formed protective film on the C-steel surface. Ultraviolet-Visible Spectroscopy (UV-Vis) was used to identify the variations in the absorbance of the inhibitor solutions. The surface of the C-steel surface was further investigated by Scanning Electron Microscopy (SEM) with Energy Dispersive X-ray analysis (EDX). Surface roughness was evaluated by Atomic Force Microscope (AFM). Contact angle measurements indicated that adding the natural surfactants effectively decreased the hydrophilicity that hindering the adsorption of water molecules. The results of gravimetric and electrochemical methods research revealed that in the presence of the ethanolic extract of natural surfactants with the immersion time progress up to 72 hrs, the inhibition capacity of inhibitor was promoted. All the findings indicated that ethanolic extract of surfactant-based green corrosion inhibitor forms an effective protective layer and prevents corrosion.

Keywords: Natural surfactants, Carbon steel, Corrosion inhibitor, NaCl medium.

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PP-EN-05

IMPROVED ELECTROCHEMICAL PERFORMANCE AND CHARGE STORAGE MECHANISM OF SPINEL TYPE Ni – BASED TERNARY METAL OXIDES BY XPS STUDY

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ABSTRACT:

Transition metal-based oxide materials are gaining more attention in supercapacitor applications due to their high abundance and high specific capacitance. However, the charge storage mechanism is not yet clearly understood. In this study, we have synthesized spinel structured Ni based secondary and Ternary metal oxides by hydrothermal method followed by annealing at a temperature of 400 ˚C for 4 h and tried to understand their charge storage mechanism by XPS study. The capacitance property of synthesized materials is evaluated for supercapacitor application. The secondary metal oxide exhibits specific capacitances of 260 F g^{-1} and ternary metal oxide exhibits the specific capacitance of about 298.5 F g^{-1}, respectively, at 0.6 A g^{-1} with 80 % and 100% capacitance retention after 5000 cycles when cycled at 2 A g^{-1}. From XPS we studied the redox couple properties of the synthesised materials, from that we have proposed the charge storage mechanism of both the materials experimentally. In that ternary metal oxides shows the better redox behaviour which lead the high specific capacity and Retention and hence that can be a promising electrode material for supercapacitor applications.

Key Words: Supercapacitors, spinels, specific capacitance, cycling stability, NaOH electrolyte, Secondary metal oxides, Ternary metal oxides.

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PP-EN-06

BENZOPHENONE DERIVATIVES AS AN EFFECTIVE CORROSION INHIBITOR FOR MILD STEEL IN 1N HCl MEDIUM: ELECTROCHEMICAL AND THERMODYNAMIC STUDY

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ABSTRACT:

An Electrochemical Study of the corrosion inhibition efficiency of Benzophenone derivatives at the mild steel electrode, in 1N HCl, was carried out. The corrosion inhibition efficiency of Benzophenone derivatives was investigated by gravimetric analysis, potentiodynamic polarization and electrochemical impedance spectroscopy (EIS). Effect of temperature on corrosion inhibition efficiency (IE) and corrosion rate was evaluated for Benzophenone derivatives at 30-60 °C using gravimetric analysis. The inhibition efficiency of the compound increased with an increase in the concentration of inhibitor and decreased with temperature rise. The inhibitors appear to function through Langmuir adsorption isotherm. The adsorption of the inhibited and uninhibited molecules on the steel surface was further supported by scanning electron microscopy (SEM) with Energy Dispersive X-ray analysis (EDAX). Surface roughness was characterized by Atomic Force Microscope (AFM).

Keywords: Mild steel, corrosion inhibitor, acidic medium, corrosion rate, adsorption isotherm

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PP-EN-07

CORROSION RESISTANCE OF MILD STEEL IN HYDROCHLORIC ACID SOLUTION BY DIFFERENT THIOSEMICARBAZONE LIGANDS

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ABSTRACT:

A novel corrosion inhibitor, Different thiosemicarbazone has been synthesized and its inhibiting efficiency on the corrosion of mild steel in HCl has been investigated by various corrosion monitoring techniques such as weight loss method, potentiodynamic polarization and electrochemical impedance spectroscopy. The electrochemical study reveals that the compound acts as an efficient mixed type inhibitor. Adsorption equilibrium constant (K_{ads}) and standard free energy of adsorption (ΔG°_{ads}) were calculated.

Keywords: Mild steel corrosion, EIS, Absorption, Theoretical Calculation.

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PP-EN-08

SIMPLE AND EFFICIENT THIOUREA-BASED COLORIMETRIC AND FLUORESCENT CHEMOSENSOR FOR FLUORIDE ANION DETECTION

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ABSTRACT:

1, 5-Bis (2-acetylpyrrole) thiocarbohydrazone chemosensor has been synthesized and characterized by spectroscopic. The chemosensor has been utilized for selective recognition of fluoride anions in DMSO solution by UV-visible and fluorescence spectroscopy. The chemosensor has shown naked-eye sensitivity for fluoride anions in solution. The binding affinity of the receptors with fluoride anion was calculated using UV-visible and fluorescence spectroscopic techniques.

Keywords: Thiocarbohydrazone, Colorimetric sensor, Fluoride Sensor, UV-visible Spectroscopy.

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PP-EN-09

DESIGN OF GRAPHENE QUANTUM DOTS DECORATED MnO_2 NANOSHEET BASED FLUORESCENCE TURN "ON-OFF-ON" NANOPROBE FOR HIGHLY SENSITIVE DETECTION OF MALATHION

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ABSTRACT:

Malathion estimation is increasingly acquiring prominence as a novel food and water contaminates. To date, diverse malathion detection methods which include high-performance liquid chromatography (HPLC), gas chromatography (GC), and liquid chromatography with mass spectrometry (LC-MS) and others have been extensively portrayed. Unfortunately, these systems have significant shortcomings including low sensitivity, selectivity, high cost, arduous and time-consuming technique, and so forth. Recently, the fluorescence-based method shows remarkable uniqueness that overcomes the demerits of traditionally reported techniques. Therefore, graphene quantum dots (GQDs) and manganese dioxide nanosheets (MnO_2-NS) based simplistic, highly sensitive, and selective fluorescent turn 'Off-On' mediated GQDs@MnO_2-NS nanoprobe was designed. Herein, MnO_2-NS addition demonstrated the quenching of GQDs containing fluorescence through inner filter effects (IFE) and strong interaction between GQDs and MnO_2-NS. The malathion addition destroyed the MnO_2-NS and fluorescence emission of GQDs reappeared which may be because of redox reaction between malathion and prepared MnO_2-NS. Herein, nanoprobe offers a wide concentration range and low limit of detection of 5 to 1600 ng/mL and 1.69 ng/mL, respectively. As fabricated GQDs@MnO_2-NS nanoprobe sensor demonstrated high selectivity, good stability, and reproducibility towards malathion that assuring applicability of biosensor. Therefore, the GQDs@MnO_2-NS nanoprobe will offer a simplistic sensor with adequate sensitivity to achieve highly responsive and selective detection of malathion.

Keywords: Malathion, graphene quantum dots, manganese dioxide nanosheet, fluorescent sensor, sensitivity

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PP-EN-10

INVESTIGATION ON ROLE OF BIOSYNTHESIZED IRON OXIDE NANOPARTICLES ON PLANT GROWTH AND YIELD

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ABSTRACT:

Micronutrients deficiencies in soil have been wide spread in the world, which is a limiting factor to high crop yield. Critical micronutrients for plant growth include iron (Fe) , boron (B), manganese (Mn), Zinc(Zn), copper (Cu), molybdenum(Mo), chlorine(Cl) and nickel (Ni) . Iron increases seed germination, root growth, and enhances chlorophyll content in plants. Therefore, conventional chelated Iron fertilizers are used to alleviate Fe deficiency. Three most abundant forms of iron oxide in nature are magnetite (Fe_3O_4), maghemite (γ-Fe_2O_3), and hematite (α-Fe_2O_3) while pyrite (FeS_2) is the most abundant sulfide mineral. Conventional chelated Iron fertilizers may be difficult for plants to absorb due to common transformation reactions into unavailable forms in soil. However, in comparison to bulk iron oxide, γ-Fe_2O_3 nanoparticles are more effectively translocated from roots to other parts of the plants due to their low volatilization and nano size. Fe in the nano-form has facilitated in enhancement of morphological features, *viz*. plant height, biomass (shoot and root). In addition, half of the recommended dosage of Fe in the nano-form positively influenced leaf area and proline content of plants too. This indicated that there is a possibility of reducing the dose of Fe supplement for plants in the nano-form to increase the nutrient use efficiency in a major cereal crop. The present review explores the mode of action of Iron based nanoparticles on plants, their uptake and their influence on overcoming different biotic and abiotic stress conditions in plants.

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OP-BM-01

GREEN SYNTHESIS OF SILVER NANOPARTICLES FROM *ALBIZZIA LEBBECK*: ANTIBACTERIAL ACTIVITY AND INVITRO STUDY

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ABSTRACT

Metal nanoparticles, particularly silver nanoparticles (AgNPs) are developing more important roles as diagnostic and therapeutic agents with the improvement of eco-friendly synthesis methods. This study demonstrates the green synthesis, antibacterial activity, and invitro study of silver nanoparticles using *Albizzia Lebbeck*. AgNPs of size 28.15nm was gathered with a spherical size structure. The AgNPs have a potent bactericidal activity against gram-positive and gram-negative bacteria with a dose-related effect. AgNPs have been used to inhibit the activity of biofilms. The biologically synthesized AgNPs inhibited the activity of biofilms when compared to the negative control. The extract exerted 47% lysis of the blood clot in thrombolytic activity test for positive control and Clots when treated with 100 µl sterile distilled water (negative control) respectively. So, the extract possessed considerable thrombolytic activity.

Keywords: AgNPs; Albizzia Lebbeck; Antibacterial activity; Thrombolytic activity

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OP-BM-02

IN-VIVO ANTICANCER ACTIVITY OF BIOSYNTHETIC SILVER NANOPARTICLES OF *CASSIA MARGINATA ROXB* AGAINST NMU INDUCED MAMMARY CARCINOMA

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ABSTRACT:

Silver nanoparticles (AgNPs) are now widely known as promising therapeutic agents, and their application in cancer diagnostics and treatment is advancing. Silver nanoparticles (AgNPs) using leaf extract of *Cassia marginata* Roxb (CM-AgNPs) was used in this work to investigate the anticancer potential against N-nitroso N-methyl urea (NMU) induced mammary carcinoma in female Sprague-Dawley rats. This is the first study that green-synthesized CM-AgNPs have tested anticancer effect against lung cancer in vitro. In this study, thirty virgin female Sprague-Dawley rats were divided into five groups of six animals each: normal control, disease control, CM-AgNPs 200 mg/kg, CM-AgNPs 400 mg/kg, and tamoxifen 10 mg/kg. NMU was used to produce mammary cancer in rats. Two intraperitoneal doses of NMU (50 mg/kg/body weight each) were given at 52 days of age and four weeks after the prior treatment in 0.9 % NaCl (kept at 40^{o} C). A total of two oral doses of CM-AgNPs (200 mg/kg and 400 mg/kg) were administered, and the results were compared to the results of a single oral dose of tamoxifen (10 mg/kg). When compared to the disease control, CM-AgNPs 200 mg/kg, 400 mg/kg, and tamoxifen 10 mg/kg reduced the incidence of tumors by 50%, 66.67 %, and 83.33 %, and the total number of tumors in the group by 46.15 %, 69.23 %, and 92.30 %, respectively, in rats. When compared to the disease control group, CM-AgNPs 200 mg/kg, 400 mg/kg, and tamoxifen 10 mg/kg reduced the average tumour burden by 68.61 %, 86.65 %, and 94.91 %, respectively, and the average tumour volume by 66.45 %, 82.01 %, and 92.98 %. According to the findings, CM-AgNPs can prevent mammary carcinogenesis in female Sprague-Dawley rats when exposed to NMU.

Keywords: Nitroso N-methyl urea, Mammary carcinoma; *Cassia marginate;* Silver nanoparticles

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OP-BM-03

BIOSYNTHESIS AND CYTOTOXIC POTENTIAL OF SILVER NANOPARTICLES OF ABUTILON HIRTUM (LAMP) SWEET

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ABSTRACT:

Hepatocellular carcinoma is one of the most aggressive tumors, and it is also the main cause of cancer-related death in the world. Silver nanoparticles have grown in relevance as molecular imaging agents and anticancer activities due to their benefits and versatility. Aqueous extract of *Abutilon hirtum* leaves was employed in this investigation to produce silver nanoparticles. The plant extract showed a quick reduction of silver ions. The synthesized silver nanoparticles were characterized by UV, ATR-FTIR, EDAX, and SEM analysis. The results of the UV showed the peak of the Plasmon resonance at 450 nm. The average crystalline size, as determined by x-ray diffraction studies and scanning electron microscopy (SEM), was found to be less than 100 nm. Analysis of ATR-FTIR data revealed the functional groups responsible for the reduction of silver nitrate to produce silver nanoparticles, together with the leaf extract's capping agent. The green synthesized nanoparticles were tested for their in-vitro antioxidant and cytotoxic potential against HepG2 cell lines. The synthesized compounds showed significant antioxidant activity in both DPPH and FRAP assays and showed promising cytotoxic activity against HpG2 cell lines by the MTT assay method.

Keywords: Hepatocellular carcinoma; *Abutilon hirtum;* Silver nanoparticles

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OP-BM-04

ANTIMICROBIAL EVALUATION OF COPPER(II) BENZIMIDAZOLE COMPLEXES DERIVED FROM O-PHENYLENEDIAMINE AND IMIDAZOLE-2-CARBOXALDEHYDE

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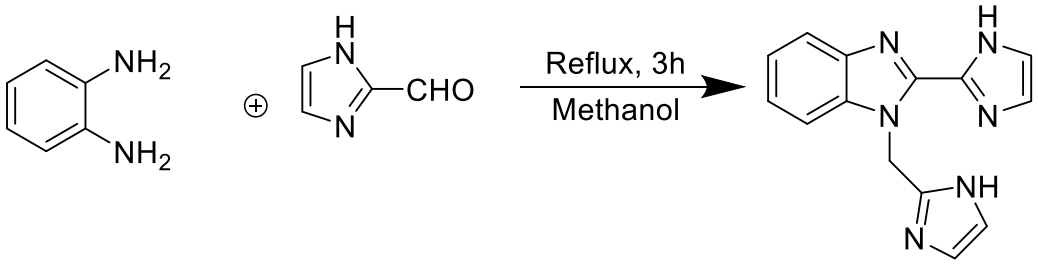
ABSTRACT:

The benzimidazole derivatives of 1, 3-diazole along with metal complexes plays an energetic part in the development of new drugs. Benzimidazole derived from o- phenylenediamine and imidazole-2-carboxaldehyde with Cu(II) ions were prepared by chemical refluxation method. In addition to this a bidentate coordinating ligand of 1,10-phenanthroline was added to the above metal complex. The ligand and its complex with 1,10-phenanthroline were subjected to infra-red, electronic,^{1}H NMR,^{13}C NMR spectra, magnetic, molar conductance, and elemental analysis. From the results, it was concluded that the ligand coordinates through azomethine nitrogen. Electronic and magnetic studies revealed that the metal complex possess a square planar geometry with four coordination and that of mixed ligand metal complex with 1,10-phenanthroline possess an octahedral geometrical environment. Fluorescence spectra, cyclic voltammograms, thermal analysis of the ligand and its complex were also investigated. Further the antimicrobial activity was also verified and concluded that Cu(II) complex with ligand and 1,10-phenanthroline possess highest activity.



Keywords: Benzimidazole; O-phenylenediamine; imidazole-2-carboxaldehyde; thermal

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OP-BM-05

METAL COMPLEXES WITH PIPERAZINE RING BASED LIGANDS AND THEIR BIOLOGICAL ACTIVITIES

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ABSTRACT:

Herein we report piperazine based acyclic ligands based on the heterocyclic piperazine ring. These simple ligands with or without the phenyl ring shows the versatility how they can be modified further with desired functionality. We have prepared transition metal complexes of these ligands and tested for their various biological targets. These complexes are moderately bioactive and shows slightly different modes of binding with biomolecules. Theoretical binding interpretation with these biological targets also have been explored with docking studies.

Keywords: Piperazine; BSA binding; DNA binding; DFT; docking

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OP-BM-06

GRAPHENE OXIDE/ZINC OXIDE NANOCOMPOSITE AS AN EFFECTIVE AGENT FOR WOUND HEALING APPLICATIONS

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ABSTRACT:

Wound healing is a common issue found in the daily life of a common man. Our immune system naturally repairs the damaged tissue by itself, but it's a time-consuming process. The GO/ZnO nanocomposite (NC) was synthesized through a simple chemical method. XRD, SEM and Raman analysis were used to analyze the physico-chemical properties of the sample. Moreover, the antimicrobial activity of GO, ZnO and GO/ZnO were validated against bacteria causing wound infections. Thus, it could be said that the GO/ZnO NC could be utilized in the near future, for enhancing the wound healing mechanism by increasing cell proliferation, antimicrobial property and rapid initiation of inflammatory.

Keywords: Nanocomposites, biomedical applications, antibacterial efficiency

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OP-BM-07

MOLECULAR STRUCTURE INVESTIGATIONS OF 3-BUTEN-2-ONE, 4-(4-HYDROXY-2,2,6-TRIMETHYL-7-OXABICYCLO [4.1.0] HEPT-1-YL): A COMBINED EXPERIMENTAL & THEORETICAL APPROACH FROM NATURAL PLANT OF *CALOTROPIS GIGANTEA* FLOWERS

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ABSTRACT:

The present study of 3-buten-2-one, 4-(4-hydroxy-2,2,6-trimethyl-7-oxabicyclo[4.1.0]hept-1-yl) analyse methanol extract of *Calotropis gigantea*. The resulting crude methanol extract used thin layer chromatography (TLC) and column chromatography for identification of the compound. The crude was characterised using gas chromatography–mass spectrometry (GC-MS). The experimental results were compared with the theoretical results. The functional group was identified in the spectral range from 400 to 4000 cm^{-1} using Fourier transformer infrared spectroscopy (FT-IR). The title compound was analysed and observed in the wave length range 200–400 nm using Ultraviolet–Visible (UV-Vis) Spectroscopy. The electron density and intermolecular interaction were studied using Natural Bond Orbital (NBO). The energy gap was calculated using HOMO and LUMO. The optimized molecular structure and vibration assignment was investigated using density functional theory (DFT).

Keywords: TLC; GC-MS; FT-IR; DFT.

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OP-BM-08

SYNERGISTIC ENHANCEMENT OF ANTIMICROBIAL AND ANTIBIOFILM ACTIVITY BY SUPPLEMENTATION OF PHYTOGENIC NANOSILVER IN ZINC OXIDE NANOPARTICLES

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ABSTRACT:

Nanotechnology driven solutions for combating antibiotic resistant pathogens was received worldwide attention. Nanoparticles show a promising alternative as antimicrobial agent due to their small size, large functionalizable surface area, easy penetration to the target site and its biocompatibility. Among various nanoparticles, zinc oxide nanoparticles (ZnONPs) and silver nanoparticles (AgNPs) exhibit antibacterial, antibiofilm, antioxidant, antidiabetic, antifungal, anticancer, anti-inflammatory, and wound healing properties. In this study, biogenic synthesis of AgNPs was carried out employing *Plumbago auriculata* leaf extract (PALE) using 1 mM silver nitrate solution at 150 rpm for 24 h. Its synergistic effect was checked in combination with ZnONPs. UV-Vis spectra showed an absorbance peak at 370 nm and 420 nm for ZnONPs and AgNPs, respectively. Average particle size of AgNPs and ZnONPs was 107.4 and 100 nm, respectively which was revealed using dynamic light scattering (DLS) analysis. Quantitative phytochemical analysis of PALE showed the presence of phenols (807.4 ± 0.3 µg/mL), flavonoids (369.2 ± 0.4 µg/mL), reducing sugar (731.6 ± 4.2 µg/mL), starch (542.7 ± 0.1 µg/mL), ascorbic acid (279.0 µg/mL) and plumbagin (620.46 ± 1.5 µg/mL) which may have played a significant role in reduction and stabilization during nanoparticles synthesis. In the present study, antimicrobial synergy of AgNPs along with ZnONPs was investigated against four bacteria, *Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa* and *Staphylococcus aureus*. Supplementation of phytogenic AgNPs synergistically enhanced the antimicrobial activity of ZnONPs up to 0.22, 0.19 and 0.15 folds against *P. aeruginosa*, *E. coli*, and *S. aureus* respectively. Further, the phytogenic AgNPs exhibited 79.18% biofilm inhibition against *P. aeruginosa*. This is the first report on synergistic enhancement of antimicrobial efficacy of ZnONPs employing AgNPs synthesized using PALE. Hence, this combinatorial strategy can help to reduce high dosage of antibiotics used for infection control that would help to prevent emergence of multidrug resistant pathogenic bacteria.

Keywords: *Plumbago auriculata*, biogenic silver nanoparticles, antimicrobial synergy, antibiofilm activity.

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OP-BM-09

GREEN SYNTHESIS OF COPPER OXIDE NANO PARTICLES USING EUPHORIAHITR LEAFPOWER ITS APPLICATION ANTIBACTERIAL AND ANTICANCER ACTIVITY

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ABSTRACT:

The present study reveals the synthesis of copper oxide nanoparticles (CuO NPs) by probiotic bacteria (Klebsiella pheumoniae and Bacillus subtilis) and demonstrates the cytotoxic effects of these nanoparticles against gram negative and positive bacteria and Cervical cancer cell lines. These nanoparticles are characterized using X-ray diffraction (XRD), FTIR analysis explained that functional groups of phytochemicals in leaf extract and CuO were present in the CuO NPs. FT-IR analysis, to validate the important functional biomolecules (O–H, C=C, C–H, C–O) are responsible for reduction and stabilization of Cu ONPs. The surface morphology of the CuO NPs showed the spherical structure and size (~ 68 nm). The antibacterial activity was checked against Klebsiella pheumoniae and Bacillus cultures by which the inhibition zones were found to be 35 mm and 38 mm, respectively. It is concluded that the CuO NPs have a good ability to resist microbes. Anticancer effects of these nanoparticles are evaluated by methyl thiazolyl diphenyl-tetrazolium bromide (MTT) assay. These results suggest that CuO NPs may exert antibacterial effects as well as cytotoxic effects on cancer cells by suppressing their growth, increasing the oxidative stress and inducing apoptosis.

Keywords: Copper Oxide Nanoparticles, Green Synthesis, Antibacterial activity, Cervical cancer cell

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OP-BM-10

FABRICATION OF SURFACE FUNCTIONALIZED CARBON QUANTUM DOTS-BASED NANOCOMPOSITE FOR SENSING OF GLUTATHIONE IN HUMAN SERUM SAMPLES AND APPLICATION IN *HELA* CELL IMAGING

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ABSTRACT:

Green synthesis of nanoparticles is becoming increasingly pertinent nowadays as it is seen as environmentally sustainable and cost-effective. Present study aimed to synthesize highly sensitive polyethyleneimine (PEI) surface functionalized carbon dots-based nanocomposite for detection of glutathione (GSH) via fluorescence "off-on" approach. Green approach was attempted for synthesis of blue luminescent Carbon dots (CDs) or carbon quantum dots by hydrothermal method. One of the bio-wastes so-called Green Pea (GP) shells were recycled to fabricate water-soluble CDs (GP-CDs) and these CDs were functionalized with polyethyleneimine (PEI) to obtain PEI functionalized carbon dots (GP-PEI-CDs). The "off" process was achieved by the addition of Cu (II) to GP-PEI-CDs, which facilitated quenching of fluorescence of GP-PEI-CDs owing to formation of complex. This "off" process provided an excellent platform to estimate Cu (II) with selectivity among 15 metal ions and the limit of detection was 23 nM with linearity range as 0 to 6 µM. "On" process enabled the restoration in fluorescence of GP-PEI-CDs when biothiols (especially GSH) was added, this could be due to removal of Cu (II) from complex by presenting selective affinity with GSH among the various biomolecules with limit of detection 38 nM and linearity in the range of 0.1 to 0.6 µM. This dependency and reliability of the fluorescence refurbishment with concentration of GSH, manufactured simple, less toxic and facile fluorescent sensor for detection of GSH and Cu (II) in the aqueous solution.

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OP-BM-11

CYTOTOXIC EFFECTS OF ENDOPHYTE ORIGIN NANOSILVER AND ITS COMPUTATIONAL STUDIES

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ABSTRACT:

The present study aimed in the investigation of anticancer potential of silver nanoparticles (AgNPs) from endophytic bacterium *Cupriavidus metallidurans* (*Cm*-AgNPs) and *Pantoea anthophila* (*Pa*-AgNPs) of *W. indica* reported in our earlier studies, against human oral epidermoid carcinoma (KB 3-1) and COLON 26 cell lines. The cytotoxicity response was assessed by 3-(4, 5-dimethylthiazol-2-yl)-2, 5-diphenyltetrazolium bromide (MTT). Measurement of intracellular reactive oxygen species (ROS), mitochondrial membrane potential ($\Delta\Psi m$) and apoptotic morphological changes were studied in KB 3-1 cell line. Both the endophytes were found to produce periplasmic nitrate reductase (PNR) that converts the ionic silver into stable nano silver. Hence the structure and function of PNR was determined by computationl tools and evolutionary relationships were constructed using Clustal Omega. The inhibitive properties of AgNP against selected cancer targets were analyzed by molecular docking tool Autodock 4.0. KB 3-1 cell line showed good anticancer response than COLON 26 cell lines. On comparison of AgNPs, *Cm*-AgNPs exhibited higher cytotoxicity with increased intracellular ROS levels, altered $\Delta\Psi m$ and apoptotic cell death than *Pa*-AgNPs. The three-dimensional structure of the PNR was modeled by Swiss model and validated using PROCHECK and PROVES. Docking study showed that the AgNP bound exactly in the inhibition site or in their close proximity that may enable the modulation of proteins. Thus the study provides an insight on the anticancer activity of AgNPs fabricated from endophytic extract.

Keywords: *Cm*-AgNPs, *Pa*-AgNPs, Anticancer activity, *in silico* analysis, molecular dockin

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OP-BM-12

AMELIORATIVE AND CRYOGENIC EFFECT OF CINNAMON MEDIATED ZINC OXIDE NANOPARTICLES ON BIOPHYSICAL ROS INDUCED SPERM DNA DAMAGE INHIBITION OF COVID-19 RECOVERED PATIENTS – AN *IN VITRO* STUDY

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ABSTRACT:

Recently, male infertility cases have been 40 to 50 % prominent because of poor semen quality and low amount of sperm cells. Smoking, Alcohol, Drivers, Heat exposure, Genetic factors, and Covid-19 are the things primarily causing male infertility. Hence the current pilot study focuses on preserving hypertension-induced infertile subjects' sperm cells by cinnamon extender and its ameliorative effect on sperm viability. With proper institutional permission from Narayani Hospital from Vellore, the semen was collected from the 20-45 age group with infertile (recently recovered from COVID-19) and processed for major conventional semen parameters as per WHO, 2020. The informed consent form was obtained and maintained confidentially. Followed by biochemical and viability analysis was done by standard procedures. Cinnamon micro-particles were synthesized, characterized, and processed for sperm preservatives for selected dosages with particular time intervals. The semen parameters (count, morphology, and motility) and biochemical parameters (Ca, Na, K, Se, Mg, and total seminal proteins) confirm that infertile due to high blood pressure because the last two years covid-19 impact on their lifestyle. Cinnamon macro- particles treated sperm cells, and its viable nature indicates that improved viability in infertile sperm cells as like fertile and noticeably further damage from infertile was avoided. Cinnamon is rich in zinc and antioxidant property and acts as a cryopreservative agent on hypertension-induced infertile subjects.

Key Words: Male infertility, Cinnamon, Trace elements, total seminal proteins, Covid-19.

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OP-BM-13

BIOGENIC SYNTHESIS OF TITANIUM DIOXIDE NANOPARTICLES

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ABSTRACT:

The use of nanotechnology in the present time has increased to overcome different medical problems including multi-drug resistant organisms, cancer, diabetes, and bacterial infections. Apart from the use of conventional methods, nanotechnology is widely used because it provides a simple and best alternative approach in therapeutic as well as environmental fields. Compared to the physical and chemical methods of nanoparticle (NP) synthesis, biological synthesis is mainly used as it is eco-friendly, non-toxic, and inexpensive. The NPs can be biologically synthesized by using different sources like bacteria, fungi, algae, and plants. Different NPs such as silver, copper, zinc, gold, etc are being synthesized from these sources. Among these particles, TiO_2NPs have found an important place because of their unique characteristic features like higher stability, non-toxic nature, specific surface chemistry, photocatalytic activity, anticancer activity, antioxidant activity, antibiofilm activity, antimicrobial activity, antidiabetic activity, antiproliferative activity, etc. These particles are also found active against the multi-drug resistant organisms (MDR) like *E. faecium*, *S. aureus*, *K. pneumoniae*, *A. baumannii*, *P. aeruginosa*, and *Enterobacter* species (ESKAPE). The current study covers the synthesis of TiO_2NPs by using different biogenic sources, characterization of synthesized NPs, and various therapeutic applications of the particles.

Keywords: TiO_2NPs, biological, therapeutic, MDR.

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OP-BM-14

ANTI-INFLAMMATORY EFFECTS OF TELLURIUM DIOXIDE-NIOBIUM PENTOXIDE NANOCOMPOSITE COATINGS ON TITANIUM IMPLANTS

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ABSTRACT:

Replacement of joints is a significant subspecialty of bone replacement surgery that calls for mechanically robust and biologically compatible, or biocompatible, implants. Stainless steels (SS), cobalt chromium alloys, or titanium (Ti) and its alloys is typically used to make orthopaedic implants. In this study, incorporating tellurium dioxide with niobium pentoxide is an effective method to impart the coatings with antibacterial properties by a thermal deposition method on titanium substrate. The developed coatings were treated for alkaline treatment and was subjected for *in vitro* study in 1.5 Kukubo's simulated body fluid after alkaline treatment to enhance biogrowth and adhesion strength. The presence of composite coatings on the surface metal strip was confirmed by XRD, FTIR, and SEM analysis studies. The results of elemental analysis of the SBF solution and electrochemical characterization carried out revealed that there was efficient apatite growth after alkaline treatment. The electrochemical experiments revealed that the developed coatings had high adhesion adhesion strength and high biomimetic growth characteristics. The antibacterial test was used to evaluate the antibacterial properties of tellurium dioxide-niobium pentoxide coatings respectively. In summary, this study provided an alternative method to prepare. In summary, a low temperature, low-cost technique can promote the physical- chemical interaction to effectively fabricate bioactivity with antibacterial ability for bioimplants.

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OP-BM-15

IN-SILICO ANTIVIRAL SCREENING OF NATIVE SEAWEED FUCOIDAN AND ITS DERIVATIVES AGAINST DENGUE VIRUS-2 RNA DEPENDANT RNA POLYMERASE (RdRp)

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ABSTRACT:

Dengue virus (DENV) infections are a major life threat around the globe with millions of people's life is at risk. The lack of Antidengue drugs and vaccines demands lead molecules for the treatment of Dengue infections. DENV-2 RNA Dependant RNA Polymerase (RdRp) of was designated as prime target because of its major role in the viral replication cycle. DENV-2 6IZY RdRp enzyme was selected for the research on antiviral drugs. The sulfated polysaccharide Fucoidan was derived from brown seaweed Stoechospermum marginatum. It was subjected to acid hydrolysis to yield low molecular weight fucoidan monomer and denoted as SMFUC. SMFUC was characterized by spectroscopic studies like FTIR, NMR, and Mass spectroscopy. The SMFUC molecule was designed to yield 40 derivatives by the structural modification of the two 2 methyl (-CH3) and two hydroxyls (-OH) of the native fucoidan. The methyl moieties were converted to the carboxyl group and it was further converted to its ester, amide, aldehyde, acid chloride, and ketone, the hydroxyl groups were acetylated, benzoylated, aminated, sulfated, and phosphorylated. Further Desulphate SMFUC was designed for the Insilco docking, ADMET, MMSD, and Molecular dynamic study against DENV RdRp 6IZY. SMFUC SMFUCB6, SMFUCD1, SMFUCE2, SMFUC4, SMFUCC1 showed the highest ligand binding affinity GLIDE scores of -7.84825, -7.73166, -7.67021, -7.65767. -7.55841-9.53 kcal/mol respectively against DENV-2 RdRp 6IZY amongst the native fucoidan and its derivatives. In-silico pharmacokinetic studies of these molecules were screened using SwissADME studies and sarADMET and it was proved that these compounds were well absorbed by GI tract and do not cross the blood-brain barrier. Simulated toxicity simulation studies proved except for phosphate fucoidans they are non-toxic and without a metabolic enzyme inhibition activity. A simulated molecular dynamics study against the optimized fucoidans showed an RMSD score of 1.5, which indicated the ideal interaction of the fucoidan against DENV-2 RdRp. Hence, we conclude that seaweed fucoidan and its derivatives have high antiviral potential against DENV. These molecules might be lead for the emergence of antiviral drugs against DENV-2 infections.

Keywords: Dengue Virus; Fucoidan; in-silico; RNA Dependant RNA Polymerase

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OP-BM-16

EFFICIENCY OF AYURVEDIC FUMIGATION USING AN AYURVEDIC HERBAL FORMULATION" DHOOMA CHOORNAM" AGAINST SELECTED PATHOGENS

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ABSTRACT:

Nosocomial infections can be defined as those occurring within 48 hours of hospital admission, 3 days of discharge or 30 days of an operation. According to WHO, at any given time over 1.4 million people across the globe suffer from a hospital acquired infection (HAI) and it causes 80,000 deaths a year. Nosocomial infections are widespread; they are important contributors to morbidity and mortality. They will become even more important as a public health problem with increasing economic and human impact. Fumigation of hospital rooms with high concentration of toxic chemicals has been proposed to reduce microbial agents on hospital surfaces to control infections. However even in these situations, there have been incidents where fumigants have escaped, causing illness and death to exposed workers and the public. So it is essential to investigate novel strategies for disinfecting healthcare environments with least side effects and cost effective techniques. The main objective of the study was to evaluate the efficiency of Ayurvedic fumigation to be used as an alternative to chemical fumigation. In the present study, 5 bacteria and 7 fungi were used as test microbes. Here, Dhoopana with ' DHOOMA CHOORNAM ' showed significant antibacterial and anti-fungal property. In the first method, drastic differences were shown in the microbial count after fumigation with this particular product. Were as in second method the product eliminated the microbial growth within 24 hours. This clearly indicated that the product is extremely reliable, effective and strongly suggested for an alternative to chemical fumigation.

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OP-BM-17

CHEMICAL AND PLANT MEDIATED SYNTHESIS OF LA_2O_3 NANOPARTICLES AND COMPARISON OF THEIR STRUCTURAL, ANTIBACTERIAL, PHOTOCATALYTIC AND OPTICAL PROPERTIES

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ABSTRACT:

In present study, two different methods (sol-gel and biological as green) were adopted for synthesis of metal oxide nanoparticles. The La_2O_3 nanoparticles have been synthesized successfully in the laboratory with both chemical and green synthesized method. The optical band gap energy of chemically synthesized and green synthesized (Mollugo oppsitifolia) and Trianthema portulacastrum leaf extract) La_2O_3 Nanoparticles was calculated from UV - visible absorption between 5.10, 4.26, and 4.46 ev. The good polycrystaline cubic nature of synthesized La_2O_3 nano particles was evident from the bright circular SAED pattern, consistent with the XRD outcome. It is clear that the nonpolar extracts could function as stabilizers for La_2O_3 nanoparticles through attachment to the counter ions. The La_2O_3 nanoparticles have been used as efficient photocatalyst to degrade acid black 1-dye under sunlight irradiation. Besides this biological catalyst showed excellent ability to degrade biologically or green synthesized La_2O_3 nanoparticles (Trianthema portulacastrum) up to 87% under visible light irradiation. Synthesis of La_2O_3 nanoparticles by green chemistry process presented good antibacterial activity – against Gram- negative and Gram – positive bacteria.

Keywords: La_2O_3 nanoparticles, M. Oppositifolia, T. Portulacastrum, Photocatalytic degradation, Antibacterial Activity.

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OP-BM-18

GREEN SYNTHESIS OF COPPER OXIDE NANO PARTICLES USING *HIBISCUS SABDARIFFA* LEAF EXTRACT

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ABSTRACT:

Synthesis and characterization of copper oxide nanoparticles (CuO) are under exploration due to their wide medical applications and various research interests in nanotechnology. Green synthesis of Copper Oxide nanoparticles is a very simple, economical, and eco-friendly method that does not involve any toxic chemicals. The present investigation was made to synthesis Copper Oxide nanoparticles by using a leaf extract of the medicinal plant Hibiscus *Sabdariffa* and Copper Sulphate ($CuSo_4$). The structural characterization of nanoparticles was carried out using the XRD technique. The synthesized Copper Oxide nanoparticles exhibit distinct features compared to traditional Physico-chemical synthesis and they have many applications in a wide range of fields such as surface coating agents, catalysts, food packaging, corrosion protection, environmental remediation, electronics so on.

Keywords- Copper Sulphate; CuO nanoparticles; Hibiscus *Sabdariffa*; XRD.

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OP-BM-19

UNDERSTANDING THE POTENTIAL OF NANOCURCUMIN IN ANTICANCER TREATMENT: AN *In Vitro* APPROACH

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ABSTRACT:

With the development of nanotechnology, great progress has been made in the diagnosis and treatment of tumors. The potential of nanoparticles for being able to carry drugs, nucleic acids, contrast agents, etc. reflects the effectiveness of nanomedical technology to reduce toxicity while playing a role in targeted drug delivery. Nanotechnology based drug delivery systems can help in the treatment of OSCC. Curcumin (diferuloylmethane) is a phytopolyphenol pigment extracted from the rhizome of Curcuma longa (Turmeric), which possess an assortment of pharmacological properties such as antioxidant, anti-inflammatory, anti-carcinogenic and anti-microbial properties. Curcumin exhibits its anti-inflammatory property by disrupting cell signal transduction by various mechanisms, which may explain its effects in inhibition of tumor cell proliferation and suppression of chemically induced carcinogenesis. Curcumin is known to have a therapeutic role in cancer including OC. Curcumin can sensitize tumors to different chemotherapeutic agents, including doxorubicin, 5-Fluorouracil, paclitaxel, vincristine, cisplatin, celecoxib, and thalidomide among others, to improve the efficacy of these agents. With this understanding, the novel properties of nanoparticles was used to generate nanocurcumin, and its antimitotic and anticancer properties was tested on OSCC cell lines to help understand the mechanisms of its anticancer properties. This allows nanocurcumin to be used as an oral adjuvant to complement existing chemotherapeutic strategies to improve their clinical utility. The current research project focused on the synthesis, characterization, and *in vitro* toxicity assessment of nanocurcumin on oral cancer cell lines. This project evaluated the anticancer effects of synthesized nanocurcumin on oral squamous cell carcinoma (OSCC) and compared it with its bulk counterpart for efficacy in uptake and activity. The novel properties of nanoparticles aided in the formulation of nanocurcumin and its anticancer properties against 2D (OSCC cell lines). The novelty of this project is based on the formulation of nanocurcumin against the commonly used bulk counterpart and its effect on OSCC, a cancer type that has not been researched extensively using nanocarriers. The nanocurcumin was tested on monolayers. This approach helped better understand the holistic *in vitro* anticancer testing and also aided in establishing the effectiveness of nanocurcumin formulations (nanotechnology-based approach) as delivery system for clinical trials in the future.

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OP-BM-20

METAL DOPED HYDROXYAPATITE COATING PREPARED VIA HYDROTHERMAL METHOD IMPROVED CORROSION RESISTANCE AND ANTIBACTERIAL ACTIVITIES ON PRE-TREATED TITANIUM ALLOY

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ABSTRACT:

Titanium alloy is used as an implant material for the medical field but the biocompatibility of the material is not satisfied when it is inserted between the metal implant and natural bone without any surface modifications. In order to improve the bone attachment ability and the corrosion resistance of the implant, the implant surface is modified by providing proper alkali treatment. In this study, the hydroxyapatite is prepared from cuttlefish bone as a precursor material for the synthesis. The prepared hydroxyapatite is mixed with different metals like Zn, Mg and Ag with three different concentrations. The metal doped hydroxyapatite is coated with alkali treated Titanium alloy using electrodeposition method. The functional group, crystallinity and phase structure of the synthesised mineral doped hydroxyapatite was confirmed by FTIR, XRD. The corrosion resistance of the coated Titanium alloy was tested by electrochemical studies. This was carried out by immersing the Ti alloy in simulated body fluid solution at 37°C. The surface morphology of the coated Ti alloy was characterized by SEM, EDAX and AFM studies. The antibacterial activities of the coated Ti alloy were tested with two bacterial strains like gram negative and gram-positive bacteria's. The silver doped hydroxyapatite coated Ti alloy has better antibacterial activity than other metal doped hydroxyapatite coated Ti alloy.

Keywords: Biocompatibility, Cuttlefish bone, bone bonding ability, Ti alloy, SEM and AFM.

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OP-BM-21

IN VITRO ANTIOXIDANT POTENTIAL OF POLYHERBAL FORMULATION; EVALUATION OF ITS ANTI-INFLAMMATORY ACTIVITY

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ABSTRACT:

The medicinal plants for health are used as herbal treatment. This concept is founded in ayurvedic and other traditional medicinal methods. Carica papaya is used for preventing and treating gastrointestinal tract disorders, intestinal parasite infection, and as sedative and diuretic. Punica granatum capable for the treatment and prevention of cancer, as well as other disease. Catharanthus roseus used for relieving muscles pain, depression of the central nerve system and Cymbopogam citrates medicine as an antispasmodic, hypotensive, anticonvulsant, analgesic, antiseptic. In present work we evaluated the phytochemical presence and extracted samples were mixed in three different concentration ratios. Samples were evaluated for antioxidants by DPPH assay. The sample 2 (C+D) shows the higher antioxidant activity. The sample 2 was evaluated for anti-inflammatory activity by albumin denaturation method. The IC 50 value of Polyherbal formulation of sample 2 was found to be 40.27 µg/ml.

Keywords: Carica papaya, Punica granatum, Catharanthus roseus, Cymbopogan citrate.

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OP-BM-22

BIOSYNTHESIS OF SELENIUM NANOPARTICLES USING MOSQUITO CRUDE EXTRACT AND EVALUATION OF ANTIMICROBIAL AND ANTIBIOFLIM ACTIVITIES

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ABSTRACT:

Foodborne diseases are one of the fundamental health problems around the world population. Developed and developing countries are highly prone to these foodborne diseases affecting around 30% of the world population every year. Biofilm – Free floating bacteria existing in an aqueous environment, so- called planktonic microorganisms are a prerequisite for Biofilm formation. The present study was aimed at synthesizing eco-friendly biosynthesis of selenium nanoparticles using mosquito's larvae Culex. Quinquefasciatus curd extract and analyzing its efficacy in controlling as well as the microbial pathogens and Biofilm activity against Staphylococcus aureus (MTCC96), Escherichia coli (MTCC4822), Vibrio cholera and Bacillus cereus. The formation of selenium nanoparticles (SeNps) was confirmed using UV-Vis spectroscopy, FTIR, X-ray diffraction and scanning electron microscopy. The size of the nanoparticles and their stability were analyzed using dynamic light scattering and zeta potential. The SeNps were also active on both the bacterial species showing strong inhibitory zones. The present results will explain the ability of SeNps in controlling the bacteria and will contribute to the development of multi potent eco-friendly compounds.

Keywords: Culex. quinquefasciatus, Selenium nanoparticles, food pathogens.

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OP-BM-23

LARVICIDAL AND ANTIMICROBIAL POTENTIAL OF SELENIUM NANOPARTICLES SYNTHESIZED USING LEAF EXTRACT OF *DILLENIAINDICA*

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ABSTRACT:

Recent days, most of diseases are spread by mosquito vectors and pathogenic microbes. The present study deals with the synthesis of selenium nanoparticles using Dillenia indica leaf extracts which was characterized by UV–Vis spectrophotometer, XRD, FTIR, SEM, DLS and Zeta Potential analysis. The antimicrobial analysis against methicillin-resistant Staphylococcus aureus (MTCC 96) and Serratiama rcescens (MTCC 86) showed that the remarkable inhibitory effect at 25µl/mL concentration level. Further, the characterized Se NPs showed a great insecticidal activity against Aedes aegyptiand Culexquinque fasciatusin the early larval stages with the median LC 50 of 0.92 mg/L. Overall, the Dillenia indica leaf mediated biogenic Se NPs was promisingly evidenced to have potential larvicidal and food pathogenic bactericidal activity in eco-friendly approach.

Keywords: Dillenia indica, Selenium nanoparticles, Aedes aegypti, food pathogens.

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OP-BM-24

FORMULATION OF HERBAL BASED HAIR COLOUR FROM *PHYLLANTHUS RETICULATUS*

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ABSTRACT:

Synthetic oxidative hair dyes available in the market contain a combination of peroxide and ammonia which damages the hair and causes allergic reactions. In addition, people who use synthetic dyes are at risk for skin burns, irritation to the nose and also lead to cancer. Hence, herbal based hair dyes are safe to use. In traditional system of medicine different parts of *Phyllanthus reticulatus* were used for curing various ailments including antidiabetic, antiviral, anticancer, anti-plasmodial, hepatoprotective, antibacterial and anti-inflammatory activities; still there is no work reported on the dye usage. The aqueous leaf extract of the *phyllanthus reticulatus* showed the presence of flavonoids, triterpenoids, protein, carbohydrates, saponins, tannins, phenols and steroids. Herbal hair has been formulated with natural ingredients like *Phyllanthus reticulates*, *Phyllanthus emblica, Vitex negundo, Eclipta prostrata, Indico fera tinctoria* and pinch of surma stone in the ratio of 5:1:1:1:1. The prepared herbal hair dye was evaluated for its various parameters such as organoleptic, physico-chemical and phytochemical. Formulation was kept for one month at room temperature (29°C-32°C) to see changes in colour, smell, texture and appearance. The formulation was found to be stable. Formulated dye showed potent *in vitro* antimicrobial activity against *Staphylococcus aureus, Bacillus subtilis, Enterococcus faecalis, Micrococcus luteus, Klebsiella pneumoniae, Proteus vulgaris, Palmonella typhi, E. coli, Salmonella typhi.* Both plant extract and hair dye formulation showed potent antioxidant activity against DPPH, Reducing power assay, ABTS, Total capacity assay, hydrogen peroxide. Since the natural ingredients are known for their non-toxic, non-habit-forming properties and there are no added chemicals, preservatives, artificial colors or perfumes in the formulated product, the chances of its degradation are close to minimal. This leads to increased shelf life with stable ingredients. It offers a natural alternative, which can be used irrespective of any side effects.

Keywords: *Phyllanthus reticulatus,* herbal, Ammonia, hair dye, colorant.

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OP-BM-25

TOPICAL HERBAL OINTMENT FORMULATION FROM ORMOCARPUM SENNOIDES TO TREAT BONE AILMENTS - A GREEN APPROACH

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ABSTRACT:

Herbal plants play pivotal role in tribal healing medicinal practice which evolved over generation of experience and practice**.** *Ormocarpum sennoides* (Willd.) DC (Family: Fabaceae) commonly known as Elumbotti in Tamil language is extremely efficient in accelerating bone healing activity and widely used by ancient tribal people to treat fracture but at present its use is known only to a handful of villagers. An effort is put forth in the present study to develop bone healing ointment from *Ormocarpum sennoides* leaf extract. It contains an array of photochemical including flavanoids, phenol, saponin, tannin and gums and mucilage**.** Parameter study have been investigated for ointment including appearance, odour, colour, homogeneity, pH, spreadability and viscosity measurement were evaluated for formulated product. *In vitro* analysis of anti-inflammatory, antimicrobial and antioxidant activity were performed with formulated products. The *Ormocarpum sennoides* have investigated for their antioxidant status showed strong antioxidant with DPPH, reducing power assay, ABTS. The *O.sennoides* formulated ointment showed strong anti-inflammatory activity with maximum inhibition of albumin denaturation 66%, similarly, membrane stabilization has the inhibition Value of 78% at the concentration of 100µg/mg. Gram positive bacteria such as *Staphylococcus aureus, Bacillus subtilis, Enterococcs faecalis, Micrococcus luteus* and gram negative bacteria such as *E.coli, Klebsiella pneumoniae, Proteus vulgaris, Salmonella typhi,* fungus *Candida albicans* showed strong antimicrobial property at 100 µg/mg when compared with standard. The present study highlights to explore the folklore therapy by developing commercial value-added product from *Ormocarpum sennoides* plant to bring into light its indigenous importance.

Keywords: Bone ailment, *Ormocarpum sennoides*, Anti-inflammatory, Anti-microbial, Antioxidant.

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OP-BM-26

FACILE SYNTHESIS OF SILVER NANOPARTICLES USING *VERNONIA ANTHELMINTICA (L.)* WILLD. AND THEIR TOXICITY AGAINST SPODOPTERA LITURA (FAB.), HELICOVERPA ARMIGERA (HU¨ B.)

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ABSTRACT:

The present study was aimed to evaluate the antifeedant, larvicidal, pupicidal, biochemical effects of Vernonia anthelmintica seeds mediated AgNPs against Spodoptera litura, Helicoverpa armigera,. The potential antifeedant activity of synthesized AgNPs were 86.90% and 89.83% and larvicidal activity of (LC50) 56.42 lg/mL and 63.65 lg/mL against S. litura and H. armigera respectively. Furthermore, larval growth duration was increased as 13.66 and 15.85 days on S. litura and H. armigera as compared to control 7.83 and 8.05 days. The damaged midget cells and peritrophic membrane was observed on treated larvae of S. litura, H. armigera, Conclusively, biosynthesised of AgNPs using V. anthelmintica seeds were used as potential biopesticide for controlling S. litura and H. armigera.

Keywords: Vernonia anthelmintica - silver nanoparticle - Insecticidal – Enzymatic activity - Histopathology studies

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OP-BM-27

GREEN SYNTHESIS OF SILVER NANOPARTICLE USING LEONOTIS NEPETIFOLIA AND THEIR TOXICITY AGAINST AGRICULTURAL PESTS OF SPODOPTERA LITURA AND HELICOVERPA ARMIGERA

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ABSTRACT:

Pest insects causing damage to cultivable crops and food products by feeding, fecundity, and parasitizing livestock, also being a nuisance to human health. The present research work was carried out to evaluate the antifeedant, larvicidal, pupicidal, larval, and pupalduration activity of Leonotis nepetifolia mediated silver nanoparticles (AgNPs) against Spodoptera litura, Helicoverpa armigera. Biosynthesized AgNPs were characterized through various techniques such as UV–Vis spectrometer, X-ray powder diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), energy-dispersive X-ray spectroscopy (EDX), transmission electron microscopy (TEM), dynamic light scattering (DLS), and zeta potential analysis. The AgNPs showed potential antifeedant activity of 78.77% and 82.16% against the larvae of S. litura and H. armigera, respectively. The maximum larval mortality rate (78.49% and 72.70%) and maximum pupal mortality rate (84.66% and 77.44%) were observed against S. litura and H. armigera.The histological examinations showed that the acceleration of the nanomaterial caused severe tissue damage in the epithelial and goblet cells in the larval midgut region of S. litura, H. armigera, Biosynthesis of silver nanoparticles using L. nepetifolia is an ideal eco-friendly approach for the managementof insect pests.

Keywords: Leonotis nepetifolia. Silver nanoparticles, Spodopteralitura, Helicoverpaarmigera.

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OP-BM-28

BIO EFFICACY OF SYNTHESISED SILVER NANOPARTICLES USING DICROCEPHALA INTEGRIFOLIA LEAF EXTRACT AND THEIR INSECTICIDAL ACTIVITY

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ABSTRACT:

In present study demonstrated that bio efficiency of Dicrocephala integrifolia plant extract used as a reducing agent for synthesis of silver nanoparticles (AgNPs) treated against Spodoptera litura and Helicoverpa armigera. The synthesized AgNPs were characterized through UV spectroscopy (UV–Vis), X- ray powder diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), energy-dispersive X-ray spectroscopy (EDX), transmission electron microscopy (TEM), dynamic light scattering (DLS), and zeta potential analysis. The AgNPs treated larvae exhibited antifeedant activity against S. litura (76.94%) and H. armigera (79.24%). The obtained larval mortality rates (69.76% and 68.04%) with LC50 values of 99.39 ppm and 108.68 ppm and pupicidal rates (74.30% and 72.11%) against S. litura and H. armigera. X 2 values were significant at the $P \leq 0.05$ level. Histologically changes were observed in treated larval midgut tissues compared to control. These results suggested that biosynthesized NPs suitable for ecofriendly insect pest management.

Keywords: Dicrocephala integrifolia, Silver nanoparticles, Spodoptera litura, Helicoverpa armigera, Larvicidal activity

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OP-BM-29

FORMULATION AND OPTIMIZATION OF COOKIES FROM OILCAKES, EVALUATION AND ESTIMATION OF SENSORY PROPERTIES AND NUTRITIONS IN COOKIES AND PROBIOTIC CREAM

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ABSTRACT:

Cookies - are backed or cooked snack or dessert that typically small, flat and sweet which is preferred by all age groups. Contains flour, sugar, egg, and some type of oil, fat, or butter. In present study we prepared five different concentrated cookies from groundnut oil cake. Cookies were analysed in quantitatively for carbohydrate, lipids, and portions and also the samples was analyzed by nine point hedonic test to evaluate the sensory properties like colour, appearance, taste, texture and odour. Lactobacillus was isolated from curd and it was confirmed by gram staining, catalase activity and Simmons citrate agar method. The lactic acid bacteria incorporated was sample to and evaluate its viability after incorporation. It shows 135 colonies in 20^{th} day.

Keywords: Groundnut oil cake, cookies, formulation, lacto bacillus, pro-biotic cream

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OP-BM-30

EXTRACTION, PHYTOCHEMICAL ANALYSIS AND EVALUATION OF ANTI-DIABETIC ACTIVITY FROM THE LEAVES OF *CALOTROPIS GIGANTEA*

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ABSTRACT:

Cough and cold is a most common problem faced by the all the people especially in the winter season. There are two types of cough. One is the dry cough and the other is wet cough. The syrup is most commonly used popular dosage form to cure both types of cough and cold. The herbal cough syrup was formulated using crude drugs as *Coleus amboinicus*, *Euphorbia hirta, Ocimum tenuiflorum* and *Solanum trilobatum* as a main ingredient along with honey or sugar or country sugar syrup as a base. Formulation at laboratory scale was done and evaluated for number of parameters such as PH, viscosity, density, and stability testing. Results indicated that the formulated syrup is stable can be used for treatment of cold and cough.

Keywords: Cold, Cough, Syrup, *Coleus amboinicus*, *Euphorbia hirta, Ocimum tenuiflorum* and *Solanum trilobatum*

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OP-BM-31

DETERMINATION OF PLANTAR FOOT PRESSURE ULCERS BY A PORTABLE DEVICE – A PILOT STUDY

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ABSTRACT:

Foot plantar pressure is the pressure field that acts between the foot and the support surface during everyday locomotive activities. Such pressure measurement is very important in maintaining the gait and posture research for diagnosing the lower limb problems, footwear design, sport biomechanics, injury prevention and other applications. In this research, the plantar foot pressure on the left & amp; right foot is estimated and the estimated pressure values on left & amp; right foot were compared. The pair of six Force Sensitive Resistor (FSR) is attached on the right and left shoe inner sole. These pressure sensors were placed on the pressure points such as big toe, forefoot (1^{st}, 3^{rd}, 5^{th} Metatarsal), inner arch and heel. FSR pressure sensors in the insole provide specific information and therefore the point of the sensor placement result in obtaining the pressure under the insole. All sensors obtained the force data simultaneously during standing and a short walk by an Arduino-Nano which placed beneath the inner sole. Finally, the obtained results were determining the foot ulcers prove this system is user-friendly, economical and reliable.

Keywords: Plantar pressure, Force Sensitive Resistor, wireless

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OP-BM-32

EXTRACTION OF *BARLERIA PRIONITIS* AND EVALUATION OF TYROSINASE INHIBITION ACTIVITY

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ABSTRACT:

Barleria prionitis is a famous perennial plant commonly known as a porcupine flower or Vajradanti. It is a shrub like plant which contains yellow colour flower with two flat seed of shielded matted hairs. It is mostly inhabitant in India. In this plant, several parts are used in the medicinal field. Furthermore, plant screened for antibacterial, antifungal, antiviral, anti-inflammatory, antifertility, antioxidant, enzyme inhibitory, hepatoprotective, antihypertensive, anticancer and anticataract activities. Various compounds such as alkaloids, Polyphenols, carbohydrates, protein, amino acids & flavonoids have been identified in the plant. *Barleria prionitis* has been extracted by solvent extraction method which has been evaluate for the anti-tyrosinase activity.

Keywords: *Baleria prionitis*, Solvent extraction, Anti-tyrosinase activity.

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OP-BM-33

GREEN SYNTHESIS AND CHARACTERIZATION OF MAGNESIUM OXIDE NANO PARTICLES USING *VITEX NEGUNDO* LEAF EXTRACT IN APPLICATION DYE DEGRADATION, ANTI-BACTERIAL ACTIVITY

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ABSTRACT:

The MgO NPs was synthesized using *Vitex negundo* leaf extract. The NPs were characterized by UV-visible spectroscopy (UV-vis), Fourier transform infrared spectroscopy (FTIR), Scanning Electron Microscope (SEM), X-ray Diffraction Spectroscopy (XRD) and Energy Dispersive X-ray analysis (EDX). The Photocatalytic potential of MgO NPs was investigated by the degradation reaction of methyleneblue (MB) dye. Further, antibacterial and anti-inflammatory potential of the synthesized NPs were also been analyzed.

Keywords: MgO NPs, *Vitex negundo*, Photocatalytic activity, antibacterial activity, anti-inflammatory activity

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OP-BM-34

GREEN SYNTHESIS, CHARACTERIZATION AND PHOTOCATALYTIC ACTIVITY OF ZINC OXIDE NANOPARTICLES USING *ZIZIPHUS MAURITIANA* LEAF EXTRACT IN APPLICATION OF DYE DEGRADATION

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ABSTRACT:

Zinc oxide Nanoparticles (ZnO NPs) synthesized by a completely environmentally safe and facile process using *Ziziphu smauritiana* leaves aqueous plant extract as effective stabilizing agent. Phytochemical screening of the aqueous leaves extract showed the presence of Alkaloids, Polyphenols, Carbohydrates, Proteins, Amino acids, Flavonoids. The synthesized ZnO NPs were characterized by UV, XRD, FT-IR, SEM and EDX. This green synthesis indicates that it is efficient method than chemical method.

Keywords: *Ziziphus mauritiana*, aqueous extraction, dye degradation

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OP-BM-35

EXTRACTION, PHYTOCHEMICAL ANALYSIS AND EVALUATION OF ANTI-DIABETIC ACTIVITY FROM THE LEAVES OF *CALOTROPIS GIGANTEA*

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ABSTRACT:

Diabetes is the world's largest endocrine disorder. Even though allopathic medications for diabetes are available all around the world, it is associated with side effects. Even though it cannot be cured, continuous efforts are been taken to control the disorder with no side effects. To achieve this, the leaves of *Calotropis gigantean* are dried and extract was prepared using various solvents and analyzed for the presence of different phytochemicals, which revealed that the n-hexane extract is rich in phyto nutrients. This extract is analyzed for their antidiabetic activity using α-amylase and α-glucosidase assay.

Keywords: *Calotropis gigantean,* α-amylase assay, α-glucosidase assay, antidiabetic activity

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OP-BM-36

PREPARATION OF ECO-FRIENDLY HERBAL SANITARY NAPKIN WITH ANTICANCER ACTIVITY

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ABSTRACT:

Sanitary napkins are used to absorb the flow of blood during menstruation. Importantly, there should be no leaks or odors, as well as a high level of hygiene. There are many sanitary napkins on the market these days that are made of chemical substances, which cause many problems for women, such as cancer, and can also interfere with the reproductive system. Nearly 355 million girls in India use sanitary napkins, and suffered with side effects as specified above due to the chemical substances added to those napkins. In order to overcome this, we designed an herbal sanitary napkin using dry fibre of bamboo and banana. In addition, dry herbal powders of neem leaves, clove buds, and flowers of *Common lantana* are used. These herbal powders had the properties such as antifungal, antibacterial, anticancer, and antioxidant. For absorption purpose, oil cloth is prepared using linen cloth. This herbal sanitary napkin is a biodegradable product and it is very comfortable to use.

Keywords: Sanitary napkins, *Common lantana*, antifungal activity, antibacterial activity, anticancer activity, and antioxidant activity.

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OP-BM-37

EXTRACTION OF *ARISTOLOCHIA BRACTEOLATE* AND *JUSTICIA ADHATODA* AND EVALUATION OF ANTI FUNGAL ACTIVITY

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ABSTRACT:

Aristolochia bracteolata and *Adhatoda vasica* is an important medicinal herb and it is original in India and Asia. Especially *Aristolochia bracteolata* plant leaves parts are bitter in taste, which have anti-helminthic, antiulcer, and anti-plasmodial activity. Both of these plants have been commonly used in Ayurvedic system of medicine. Furthermore, *Adhatoda vasica* screened for antifungal, anti-inflammatory, antioxidant, antibacterial activity and *Aristolochia bracteolata* screened for anti-inflammatory, antifungal, antibacterial, antiulcer activity. We have combined both the plant extracts and evaluated the antifungal activity by disc diffusion method against various fungal strains. These plants contain some chemical compounds such as alkaloids, flavonoids, carbohydrates, terpenoids etc.

Keywords – *Aristolochia bracteolata*, *Justicia adhatoda*, Anti-fungal activity, Disc diffusion method.

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OP-BM-38

IN SILICO ANALYSIS OF 4-(4-HYDROXYPHENYL) -2-[4-(TRIFLUOROMETHYL) PHENYL]-THIAZOLE FROM *HYGROPHILA AURICULATA* AGAINST THE TARGETED PROTEIN OF CANCER

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ABSTRACT:

Cancer is an epidemic and always remains a challenge in the medical field. It is the world's second-largest cause of mortality and the number of cases is still increasing. Cancer therapy includes surgery of tumour, radiotherapy and chemotherapy. The method of treatment depends on the age, stage and location of the tumour. Chemotherapeutic drugs used for treating cancer possess severe toxicity to the healthy cells also. Historically plant-based products have been the basis of medicine since before the advent of modern western medicine. The secondary metabolites identified from *Hygrophila auriculata* are used as one of the anti-cancer potentials. The aim of the present study is to identify the binding potential of purified compound against targeted protein which is responsible for cancer used in silico studies. Targeted protein selected based on literature survey. **PIK3R1, AKT1, EGFR, and ERK** were proteins responsible for cancer. The selected protein was docked using discovery studio software. The ***In- silico*** study demonstrated the **4-(4-Hydroxyphenyl) -2-[4-(trifluoromethyl) phenyl]-thiazole** compound was the best compound indicating higher binding energy when compared with other protein **AKT1** receptor leaving -7.7 kcal/mol and **PIK3R1** receptor is -6.5 kcal/mol of binding energy As a result, purified compound can be used for the formulation of novel cancer therapy.

Keywords: 4-(4-Hydroxyphenyl) -2-[4-(trifluoromethyl) phenyl]-thiazole, *Hygrophila auriculata, in silico, phytochemical*

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PP-BM-01

NMR STUDY OF THE Z-DNA AND Z-RNA BINDING MODE OF ZA DOMAIN OF HUMAN RNA EDITING ENZYME (ADAR1)

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ABSTRACT:

Human ADAR1 deaminates adenine in pre-mRNA to yield inosine (I), which codes as a guanine residue in mRNA. These A-to-I conversions can lead to functional changes in the resulting proteins. The Zα domain of human ADAR1 (ZαADAR1) binds to Z-DNA through intermolecular interactions mediated by α3-core and β-hairpin. The five residues of the α3 helix and the four residues of the β-hairpin play an important role in Zα function, forming direct or moisture-mediated hydrogen bonds with DNA skeletal phosphates or hydrophobic interactions with DNA bases. The substitution of P193, which located in β-hairpin, to A caused Aicardi - Goutières syndrome. Aicardi-Goutières syndrome (AGS) is a severe infant or juvenile-onset autoimmune disease characterized by inflammatory encephalopathy with an elevated type 1 interferon-stimulated gene (ISG) expression signature in the brain. In this study, we performed heteronuclear single quantum correlation (HSQC) titrations on complexes of the P193A mutant of ZαADAR1 with DNA or RNA duplexes at various DNA-to-protein molar ratios. Comparison of these results provides the structural information to explain the origin of Aicardi-Goutières syndrome.

Keywords: ADAR1; AGS; DNA; RNA; (Maximum 4).

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PP-BM-02

A STUDY ON DLX3 AND ITS DNA RECOGNITION THROUGH NMR

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ABSTRACT:

Transcription factors (TFs) are proteins that recognize specific DNA sequences and induce gene expression or inhibition. A mutation in DLX3 Homeodomain (residue 129-188) cause TDO syndrome. The highly conserved DLX3 is responsible for specific recognition of a common sequence motif, 5'- TAATTG-3'. In this study, DNA and DLX3 protein complex was found as molecular mechanisms of specific DNA recognition through 2D HSQC in NMR. We present the binding affinity of the DLX3-HD for DNA using HSQC titrations at various salt concentration conditions. This experiment provides structural features of the DLX3-DNA complex and the mechanism of target DNA recognition of DLX3 transcription factors.

Keywords: TDO Syndrome; DLX3; Transcription Factor; NMR;

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PP-BM-03

NMR STUDY ON THE INTERACTION OF HUMAN ZBP1 WITH ITS TARGET Z-DNA

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ABSTRACT:

Z-DNA-binding protein 1, also known as the DNA-dependent activator of IFN-regulatory factors (DAI) and DLM-1, is a protein that in humans is encoded by the ZBP1 gene. The role of ZBP1 in DNA sensing has been questioned. It has been found to sense Influenza A Virus (IAV) infection and induce cell death. Since DNA is not synthesized in any stage of the IAV life cycle, DNA sensing playing a role in this context is unlikely. However, recent investigation has found that ZBP1 is capable of sensing Z-form RNAs produced during IAV infection, cumulating in a form of caspase-independent, inflammatory cell death called necroptosis. The human DNA-dependent activator of the IFN-regulatory factor (ZBP1) protein, which activates the innate immune response in response to DNA, contains two tandem Z-DNA binding domains (Zα1 and Zα2) at the NH2 terminus. The $hZ\alpha1_{ZBP1}$ and hZα2ZBP1 structure are similar to other Z-DNA binding proteins, although it demonstrates an unusual Z-DNA recognition. In this study, we performed heteronuclear single-quantum correlation (HSQC) experiments on complexes of $Z\alpha1_{ZBP1}$ and $Z\alpha2_{ZBP1}$ with d(CG)3 duplex at various DNA-to-protein molar ratios. The results from previous studies can produce valuable insights into the distinct molecular mechanism of the DNA duplex B–Z transition induced by $hZ\alpha1_{ZBP1}$ and $hZ\alpha2_{ZBP1}$.

Keywords: NMR; Protein-DNA; Dynamics;

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PP-BM-04

GRAPHENE QUANTUM DOTS- MnO_2 NANOSHEET BASED FLUORESCENT NANOPROBE FOR DETECTION OF LACTOFERRIN

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ABSTRACT:

Lactoferrin estimation is increasingly acquiring prominence as a novel biomarker for the diagnosis of periodontal disease. To date, diverse lactoferrin detection methods which include electrochemical, surface-enhanced Raman scattering, colorimetric, and others have been extensively portrayed. Unfortunately, these systems have significant shortcomings including low sensitivity, selectivity, high cost, arduous and time-consuming technique, and so forth. Recently, the fluorescence-based method shows remarkable uniqueness that overcomes the demerits of traditionally reported techniques. Therefore, graphene quantum dots (GQDs) and manganese dioxide nanosheets (MnO_2-NS) based simplistic, highly sensitive, and selective fluorescent turn 'Off-On' mediated GQDs@MnO_2-NS nanoprobe was designed. Herein, MnO_2-NS addition demonstrated the quenching of GQDs containing fluorescence through inner filter effects (IFE) and strong interaction between GQDs and MnO_2-NS. The lactoferrin addition destroyed the MnO_2-NS and fluorescence emission of GQDs reappeared which may be because of redox reaction between lactoferrin and prepared MnO_2-NS. Herein, nanoprobe offers a wide concentration range and low limit of detection of 5 to 1600 ng/mL and 1.69 ng/mL, respectively. As fabricated GQDs@MnO_2-NS nanoprobe sensor demonstrated high selectivity, good stability, and reproducibility towards lactoferrin that assuring applicability of biosensor. Therefore, the GQDs@MnO_2-NS nanoprobe will offer a simplistic sensor with adequate sensitivity to achieve highly responsive and selective detection of lactoferrin.

Keywords: Lactoferrin; Periodontal disease; Graphene quantum dots; Manganese dioxide nanosheet; Fluorescent sensor; Sensitivity

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PP-BM-05

LAYER-BY-LAYER ASSEMBLY-BASED GRAPHENE NANOCOMPOSITE DECORATED SPR BIOSENSOR FOR PROGNOSIS OF ALZHEIMER'S DISEASE

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ABSTRACT:

Alzheimer's disease (AD), and its consequent effect primarily clinical dementia, Parkinson's disease dementia, etc. currently bring potential avenues for diagnosis centered on identification of beta-amyloid1-42 (Aβ1-42). Unfortunately, techniques engaged in AD core biomarker (Aβ1-42) detection are majorly suffering from poor sensitivity and selectivity. Thus, we fabricated graphene oxide (GO) surface decorated chitosan (CS) mediated layer-by-layer (LbL) assembly based surface plasmon resonance (SPR) biosensor for highly sensitive and selective recognition of Aβ1-42. Briefly, silver nanoparticles (AgNPs) and GO synthesis were achieved through a greener approach. LbL assembly was designed using CS and polystyrene sulphonate (PSS) on surface of AgNPs (AgNPs-CS-PSS-CS) and then antibodies of Aβ (anti-Aβ) were fixed on LbL assembly (AgNPs-CS-PSS-CS@anti-Aβ). Herein, amine functionality of CS offers a plethora of sites for anti-Aβ antibody immobilization that gives specific direction, high selectivity, and an adequate amount of antibody immobilization. For fabrication, synthesized GO was immobilized on an amine-modified gold-coated sensor chip via carbodiimide chemistry followed by AgNPs-CS-PSS-CS@anti-Aβ immobilization on an activated GO surface. Consequently, linearity range and limit of detection (LOD) of Aβ1-42 antigens were found to be 2 fg/mL to 400 ng/mL and 1.21 fg/mL, respectively. Moreover, analysis of Aβ1-42 in AD-induced rats confirmed the real-time-applicability of the designed SPR biosensor. Hence, GO surface decorated AgNPs-CS-PSS-CS@anti-Aβ mediated SPR biosensor would provide a novel approach for exceptionally sensitive and selective Aβ detection.

Keywords: Alzheimer's disease, biosensor, graphene, biomarker

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PP-BM-06

SYNTHESIS OF SILVER NANOPARTICLES BY BACTERIAL ISOLATE *E. COLI SPP.*, AND THEIR ANTIBACTERIAL ACTIVITY

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ABSTRACT:

The use of microorganisms in the synthesis of nanoparticles emerges as an eco-friendly and exciting approach. The scope of the study is to derive a standardised technique to synthesis silver nanoparticles and to assess its antibacterial activity. In the present study, we observed the synthesis of silver nanoparticles and we report the biosynthesis of silver nanoparticles employing the bacterium *E. coli*. The multi drug resistant pathogen *E. coli* was chosen due to its highest AgNP synthesis. The higher level of nitrate reductase activity was measured at 731.24 U/ml in the 60th run with presence of (%) glucose: 0.1%, peptone: 1%, yeast extract: 0.4%, KNO3: 0.4%, pH: 7.5 at 25 ˚C and 3 days incubation period. The spectrophotometric analysis of Ag NPs at the band ƛ 431 nm for characteristic Surface Plasmon Resonance indicating the Ag nanoparticles are in spherical or roughly spherical shaped. FT-IR spectrum of AgNPs the bands observed at 1359.35 cm–1, 1350.3 cm-1 and 1398.40cm-1. AgNO3 showed more effective treated with gamma radiation of after mixing than before mixing with silver nitrate solution. The AgNPs synthesis showed the antimicrobial activity for the *E. coli* measured was 18.67±2.082 diameter in zone on inhibition. The AgNPs synthesized values of MIC against the tested clinical pathogen showed the antimicrobial activity at 200 ppm for *E. coli* respectively. The antibactericidal activity have proved that AgNPs kill microorganisms at such low levels (units of ppm), does not disclose acute dangerous effects on human health, in addition to that resistance, and low cost compared to conventional antibiotics. It was found to be a cost effective and eco-friendly method. This cheap and easy method can be used as others to chemical, physical, and microbial mediated methods used for synthesis of silver nanoparticles.

Keywords: Microbial production of Silver Nanoparticles; E. coli bacteria; UV-Vis spectroscopy; Transmission Electron Microscopy; Antibacterial activity; Bacterial growth curve.

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PP-BM-07

ASSESSMENT OF ANTI-ULCER AND GASTRO PROTECTIVE POTENTIAL OF LEAVES OF *CASSIA GRANDIS LINN* ON DIFFERENT IN-VITRO MODELS

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ABSTRACT:

Stress, long-term use of anti-inflammatory medications, and other causes can all lead to ulcers in people. Although the exact cause of ulcers is unknown in the majority of instances, it is widely acknowledged that an imbalance between aggressive factors and the endogenous defence mechanism's ability to maintain the integrity of the mucosa leads to ulcer formation. Thus, the search for a safe anti-ulcer drug that optimizes these properties is continuing, and part of the search is the evaluation of medicinal plants for gastroprotective properties. *Cassia grandis* Linn leaves have been used in folk medicine for the treatment of inflammation and gastrointestinal diseases. In this study, we assessed the anti-ulcer activities of ethanolic leaf extract of *Cassia grandis* by *in-vitro* methods such as the acidneutralizing capacity (ANC) , α-chymotrypsin enzyme and H+/K+ - ATPase inhibition activity method by using standard *in-vitro* inhibition assays. Human adenogastric carcinoma epithelial cell line was used to study the gastro protective effect by MTT assay method. The neutralizing effect of the ethanolic extract was studied at different concentrations and showed maximum neutralization at higher concentration. While in α-chymotrypsin enzyme and H+/K+ - ATPase inhibition activity, the extract showed maximum percentage inhibition 85.32% and 65.18% at the concentration 100µg as compared to 90.12 and 70.47% with standard Chymostatin and Omeprazole respectively. In the human adenogastric carcinoma epithelial cells, *Cassia grandis* Linn protected against the damage induced by indomethacin at 10mM; the ethanolic extract at 100 µg revealed maximum percent inhibition of the infected AGS cells (89.12%) with IC50 value of 29.01 µg mL-1.Thus the results of the present study showed that the ethanolic leaf extract of *Cassia grandis* may possess promising antacid, antisecretory and gastroprotective property which may be due to the presence of phyotocompounds in the extracts. However, further *in-vivo* studies are required to establish its exact mode of action and the active principles involved in its antiulcer effect.

Keywords: *Cassia grandis* Linn; anti-ulcer; Adenogastric carcinoma; Omeprazole.

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PP-BM-08

DIABETIC WOUNDS CAN BE PROTECTED FROM OXIDATIVE STRESS BY UTILIZING METAL OXIDES

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ABSTRACT:

Diabetes is the most serious consequence of Type 2 Diabetic Mellitus which affects almost all vital organs in the human body. According to the world health organization, 537 million adults worldwide are affected by diabetes and its complications. By 2030, this figure is expected to reach 643 million, and by 2045, it will reach 783 million. Up to 25% of diabetic patients experience the equivalent foot Ulcer (Also referred to as a Diabetic wound). Infections result in hospitalization in more than 50% of wounds, and 20% of infections necessitate amputations. In India, people with DWs account for 80 percent of all non-traumatic amputations performed each year. The rise in blood sugar levels, reflected by a chronic hyperglycaemic state, is a significant contributor to the failure of the healing process. This impaired wound healing is an unmet medical need that significantly impacts the quality of life of patients and global health care. Despite the fact that the delay in diabetic wound healing varies, ischemic-hypoxic conditions and elevated inflammation are the shared pathological factors that delay tissue regeneration. Hypoxia-inducible factor-1α (HIF-1 α) is less stable when exposed to high levels of glucose because it is quickly hydroxylated and broken down after translation. This change makes it harder for the diabetic wound to up-regulate vascular endothelial growth factor (VEGF) in response to soft tissue ischemia, which impairs the creation of new blood vessels and slows the healing of wounds. This makes angiogenesis and wound healing slower. Hence, reducing hypoxia in treating chronic wounds is an important clinical problem for people with Diabetes. In this article, we spotlight the metal oxide-related nanofibers that serve as wound dressings with the properties of oxygen releasing, antioxidant, antimicrobial, and angiogenic which will attenuate the overall healing process in diabetic wounds.

Keywords: Diabetic wound; metal oxide; HIF-1 α stabilization; Oxidative stress; antioxidant activity

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OP-ESC-27

BISMALEIMIDE AND NANO COMPOSITE BLENDS: STUDIES ON THERMAL CURING AND THERMAL DEGRADATION

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ABSTRACT:

Thermosetting materials are having outstanding mechanical and thermal properties due to the presence of high crosslinking in its structure. Polyimides are thermally stable polymers with linear or crosslinked chain structure. The present investigation involves the procurement of a bismaleimides, 4,4'-bismaleimidodiphenyl methane (BMIM) and blending it with graphite, graphene oxide and graphene oxide washed nanoparticles by ultra-sonication method. Both the pure BMIM and the different blends are thermally polymerized. The effect of nano-particles on the curing of the BMIM was investigated using DSC and the thermal stability of the cured BMIM-graphite, graphene oxide and graphene oxide washed nanoparticles was also studied using TG techniques. The surface morphology of the nanoparticles in the polymerized BMIM matrix was studied using SEM. The SEM results reveal that the debris of GO are removed by the base washing of GO and the incorporated nanoparticles are well dispersed in the polyBMIM.

Keywords: Bismaleimide; Nanoparticles; Graphite; Graphite Oxide

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OP-ESC-28

STUDY ON THE ELECTROSPINNING OF POLYCAPROLACTONE/PULLULAN COMPOSITE NANOFIBERS

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ABSTRACT:

In this study, Polycaprolactone and pullulan were successfully prepared as a novel type of protein–polysaccharide composite nanofibrous membrane by electrospinning at room temperature with 1,1,1,3,3,3-Hexafluoro-2-propanol (HFIP) as the solvent. The effects of Polycaprolactone content on the properties of the solution, as well as the morphology of the resultant nanofibers, were investigated. Scanning electron microscopy (SEM) was utilized to observe the surface morphology. Fourier transform infrared spectroscopy (FTIR) was used to study the interaction between Polycaprolactone and pullulan. Incorporation of pullulan with Polycaprolactone will improve the spinnability of the mixed aqueous solution due to lower surface tension. Moreover, the conductivity of the solution had a greater effect on the fiber diameters, and the as-spun fibers became thinner as the viscosity and the surface tension increased due to the addition of the Polycaprolactone. The electrospun Polycaprolactone/pullulan nanofibers could mimic both the structure and the composition of the extracellular matrix, and thus could be applied in tissue engineering.

Keywords: Pullulan, Polycaprolactone, Biomedical application, tissue engineering.

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OP-ESC-29

INTRINSIC DEFECT SCATTERING IN TOPOLOGICAL INSULATORS: A REVIEW

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ABSTRACT:

Topological insulators (TI's) are materials typically composed of crystalline structures that do not allow electrons to transport inside their bulk structure. However, the material's topological symmetry is broken at the surface, thus allowing for conductivity on the top layers of the crystal. These top-layer-atoms see change in their electrons' conduction and valence bands with new surface states appearing to bridge the conductive gap. These surface states (SS) are spin degenerate due to spin orbit coupling (SOC) and most importantly these surface states are protected by time reversal symmetry (TRS). Interestingly the SS of TIs is robust enough that it does not allow any scattering to non-magnetic impurities, hence dissipation less flow of the carrier. Both theoretically and magneto transport experiments have shown that surface conduction very often dominated by the bulk electron transport which means that conducting surface states are not well separated from the insulating bulk states. These considerations open a fundamental question at what limits the surface state electrons conduct in the surface of 3D TI's and unperturbed from bulk states. There is strong backscattering of surface electron below the Dirac point near the bulk energy gap region. This unique property makes TI's interesting for generation, control and detection of spin polarized current desire spintronic devices.

Keywords: Topological insulators, surface states, spin orbit coupling, time reversal symmetry, bulk electron transport, backscattering, Dirac point

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OP-ESC-30

PREPARATION OF LiV_3O_8 NANOROD THIN FILMS BY SPRAY PYROLYSIS TECHNIQUE

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ABSTRACT

The nanorods of LiV_3O_8 (LV_35C) in the form of a thin film coated on Fluorine doped Tin Oxide (FTO) was prepared by spray pyrolysis method for an optimized substrate and annealing temperatures of 350°C and 500°C, respectively. The SEM and AFM analysis clearly shows the rod like structures with the diameter in the range of 50 nm. The sheet resistance of the film was found to be 137 Ohm. The electrochemical studies were made using a three-electrode system and the thin film LV35C showed the areal capacitance value of 8.8 ºF cm^{-2} for the current density of 10 mA in the voltage range of -0.6 to 0.4 V. The electrochemical properties shows the pseudocapacitive behaviour of the LiV3O8 thin film nanorods on the FTO substrate.

Key words: Lithium tri vanadate, Spray pyrolysis technique, pseudo-capacitor

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OP-ESC-31

MODELLING AND SIMULATION OF ORGANIC (PENTACENE) FIELD EFFECT TRANSISTOR

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ABSTRACT

In this work, we studied the simulation of the electrical parameters of an organic pentacene field-effect transistor (OFET) based on the Poole-Frenkel method, which aims to provide a good balance between static and dynamic performance parameters. This approach gives us a quick and easy way to model devices with strong nonlinear behaviour without going into the physics of the device. An inverted step (bottom gate, top contact) and planar (bottom gate, bottom contact) device structure was used with metal gates, room temperature deposited gate dielectric, and vacuum deposited pentacene as semiconductor. The OFETs have a channel length of 2 μm and a channel width of 10 mm. The finite element type simulation is performed using the Silvaco 2-D Atlas simulator. The simulation results indicate that the source electrode of the planning structure has a better ability to deliver current than the current electrode of the distributed structure.

Keywords: Organic Field Effect Transistors (OFET); Organic Semiconductor (OSC); Poole–Frenkel mechanism.

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OP-ESC-32

EFFECT OF Fe AND Pt SUBSTITUTION IN TiNi SHAPE MEMORY ALLOY

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ABSTRACT

The self-consistent Tight-Binding Linear Muffin-Tin Orbital (TBLMTO) method is employed to calculate the electronic structure and total energy of TiNi0.5 X0.5 (X= Fe and Pt) shape memory alloys in B2 (cubic) and B19 (orthorhombic) phases. The results are used to study the structural stability and cohesive properties of these intermetallic compounds. The theoretical calculations show that the B2 phase is the most stable phase of TiNi0.5Fe0.5and TiNi0.5Pt0.5 alloys. The densities of states (total, site and angular momentum projected decomposed) are studied in detail. The Young's modulus of TiNi in B2 phase is expected to increase with the substitution of Fe at Ni site. The substitution of Fe and Pt at Ni site in TiNi improves the glass forming ability of the system. In addition, the work also exhibits the calculated equilibrium lattice parameters, heat of formation and bulk modulus of these systems.

Keyword: TBLMTO; electronic structure; structural stability; glass forming ability;

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OP-ESC-33

MODELLING AND SIMULATION OF SELF POWERED TRIBOELECTRIC NANO GENERATOR SENSOR FOR HEARTBEAT MONITORING

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ABSTRACT

The triboelectric generators are based on systems that allow taking advantage of the potential difference caused by the accumulation of charges due to friction between different materials. Within the field of medicine, the main goal is the development of self-powered sensors. Most medical devices, such as sensors, need an external power source, so that they cannot work independently. In this paper this problem is addressed by analysing the combination of these devices with the technology known as energy harvesting. The concept of energy harvesting refers to the generation of electrical signals by the same device when detecting stimuli such as body movement, touch, pressure. In this paper Triboelectric Nano generators (TENGs), which are based on mechanical energy is being used for biosensors. TENGs are based on the triboelectrification principle, which states that an electric charge is generated on the surface of two materials when being fractioned one against the other. The electric energy generated will be collected and stored, in order to be used to power the device itself. In the case of implantable devices, the replacement of power supply systems is even more complex, since it requires a surgical intervention. An effort on harvesting heartbeat energy is being made for the power supply of pacemakers. This paper discusses simulation and modelling of contact separation mode based TENGs with Spice (Simulation Program with Integrated Circuit Emphasis) software. The signal generation of the triboelectric generator has been simulated by SPICE and numerical calculations have been performed for the analysis of the circuit. Current heartrate monitoring techniques are inconvenient for daily wearing continuous biomonitoring. With a collection of compelling features, such as light weight and high sensitivity, TENGs become an emerging and cost-effective biotechnology for long-term and continuous heart rate monitoring in a wearable manner.

Keywords: Triboelectric Nanogenerators; Biosensors; SPICE; Heart rate.

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OP-ESC-34

MODELLING OF WAVE PROPAGATION THROUGH PHOTONIC LANTERNS

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ABSTRACT:

Multimode optical fibers have been primarily used as "light pipes" in short distance telecommunications and astronomical spectroscopy. Until recently, most photonic applications in the applied sciences have arisen from developments in telecommunications. Photonic lanterns are devices that basically used to make transition of multimode (MM) optical fiber to single mode (SM) optical fiber and vice –versa with minimized loss. This device is adiabatically tapered which transform adiabatically the mode supported by it multimode end into the super mode of an array of single mode waveguide. In other word we can say that photonic lantern an optical fiber device that allows to take a single mode photonic function within a multimode fiber. In photonic lanterns we have to try to understand modal behavior of photonic lanterns and we try to get the conditions for achieving low loss between a multimode fiber. In this review we will discuss the theory and function of the photonic lantern along with several different variants of the technology.

Keywords: Photonic Lantern, Multimode Optical, Fibers Optical, Fiber Tapers

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OP-ESC-35

GREEN SYNTHESIS OF COBALT TUNGSTATE NANOPARTICLES USING *CORALLOCARPUS EPIGAEUS* LEAF EXTRACT FOR SUPERCAPACITOR APPLICATIONS

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ABSTRACT

In this work, we report the synthesis of $CoWo_4$ nanostructure electro-active material through a plant leaf extract via a Green Synthesis method. The obtained product was subjected to structural and morphological studies. Morphological images of $CoWo_4$ material revealed Spherical like structures. Electrochemical properties of the modified electrode were evaluated by cyclic voltammetry, charge–discharge and electrochemical impedance spectroscopy techniques. The modified $CoWo_4$ electrode delivered the highest specific capacitance of 523F/g faradaic behaviour and excellent capacitive properties. Furthermore, the long cycling stability of the electrode was tested. The novel synthetic route of $CoWo_4$ preparation is a convenient potential means of obtaining secondary energy material for super-capacitor applications. In addition to that basic studies like PXRD to check its crystalline nature and FT-IR to check its unknown mixture were also carried out.

Keywords: PXRD; FT-IR; SEM with EDAX; CV

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THERMALLY EVAPORATED InTiO TRANSPARENT THIN FILM: OPTICAL AND PHOTOCONDUCTION BEHAVIOR

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ABSTRACT

This paper presents a novel indium titanium oxide (InTiO) transparent thin film by thermal evaporation technique. The presence of In-O-Ti bond was confirmed from the Fourier transform infrared spectroscopy. X-ray diffraction patterns revealed the mixed phase of cubic-rutile structure. Uniformly distributed spherical shape morphology was observed from Scanning electron microscope. The presence of elements such as In, Ti and O were identified from the energy dispersive spectroscopy. The optical study shows the higher transmittance (85%), wide band gap energy (3.69 eV) and low absorption in the entire visible to NIR region. Photoconduction behaviors with variation in photocurrent and photosensitivity values are absorbed for different light illuminations. The acquired results of InTiO thin films with imperative properties are more enough to be utilization in transparent opto-electronic devices.

Keywords: InTiO thin film; Structure; Morphology; Optical and Photoconduction

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PP-ESC-12

METAL OXIDE NANOCOMPOSITES FOR ULTRA-VIOLET AND THERMAL SHIELDING APPLICATIONS

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ABSTRACT:

Harmful Ultraviolet radiation causes damages to the human body such as skin ageing, skin cancer and allergies throughout the world. A facile and economical approach of hydrothermal method was used to synthesis Zinc Oxide (ZnO) and Tin Oxide (SnO_2) nanocomposites which plays a vital role in blocking ultra-violet (UV) and infrared (IR). The band gap of the ZnO and SnO2 was calculated to be 3.3 and 3.4 eV. These nanocomposites will protect human skin from ultraviolet and heat radiation that emerged from the sun. The crystallography, optical properties and the presence of elements in synthesised nanoparticles were studied using X-ray diffraction (XRD), UV-visible spectrometer (UV-Vis), Raman spectrometer and photoluminescence spectrometer (PL). The morphology of the nanoparticles were observed using scanning electron microscopy (SEM) which confirms the formation of nanostructures. The UV-Vis, Raman and photoluminescence spectroscopy analysis indicates that the zinc and tin oxide nanocomposites have potent in blocking UV radiations and also resist the flow of heat to the human body.

Keywords: ZnO; SnO_2; UV-blocking; thermal shielding

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PP-ESC-13

PREPARATION AND CHARACTERIZATION OF Ce^{3+} DOPED $BaWO_4$ NANOMATERIALS

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ABSTRACT

Cerium (Ce^{3+}) ions doped BaWO4 nanopowder samples were prepared by simple co-precipitation method at room temperature (RT). The samples were characterized by X-ray diffraction (XRD) and UV-Visible optical reflectance spectroscopy. XRD analysis shows pure single phase Scheelite tetragonal structure for all doped $BaWO_4$ nanopowder samples. Characteristics optical reflectance peaks of (Ce^{3+}) ions are observed in the visible region. Two reflectance spectra peak observed in the range 200-350nm. Minimum reflectance peak intensity (maximum absorption) is for Ce^{3+} (8%) doped sample and maximum reflectance (minimum absorption) peak intensity is for BaWO4 sample. The cerium (Ce^{3+}) ions doped BaWO4 is suitable for application such as solid-state phosphors and luminescent materials.

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PP-ESC-14

CITRIC ACID SUPPORTED CeO_2 NANOPARTICLES AND THEIR ELECTROCHEMICAL PERFORMANCES

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ABSTRACT

One of the abundant and versatile rare earth oxides, CeO_2 was prepared through a simple co-precipitation method along with citric acid monohydrate at different molarities for supercapacitor electrode materials. Average crystallite size calculated using De-bye Scherrer's formula from X-ray diffraction analysis for the synthesized samples was found to be 25.5 nm. FE-SEM images confirm the formation of uniform sized and nearly spherical shaped nanoparticles with slight agglomeration. Metal oxygen and surface oxygen bands were confirmed through FTIR analysis. The Cyclic Voltammetry studies displayed a maximum specific capacitance value of about 46.5 Fg^{-1} at 5 mVs^{-1} and GCD of about 35.8 Fg^{-1} at 1 Ag^{-1} for 0.08 M citric acid assisted CeO_2 sample. The slurry of the synthesized samples was coated on graphite sheet for analyzing electrochemical performances making them economical and commercial materials.

Key words: Cerium oxide; Citric acid; specific capacitance; graphite sheet; Cyclic Voltammetry

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AL SURFACE FUNCTIONALIZED ZnO NANOPARTICLES FOR NEXT GENERATION PHOTODETECTOR APPLICATIONS

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ABSTRACT:
The emerging era of Internet of Things (IoT) demands next-generation wearable photodetectors that are flexible, on-chip, light weight, cost effective, bio-compatiable and suitable for large-scale production. Visible light photodetectors are indispensable components in various optoelectronic applications such as imaging, environmental research, chemical analysis and optical communications. Among various semiconducting materials, ZnO has received considerable attention due to its striking optoelectronic properties. In this work, pristine ZnO nanoparticles were synthesized via a facile reflux condensation route. The optical properties of ZnO nanoparticles were optimized by the surface functionalization of ZnO nanoparticles with Aluminium (Al) nanoclusters. Al was functionalized on the surface of ZnO nanoparticles with the concentration of 10 at.% and 20 at.% by co-precipitation method. The influence of functionalization of Al in ZnO on the crystallite size, surface morphology, bandgap were studied through XRD, SEM and UV-Visible spectrophotometer respectively. The optical properties of the samples were analysed using photoluminescence spectroscopy. The enhanced properties of the Al functionalized ZnO nanparticles were attributed to the surface plasmon resonance effect. The photocurrent measurement analysis confirms that the above synthesized Al functionalized ZnO nanoparticles are potential candidates for the fabrication of next generation photodetectors.

Keywords: ZnO nanoparticle; reflux condensation; surface functionalization; surface plasmon resonance.

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PP-ESC-16

SANDWICH STRUCTURED PEDOT-TiO_2/GO/PEDOT-TiO2 ELECTRODES FOR SUPERCAPACITOR

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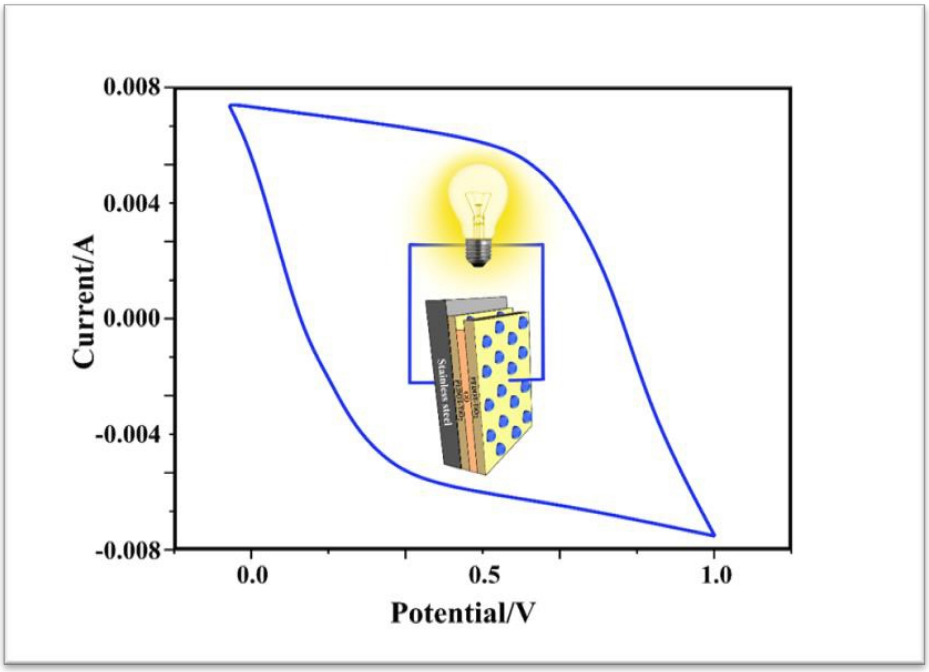
ABSTRACT

A novel strategy to enhance the electrochemical capacitive properties of electrode via multistep green and facile electrodeposition and brush coating technique of PEDOT-TiO2/GO/PEDOT-TiO2 composite. The synthesised composite shown both EDLC and Pseudocapacitive behaviour with good specific capacitance of 501 Fg-1 At 1 Ag-1. This leads to a fast charge–discharge cycle as well as a very high value of power density (500 kW/ kg) suitable for supercapacitor applications. The substance demonstrated excellent electrochemical stability, retaining 94% of capacitance after 2000 cycles. The obtained nanocomposites were examined by FTIR, XRD, Raman, SEM-EDX and electrochemical analysis such as CV, GCD and EIS analyses. All together the synthesized composite with the better ion transportation could be utilised as an electrode material for supercapacitor fabrication.



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OP-BM-39

EFFECT OF POTASSIUM CHLORIDE ON THE SOLVATION BEHAVIOUR OF CAFFEINE, THEOPHYLLINE AND THEOBROMINE: VOLUMETRIC, VISCOMETRIC, CALORIMETRY AND SPECTROSCOPIC APPROACH

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ABSTRACT

The density (ρ), speed of sound (u), viscosity (η) and enthalpy of dilution (q) measurements for methylxanthines (caffeine, theophylline and theobromine) in aqueous medium and in aqueous solutions of (0.10-1.00) mol·kg-1 KCl covering a temperature range T = (288.15 to 318.15) K and at p = 101.325 kPa have been accomplished using a density and sound velocity meter, Micro-Ubbelohde type capillary viscometer and Isothermal Titration Calorimetry, respectively. Transfer parameters evaluated from the data suggest that competition among various interactions exists at low and high molalities of KCl(aq.) solutions. The increase in bitterness and decrease in hydration number of methylxanthines with the mB values have been observed. The dehydration effect of KCl(aq.) at low molalities on the methylxanthines has also been established using ITC. Positive change in the chemical shifts (1H NMR) and increase in absorption intensity (UV-vis) of methylxanthines in the presence of KCl(aq.) further support our results.

Keywords: Methylxanthines; Potassium Chloride; Taste quality; Hydration number.

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OP-BM-40

INVESTIGATION ON GROWTH AND CHARACTERIZATION OF IODIC ACID DOPED L-PROLINE HYDRATE CRYSTALS BY SLOW SOLUTION METHOD

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ABSTRACT

Among organic crystals of nonlinear optical (NLO) applications, amino acids display specific features of interest such as molecular chirality, which secures acentric crystallographic structures, absence of strongly conjugated bonds leading to high transparency ranges in the visible and UV spectral regions and zwitterionic nature of the molecule, which favours crystal hardness. L-proline is the only heterocyclic amino acid among many amino acids. Proline is an imino acid as it contains no amino group; nonetheless, it is called an amino acid. It is found in essentially most proteins and is a major constituent in collagens, the fibrous protein of connective tissue. Single crystal X-ray diffractometer collects crystallographic data required for structure determination. The grown IALP crystal was subjected to single crystal X-ray diffraction study at room temperature with MoKα radiation (λ= 0.71073Å) using Bruker-Nonius MACH3/CAD4 diffractometer and the structural data were obtained. Single crystal XRD indicates that IALP belong to orthorhombic system. AR grade (98% purity) L-proline and iodic acid were purchased commercially from Merck India. Initially, saturated solution was prepared using L-proline and double distilled water and 1 mole% of iodic acid was added into the solution with adding slightly more amount of water. The solution was stirred for about 3 hours using a motorized magnetic stirrer and during the stirring the hotplate was switched on and it was maintained below an optimum temperature of 45°C. Colourless and transparent crystals have been harvested after the growth period of 35 days. The grown crystal has been subjected to single crystal XRD studies and the crystal structure is observed to be orthorhombic. Dielectric studies of IALP crystal were carried out

to analyze the electrical properties. Optical transmittance spectrum of the sample was recorded in the wavelength range 200-1100 nm and linear optical properties like transmittance, absorption coefficient and extinction coefficient of IALP crystal have been determined. SHG studies of the polycrystalline sample of IALP was carried out by Kurtz-Perry technique.

Key words: NLO; amino acid; doping; single crystal; XRD; transmittance; SHG; dielectrics

Grown iodic acid doped L-proline hydrate crystal

References

1. D.S. Chemla and J. Zyss, Nonlinear optical properties of organic molecules and crystals, vol. 1-2, Academic Press, New York (1987).
2. H.O. Mercy, L.F. Warren, M.S. Webb, C.A. Ebbers, S.P. Velsko, G.C. Kennedy and G.C. Catella, Appl. Opt., 31 (1992) 5051.
3. P. Santhana Ragavan and P. Ramasamy, Crystal Growth Processes and Methods, KRU Publications, Kumbakonam (2001). https://pubchem.ncbi.nlm.nih.gov/compound/L-proline
4. J. Thomas Joseph Prakash and S. Kumararaman, Materials Letters, 62 (2008) 4097.
5. S. Suresh, A. Ramanand, D. Jayaraman and P. Mani, Optoelectronics Adv. Mater., 4 (2010) 1743.

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OP-BM-41

SURVEY ON BIG DATA INNOVATION AND TECHNOLOGY IN HEALTHCARE

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ABSTRACT

Big data in healthcare is a term used to describe massive volumes of information created by the adoption of digital technologies that collect patients records and help in managing hospital performance, otherwise too large and complex for traditional technologies.

The application of big data analytics in healthcare has a lot of positive and also life-saving outcomes. In essence, big-style data refers to the vast quantities of information created by the digitization of everything, which gets consolidated and analyzed by specific technologies. Applied to healthcare, it will use specific health data of a population (or of a particular individual) and potentially help to prevent epidemics, cure disease, cut down costs, etc.

Privacy of patient data is crucial to protect as big data infrastructures emerge and develop in healthcare. In light of ongoing cyber security breaches, healthcare organizations must prioritize security. From malware to phishing attacks, healthcare data has vulnerabilities like any other collection of confidential information. The rapid development of the right technology and there is a need for industry-academia relationship. In the health sector in other subgroups, are diagnostic kits. Hospitals, clinics, Universities, laboratories and personally for many diagnostic kit used sensors comprise a wide market.

Keywords: Big Data, Healthcare, Cybersecurity.

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OP-BM-42

ANTIBACTERIAL STUDY ON BABY DIAPERS WITH NANO ZnO AND ALOE-VERA EXTRACTS

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ABSTRACT

The synthesis and characterization of ZnO nanoparticles with the aid of the natural extracts aloe-vera is investigated in the baby diaper mainly to arrest the irritation, rashes and the associated dermatitis problems. The ZnO having a good antibacterial activity is synthesized by hydrothermal reaction under controlled pressure and temperature. The synthesized sample powder is coagulated with the natural extracts of talc/aloe-vera gel, coated on the cotton fabric, and further, their influences are studied by the structural and morphological characterizations. The crystal structure and the phase analysis of ZnO/talc composites are characterized and confirmed by X-ray diffraction (XRD) analysis. The incorporated aloe-vera extract act as a capping molecule rendering a reduced average crystallite size in ZnO/talc composites as estimated from the Scherrer formula. The reduced crystallite size of ZnO cohesively bond with the talc composition and the presence of distinct functional group pyridines/ammonia in the synthesized nanocomposites enriches the good adhesion between the as-synthesized material and cotton fabric. The scanning electron microscopy (SEM) images revealed the good adhesion and homogeneous distribution of ZnO nanoparticles on the cotton fabric. The basic studies and characterizations would pave way for anti-bacterial study on baby diaper.

Keywords: Nanocomposites, average crystallite size, homogeneous distribution and anti-bacterial study

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OP-BM-43

HIGH ENERGY NUTRITIONAL VALUE WITH HIGH SENSORY PROPERTIES OF COOKIES PREPARED WITH AZOLLA ANA SPIRULINA

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ABSTRACT

A cookie is often a compact, flat, sweet baked or cooked snack. Typically, it is made using flour, sugar, and an oil or fat. This study was carried out with the aim of developing energy-rich cookies. In this modern world, the changes in food style and lifestyle increase the risk of diseases like heart disease, diabetes, and protein deficiency. This condition necessitates the quest for affordable, nutritious and medicinally food products. To enhance the protein level in these energy cookies we added a dry powder of small floating fern Azolla filiculoides and microalgae Spirulina. Mainly energy comes from the three main nutrients like carbohydrates, proteins, and fats, with carbohydrates being the most important energy source. Proteins are essential nutrients in the diet, with the recommended amount of daily protein consumption varying for people with different health statuses and activity levels. In this cookies calcium level is high it helps to build and maintain strong bones. Our heart, muscles and nerves also need calcium to function properly. In addition, black rice, oats, and kodo millet are used to enhance the energy in the cookies. The addition of white sugar or artificial sweetener affects the health status of people. In order to avoid this problem, we added naturally occurring sweetness like palm jaggery and brown sugar. The sensory evaluation of our cookies shows that high in energy level and it is good characteristics of aroma, taste and mouth feel.

Keywords: Cookies, Energy rich, Protein deficiency, Azolla filiculodies, Spirulina.

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OP-BM-44

FORMATION OF FACIAL CLEANSER FROM NATURAL SOURCES – SEEDS OF KIWI & SAPODILLA AND MESOCARP OF POMEGRANATE FOR DRY SKIN

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ABSTRACT

The present study was to develop and evaluate a cleanser comprising extracts of seeds of Actinidia deliciosa and Manilkara zapota and mesocarp skin of Punica granatum which act as skin cleanser and anti-aging for dry skin. The methanol extract of the above samples was formulated with Glycerin, Alantoin, Trimethyl glycine, and Glidant, DI water and Triethanolamine in appropriate concentration. The evaluations of formulation were done on different parameters like color, odour, relative density, smoothness, pH, foaming, conductivity, irritability, spreadability and stability were examined. Formulations showed good spreadability, good consistency, stability, smoothness, irritability, conductivity and ease of removal. The formulation showed no redness, edema, inflammation and irritation during irritancy studies. It contains a bunch of phytochemicals such as alkaloids, flavonoids, steroids, terpenoids, phenols and carbohydrates are present in all the 3 samples. The A. deliciosa seeds extract shows highest phytoconstituents when compared to other extracts. Formulated cleanser and extract showed potent in vitro antimicrobial activity against Pseudomonas aeruginosa, Staphylococcus aureus and Escherichia coli which were isolated and screened from our faces and the maximum inhibition was found in formulated A. deliciosa cleanser at 19-22 mm. The formulated kiwi cleanser showed potent antioxidant activity against DPPH Assay, FRAP Assay and ABTS Assay. The formulated cleanser shows strong Acetylcholinesterase inhibitory activity of 66.43% in A. deliciosa, 45.28% in P. granatum and 21.91% in M. zapota samples. The formulated cleanser is safe to use for skin and increase a value to the samples to present its importance.

Keywords: A. deliciosa, skin cleanser, antioxidant, acetylcholinesterase

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OP-BM-45

FORMULATION OF PROBIOTIC ICE CREAM FROM KODO MILLETS

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ABSTRACT

Ice cream is a delicious, nourishing frozen dairy product and a popular dessert which is preferred by all age groups. Ice cream is a complex food colloid that consists of an unfrozen scrum phase, ice crystals, fat globules, and air bubble. In present Work Five different concentrated ice cream sample were prepared from kodo millet, samples were analyzed in quantitatively for carbohydrate, lipids and protein, and also the samples was analyzed by nine point hedonic test to evaluate their sensory properties like colour, appearance taste, texture, and odour from the results of analysis the sample two shows better results than over sample the lactobacillus was Isolated from cured and it was confirmed by gram staining, catalase activity and Simmon citrate agar method. The lactic acid bacteria incorporated was sample two and evaluate its viability after incorporation its shows 150 colonies in 20th day.

Keywords: Kodo Millet, Lactobacillus, Ice Cream.

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OP-BM-46

DESIGN, SYNTHESIS AND EVALUATION OF PHENOTHIAZINE DERIVATIVES AS A POTENTIAL ANTI-ALZHEIMER'S DRUG TARGETING NMDA RECPTOR

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ABSTRACT

Alzheimer's disease (AD) is a neurodegenerative disorder that progresses slowly involving chronic dementia integrated with the decrease in the neurotransmitter acetylcholine (AcH) and oxidative stress caused by the aggravation of glutamergic transmission. AD related dementia is anticipated to grow from 0.05 billion people in 2010 to 0.113 billion by 2050 globally. The N-Methyl-D-aspartate receptor (NMDAR) is one of the 3 primary glutamate receptor subtypes. Because of intrinsic permeability to Ca^{2+} ions, NMDARs play a pivotal part in both neuronal apoptosis and synaptic plasticity in excitotoxicity pathophysiological conditions. Phenothiazine derivatives were designed to block the actions of NMDAR. The 3D low energy conformers of the designed phenothiazine derivatives were subjected to XP (extra precision) mode of molecular docking in the catalytic pocket of NMDA receptor (7EU7.pdb) and PRIME MM-GBSA was performed to study the binding modes and binding free energy. From these studies a total of five compounds (NJ3a-NJ3e) were synthesized and it was identified that compound NJ3a with docking score -6.09 Kcal/mol and free binding energy of - 101.83 Kcal/mol found to be active with Vander Waal energy as a major contributor for binding. Almost all the synthesized compounds interacted with the amino acid residues TRP 558, TYR 645, PHE 562, VAL 612, ILE642, ALA 827, VAL 635, PHE639, LEU 642, MET 564, PHE 637 through hydrophobic interaction, amino acid residue TRP 558, through hydrogen bond and amino acid residue PHE 641, TRP 609, TYR 654 through Pi-Pi stacking with the ligand. ADME properties of the drugs showed that the synthesized compounds have log P in the range of 3.4-5.4, % human oral absorption in the range 96%-100%. The synthesized compounds were characterized using FT-IR, 1H NMR, 13C NMR and mass spectra. The melting point of the synthesized compounds were in the range of 196 ^{o}C-230 ^{o}C.

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OP-BM-47

IN-VITRO ANTI HYPERGLYCEMIC EVALUATION OF HYDROALCOHOLIC EXTRACT OF DELONIX REGIA BARK

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ABSTRACT

Anti-hyperglycemic agents is a substance that helps a person with diabetes controls their level of glucose (sugar) in the blood. It includes insulin and the oral anti hyperglycemic agents. Diabetes is a metabolic disorder that is characterized by increased levels of blood glucose leading to other major complications. Thus there prevails a necessity for obtaining these anti hyperglycemic agents through easily available flora. Delonix regia, is a tree cultivated across the world, has also been used as traditional medicine in various disorders. Aim of the project work was to evaluate the anti hyperglycemic activity in the hydroalcoholic extract of Delonix regia bark for the treatment of hyperglycemia. The collected bark was dried, powdered and extracted through cold maceration method. The extract was further concentrated to obtain a gummy mass of the hydroalcoholic extract. The extract was subjected to phytochemical analysis through conventional chemical tests and GC-MS. After the identification of the phytoconstituents, they were studied for their clinically proven properties. In vitro anti hyperglycemic studies were carried out through assays like alphaamylase inhibition assay and alpha-glucosidase inhibition assay. The results of the extract were compared with results of standard acarbose. The IC50 values of standard in alpha-amylase inhibition assay and α-glucosidase inhibition assay was 98.77µg/ml and 84.33µg/ml respectively. The IC50 values of hydroalcoholic extract of Delonix regia bark in alpha-amylase inhibition assay and alpha-glucosidase inhibition assay was 167µg/ml and 116.31µg/ml respectively. From the study, hydroalcoholic extract of bark of Delonix regia exhibit antihyperglycemic activity compared to standard acarbose.

Keywords: Antihyperglycemic activity, Delonix regia, hydroalcoholic extract, GC-MS analysis

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OP-BM-48

SYNTHESIS AND CHARACTERIZATION OF CYCLOHEXANAMINIUM (Z)-3-CARBOXYACRYLATE SINGLE CRYSTAL AND ITS ANTI-BACTERIAL ACTIVITIES

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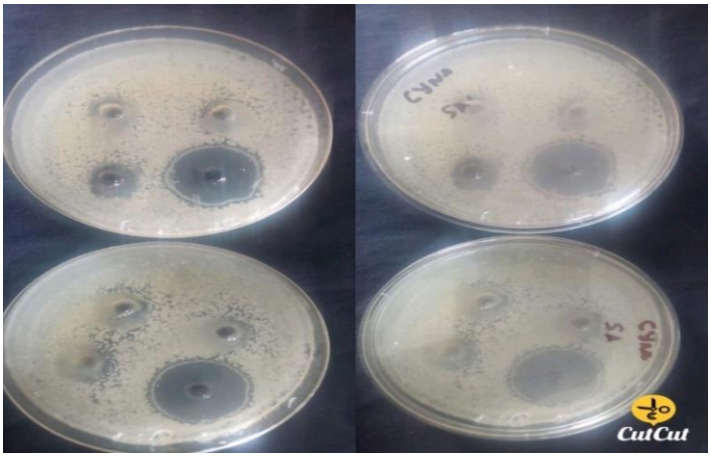
ABSTRACT

The crystal CYHCA grown by slow solvent evaporation technique with distilled water as solvent. The CYHCA was in monoclinic crystal system with space group C12/C1 and its structure consists of a unique cyclohexylamine and an independent free maleic acid molecule with all atoms placed in general positions. The final cell constants values are a = 24.3379(13) Å, b = 5.5375(3) Å, c = 18.6930(9) Å, β = 111.254(2)°, volume = 2347.9(2) Å. The grown CYHMA crystal was subjected to various characterization studies like Fourier transform infrared (FT IR), UV-Vis-NIR spectral analysis, TG/DTA analyses and anti-bacterial activities. From the UV-Vis-NIR studies it is found that the cut off wavelength of CYHCA is 347 nm and CYHCA single crystal shows good transparency in the entire visible region. Melting point of CYHCA was 112 ˚C using TG-DSC analysis. Staphylococcusaureus and Escherichia coli were selected for anti-bacterial tests.



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OP-BM-49

EXTRACTION, ISOLATION AND CHARACTERIZATION OF BIOACTIVE COMPOUNDS FROM *SOLANUM TRILOBATUM* ROOT EXTRACT

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ABSTRACT

Herbs are the valuable sources of drugs for ever. To avail the therapeutic benefits, these herbal plants are utilized either as extracts or by isolating their active principles. These extracted phytoconstituents are used as drugs either directly or after little modifications. As *Solanum trilobatum* is well known for its antitussive activity, the constituents from this herbal plant are extracted from their root using different solvents and the major class of phytochemicals present in each extract was studied. These compounds were isolated and identified using liquid chromatography - mass spectroscopy (LC-MS). These compounds were characterized using UV-Visible spectroscopy and FTIR.

Keywords: *Solanum trilobatum*, Antitussive activity, Phtoconstituents, LC-MS, FTIR.

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OP-BM-50

SYNTHESIS OF BIOGENIC HYDROXYAPATITE/CHONDROITIN SULFATE COMPOSITE FOR BIOMEDICAL APPLICATIONS

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ABSTRACT

Hydroxyapatite (HAP, $Ca_{10}(PO_4)_6(OH)_2$) have been commonly used in bone tissue engineering applications as a bone-replacing material for the past three decades because of its good bioactivity and biocompatibility with bone tissues, biodegradation, and osteoconductivity. During past decades, various issues arising from the use of synthetic HAP since they were not easily biodegradable and also expensive. The aforesaid difficulties on synthetic HAP can be resolved by utilizing the biogenic waste materials. In present investigation, *Cirrhinus cirrhosis* fish bone and fish scale were used as a calcium source for preparation of HAP because of its abundant availability, cost-effective and environmental impact. However, the inferior mechanical and biological properties of pure HAP in comparison with the natural bone have restricted its use in biomedical applications. Recently, the main interest on the researchers is to control the shape and size of substituted HAP particles to enhance the new bone formation with an eventual effect of decreasing the risk of fractures. The addition of further ECM components like chondroitin sulfate (CS) appears attractive to provide a favorable environment for osteoblasts to enhance bone healing. Thus, the significant cost effect and eco-friendly way of getting HAP/Chondroitin sulfate (HAP/CS) composite. The final product was characterized by Fourier Transform Infrared Spectroscopy (FT-IR), X-ray diffraction and Scanning electron microscopy (SEM). Antibacterial study was carried out against *E. coli* and *S. aureus*. From the result, it can be well evident that, the as synthesized HAP/CS composite can be suitable for bone tissue engineering applications.

Keywords: Biogenic, Fish scale, Chondroitin sulfate, Hydroxyapatite, Composite, Bone tissue engineering applications.

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OP-BM-51

CYTOTOXIC AND ANTIDIABETIC POTENTIAL OF SILVER DOPED ZINC OXIDE NANOPARTICLES SYNTHESISED USING *VINCA ROSEA (L)* EXTRACT IN A GREEN METHOD

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ABSTRACT

Green synthesis novel properties have covered the way for novel research in the scientific community. In the present study, using the extract of *Vinca rosea (L)*, an efficient investigation has been achieved to synthesise uniform and extremely oriented Ag-doped ZnO (Ag-ZnO NPs) nanoparticles. XRD and SEM were used to examine the structural and morphological characteristics of synthesised Ag-ZnO NPs. The Williamson-Hall and Scherrer methods calculated crystallite size to be 43 nm and 39 nm, respectively. SEM confirms the flowerlike structure of the nanoparticles, and the presence of Zinc (Zn), Oxygen (O_2), and Silver (Ag) in the synthesised sample was confirmed by EDX analysis. The continuous planes of the crystal are visible in TEM images, confirming the sample's high crystallinity. Antimicrobial activity was tested against various human pathogenic bacteria, including *Staphylococcus aureus, Bacillus subtiles, Salmonella typhi, Escherichia coli* and fungi such as *Aspergillus niger*. Compared to other bacteria, Ag-ZnO NPs showed the most excellent inhibition zone against *Salmonella typhi* (20 mm) and the most miniature inhibition zone against *Aspergillus niger* (13 mm) at the Ag-ZnO NPs concentration of 100 µg/ ml. This present work shows the anticancer activities of Ag-ZnO NPs on cells such as lung (A549) and breast (MCF7) cancer cells. The cancer cells were tested with different concentrations of Ag-ZnO NPs to observe the cytotoxicity. In A549 and MCF7 cells, combining Ag-ZnO NPs with *Vinca rosea (L)* improved apoptosis. The antidiabetic activity of Ag-ZnO NPs was evaluated in-vitro method. The current study demonstrated a feasible strategy for creating nanostructures with acceptable features for use in antidiabetic and anticancer activities.

Keywords: Green synthesis, Vinca rosea (L), antidiabetic, cytotoxic effect.

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OP-BM-52

SYNTHESIS OF *VINCA ROSEA* DERIVED ZnO AND V DOPED ZnO NANOPARTICLES – EVALUATION OF ITS ANTIDIABETIC AND ANTICANCER ACTIVITIES

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ABSTRACT:

In the current research, we newly synthesised spotless ZnO and vanadium doped ZnO nanoparticles (V-ZnO NPs) and crowned the synthesised NPs by *Vinca rosea* plant leaf. The structural properties and morphology of ZnO and vanadium doped ZnO NPs were examined by x-ray diffraction (XRD). The XRD analysis confirmed the formation of a hexagonal crystal structure of ZnO and V doped ZnO NPs. EDX and FTIR analysis confirmed the doping and externalisation of the contaminant in the ZnO nanostructure. In addition, the cytotoxic effect of ZnO and V-ZnO NPs breast cancer (MCF-7) cell line was estimated. From the assay, *Vinca rosea* capping ZnO NPs has exposed improved cytotoxic activity than *Vinca rosea* capping V-ZnO NPs and has excellent antioxidants. The result suggested that *Vinca rosea* capping ZnO nanoparticles prepared using the green approach showed high effective antioxidant, antidiabetic activity, and anticancer activity than vanadium doped ZnO NPs.

Keywords: Green approach**,** V doped ZnO NPs, ZnO NPs, Vinca rosea, Antidiabetic, Anticancer.

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OP-ESC-37

TRIBOELECTRIC ENERGY HARVESTING FOR MECHANICAL MOTION

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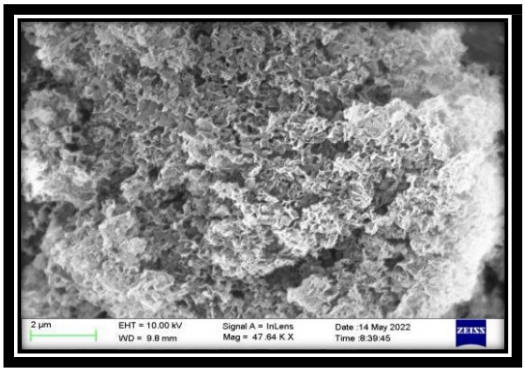
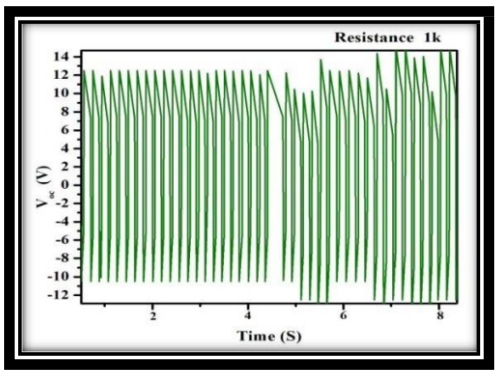
Abstract:

Recently, research on energy harvesting has attracted great attention as a solution to energy depletion and environmental problems due to the use of fossil fuels such as coal, natural gas, and oil. Nanogenerators is the growing technology that facilitates self-powered systems, sensors, and flexible and portable electronics in the thriving era of internet of things (IOT). A new type of energy harvesting technology named as triboelectric nanogenerator (TENG) has emerged to harness ambient mechanical motions. TiO_2 nanoparticles, bulk and sheets of g C_3N_4 were used for triboelectric positive materials. Tribo positive working electrodes have been prepared using a screen-printed paste of each sample. Open circuit voltage and the output performances of the tribo devices against load resistances have been measured.



FESEM image of sheet g-C_3N_4



Output Voltage against g-C_3N_4

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OP-ESC-38

INVESTIGATION OF STRUCTURAL, MECHANICAL, DIELECTRIC, AND THERMAL BEHAVIOUR OF PURE AND L-H DOPED LSMH SINGLE CRYSTALS

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Abstract

The distinct crystals of clear Lithium Sulfate Monohydrate (LSMH) and L–Histidine amino acid doped Lithium Sulfate Monohydrate grown up from a conjugate solution of a slow evaporation process that produces fine quality crystals. The grown crystals were undertaken different analysis techniques which confirmed that LSMH crystals have good mechanical properties, high thermal stability and good dielectric property. The space group system of crystal and its lattice parameters were found by using powder X-Ray diffraction scrutiny, which results that the crystals arranged in the monoclinic system of non-centro symmetric with the space group P_{21}. The analysis technique Fourier Transform Infrared spectroscopy gave a detailed explanation of functional groups that existed in the grown sample. Additionally, the measurements of the different elements that existed in this crystal sample were recognized by EDAX analysis. The hardness characteristics of the crystals were calculated by using a microhardness tester. The thermal stability of the sample crystals was calculated by TG/DTA analysis and it exposed the thermal steadiness up to around 140 °C.

Keywords: Crystal growth, X-Ray diffraction analysis, EDAX analysis, Microhardness studies, TG/DTA, Fourier Transform Infrared studies.

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OP-ESC-39

THE EFFECT OF SHOCK WAVE ON STRUCTURAL AND OPTICAL PROPERTIES OF L-ALANINE ACETATE (LAA) SINGLE CRYSTALS

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This present work deals with the effect of shock waves on the structural and optical properties of LAA single crystals. A shock wave of Mach number 1.7 with different shock pulses has been subjected to test crystals. The exposed shockwave has transient pressure of 1.048 MPa and 644K temperature. Optical microscope analysis has been carried out to observe the surface morphological changes of reference and shocked crystal. Structural properties have been illustrated using XRD analysis which shows the degree of crystallinity is altered after shock wave exposure. Optical properties are investigated using UV analysis in the range of 200-800 nm. Optical transmission is gradually decreased due to the formation of surface defects attributed to the effect of the shock wave. The outcome of experimental analyses conveys that the optical properties of LAA crystal are significantly altered by the exposure of shock wave exposure.

Keyword: LAA crystal; XRD; UV; Optical Microscope; Shock wave

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OP-ESC-40

IMPACT OF SHOCK WAVE INDUCED ORDER-DISORDER TYPE PHASE TRANSITION OF COBALT CHLORIDE HEXAHYDRATE DOPED L-HISTIDINE HYDROCHLORIDE MONOHYDRATE SINGLE CRYSTAL

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In recent years, research on the impact of supersonic shock has advanced significantly in the field of material science. The phase transition behaviour of materials under shock is also a topic of great interest in the newest fields at the cutting edge of structural science. In the present investigation, we have proved the impact of shock wave-induced order-disorder type phase transition of cobalt chloride hexahydrate doped L-histidine hydrochloride monohydrate single crystal. The phase transitions were observed with the number of shock pulses 0, 1, 2, 3, and 4, respectively. The phase transition is analytically proven using powder x-ray diffraction, Raman spectroscopic, and microscopic techniques. The title crystal is suggested for use in switching molecules, and sensor applications due to its higher shock resistivity.

Keywords: supersonic shock, powder x-ray diffraction, Raman spectroscopy

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OP-ESC-41

SYNTHESIS AND ANTIMICROBIAL ACTIVITY OF SILVER NANOPARTICLES: INCORPORATED *COUROUPITA GUIANENSIS* FLOWER PETAL EXTRACT FOR BIOMEDICAL APPLICATIONS

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Abstract

Recently, numerous plant-based synthesis techniques have been used to develop metal nanoparticles. The current study uses the medicinal plant extract of *couroupita guianensis* (CG) petals to create biogenic silver nanoparticles in an environmentally friendly manner. Different techniques, including ultraviolet-visible spectroscopy (UV-vis), Fourier Transformation Infrared spectroscopy (FTIR), X-ray diffraction (XRD), and Dynamic Light Scattering (DLS) analysis, are used to evaluate synthesized silver nanoparticles. From the XRD results confirm the emergence of nanosilver crystalline arrangement with the characteristic peaks at the glancing angles of 38.04°, 44.22°, 64.40°, and 77.37°. UV-vis spectroscopy displays the spectral absorption at λ_{max} = 282 nm and shows the formation of silver nanoparticles. Images of produced Ag NPs taken with a scanning electron microscope (SEM) show the creation of flower-shaped particles. The functional behavior of flavones, triterpenoids, and polyphenols belonging to *couroupita guianensis* has been observed by ensuring their selective absorptions in FTIR spectral analysis silver nanoparticles had a substantial antibacterial effect on Gram-positive (*B. subtilis*) and Gram-negative (*Escherichia coli)* bacteria in general. It is found to become effective when symbiotic with the extract of *couroupita guianensis* flower petals for enhancing their antibacterial properties. This composite product gives a new and cost-effective formulation with more therapeutic possibilities. The observed results wide open the avenues of research possibilities with a lot of future scopes. The photocatalytic degradation efficiency of CG-Ag NPs on methylene blue (MB) dye was evaluated under visible light irradiation and produced indications of the synthesized material for photocatalytic applications.

Keywords: *Couroupita guianensis flower* petals, silver nanoparticles, SEM analysis, X-ray, DSL analysis, antimicrobial activity, and photocatalytic activity.

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OP-ESC-42

EFFECT OF BIMETALLIC DOPING IN CERIUM OXIDE FOR CATALYTIC DETOXIFICATION OF CARBON MONOXIDE

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The growing industrial sector and extensive use of automobiles created a major environmental destabilization by disturbing the purity of atmospheric air. Carbon monoxide is one of the major pollutants which is released as a result of incomplete combustion of fuel from industries and transportation. The toxic effect of carbon monoxide on living bodies is already known from decades. Thus, the oxidation of carbon monoxide to carbon dioxide is essential to overcome the severe effects of CO.

In the past years, the catalytic oxidation of carbon monoxide has been studied extensively over various types of catalysts. Over various different combinations, precious metals composed are more favorable catalysts for their unique redox ability and high stability. Presently researchers across the globe are trying to minimize the use of precious metals in exhaust treatment systems due to their high cost and availability. Transition metal oxides have a good scope for this reaction due to their variable oxidation states. Designing the catalysts to give the low- temperature reaction (CO to CO2) without using precious metals is a major challenge for the researcher.

The present work focuses on developing catalytic material for higher efficiency through a co-doping approach. The cerium oxide and transition metal doped cerium oxides have been synthesized by the sol-gel method and studied for catalytic oxidation of CO to CO2. Prepared oxides were characterized by X-ray diffraction (XRD), infrared spectroscopy (IR), Thermo-gravimetric (TG), BET surface area, and scanning electron microscopy (SEM). The enhanced effect of bimetallic substitution in cerium oxide presented a good catalytic conversion of carbon monoxide below 100^{o}C. This enhancement in conversion specifically described the synergistic interaction within Ce, Cu, and Mn by modifying the surface reactivity of the host cerium catalyst.

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OP-BM-53

ISOLATION AND CHARACTERIZATION OF MARINE SPONGE *CALLYSPONGIA* SP. ASSOCIATED *MICROBACTERIUM SEDIMINIS* AND THE EVALUATION OF ITS BIOACTIVE POTENTIAL

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Abstract
Natural products from marine resources play an important role in drug discovery. The over usage of antibiotics has led to the emergence of multidrug-resistant organisms, which reduces the chances of treating people infected with conventional antibiotics. This resistance requires the search for new antimicrobials from successful producers of new natural products, including marinesponges. Many of the novel active compounds reported from sponges have originated from their microbial symbionts. The number and morphological diversity of isolated bacteria in the study area varied depending on the origin of the Marine sponges. Therefore, this study aims to screen for bioactive metabolites from marine sponge associated bacteria. Sponge associated bacteria can synthesize many bioactive metabolizing compounds, they have great potential for the developmentof the marine pharmaceutical industry. The total of 29 bacterial strains were isolated from the marine sponge *Callyspongia* sp. collected from Palk Strait region, Tamil Nadu, India. The isolated bacterial species were screened against 11 human pathogens such *as Candida albicans, Bacillus subtilis, E. coli, Salmonella* sp., *Pseudomonas* sp., *Klebsiella* sp., *Vibrio cholera, Proteus* sp., *Enterococcus* sp., *Streptococcus mutans and Staphylococcus aureus*. Four bacterial strains were found to be active against the human

pathogens *Streptococcus mutans, Staphylococcus aureus, Bacillus subtilis* and *Candida albicans* in agar well diffusion assay. The novel active compounds from the potent bacterial strain were purified and further characterized by thin layer chromatography, ultraviolet - visible spectroscopy, Fourier transform infrared spectroscopy and gas chromatography-mass spectrometry which revealed its bioactive potential. Using 16S rRNA, the strain was identified as *Microbacterium sediminis*. The present study reports that the sponge associated bacteria had the ability to produce a novel bioactive compound with antimicrobial activities against human pathogenic bacteria and fungi, that may be a promising candidate for the therapeutic and biomedical application.

Keywords: Marine sponges; *Microbacterium sediminis*; Antimicrobial activity; Bioactive compounds;Secondary metabolites; Palk Strait region.

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OP-ESC-43

PREPARATION, CHARACTERIZATION AND OPTICAL STUDIES OF $Sr_{1-x}Pb_xWO_4$ (x = 0.25, 0.50, 1) MIXED OXIDE NANOMATERIALS

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Nanoparticle of $Sr_{1-x}Pb_xWO_4$ solid solutions were prepared at room temperature (RT) by coprecipitation method. Sample was characterized by X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), XRD analysis reveals that the crystal structure of the sample matched with scheelite tetragonal structure. FTIR spectra characterize the various vibrational bonds present in the sample. UV-Visible diffuse reflectance spectroscopy (DRS) and photoluminescence (PL) were studied at RT. Different PL emission observed for different excitation. PL spectra indicate broad emission peak maximum at 541 nm (exc =273 nm). The calculated CIE color coordinates of the sample shows near white light emission.

Keywords: Nanoparticle; X-ray diffraction; Fourier transform infrared spectroscopy; photoluminescence

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2	**Rishi Kant**	GNA UNIVERSITY, Phagwara, Punjab	Metal complexes with piperazine ring-based ligands and their biological activities
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