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REVA UNIVERSITY
Bengaluru, India

School of Applied Sciences, REVA University

in collabration with
INTI International University Malaysia
San Beda University Philippines
Pukyong National University South Korea

Organises

4th International Conference on

Souvenir 2024

Global Trends in Sustainable Technology & its Applications in Applied Sciences (ICGTSTAS-2024)

Date: October 24th - 25th 2024

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REVA University

School of Applied Sciences in collaboration with

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Organises

4th International Conference on

"Global Trends in Sustainable Technology and its Applications in Applied Sciences" (ICGTSTAS – 2024)

24th - 25th October 2024

About the 4th International Conference

The School of Applied Sciences at REVA University is hosting the **"Global Trends in Sustainable Technology its Applications in Applied Sciences (ICGTSTAS-2024)"** on October 24th and 25th, 2024. The conference aims to deliver concepts related to sustainable technologies, challenges and its applications in the Physical, Chemical, Biological Sciences and Medical Sciences. It will bring together researchers, scientists, industry personnel, and scholars from all fields to discuss original research conclusions, new approaches, and developmental practices. The conference theme is **"Global Trends in Sustainable Technology its Applications in Applied Sciences (ICGTSTAS-2024)"** aiming to provide an interdisciplinary platform for discussing recent innovations, trends, and practical challenges.

Objectives of the Conference

To provide an international forum to exchange information, share experiences and research results from various specialized and interdisciplinary fields in Applied and Medical sector. To bring academicians, leading researchers, scholars as well as innovative practitioners from industry onto common platform to share research knowledge, skills, and insights promoting research and innovations addressing sustainable technologies and applications. To provide a platform for participants to establish professional networks in their respective fields and to enhance collaborative research.

About REVA University

REVA University, established under the REVA University Act 2012, offers 39 undergraduate programs, 32 postgraduate programs, 18 PhD programs, and various certification and diploma courses across various disciplines. The university supports research leading to Doctoral Degrees in all disciplines. Programs focus on knowledge assimilation, practical applications, hands-on training, global and industrial relevance, and social significance. The faculty consists of experienced academics and industry professionals, ensuring a curriculum that bridges academia and industry. The university's lush green campus includes state-of-the-art laboratories, classrooms, and sports facilities, making it a preferred choice among students and recruiters.

About School of Applied Sciences

The School of Applied Sciences at REVA University is staffed by experienced faculty, equipped with state-of-the-art facilities like digital classrooms and laboratories. The academic atmosphere is serene, and the school collaborates with industries and research organizations to provide necessary skills. The goal is to develop a critical thinking community for innovative problem-solving. The school has published numerous peer-reviewed articles and received grants from funding agencies like DST, DBT, VGST, and ICMR.

About INTI International University

INTI International University stands as one of Malaysia's leading private universities, nestled within 82 acres of meticulously landscaped grounds in the bustling town of Putra Nilai, approximately an hour south of the capital city Kuala Lumpur. The university offers an ideal environment for academic growth, complete with state-of-the-art facilities and amenities. With a history spanning over 35 years, INTI International University & Colleges serves as a beacon of educational excellence, having produced over 86,000 graduates across its four campuses. Currently, the university and its colleges foster a vibrant community of over 13,000 local and international students, providing them with a dynamic, cross-cultural learning experience.

About SAN BEDA University

San Beda University, is committed to the holistic development of individuals, blending faith, knowledge, and virtue. Guided by its vision to foster a community that is fully human, wholly Christian, truly Filipino, and globally competitive, the university embraces the Benedictine values of ora et labora - prayer and work- instilling discipline, humility, stewardship, and hospitality in its students. With a strong emphasis on academic excellence, transformative leadership, and service to society, San Beda University aims to shape servant-leaders who contribute meaningfully to the Church, the nation, and the global community. Through innovative curricula, quality research, and strategic collaborations, the institution ensures a dynamic learning environment, empowering the Bedan community to pursue knowledge, peace, and the common good.

About PUKYONG National University

Pukyong National University (PKNU), located in Busan, South Korea, is a prestigious national institution known for its emphasis on marine, maritime studies, and engineering disciplines. Established in 1996, PKNU is committed to fostering innovation, research, and the development of ethical professionals equipped to contribute to global and local communities. The university provides a wide array of programs across fields like natural sciences, business, engineering, and the humanities, ensuring that students are well-prepared for careers in both academic and industrial sectors. PKNU also emphasizes international collaboration, hosting a diverse body of students from around the world, and maintains modern research facilities to support cutting-edge projects.

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- **Dr. D.V Sunitha,** Head - Department of Physics, SoAS, REVA University

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- Ms. Leong Wai Ching, Life Science Division, Faculty of Health and Life Sciences, Malaysia

Speakers

S. No.	Name
1	**Dr. Lam Man Kee**, Professor, Chemical Engineering Department, Universiti Teknologi PETRONAS, Persiaran UTP, 32610 Seri Iskandar, Perak, Malaysia
2	**Dr. Redanna Pallu,** Emeritus Professor, Department of Animal Sciences, School of Life Sciences, University of Hyderabad, India
3	**Prof. Dr. Jayanthi Barasarathi,** Associate Professor, Faculty of Life Sciences, INTI University, Malaysia.
4	**Dr. Dhandapany Perundurai,** Associate Professor and Scientist, Institute for Stem Cell Biology and Regenerative Medicine, Bengaluru, Karnataka, India
5	**Dr. Subba Rao Gangi Setty,** Professor, Dep. of Microbiology & Cell Biology, Indian Institute of Science (IISc), Bangalore, Karnataka, India
6	**Dr. Tharamani,** Professor & Head, IIT -Ropar, Panjab, India
7	**Dr. Harish Barshilia,** Chief Scientist and Head, Surface Engineering Division, CSIR-National Aerospace, India,
8	**Dr. P D Babu,** Scientist UGC-DAE, CSR, Mumbai Centre, Maharashtra, India
9	**Dr. G. Mugesh,** Professor Chemical Sciences Indian Institute of Science Bangalore

Message from Convener

Associate Dean, School of Applied Sciences, REVA University

I am honoured and delighted to welcome you all to the School of Applied Sciences, REVA University and INTI International University, Malaysia, SAN BEDA University, Phillipines and PUKYONG National University, South Korea is organizing an 4th International Conference on **"Global Trends in Sustainable Technology and its Applications in Applied Sciences (ICGTSTAS-2024)"** from 24th and 25th October 2024.

Various societal challenges can be addressed with the emerging sustainable technologies in life sciences, physical and chemical sciences. Applied Sciences join hands together to provide answers to the existing problems and benefit the mankind in several ways. The conference has several tracks with niche areas of scopes including biotechnology, microbial technologies, green technologies, biomaterials, bioengineering and biomedical sciences, nanotechnology etc. to provide ample information about current developments and knowledge to the audience.

Collaborations between various national and international universities provide wide range of opportunities to the academicians as well as researchers. With these collaborative efforts, the **4th International Conference on "Global Trends in Sustainable Technology and its Applications in Applied Sciences (ICGTSTAS-2024)"** will provide the participants a great knowledge and take-home message in the relevant fields with amazing research topics and speakers from across the globe including India, Phillipines, South Korea and Malaysia.

Dr. PASUPULETI VISWESWARA RAO
Convener, ICGTSTAS-2024
Associate Dean, SoAS,
Director, International Relations and Research Collaborations,
REVA University.

4th International University on "Global trends in Sustainable Technology its Applications in Applied Sciences (ICGTSTAS-2024)"

School of Applied Sciences, REVA University

I deem it as my privilege and honour to welcome you all to 4th International Conference on **"Global Trends in Sustainable Technology and its Applications in Applied Sciences (ICGTSTAS-2024)"** from 24th and 25th October 2024 organized by School of Applied Sciences, REVA University in collaboration with INTI International University, Malaysia, SAN BEDA University, Philippines and PUKYONG University, South Korea.

The theme of the conference **"Global Trends in Sustainable Technology and its Applications in Applied Sciences (ICGTSTAS-2024)"** shares an insight into recent research and cutting-edge sustainable technologies which gains immense interest among academicians, brilliant researchers, industry professionals and talented student communities. This conference brings together a multidisciplinary group of scientists across the world to present and exchange break through ideas related to the domain of Applied Sciences in a broader perspective addressing various societal issues. The conference promotes insights about recent technologies and its applications and provides an opportunity for discussions and presentations focusing attention on recent outstanding achievements in the field of applied science, future trends and needs.

It gives me an immense pleasure to welcome renowned speakers, scientists and participants across the globe and I look forward for exciting deliberations and discussions in alignment with conference theme.

With this note, I wish organizing team of REVA University and INTI International University, SAN BEDA University, PKYONG University, esteemed speakers and participants all the very best and hope to make this conference a memorable event in true sense.

Prof. Shilpa BR
Convener, ICGTSTAS-2024
Director Incharge,
School of Applied Sciences,
REVA University.

Message from Co-Convener

Greetings...

As we come together for the International Conference on Global Trends in Sustainable Technology and its Applications in Applied Sciences, I would like to take a moment to reflect on the importance of our gathering.

This conference unites dedicated professionals, researchers, and innovators who share a common goal—advancing sustainable technology to address the pressing challenges of our time. Over the course of this event, we will explore groundbreaking ideas, foster meaningful discussions, and collaborate on solutions that promote sustainability across various fields.

The insights and knowledge gained here will not only inspire our current endeavours but will also serve as a foundation for future innovations that can lead to a more sustainable and resilient world. I urge you to engage fully, ask questions, and share your valuable expertise with one another. Thank you for being a part of this important event. Together, we can drive the change necessary for a better tomorrow.

Prof. Madhusudana Reddy M B
Co-convener, ICGTSTAS-2024
Professor, Department of Chemistry
School of Applied Sciences
REVA University

Message from Organising Secretary

Welcome to the 4th International Conference on Global Trends in Sustainable Technology and its Applications in Applied Sciences (ICGTSTAS-2024). We are excited to have you join us on this journey of exploration and knowledge sharing.

This conference aims to foster collaboration and innovation across various fields, bringing together leading researchers, practitioners, and students. Your participation is vital to the success of this event, as we delve into the latest advancements and challenges in physical sciences, chemical sciences, biological sciences, and medical sciences. We hope you will engage actively in discussions, share your insights, and take advantage of the opportunity to network with fellow scholars and professionals. Together, let us contribute to a sustainable future through applied sciences. Thank you for being part of this important gathering.

Dr. D. V. Sunitha
Organizing Secretary, ICGTSTAS-2024
Professor & Head
Department of Physical Sciences,
SoAS, REVA University

THEME OF THE CONFERENCE

Physics	
Laser Science and Technologies	Nano and Bio Photonics
Luminescence-Materials and Applications	Carbon-based materials
Radiation effect on materials	Ceramics
Dielectrics and Ferroelectric Materials	Thin Films and Related Technologies
Photovoltaic Materials and Cells	Materials for space applications
Chemistry	
Green Chemistry	Medicinal Chemistry
Total Synthesis	Crystallography
Catalytic Materials for Energy	Polymorphism
Batteries	Sensors
Environment	Nanomaterials
Self-Assembly	Polymer Chemical biology
Electro kinetics	Organic Electronics
Reverse Osmosis	Nano Filtration & Ultra Filtration membrane
Biotechnology	
Microbial Technology	Biopharmaceutical and drug discovery
Regenerative medicine and Stem Cell Biology	Nano-biotechnology
Agricultural Biotechnology	Cancer Biology and therapy
Genetics and Molecular Biology	Environmental bioremediation
Toxicology & Animal studies	Antimicrobial peptides and therapies
Immunology	Vaccine development
Developmental biology	Computational Biology and Bioinformatics
Genomics and Proteomics	Molecular pharmacology
Biomedicine	Infectious Diseases
Health and Disease Management	Nanotechnology & Drug development

KEYNOTE SPEAKER

Dr. Lam Man Kee

Professor, Chemical Engineering Department,

Universiti Teknologi PETRONAS,

Persiaran UTP, 32610 Seri Iskandar, Perak, Malaysia

Dr. Lam Man Kee is presently a senior lecturer at Universiti Teknologi PETRONAS in Malaysia. He earned his PhD in Chemical Engineering (Renewable Energy) from Universiti Sains Malaysia in 2014. His research interests encompass microalgae cultivation, biomass and biodiesel production, heterogeneous catalyst development, life cycle energy assessment, and the socio-economic impact of biofuels. With over 10 years of experience in cultivating microalgae for biofuel production, he has also been involved in consultancy projects with industries related to algae research.

Dr. Lam has an impressive publication record, with over 190 papers published in ISI/SCOPUS-indexed journals. His work has garnered a total of 9000 citations and an H-index of 52. In the years 2021 to 2023, he was recognized as one of the global Top 2% Scientists in a study conducted by Stanford University which showcases his exceptional contributions to his field of research and the impact of his work on the scientific community. Currently, he serves as the Deputy Editor of the International Journal of Biomass & Renewables (UTP Press) and is an Editorial Board Member of the Journal of Advanced Chemical Engineering (Omics International) and Indonesian Journal of Energy (Purnomo Yusgiantoro Center (PYC)).

Furthermore, his research findings in microalgae cultivation for biofuel have garnered attention from the industry, leading to an industrial grant and consultancy project from PETRONAS to further develop the process on a larger scale. As of today, he has obtained 13 research grants as Principal Investigator, totalling RM1.40 million. In addition to his academic achievements, Dr. Lam has delivered several short courses to both academic and industrial audiences. These courses include topics such as ***"Renewable Energy", "Biomass to Fuels & Chemicals," "Reaction Engineering and LCA for Biomass Conversion," "Academic Paper Writing in the Field of Chemical Engineering, Biomass, and Biofuel," "Cultivation of Microalgae and Larvae for Biofuel Production,"*** and ***"Writing and Publishing in High Impact Journals: Tricks & Tips."***

PROFILE OF PLENARY SPEAKER

Dr. Redanna Pallu
Emeritus Professor,
Department of Animal Sciences,
School of Life Sciences, University of Hyderabad, India

Prof. Pallu Reddanna, an esteemed honorary member, brings 40+ years of extensive experience in inflammation and cancer research. As Professor Emeritus at the School of Life Sciences, University of Hyderabad, he has a distinguished career marked by 200+ published papers and the successful supervision of 41 Ph.D. students.

Currently serving as the Executive President of the Federation of Asian Biotech Associations (FABA) and a Director of ASPIRE, Prof. Reddanna holds a significant global influence in the biotech landscape. He played a pivotal role as the founder Director of the National Institute of Animal Biotechnology, contributing to institution building.

His collaborative efforts with Pharma and Biotech industries have earned prestigious accolades, including the "Outstanding Contribution Award (Pharma)" from the Chemtech Foundation and the "Outstanding Scientist Award for the Benefit of Industry" from the Federation of Andhra Pradesh Chamber of Commerce and Industry (FAPCCI). The Rockefeller Foundation Biotechnology Career Award and the Royan International Award have recognized his exceptional work.

In academic administration, Prof. Reddanna has held key positions such as Head of the Department, Coordinator of the Center for Biotechnology, and Dean of the School of Life Sciences. Elected as the Vice-President of Agri Biotech Foundation, he has been instrumental in establishing the Technology Business Incubator (TBI) and BioNEST incubation centres, along with ASPIRE, contributing significantly to the growth of the scientific and entrepreneurial ecosystem.

PROFILE OF PLENARY SPEAKER

Prof. Dr. Jayanthi Barasarathi,
Associate Professor,
Faculty of Life Sciences, INTI International University, Malaysia.

Dr. Jayanthi Barasarathi graduates with Doctor of Philosophy in the field of Environmental Science & Management in year 2018 from University of Malaya, Malaysia. She is currently attached to Faculty of Health & Life science at Inti International University, Malaysia as a Head of Program for Life Sciences program. She worked as academician for more than 5 years and she has been actively involved in various research projects for about 10 years. She has published more than 30 articles in high-ranking journal and conference proceedings. Her research interest is on bioremediation, phytoremediation, environmental microbiology, and environmental biotechnology and leachate studies, microplastic related studies and extended producer responsibility and she is always approachable for any local or international collaboration. She has also international collaboration in several countries such as Canada, Indonesia, India, Pakistan, and Nigeria.

PROFILE OF PLENARY SPEAKER

Dr. Dhandapany Perundurai,
Associate Professor and Scientist,
Institute for Stem Cell Biology and Regenerative Medicine,
Bengaluru, Karnataka, India

Dr. Perundurai is a faculty at the Institute for Stem Cell Science and Regenerative Medicine (inStem), Bangalore. Dr. Perundurai earned his MSC and PhD degrees from India in 2000 and 2008 respectively. He completed his post-doctoral training at Mount Sinai School of Medicine, New York City and was promoted to Instructor in Paediatrics 2014. He joined inStem and Oregon Health and Science University, Portland, USA in 2016 as an Assistant Professor and now as an Associate Professor and Scientist F at inStem. Dr. Perundurai is interested in identifying novel genes and curative drugs for cardiomyopathies using a multi-model approach involving various model organisms. He is a recipient of various national and international awards and fellowships including ICMR- rare disease challenge grant, Ramanujan fellowship, American Heart Association-International Professor Award, Scientist Development Award, Welcome Trust fellowship, CEFIPRA etc. He had more than 40 papers in various prestigious international journals including Nature genetics, PNAS, Science Advances, Cell Reports, EMBO etc.

PROFILE OF PLENARY SPEAKER

Dr. Subba Rao Gangi Setty,
Professor, Dep. of Microbiology & Cell Biology,
Indian Institute of Science (IISc),
Bangalore, Karnataka, India

Prof. Subba Rao Gangi Setty, an Associate Professor at the Indian Institute of Science (IISc) in Bengaluru, is a leading researcher in the field of intracellular trafficking. His work focuses on understanding the cellular mechanisms responsible for the transport of proteins and lipids between organelles, especially the Golgi apparatus, endosomes, and lysosomes. These processes are critical for maintaining cellular homeostasis, and defects in trafficking can lead to various diseases, including cancers, neurodegenerative disorders, and lysosomal storage diseases.

Prof. Setty has published numerous influential research papers in leading scientific journals. Prof. Setty's work has earned him numerous awards and Honors, including-The prestigious **Welcome Trust-DBT India Alliance Intermediate Fellowship**, which recognizes his contributions to advancing molecular biology and cell trafficking research. The **INSA Young Investigator Award**, presented by the Indian National Science Academy for his significant contributions to cell biology. The **IISc Alumni Award for excellence in research**, further highlighting his impact on the scientific community. Prof. Setty leads a vibrant research group at IISc, mentoring Ph.D. students, postdoctoral fellows, and young scientists. His lab employs state-of-the-art molecular biology tools such as: Live-cell imaging, Fluorescence microscopy, Genetic manipulation techniques.

PROFILE OF PLENARY SPEAKER

Dr. Tharamani Nagaiah

Department of Chemistry, IIT Ropar

Thara is currently an Associate Professor and Head, Department of Chemistry at Indian Institute of Technology (IIT) Ropar, India. Her research interests include design and development of new materials with focus on energy conversion/storage and biosensing applications, in-depth fundamental analysis of the newly designed electrocatalysts by various electrochemical, spectroscopic, microscopic and scanning probe techniques.

Her research interests include design and development of various carbonaceous materials, nanomaterials, molecular catalyst with focus on energy conversion and storage, Biosensors. In-depth fundamental analysis of the newly designed electrocatalysts towards fuel cells and

batteries by various electrochemical, spectroscopic, microscopic and scanning probe techniques (SECM). Her scientific output resulted in 117 publications and four patents at international refereed journals.

She is a recipient of several prestigious fellowships like **Alexander von Humboldt Postdoctoral Fellowship, Germany** and **Ramanujan Fellowship** by Department of Science and Technology, Govt. of India. She is a **Fellow of Royal Society of Chemistry** admitted through "Leaders in the field" scheme and also an elected **Fellow of Indian Chemical Society**. She is a recipient of **CRSI-Bronze Medal 2023** from the Chemical Research Society of India and **Silver Medal of CRS 2023** from the Society Chirantan Rasayan Sanstha, **ECSI National Metrohm Award 2023** from Electrochemical Society of India and **A.V. Rama Rao prize for women 2024** from Chemical Research Society of India. She is an Associate Editor of Chemistry of Materials (ACS), an Editorial Board Member of Electrocatalysis (Springer Nature) and Sustainable Energy and Fuels (Royal Society of Chemistry).

PROFILE OF PLENARY SPEAKER

Dr. Harish C. Barshilia
Chief Scientist and Head,
Surface Engineering Division,
CSIR - National Aerospace Laboratories, India

Dr. Harish C. Barshilia, Chief Scientist and Head of Surface Engineering at CSIR-NAL, Bangalore, holds M. Tech. and Ph.D. degrees from IIT Delhi and completed postdoctoral fellowships in the USA. His research spans nanotechnology, thin films, and surface engineering. He has published over 260 papers, 33 conference papers, 6 book chapters, and 8 reviews, with 16 patents (11 international).

Dr. Barshilia has led 45 projects, delivered 150 invited lectures, and contributed to 120 conferences. His awards include the **CSIR Young Scientist Award, Dr. Ambasankaran Award, and the MRSI Medal.** He is a Fellow of INAE and NASI. Dr. Harish C. Barshilia has also authored several invited review articles and executed numerous grant-in-aid projects. He has been recognized for his outstanding contributions with multiple prestigious awards and fellowships, making significant advancements in surface engineering and nanotechnology.

PROFILE OF PLENARY SPEAKER

Dr. P D Babu
Centre Director, UGC-DAE CSIR, Mumbai Centre
BARC, Mumbai, India

Dr. P. D. Babu is the Centre Director of the UGC-DAE Consortium for Scientific Research (CSR) at the Mumbai Centre. He has made significant contributions to the field of material sciences, particularly in the study of magnetism, magnetic materials, and neutron scattering techniques. His research focuses on the chemical and magnetic structure of materials, utilizing advanced instruments like the Focusing Crystal Powder Neutron Diffractometer (FCD), Vibrating Sample Magnetometer (VSM), and Physical Property Measurement Systems. These instruments allow for detailed examination of magnetic properties and structural behaviours of materials under different conditions. As a leader in neutron-based research, Dr. Babu is actively involved in promoting atomic energy studies and using neutron scattering to explore the atomic structure of various materials. His work extends to exploring how magnetism can be applied in technology and materials science, addressing problems in modern-day applications related to physics, chemistry, and engineering. Dr. Babu's leadership at CSR Mumbai ensures the centre remains at the forefront of scientific research, fostering collaborations between scientists and offering advanced research facilities to the scientific community. He is also a prominent figure in organizing and overseeing projects that utilize atomic energy and neutron applications to solve pressing scientific questions.

PROFILE OF PLENARY SPEAKER

Dr. Govindasamy Mugesh
Department of Inorganic and Physical Chemistry
Indian Institute of Science
Bangalore 560012, INDIA

G. Mugesh received his B.Sc. (1990) and M.Sc. (1993) degrees from the University of Madras and Bharathidasan University, respectively. He obtained his Ph.D. (1998) at the Indian Institute of Technology, Bombay, under the supervision of Prof. H. B. Singh. In 2000, he moved to Germany as an Alexander von Humboldt Fellow at the Technical University, Braunschweig. In 2001-2002, he worked with Prof. K. C. Nicolaou at the Scripps Research Institute, as a Skaggs postdoctoral fellow.

Mugesh's work ranges from fundamental chemical synthesis and reaction mechanism at the molecular level to practical biomedical applications. His work on artificial enzymes including nanozymes that modulate the cellular redox signaling has attracted a global attention. The recent discovery from his laboratory that proteins and small molecules can be delivered into mammalian cells by utilizing halogen bonding has direct applications to human health. This novel strategy can be used for the efficient delivery of proteins and small molecules for therapeutic applications.

Mugesh is a recipient of the Ignite Life Science Foundation Award (2022); A. V. Rama Rao Foundation Prize Lecture in Chemistry by JNCASR (2021); IIT Bombay Distinguished Alumnus Award (2021); SASTRA-CNR Rao Award in Chemistry & Materials Science (2021); Dr. Ghanshyam Srivastava Memorial Award, Indian Chemical Society (2020); Infosys Prize in Physical Sciences (2019); CRSI Silver Medal (2019); National Prize for Research on Interfaces of Chemistry and

Biology (2017); Rajib Goyal Prize in Chemical Science (2017); Bhagyatara Award (2017); ISCB Award for Excellence (2016); J. C. Bose National Fellowship (2015); Shanti Swarup Bhatnagar Prize (2012); AstraZeneca Excellence in Chemistry Award (2012); CDRI Award for Excellence in Drug Research (2010); Swarnajayanti Fellowship (2006-07); Ramanna Fellowship, DST (2006).

He is a fellow of the National Academy of Sciences, India (2012), Indian Academy of Sciences (2012) and Indian National Science Academy (2016). He serves as a National Representative - IUPAC, Chemistry and Human Health Division. He also serves/d in the Editorial or Editorial Advisory Boards of Chemistry – A European Journal (ChemPubSoc, Europe), Organic and Biomolecular Chemistry (RSC), ACS Omega (ACS); Bioorganic Chemistry (Elsevier) and Biological Chemistry (De Gruyter, Germany).

SPEAKERS ABSTRACTS

Title: In search of facile and sustainable novel renewable energy materials for solar energy harvesting

Harish C. Barshilia

Surface Engineering Division, CSIR-National Aerospace Laboratories, HAL Airport Road, Kodihalli, Bangalore – 560 017

E-mail: harish@nal.res.in

Abstract:

Solar radiation is converted into thermal energy and subsequently to electrical energy by solar thermal concentrating systems. Concentrated solar power systems use solar absorbers to convert sunlight to thermal electric power. The solar collectors are coated with solar selective coatings with high solar absorptance and low thermal emittance. Spectrally selective coatings, which are stable up to temperatures 400°C (in air and vacuum), have been developed in the past. However, in order to increase the efficiency of solar thermal power plants, solar selective coatings with high thermal stability are required. In recent years, great advances have been made in the field of nanostructured solar selective coatings with high solar absorptance and low thermal emittance at higher temperatures (T >450°C). Amongst these, nanostructured transition metal nitride, oxide and carbide based tandem absorbers have emerged as novel high temperature solar selective coatings, which can be used for solar thermal power plants for electricity generation. Research is currently underway to increase the thermal stability of the coatings and subsequently to improve the efficiency of the solar thermal power plants. This talk will present an overview of the sputter deposited mid- to high-temperature solar selective coatings used for solar thermal applications. The presentation will also describe in detail commercially available sputter deposited solar selective coatings for solar thermal power generation applications. Other emerging materials such as CNTs and graphene derivatives will also be explored as potential solar energy harvesting materials. Finally, our efforts towards commercialization of one of the technologies will be presented.

Title: Probing materials with Mega Science Facilities

P D. Babu

UGC-DAE Consortium for Scientific Research, Mumbai Centre, 245-C, CFB, BARC Campus, Trombay, Mumbai – 400 085; Email: pdbabu@csr.res.in

Abstract:

A Brief overview of recent developments in magnetic and spintronic materials, highlighting the growing importance of characterizing their physical and microscopic properties have been discussed. Advanced state-of-the-art techniques have been discussed for probing these materials, with a focus on their relevance in modern research. Additionally, role of large-scale scientific facilities, such as nuclear reactor-based neutron scattering and synchrotron radiation, and their availability in India and globally have been explained. Emphasis will be placed on the insights these techniques provide, which are crucial for understanding material properties and facilitating their application in advanced technologies

Title: Halogen Bonding in Cell Membrane Transport

Govindasamy Mugesh

Department of Inorganic and Physical Chemistry, Indian Institute of Science, Bangalore

mugesh@iisc.ac.in

Abstract:

Small-molecule-based fluorescent probes have become important tools in biology for sensing and imaging applications. However, the biological applications of many of the fluorescent molecules are hampered by low cellular uptake and high toxicity. Recently, we showed for the first time that the introduction of halogen atoms enhances the cellular uptake of small molecules and proteins, and the nature of halogen atoms plays a crucial role in the plasma membrane transport in mammalian cells. The remarkably higher uptake of iodinated compounds as compared to that of their chloro or bromo analogues suggests that the strong halogen bonding ability of iodine atoms may play an important role in the membrane transport. This study provided a novel strategy for the transport of fluorescent molecules including proteins across the plasma membrane in living cells.

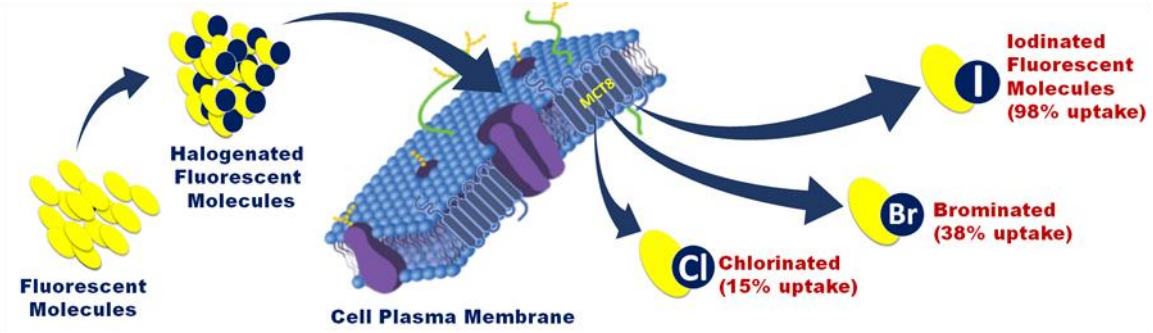

Figure 1: Halogen bond-assisted cellular uptake of fluorescent probes.

Title; Designing a greener energy conversion system for a sustainable future

Tharamani C. Nagaiah

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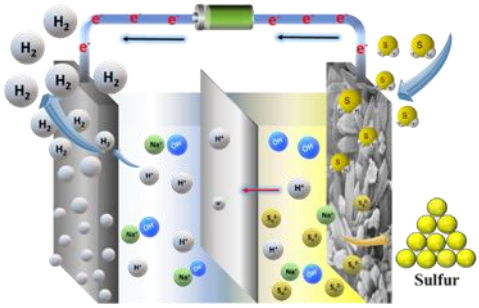
Abstract

Highly efficient and cost-effective hydrogen production (H2) promises to play a vital role in green energy production due to its high energy density, low-pollution, and renewable nature. The electrocatalytic decomposition of H2O to H2 and O2 considered to be the most sustainable method for pure H2 production, unfortunately, it stumbles due to potentially uphill and energy-consuming sluggish anodic oxygen evolution reaction (OER).[1] Contrary to H2O isostructural hydrogen sulfide (H2S) possesses lower bond dissociation energy. Therefore, anodic sulfide oxidation reaction (SOR) will be more energy-efficient than OER. Presently, the Claus process is the most popular industrial technology for removing H2S, but energy wasted in the form of steam. Therefore, electrochemical conversion of environment pollutant H2S into H2 and S provide a way to remove pollutant H2S and also emerges as new energy source.[2] However, the industrialization of such energy-efficient technology never meets the expectation in reality in the absence of cost-effective and robust electrocatalyst. Therefore, talk addresses the non-noble metal-based catalyst that exhibited lower onset potential of 0.23 V *vs.* RHE towards SOR, which is 1.25 V lower than OER. Notably, only a 1.2 V commercial battery easily derives H2S electrolysis, which is impossible for H2O splitting demonstrating the tremendous future prospective of H2S for cheaper hydrogen production for a sustainable economy.



Scheme 1. Schematic representation of H2S electrolysis into cathodic H2 and anodic S.

4th International University on "Global trends in Sustainable Technology its Applications in Applied Sciences (ICGTSTAS-2024)"

PROGRAM SCHEDULE

4th International Conference on "Global Trends in sustainable technology and its application in Applied Sciences" on 24th and 25th of October 2024 Organized by REVA University in collaboration with INTI University

<table>
<tr><th colspan="4">Program Schedule</th></tr>
<tr><th colspan="4">Day 1: 24th October 2024</th></tr>
<tr><th>Timings</th><th colspan="2">Program</th><th>Venue</th></tr>
<tr><td>8:30 to 9:15 AM</td><td colspan="2">Registration</td><td>Science Block,
REVA University</td></tr>
<tr><td>9:15 to 9:45 AM</td><td colspan="2">Inauguration
Live Streaming link:</td><td>Chanakya Auditorium,
RBS Block, REVA University</td></tr>
<tr><td colspan="4">Session-I</td></tr>
<tr><td colspan="4">Keynote Address</td></tr>
<tr><td rowspan="3">9:45 to 10:45 AM</td><td>Title of the talk:
The Potential and Challenges of Microalgae Biofuel Production</td><td>Session Chair
Dr. Ashoka S
Associate Prof
Dept of Chemistry, SOAS</td><td rowspan="3">Chanakya Auditorium
RBS Block</td></tr>
<tr><td rowspan="2">Dr. Lam Man Kee
Professor,
Chemical Engineering Department, Universiti Teknologi PETRONAS Persiaran UTP, 32610 Seri Iskandar, Perak, Malaysia</td><td>Welcome Address
Dr. Ramaraghavulu
Asst. Prof
Dept of Physics, SoAS</td></tr>
<tr><td>Vote of Thanks
Dr. Prabhakar Mishra
Asso. Prof
Dept of BT, SoAS</td></tr>
<tr><td>10:45 - 11:15 AM</td><td colspan="2">Tea break</td><td>Science Block</td></tr>
<tr><td colspan="4">Plenary talk -1</td></tr>
<tr><td rowspan="3">11:15 AM to 12:15 PM</td><td>Title of the talk:
Innovation and entrepreneurship ecosystem at educational institutions: University of Hyderabad as a case study</td><td>Session Chair
Dr.Santosh Anand
Associate Prof
Depart. of BT, SoAS</td><td rowspan="3">Chanakya Auditorium, RBS Block</td></tr>
<tr><td rowspan="2">Prof. Pallu Redanna
Emeritus Professor
University of Hyderabad, Hyderabad, Andhra Pradesh</td><td>Welcome Address
Dr. P. Visweshwar Rao
Dean, SOAS</td></tr>
<tr><td>Vote of Thanks
Dr. Madhusudan Reddy
Head, Dept of Chemistry, SoAS</td></tr>
<tr><td colspan="4">Plenary talk -2</td></tr>
<tr><td>12:15 to 1:15PM</td><td>Title of the talk:
Degradation of HDPE and LDPE plastic using indigenous bacteria from</td><td>Session Chair
Prof. Renuka Madhu
Asso. Prof
Dept of BT, SOAS</td><td>Chanakya auditorium, RBS Block, REVA University</td></tr>
</table>

	mangrove sediment: A sustainable approach		
	Dr. Jayanthi Barasarathi, Associate Professor, INTI International University, Malaysia	**Welcome Address** Dr.Senthilkumar R Associate Professor Dept of BT, SoAS	
		Vote of Thanks Dr. Sunitha Head, Dept of Physics, SoAS	
1:15 to 2:00 PM	**Lunch Break**		
Session-II			
Plenary talk -3			
2.00 to 3:00 PM	**Title of the talk:** Halogen Bonding in Cell Membrane Transport	**Session Chair** Dr. Nagendra G Assistant Professor Dept of Chemistry SoAS	**Chanakya auditorium,** RBS Block, REVA University
	Dr. G. Mugesh Professor Chemical Sciences Indian Institute of Science Bangalore	**Welcome Address** Dr. Gitanjali Pradhan Assistant Professor Dept of Chemistry SoAS	
		Vote of Thanks Dr. Ashoka S Associate Professor Dept of Chemistry SoAS	

Technical Session				
Time	**Poster Presentation**		**Oral Presentation**	
3:00 to 4:00 PM	**Biotechnology InCharge Faculty:** Dr. Santharam Katta	**Rangasthala,** Swami Vivekananda Block, REVA University	**Biotechnology InCharge Faculty:** Dr. Manjula KR	**Junjappa Seminar Hall, SOAS, Science Block** **Audience:** Biotechnology
	Physics InCharge Faculty: Dr. Muniratnam		**Physics InCharge Faculty:** Dr. Deepak	**APJ Abdul Kalam Hall SOAS, Science Block** **Audience:** Physics
	Chemistry InCharge Faculty: Dr. S. Shivakumara		**Chemistry InCharge Faculty:** Dr. Lakshmi.B	**Library Seminar Hall, Central Library** **Audience:** Chemistry
4:00 to 4:30 PM	**Tea & Biscuits**			**Science Block**

Day: 2 25th October 2024			
Session-III : Biological Sciences (Parallel Sessions)			
9:00 - 10:00 AM	**Title of the talk:** Discovery of a new syndrome by integrating human molecular genetics, stem cells and pre-clinical models	**Session Chair** Dr. Nethravathi V Associate Professor Dept of BT, SoAS	**Junjappa Seminar Hall, Science Block Audience:** Biotechnology departments
	Dr. Dhandapany Perundurai Associate Professor and Scientist F, Institute for Stem Cell Biology and Regenerative Medicine, Bengaluru	**Welcome Address** Dr. Senthil Kumar R Asso. Professor Dept of BT, SoAS	
		Vote of Thanks Dr. Guruprasad NM Asso. Professor Department of BT, SoAS	
10:00 to 11:00 AM	**Title of the talk:** ER stress linking mitochondrial fission and turnover	**Session Chair** Dr. Manjula KR Professor Dept of BT, SoAS	
	Dr. Subba Rao Gangi Setty Professor, Dept. of Microbiology & Cell Biology, Indian Institute of Science, Bangalore	**Welcome Address** Dr. V Damodhara Reddy Associate Professor Dept of BT, SoAS	
		Vote of Thanks Dr. Ramya M Asso. Professor Dept of BT, SoAS	
11:00 to 11:30 AM	**Tea Break**		**Science Block**, SOAS, REVA University
Session-IV : Physical and Chemical Sciences (Parallel Sessions)			
9:00 to 10:00 AM	**Title of the talk:** In search of facile and sustainable novel renewable energy materials for solar energy harvesting	**Session Chair** **Dr.Mahipal Ranot** Associate Professor Department of Physics, SoAS	**APJ Abdul Kalam Hall, Science Block**
	Dr. Harish Barshilia, Chief Scientist and Head, Surface Engineering Division, CSIR - National Aerospace, India	**Welcome by** **Dr.Muniratnam** Associate Professor Department of Physics SoAS	
		Vote of Thanks **Dr.Lavanya D. R.** Assistant Professor Department of Physics SoAS	
10:00 AM to 11:00 AM	**Title of the talk:** Probing materials with Mega Science Facilities	**Session Chair** Dr. Upendra Kumar K. Professor, Department of Physics SoAS	

		Welcome Address **Dr. Subrata K.** Assistant Professor Department of Physics SoAS	
	Dr. P D Babu Centre Director UGC-DAE CSIR, Mumbai Centre		
		Vote of Thanks **Dr.Pramodini S.** Assistant Professor Department of Physics SoAS	
11:00 AM to 11:30 AM	**Tea Break**		**Science Block**, SOAS, REVA University
11:30 PM to 1:00 PM	**Technical Session (Physics and Chemistry)**		
	Poster Presentation		**Oral Presentation**
	Biotechnology Incharge Faculty: Dr. Santharam Katta	**Rangast hala.** Swami Viveka nanda` Block	**Biotechnology InCharge Faculty:** Dr. Manjula KR **Junjappa Seminar Hall, Science Block**
	Physics Incharge Faculty: Dr. Muniratnam		**Physics InCharge Faculty:** Dr. Deepak **Library Seminar Hall, Central Library**
	Chemistry Incharge Faculty: Dr. S. Shiva kumara		**Chemistry InCharge Faculty:** Dr. Lakshmi.B **APJ Abdul Kalam Seminar Hall,** CV Raman Block
1.00- 2.00 PM	**Lunch Break**		To be decided
Session-V (Common for all streams)			
2:00 to 2:10 PM	Sponsor's presentation		**Chanakya Auditorium,** REVA Business School (RBS)
2.10 to 3.10 PM	**Title of the talk:** Designing a greener energy conversion system for a sustainable future	**Session Chair and welcome by** Dr. DH Nagaraju Professor Department of Chemistry SOAS **Welcome Address**	**Chanakya Auditorium,** RBS
	Dr. Tharamani, Professor & Head, Chemistry IIT -Ropar	**Vote of Thanks** Assistant Professor Department of Physics SoAS	
Valedictory Session			
3:15to 4:00 PM	**Chief Guest** Dr. P D Babu Scientist, UGC-DAE, CSR, Mumbai Centre		**Chanakya Auditorium,** REVA Business School (RBS), REVA University
	Welcome Address Dr. Dr. P Visweswara Rao		
	Vote of Thanks Dr.Sunitha D V		
4.00-4.30 PM	**Certificate distribution & High Tea, Science Block Entrance**		

Abstracts Biotechnology

ABSTRACTS FOR POSTER PRESENTATION (Biotechnology)

Abstract ID	Title of the Abstract	Authors
STBP-01	Bioremediation: A Sustainable Solution for Environmental Pollution	MANOJ N.J, MOHAN KUMAR, M.NAVAJEETH, MATHESH, NANESH.
STBP-02	STBP 2. NANOMATERIALS USED IN FOOD INDUSTRY	PRAVALIKA A
STBP-03	Tea Granules Residue : An Insightful Study of Bioactives Extraction, Characterization, Antioxidant Activities, and Anti-cancer Potentials in Liver and Breast Cancer Cell Lines.	Dattatreya Govindan , Sandopu Sravan Kumar , Parvatam Giridhar , Paramesha Mahadevappa
STBP-04	BIODEGRADABLE PLASTICS: A path to Ecosystem Sustainability	Chavan, Lekha
STBP-05	MYCOTOXIN EFFECTS AND IT'S ROLE IN THE BIOLOGICAL SYSTEM	Hafsa , Mehtab
STBP-06	MICRO RNAs AS NOVEL BIOMARKERS IN CANCR DIAGNOSTICS	LAKSHANYA RAMESH
STBP-07	Toxicity of Plasticizers on Kidney Health: A Growing Concern	Siriguppa Shiri Chandana, Sireesha .s, Hasya. s Yuvashree Muralidaran; Prabhakar Mishra
STBP-08	Danio rerio: A significant animal model to study reproductive toxicology	Prabhakar Mishra; Vinjam Pavani Ramya; Mahima Halder
STBP-09	Exploring the Complex Interplay Between Diabetes and Bone	Sneha V S; Soundarya; Yuvashree Muralidaran
STBP-10	Evolution of Human microbiome with Next Generation Sequencing	Yashaswini S, Thanuja V and Dr. Jyothi B
STBP-11	Withania somnifera modulates glucose metabolism by inhibiting SGLT2, α-glucosidase and α-amylase: An in silico and in vitro study	Chethan Kumar Narayanaswamy a, Gouthami Kuruvalli a , Subhashish Maity a, Althaf Hussain Shaikb, Vaddi Damodar Reddy a *, Guru Prasad NM a *
STBP-12	Evaluation of Antifungal and anti-inflammatory activity of Pongamia pinnata (L.) Pierre. seeds	Honnesh N H 1* , Santanu Saha 2
STBP-13	Coumarin linked limidazo[2,1b][1,3,4]thiadiazoles as Hsp90 1UYL Inhibitors	Sujeet Kumar a,* , Subhas S. Karki b , Basavaraj Metikurki a

STBP-01. Bioremediation: A Sustainable Solution for Environmental Pollution

MANOJ N.J, MOHAN KUMAR, M.NAVAJEETH, MATHESH, NANESH.
B.Tech Biotechnology, Rajalakshmi Engineering College, Chennai, India
MENTOR: Ms TR Poorani, poorani.tr@rajalakshmi.edu.in

Abstract

The alarming accumulation of hazardous compounds in the environment, caused by agriculture practices, industrial manufacturing, and human lifestyle, has led to severe health issues and environmental concerns. Bioremediation, an eco-friendly approach, utilizes living microbiomes to clean pollutants, ensuring sustainability. Contrary to chemical methods, bioremediation techniques, such as phytoremediation, mycoremediation, and bio-augmentation, offer a viable alternative. Recent advancements in bioremediation include nanotechnology integration, genetic engineering, and biochemical engineering. Microbial enzymes and extremophiles play crucial roles in pollutant degradation. Bioremediation effectively manages heavy metals, pesticides, industrial effluents, and biomedical waste. The integration of nanotechnology and bioremediation enhances efficiency and sustainability. Nanoparticles synthesized from microorganisms demonstrate potential in removing heavy metals and degrading pollutants. This approach is cost-effective, environmentally friendly, and promising for waste management. However, limitations exist, such as inefficiency against non-biodegradable compounds and slower rates compared to other alternatives. To address environmental pollution, bioremediation is recognized as an essential strategy for sustainable development. Global cooperation among scientists, policymakers, and stakeholders is necessary to prioritize eco-friendly practices, fund research, and implement bioremediation-based solutions.

Keywords: Bioremediation, Sustainability, Environmental pollution, Microbiomes, Nanotechnology, Extremophiles.

STBP 2. NANOMATERIALS USED IN FOOD INDUSTRY

PRAVALIKA A
B.Tech Biotechnology, Rajalakshmi Engineering College, Chennai, India
230401120@rajalakshmi.edu.in
MENTOR: Ms TR Poorani, poorani.tr@rajalakshmi.edu.in

Abstract:

Nano-biotechnology has a integration of nano materials and biological systems. The nanomaterial include selenium, silver and chitosan. Chitosan is a biopolymer that is produced through the deacetylation of chitin, which is found in the shells of crustaceans like shrimp and crabs. It is a natural and renewable resource widely used across various industries. It has been emerged as a valuable resource in the food industry due to their biodegradability, biocompatibility, and inherent antimicrobial, antioxidant and film-forming abilities to protect fresh produce, meat, and dairy products by forming barriers against microbial contamination and oxidative spoilage. These nanoparticles extend shelf life and maintain food quality without introducing toxic or harmful substances. By embracing chitosan nanomaterials, the food industry can significantly contribute

to a healthier, more sustainable future, ensuring that our food supply not only meets the highest standards of quality but also aligns with global efforts towards environmental responsibility.

Keywords: Chitosan Nanomaterial, Biocompatible, Film-forming, biopolymer, Antioxidan

STBP 3: Tea Granules Residue : An Insightful Study of Bioactives Extraction, Characterization, Antioxidant Activities, and Anti-cancer Potentials in Liver and Breast Cancer Cell Lines.

Dattatreya Govindan , Sandopu Sravan Kumar , Parvatam Giridhar , Paramesha Mahadevappa.

1 Food Processing Centre Lab, Department of Studies and Research in Food Technology, Davangere University, Davangere-577 007, Karnataka, India

2 Plant Cell Biotechnology Department, CSIR-Central Food Technological Research Institute, Mysore-570020, Karnataka, India

2 Food Safety and Analytical Quality Control Laboratory, CSIR-Central Food Technological Research Institute, Mysore-570020, Karnataka, India

*Email: parameshbt@gmail.com; paramesham8@davangereuniversity.ac.in

Abstract

As there is growing demand for tea (Camellia sinensis) worldwide, the quantity of agricultural and processed waste that has been produced has also been increased. The current study was focused to extract bioactive metabolites at various brewing times (5 min, 10 min, 15 min) using tea granules, tea granules + sugar, and tea granules + sugar + milk and its antioxidant activities evaluation to fight against cancer cell (liver and breast) proliferation proving the efficacy of tea granules residual biomass metabolites. The nutritional analysis of native and the residue brewed for 15 min with, without sugar, and sugar+milk showed a higher content of total carbohydrate content from 14.40% to 22.51 and 16.78% respectively due to bounded sugar molecule and milk residues to the tea residue. The total protein content was not significantly altered (21.78% to 23.22%). The mineral content retention was highest in iron and calcium contents. The total phenolic content of native sample brewed showed about 4.48% which were lowered during processing to 3.82% respectively. However, the sugar and sugar+milk added brewing extracted more bioactives 9.21% and 1.93% in 5 min brewing. More significantly the residual tea granules waste methanol extract showed about 1.43% of TPC, 0.15% TFC, 1.16% TAA, 0.32 µg/mL DPPH, and 1.85% FRAP activity which is higher than that of residue with tea granules and sugar and sugar+milk brewed residue respectively. The HPLC analysis revealed the major bioactives (catechin, epicatechin, rutin, gallic acids etc) and its efficacy to fight against liver (IC50 120 µg) and breast cancer (IC50 15.625 µg) cell lines of tea granules+sugar residue. The findings would contribute significantly to enhance the use of processed tea granules residue for bioactive metabolites use and its application agriculture as nutrient rich manure.

Keywords: Tea granules, Nutritional, Minerals, Bioactives, Antioxidant activities, Cell Culture

STBP **4. BIODEGRADABLE PLASTICS: A path to Ecosystem Sustainability**

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23150700058@reva.edu.in

School of Applied Sciences- Biotechnology, Reva University, Yelahanka, 560064.

Abstract;

Plastics play a vital role in modern society, with applications spanning packaging, construction, electronics, household goods, and agriculture. However, their resistance to microbial decomposition and the uncertainty surrounding their biodegradation timeline pose significant environmental challenges. Incineration of plastics releases greenhouse gases, while landfills, currently the primary disposal method, are rapidly running out of space. Bioplastics, derived from renewable biomass sources such as vegetable oils, corn starch, and waste materials, offer a promising alternative to conventional plastics. Unlike traditional plastics, bioplastics are composed of biopolymers like starch and cellulose, which can be sourced from various forms of food waste. This study aims to explore the potential of converting food waste, including banana peels, pineapple peels, durian seeds, jackfruit seeds, and chicken feathers, into sustainable bioplastic materials for packaging. The findings demonstrate that many types of food waste, especially those rich in biopolymers, can serve as viable sources for bioplastic production. Developing bioplastics from food waste not only addresses the growing plastic waste crisis but also helps reduce food waste, thereby promoting environmental sustainability through a circular economy approach.

Keywords: Bioplastics, Biopolymers, Sustainability, Starch , Cellulose

STBP 5.MYCOTOXIN EFFECTS AND IT'S ROLE IN THE BIOLOGICAL SYSTEM

Hafsa , Mehtab

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23140600550@reva.edu.in

School of Applied Sciences- Biotechnology, Reva University, Yelahanka, 560064.

Abstract

Mycotoxins are toxic secondary metabolites produced by various fungi, predominantly from the genera Aspergillus, Penicillium, and Fusarium. These compounds contaminate agricultural products such as cereals, nuts, and spices, posing serious health risks to humans and animals. This review explores the biological effects of major mycotoxins, including aflatoxins, ochratoxins, fumonisins, zearalenone, and trichothecenes, highlighting their impact on key physiological systems. Aflatoxins, known for their hepatotoxic and carcinogenic properties, primarily affect liver function, while ochratoxins and fumonisins contribute to nephrotoxicity and neurotoxicity, respectively. Zearalenone's estrogenic activity causes significant reproductive harm, whereas trichothecenes disrupt protein synthesis, leading to cytotoxic effects. The review also examines the role of mycotoxins in modulating the immune system, inducing oxidative stress,

and interfering with metabolic and endocrine functions. Chronic exposure to contaminated food products remains a significant global health challenge, especially in regions with poor agricultural storage practices. Additionally, mycotoxins have genotoxic and carcinogenic properties that elevate the risk of various cancers. Understanding the mechanisms of mycotoxin toxicity is essential for developing strategies for food safety, mycotoxin management, and public health protection. Preventative measures, including improved storage techniques, food monitoring, and fungal control methods, are critical in mitigating the risks posed by these toxic compounds.

Keywords: Mycotoxins, Fumonisins, Aflatoxins, Immunosuppression, Food safety.

STBP 6. MICRO RNAs AS NOVEL BIOMARKERS IN CANCR DIAGNOSTICS

LAKSHANYA RAMESH

B.tech Biotechnology, Rajalakshmi Engineering College, Chennai, India

230401076@rajalakshmi.edu.in

MENTOR: Dr. Johanna Rajkumar

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Abstract:

MicroRNAs (miRNAs) are a group of tiny molecules of 18–22 nucleotide long noncoding RNA that regulate the post-transcriptional gene expression through translational inhibition and/or mRNA destabilization. Because of their involvement in important developmental processes, it is highly likely that the altered expression of miRNAs could be associated with abnormal conditions like suboptimal growth or diseases. Thus, the expression of miRNAs can be used as biomarkers in pathophysiological conditions. Specific and sensitive non-invasive biomarkers for the detection of human epithelial malignancies are urgently required to reduce the worldwide morbidity and mortality caused by cancer. Many studies have shown that miRNA dysregulation is involved in cancer initiation, invasion, metastasis, and so forth. Notably, recent studies have revealed secretory miRNA levels in blood and other body fluids to correlate significantly with cancer progression, therapeutic response and patient survival. Thus, secretory miRNAs have demonstrated great potential as powerful and non-invasive cancer biomarkers. The discovery of miRNAs in general and particularly of circulating miRNAs is one of the major scientific breakthroughs in the modern era and hold great promises given miRNAs are able to significantly alter the biological processes as well as cellular behavior. This descriptive abstract aims to bring attention to the possibility of regulating cancer, or even the early detection of the tumors, by incorporating microRNAs as biomarkers in cancer diagnostics.

Specific and sensitive non-invasive biomarkers for the detection of human epithelial malignancies are urgently required to reduce the worldwide morbidity and mortality caused by cancer. miRNAs are frequently dysregulated in cancer and have shown great promise as tissue-based markers for cancer classification. Once thought to be unstable RNA molecules, miRNAs are now shown to be stably expressed in serum, plasma, urine, saliva, and other body fluids. Moreover, the unique expression patterns of these circulating miRNAs are correlated with certain human diseases, including various types of cancer. Therefore, tumor-derived

miRNAs in serum or plasma are emerging as novel blood-based fingerprints for the detection of human cancers, especially at an early stage. This review presented newly uncovered cellular and molecular mechanisms of the sources and stability of circulating miRNAs, revealing their great potential as a class of highly specific and sensitive biomarkers for tumor classification and prognostication. Meanwhile, this review also addressed certain critical issues that hinder the wide application of this new approach. Some potential challenges for the transition of circulating miRNAs from a research setting to a clinical application were also highlighted, with a future perspective of the incorporation of circulating miRNAs in the field of clinical oncology, especially their great potential from diagnostic to prognostic and predictive applications. Many studies have shown that miRNA dysregulation is involved in cancer initiation, invasion, metastasis, and so forth. Notably, recent studies have revealed secretory miRNA levels in blood and other body fluids to correlate significantly with cancer progression, therapeutic response and patient survival. Thus, secretory miRNAs have demonstrated great potential as powerful and non-invasive cancer biomarkers. Herein, we summarize the current progress of secretory miRNAs in different cancer types and analyze the potential mechanisms of miRNA secretion. Then, we discuss the different approaches to miRNA detection in body fluids and the advantages of secretory miRNAs as biomarkers for early cancer diagnosis and the prediction of therapeutic efficacy. Finally, we list the current progress of secretory miRNAs as cancer biomarkers in clinical trials. Although several issues remain to be clarified, such as the mechanisms of miRNA secretion, it is only a matter of time before miRNAs are widely utilized as cancer biomarkers.

STBP 7. Toxicity of Plasticizers on Kidney Health: A Growing Concern

Siriguppa Shiri Chandana, Sireesha .s, Hasya. s Yuvashree Muralidaran; Prabhakar Mishra
Department of Biotechnology, School of Applied Sciences
REVA University, Karnataka

Abstract

Plasticizers, particularly phthalates and bisphenol A (BPA), are widely used in the production of plastics to increase their flexibility and durability. However, increasing evidence suggests that these compounds pose significant risks to human health, particularly to the kidneys. Plasticizers can enter the human body through ingestion, inhalation, or dermal exposure and are subsequently metabolized, releasing toxic metabolites. Studies indicate that chronic exposure to plasticizers can lead to nephrotoxicity, characterized by oxidative stress, inflammation, and disruption of kidney function. The mechanisms of toxicity involve the induction of reactive oxygen species (ROS) and the activation of pathways leading to fibrosis and apoptosis in renal cells. Animal models have demonstrated that high doses of plasticizers are associated with glomerular and tubular damage, while epidemiological studies in humans suggest a correlation between plasticizer exposure and decreased renal function.

Keywords: plasticizers, kidney toxicity, phthalates, bisphenols, chronic kidney disease.

STBP 8. Danio rerio: A significant animal model to study reproductive toxicology

Prabhakar Mishra; Vinjam Pavani Ramya; Mahima Halder
Department of Biotechnology, School of Applied Sciences
REVA University, Bengaluru, Karnataka

Abstract

Zebrafish (Danio rerio) is highly used as a vertebrate model organism to study Reproductive toxicity and safety. About 70% of human genes are similar to zebrafish, and numerous studies have proved that Zebrafish and mammals have very similar physiology, metabolic pathways, and development. Zebrafish response to toxicity is highly predictive of human or mammalian responses. Research has proven that this small organism shares a close reproductive similarity with humans. Through research on the reproductive toxicity of Zebrafish, a significant number of drug candidates have failed in the preclinical tests due to their adverse effects on reproductive health. This model organism plays a crucial role in the fertility study, they even share many common genes with humans, such as sox9, steroidogenic factor 1 (SF-1), Wilm's tumor suppressor gene 1 (wt1), and GATA4. The behaviour in courtship characteristics in zebrafish has laid a stronger base and given a stronger reason to rely on Zebrafish for fertility research. The new approach to assessing reproductive toxicity in Zebrafish offers several advantages, including a short test period, larva transparency, high output, low cost, easy manipulation, etc. The present review discusses the importance of zebrafish in the study of human reproductive health and demonstrates its versatility and potential use in determining infertility caused by toxins.

Keywords: Zebrafish, Genes, Reproductive toxicology, Model organism.

STBP 9. Exploring the Complex Interplay Between Diabetes and Bone

Sneha V S; Soundarya; Yuvashree Muralidaran
Department of biotechnology, School of applied Sciences
REVA University, Bengaluru, Karnataka

Abstract

This review examines the intricate relationship between diabetes mellitus (DM) and bone health. Diabetes increases the risk of osteoporosis, fractures, and skeletal fragility due to hyperglycemia, insulin resistance, advanced glycosylation end-products, and renal impairment. Understanding these interactions is essential for developing effective interventions to reduce fracture risk and improve quality of life in individuals with diabetes. This review highlights pathophysiological mechanisms, clinical manifestations, and therapeutic considerations, emphasizing the need for early screening, prevention, and treatment strategies to mitigate diabetes' adverse effects on bone health.

Keywords: diabetes, bone health, osteoporosis, hyperglycemia, fracture risk

STBP 10. Evolution of Human microbiome with Next Generation Sequencing

Yashaswini S, Thanuja V and Dr. Jyothi B

Department of Biotechnology, School of Applied Science, REVA University, Bengaluru- 560 064.

Abstract

The human body supports a thriving diversity of microbes which comprise a dynamic, ancillary, functional system that synergistically develops in lock-step with physiological development of its host. The human body has generally been regarded as a self-sustaining organism that can regulate all of its life processes. It is likely that the human ecosystem is the result of the evolutionary co-existence between the microbial community and the human body. Human microbiome plays a crucial role in protecting the host against pathogenic microbes and providing metabolic functions that are not encoded by the human genome. Analysis of the human microbiome using metagenomics approach allows us to investigate the compositions and functions of the human microbiome. Diseases driven by pathogens have been studied for decades, but the mechanisms of those diseases are still not completely understood. Next-generation sequencing provides a powerful technology with which to observe changes of pathogens at a genome level and the composition of microbial communities. This in turn has facilitated investigation on the associations between the microbiome and diseases.

Keywords: microbial community, human microbiome, metabolic functions, pathogenic microbes and next-generation sequencing.

STBP 11. Withania somnifera modulates glucose metabolism by inhibiting SGLT2, α-glucosidase and α-amylase: An in silico and in vitro study

Chethan Kumar Narayanaswamy a, Gouthami Kuruvalli a , Subhashish Maity a, Althaf Hussain Shaikb, Vaddi Damodar Reddy a *, Guru Prasad NM a *

[a] Department of Biotechnology, REVA University, Bengaluru-560064, Karnataka, India

[b] Department of Zoology, College of Science, King Saud University, Riyadh, Saudi Arabia.

Abstract

Objective: Diabetes is a growing metabolic disorder all over the world for which effective therapeutic strategies are sought. The study aimed to understand the mechanistic role of Ashwagandha (Withania somnifera.L.) root extract in modulating hyperglycemia.

Materials and methods: Withania somnifera (W. somnifera) is recognized for its therapeutic potential. This study explored the antidiabetic properties of metabolites in W. somnifera by GC-MS analysis utilizing in vitro and in silico approaches. We conducted qualitative phytochemical screening and a free radical scavenging study utilizing DPPH+ and ABTS+assays. Furthermore, α-amylase and α-glucosidase inhibition tests were conducted. Molecular docking studies were conducted employing identified compounds from W.

somnifera root extract against target proteins sodium-glucose transport protein 2 (SGLT2), α-glucosidase, and α-amylase.

Results: A qualitative examination revealed that W. somnifera comprised phenolics, steroids, and terpenoids. The DPPH+ and ABTS+ free radical scavenging tests showed good antioxidant activity with IC50 values of 37.8 and 34.4 µg/mL, respectively. W. somnifera inhibited α-amylase and α-glucosidase enzymes with concentrations ranging from 3.25 to 50 µg/mL. Docking studies revealed strong binding affinities of -9.6 to -3.5 kcal/mol, -11.8 to - 5.5 kcal/mol, and -9.3 to -4.5 kcal/mol, respectively.

Conclusion: The phytochemicals present in W. somnifera synergistically inhibited SGLT-2, a glucose transporter, enzymes α-amylase and α-glucosidase, which break down complex carbohydrates into simple sugars and regulate blood sugar levels. Furthermore, our docking analysis validated our in vitro studies. These findings show that W. somnifera can manage blood sugar levels and be utilized as an alternative traditional medicine in diabetes therapy.

Keywords: Diabetes mellitus; Withania somnifera; GC-MS analysis; α – Glucosidase; α- amylase; Molecular docking.

STBP 12. Evaluation of Antifungal and anti-inflammatory activity of Pongamia pinnata (L.) Pierre. seeds

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Abstract

The inflammations are caused by traumas, illnesses, injuries, burns, radiation injuries, frostbite, and contact with caustic chemicals such as acids, alkalis. Non-steroidal anti-inflammatory drugs (NSAIDs) are usually used to treat the pain and inflammation associated with arthritis and other musculoskeletal disorders. NSAIDs show serious side effects, some of which are life-threatening. So there is a need for anti-inflammatory traditional herbal medicines. The legume tree Pongamia pinnata tree has long been used to treat ulcer, bronchitis, pain, and wound. The seed oil is used to generate biodiesel, topically applied to wound to remove helminth, larvae from wounds thereby indirectly enhance wound healing in animals. The current study aims to identify the effect of methanol extract of selected plant on specific use. To identify the phytochemicals included in the methanol extract, a preliminary screening for phytochemicals was carried out. The P Pinnata extract was found to contain carbohydrates, tannins, proteins, flavonoids and fixe oil. Various dosages (100 mg, 200 mg, and 400 mg) of P.pinnata extracts were tested for their antifungal and anti-inflammatory properties in the carrageenan-induced model in wister albino rats, There is a dose-dependent action shown in the extract. In inflammatory model after four hours of administration, the percentage inhibition of oedema formation for 100 mg, 200 mg, and 400 mg extracts was found to be 36.17%,

48.60%, and 60.76% respectively, compared to the standard diclofenac oedema inhibition 65.24%. This indicates a significant anti-inflammatory effect. Future need purification of extract to remove odorous principles and facilitate human use.

Keywords: Anti-inflammatory activity, Carrageenan, Methanol extract, Pongamia pinnata, Phytochemical

STBP 13. Coumarin linked limidazo[2,1b][1,3,4]thiadiazoles as Hsp90 1UYL Inhibitors

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Abstract

A series of coumarin-linked imidazo[2,1-b][1,3,4]thiadiazoles were prepared and screened for their cytotoxicity in human CEM, HeLa and L1210 cell lines. Molecule 3-[5bromo-2-(thiophenyl-2-methyl)imidazo[2,1-b][1,3,4]thiadiazol-6-yl]-2Hchromen-2-one (9b) exhibited cytotoxicity at 0.77 µM against CEM, 1.6 µM against L1210 and 0.38 µM against HeLa cells while derivative 6-(2-oxo-2H-chromen-3-yl)-2-(thiophenyl-2-methyl)imidazo[2,1-b][1,3,4]thiadiazol-5-carbaldehyde (10b) showed cytotoxicity at 3.5 µM against CEM and at 9.5 µM against HeLa cells. The molecular docking simulations performed on heat shock protein 90 (Hsp90), Pdb ID: 1UYL receptors revealing good interaction of -10.7 Kcal/mole for 9b and -10.5 Kcal/mole for 10b.

Keywords: Coumarin, Imidazo[2,1b][1,3,4]thiadiazole, Hsp90, 1UYL.

ABSTRACTS FOR ORAL PRESENTATION(Biotechnology)

Abstract ID	Title of the Abstract	Authors
STBO-01	Design and construction of $CoAl_2O_4$ modified pencil electrode for electrochemical sensing of urea	Rangaswamy R, Manohara S. R*
STBO-02	STBO-02: Development of Phytodrug-loaded Lipid Nanoparticles for Improved Anticancer Therapy	Saumyadeep Bora[1], Dr. Hitesh Kulhari[1]
STBO-03	STBO-03: Anti-Angiogenic Activity of Selenium Nanoparticles: A Molecular Perspective	Y Santhosh Kumar

STBO-04	STBO-04: In vitro and in silico investigations to evaluate the antioxidant activity and therapeutic properties of the Couroupita guianensis aubl. plant extract	Sujatha Jagannatha, Dr.Ramanjaneyulu Golla
STBO-05	Investigation of Traditional vs Nanotechnological approach for post-harvest preservation of Sapota fruits	Jha Anamika*, Joshi Gatha, Patel Divyesh
STBO-06	CARBON EMISSION FROM LAKES	[1]Dr. S. Shreemathi Giri*, [2] Dhanushree H, [3]Lakshmi Priya P
STBO-07	Battling Drug Resistance in Proteus mirabilis Using Anti-Quorum Sensing Compounds from Actinobacteria	Nisha Dnyaneshwar Margode[1], Vara Prasad Kolla[1], Sunita Bundale[2*],
STBO-08	Preliminary Phytochemical Analysis And Antimicrobial Activities of Leaf Extracts of Archidendron bigeminum (L.)	I.C.Nielsen, Preetha Florina
STBO-09	Qualitative, Quantitative phytochemical analysis and antimicrobial activities of leaf extracts of Cayratia mollissima (Planch.) Gagnep	S Shwetha.
STBO-10	Isolation and molecular characterization of an edible wild mushroom from Tirumala hills: Identification of novel compounds via LC-QTOF-MS and evaluation of anticancer potential against ovarian cancer	Yesaswi Vishnubhotla†, R. Usha*
STBO-11	Qualitative and Quantitative Analysis of Phytochemicals and Anti-bacterial Activities of Meiogyne pannosa [Dalzell] J.S.	S. R. Yamuna

STBO-01: Antibacterial Activity of *Syzygium cumini*: A Natural Alternative for Pathogen Control

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Abstract:

Syzygium cumini, also known as Java plum or black plum, has been valued in traditional medicine for its various health benefits, including its antimicrobial properties. This study focuses on examining the antibacterial potential of different extracts (aqueous, methanol, and ethyl acetate) of S. cumini against several Gram-positive and Gram-negative bacterial pathogens.The findings indicate that S. cumini extracts have notable antibacterial effects, especially against Gram-positive bacteria such as Staphylococcus aureus and Gram-negative bacteria like Chromobacterium violaceum, with inhibition zones similar to those of standard antibiotics. This activity is linked to the phytochemical components of S. cumini, which include flavonoids, phenolic compounds, tannins, and essential oils. Additionally, we found that the methanolic extract exhibited the strongest antibacterial activity, suggesting that methanol is a more effective solvent for extracting the active phytoconstituents. When compared to standard bacteria, Syzygium cumini extracts showed greater antimicrobial activity against Chromobacterium violaceum, indicating its potential as an alternative treatment for various infections caused by this strain. In summary, the results highlight the therapeutic promise of Syzygium cumini as a natural antibacterial agent. More research is necessary to evaluate its effectiveness against resistant strains and within complex microbial environments.

Keywords: Syzgium cumini, Staphylococcus aureus, Chromobacterium violaceum, Anti-microbial activity, Therapeutic Properties

STBO-02: Development of Phytodrug-loaded Lipid Nanoparticles for Improved Anticancer Therapy

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Abstract:

Cancer is a primary cause of death worldwide, demanding continuous developments in drug delivery technology to improve anticancer medicines' therapeutic efficiency. Hydrophilic phytodrugs have strong anticancer potential, but their restricted permeability and susceptibility to enzymatic degradation have hampered their application in cancer treatment. Pharmaceutical research continues to prioritise the development of efficient delivery methods for hydrophilic anticancer phytodrugs in order to address these problems. Due to its advantages over other nanocarriers for hydrophilic phytodrugs, including improved bioavailability, stability, and decreased systemic toxicity, lipid nanoparticles have drawn interest. In this

study, we formulated lipid nanoparticles loaded with a hydrophilic anticancer phytodrug to improve its therapeutic effects. The nanoparticles were comprehensively characterized for key attributes required for successful drug delivery, including particle size, morphology, crystallinity, and thermal stability. These nanoparticles also showed excellent drug release profile, as well as colloidal and storage stability. Further, *in vitro* evaluations showed that the nanoparticles effectively delivered the phytodrug to cancer cells, leading to enhanced cytotoxicity, apoptosis, inhibition of colony formation, and cellular uptake compared to the free phytodrug. This study shows that lipid nanoparticles can be excellent nanocarriers of hydrophilic anticancer phytodrugs, improving therapeutic efficacy and minimizing adverse effects to enhance cancer treatment.

Keywords: Cancer, phytodrugs, permeability, stability, nanoparticles

STBO-03: Anti-Angiogenic Activity of Selenium Nanoparticles: A Molecular Perspective

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Abstract:

Cancer is a collective term for over 100 conditions characterized by uncontrolled cell division, often developing gradually. Tumor progression depends on angiogenesis, the formation of new blood vessels, which provides oxygen and nutrients to growing tumors. Selenium nanoparticles (SeNPs) have emerged as a novel therapeutic agent with enhanced bioavailability and biological activity. The present study aimed to assess the anti-angiogenic effects of SeNPs on *in vitro* HUVEC Cell lines. The synthesis of SeNPs was carried out by chemical reduction method. The Physiochemical characterization was done by UV-Vis Spectroscopy, DLS, and TEM analysis. The in vitro anti-angiogenesis was evaluated on HUVEC cell lines by MTT assay, Wound healing, and mRNA expression using RT-PCR. The SeNPs were successfully synthesized and particles were characterized by UV-Vis Spectroscopy, DLS, and TEM analysis. The MTT assay results revealed that SeNPs showed significant dose dependent inhibition on HUVECs compared with control. Similarly, SeNPs exhibited a significant inhibitory effect on the wound healing process compared to control. The mRNA results revealed a significant decrease in the expression levels. In conclusion, the study demonstrated that SeNPs effectively inhibit angiogenesis in HUVEC cell lines. The results highlight SeNPs' potential as a promising anti-angiogenic agent for cancer therapy. In future, more studied are needed on exploring the detailed molecular mechanisms of SeNPs' anti-angiogenic effects and assessing their efficacy in in vivo cancer models. Additionally, optimizing SeNP formulations for enhanced therapeutic targeting and reduced toxicity would be valuable for clinical applications.

Keywords: Cancer, Angiogenesis, Selenium, Nanoparticles, mRNA, HUVEC cell lines.

STBO-04: In vitro and in silico investigations to evaluate the antioxidant activity and therapeutic properties of the Couroupita guianensis aubl. plant extract

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Abstract:

Couroupita guianensis is also called as “Cannonball tree” or “Sal tree”. The tree is seen in many parts of the world. medicinal values are found in many parts of the tree like leaves, flower, fruits, and bark. This medicinal plant is used to cure malaria, skin infection, hypertension, stomachache, tooth ache, scabies, bleeding piles and scorpion poison. This plant is also immune booster and having antifungal and antibacterial activity.

This study is mainly concentrated on the extraction of whole fruit, flowers, leaves, and bark using different solvents like ethanol, Methanol,water, and ethyl acetate.

Extracts will be tested for the presence of medicinal active ingredient. The part with more ingredient and the solvent which extracts more active ingredient will be taken for purification by selective solvent method or by column chromatography. The purified ingredient is evaluated for its medicinal properties.

Keywords: Couroupita guianensis, Purification**,** Medicinal plants, Medicinal value, Chromatography, Active ingredient.

STBO-05: Investigation of Traditional vs Nanotechnological approach for post-harvest preservation of Sapota fruits

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Abstract:

Recent years have witnessed the demand for sustainable food preservation technologies has surged, driven by the need to maintain freshness, reduce additives, ensure safety, and adopt eco-friendly packaging solutions. Biopolymers have emerged as a sustainable alternative to synthetic materials, especially in the creation of biodegradable packaging like edible films and coatings. Nanoemulsion technology has advanced

the functional properties of these biodegradable materials, offering a more effective solution for modern sustainability needs. Sapota (Chikoo) fruits, being highly perishable, are particularly prone to temperature fluctuations and microbial colonization, leading to rapid deterioration in texture, shape, and taste. This study compared the efficacy of traditionally used clove oil with a rice bran oil nanoemulsion (NE) for preserving Sapota fruits. The NE was prepared using chitosan as a matrix, rice bran oil, Tween 80 as a surfactant, and acetic acid. Particle size analysis (PSA) revealed an effective diameter of 5-20 nm range, and FTIR analysis confirmed the composition of the nanoemulsion, with SEM images showing rice bran oil globules within a chitosan network. The NE was tested against clove oil for its antimicrobial properties in Sapota preservation. Results from nutritional, biochemical, and organoleptic tests demonstrated that the rice bran oil-based NE significantly outperformed clove oil and untreated controls. Untreated Sapota spoiled within 4 days, while clove oil-treated fruit showed spoilage by 7th day. Remarkably, the NE-treated sapota exhibited no visible spoilage till 12 days, aside from minor over-ripening due to yeast activity. Overall, the chitosan-rice bran oil NE effectively extended Sapota's shelf life under ambient conditions (25-46°C). In summary, the study highlighted the strategic selection of rice bran oil for the development of chitosan-based nanoemulsion for fruit coating applications, offering both economic and quality advantages for both producers and consumers.

Keywords: Nanoemulsion, rice bran oil, Sapota, chitosan, antimicrobial activity

STBO-06: CARBON EMISSION FROM LAKES

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Abstract:

Lakes are vital source of biodiversity, water for drinking, irrigation, industrial use. Lakes also moderate the climate of surrounding area. It restores, regulate, recharge surface and sub surface water. Lakes are hotspot of carbon cycle which act as sink and source. The disappearance and shrinkage of lakes can lead to increase carbon emission. It causes eutrophication, excess nutrient from agriculture runoff, excessive algae growth often toxic and great impact in diversity altering ecosystem. The main aim of the paper is to overcome this issue by a survey and analysis of plants and trees which reduces carbon emission. This paper also suggests the selection of plants and trees to be planted so that carbon emission can be reduced.

Keywords: Lakes, Carbon Emission, survey, analysis, plants, trees.

STBO-07: Battling Drug Resistance in *Proteus mirabilis* Using Anti-Quorum Sensing Compounds from Actinobacteria

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Abstract:

Antibiotic resistance is a very important problem arousing global health concerns. Antibiotic overuse has resulted in the evolution of multidrug-resistant (MDR) microbial strains. The Global Leaders Group (GLG, United States) on antimicrobial resistance (AMR), warns that AMR causes 1.27 million deaths annually and poses a severe threat to the global economy. Hence, the focus is now diverting towards alternative non-antibiotic therapies for bacterial infections. Quorum sensing (QS) is a bacterial cell-to-cell communication through chemical signals, called autoinducers (AIs) that coordinate group behaviors such as biofilm formation, virulence, and antibiotic resistance. Disruption of the quorum-sensing pathway of pathogenic microbes is considered a novel approach to fight against infectious diseases and prevent drug resistance. *P. mirabilis* is an opportunistic pathogen, especially among hospitalized and/or catheterized patients and menopausal women. *P. mirabilis* exhibits the swarming phenotype which plays a crucial role in the establishment of renal infections responsible for UTI. Despite the availability of various antibiotics, there is an increasing prevalence of multidrug-resistant (MDR) strains of *Proteus mirabilis*. Actinobacteria are a group of gram-positive bacteria known for producing many bioactive compounds including antibiotics. Recently, they have attracted interest for their potential to produce anti-quorum-sensing agents. Research on anti-quorum-sensing agents from actinobacteria is limited and still in its early stages. These compounds can disrupt bacterial communication making them a promising source for new therapies to combat bacterial infections and reduce antibiotic resistance. The current study was planned to isolate actinobacteria and evaluate their anti-quorum sensing (AQS) properties against *P. mirabilis*, the most prevalent causative agent of urinary tract infection.

Keywords: multi-drug resistance, *Proteus mirabilis*, quorum sensing inhibitors, autoinducers, actinobacteria.

STBO-08: Preliminary Phytochemical Analysis And Antimicrobial Activities of Leaf Extracts of Archidendron bigeminum (L.)

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Abstract:

Plant kingdom harbours an inexhaustible source of active ingredients that when explored can play a vital role in various fields and also in the management of human health. Phytochemical analysis helps in understanding the basic components present in plants, they also help in finding and locating chemical constituents which are source of pharmacologically active principles .Hence the present study was carried out to detect preliminary phytochemicals and antimicrobial activities of solvent extracts from the leaves of *Archidendron bigeminum* using standard methods. Qualitative phytochemical analysis were performed on seven different sovents such as Methanol, hexane, acetone, chloroform, petroleum ether,ethyl acetate and water extracts. The extracts showed the presence of Tannins, flavonoids, cardiac glycosides, steroids, terpenoids and saponins.These extracts were further investigated for their antimicrobial activity of different microorganism tests, including bacteria and fungi by using Agar well diffusion method .The extracts exhibited antimicrobial activity against harmful bacteria such as ***Staphylococcus aureus, Escherichia coli, Bacillus subtilis*** and ***Pseudomonas aeruginosa*** and fungi such as ***Fusarium oxysporium*** *and* ***Aspergillus niger*** .The plant appears to be a ideal source for the active phyto-constituent responsible for anti-infective property and also for development of new phyto-medicine against various resistant organisms.

Keywords: Phytoconstituents, Antimicrobial, Pharmacologically *Archidendron bigeminum,*

STBO-09: Qualitative, Quantitative phytochemical analysis and antimicrobial activities of leaf extracts of *Cayratia mollissima* (Planch.) Gagnep

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Abstract:

Phytoconstituents of medicinal plants have been playing an important role in treating or for prevention of various diseases. Plant secondary metabolites have provided important bioactive principles for developing new lead compounds.Vitaceae family members are known to have some important biological activities. Cayratia mollissima is used in folk medicine and also have ethanomedicinal properties. .The present study was mainly focused on evaluation of qualitative, quantitative and antimicrobial activities of leaf extract of Cayratia mollissima. The crude extract of different solvents like Hexane, Petroleum ether, Ethyle acetate, acetone, ethanol and water shows the presence of phytoconstituents like Alkaloids, flavonoids, tannins, phenols, terpenoids, glycosides, steroids and cardiac glycosides. Quantitative analysis revealed good source of Phenols, flavonoids, alkaloids, terpenoids and tannins in the extracts. In antimicrobial assays, the hexane,

chloroform and acetone extracts show more activity against **S.auerus, B. subtilis, E.coli** and **P aeruginosa**. Ethanol and chloroform extracts had moderate activity against all four pathogens and ethyl acetate and aqueous extracts shows no activity against all pathogens. Further isolation of phytochemicals present in different solvent extracts of Cayratia mollissima leaf have great importance as therapeutic agent and used for pharmacological products.

Key words: Phytochemicals, qualitative, quantitative, antimicrobial, Cayratia mollissima.

STBO-10: Isolation and molecular characterization of an edible wild mushroom from Tirumala hills: Identification of novel compounds via LC-QTOF-MS and evaluation of anticancer potential against ovarian cancer

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Abstract:

This study investigates the isolation and identification of bioactive compounds from an edible wild mushroom species sourced from the Tirumala Hills, with a particular emphasis on its therapeutic potential for the treatment of ovarian cancer. The initial identification of the mushroom species was confirmed through molecular characterization techniques. Subsequently, bioactive compounds were extracted using crude aqueous extracts. Metabolite profiling was conducted using Liquid Chromatography Quadrupole Time-of-Flight Mass Spectrometry (LC-QTOF-MS), which facilitated the identification of a diverse array of compounds with potential anticancer properties. In silico molecular docking analyses demonstrated strong interactions of the identified compounds with key ovarian cancer targets, including Vascular Endothelial Growth Factor Receptor (VEGFR) and Poly (ADP-Ribose) Polymerase (PARP), indicating their possible inhibitory effects. Furthermore, in vitro assays will be performed using ovarian cancer cell lines to assess cytotoxicity, complemented by in vivo studies in rodent models to evaluate the efficacy of the crude aqueous extract in inhibiting tumor progression. This comprehensive approach, which integrates metabolomics, computational analysis, and biological studies, lays the groundwork for the development of novel mushroom-based therapeutic agents for the management of ovarian cancer.

Keywords: Edible wild mushroom, LC-QTOF-MS, ovarian cancer, in silico analysis, in vitro evaluation, in vivo study, anticancer therapy.

STBO-11: Qualitative and Quantitative Analysis of Phytochemicals and Anti-bacterial Activities of Meiogyne pannosa [Dalzell] J.S.

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Abstract:

Medicinal plants containing beneficial phytochemicals may supplement the needs of the human body by acting as natural medicine. Annonaceous plants have been konown as source of traditional medicine and several species of Meiogyne have been used as folk medicine. The present study was to investigate the qualitative and quantitative analysis of phytochemicals of Meiogyne pannosa leaves extracts and demonstrate its anti-bacterial activities. The qualitative and quantitative analysis results showed the presence of primary and secondary metabolite in which methanol extract showed highest amount of total phenols, flavonoids, tannins and alkaloids with 20mg, 154.2mg, 37.54mg and 1.72mg respectively followed by Acetone, Ethyl acetate and choloroform extracts. The anti-bacterial activities against gram $+^{ve}$ and gram $-^{ve}$ bacteria with all seven solvents were tested. Hexane and methanol extracts exhibited zone of inhibition against S. aureus, B. subtilis, E. coli and K. pneunomiae of 14mm to 18mm. The results showed that Meiogyne pannosa has significant amount of phytochemicals which has anti-bacterial properties which might help in the development of novel lead drugs for treatment of various diseases.

Key words: Qualitative analysis, Quantitative analysis, Phytochemicals, Anti-bacterial, Meiogyne pannosa.

Abstracts Physics

ABSTRACTS FOR POSTER PRESENTATIONS (PHYSICS)

Abstract ID	Title of the Abstract	Authors
STPP - 01	Synthesis And Characterization of Sm^{3+}-Doped Alkaline Earth Silicate Phosphors for LED Applications	Tejas, Princy A, S Masilla Moses Kennedy, Sudha D Kamath
STPP - 02	Spatial Distribution of ^{210}Po in Soil and Aquatic Vegetation along the Coastal Regions of Udupi, Karnataka, India	Ranjan B Shetty, Sujith S, Y Narayana
STPP - 03	Activity of ^{210}Po in home-grown spices in site specific regions of the foothills of western ghats in southern Karnataka	Sujith S, Ranjan B Shetty and Narayana Y
STPP - 04	Substrate dependent study of properties of surface acoustic waves with symmetric Inter digital transducer: A Multiphysics simulation study	Rajesh Chandrashekhar, Garima Bajpayi, Loukik Manjunath, Aditya Pandey, Gajanan Honnavar
STPP - 05	Preparation and gas sensing properties of Zirconium Dioxide (ZrO_2) thin films by solgel	Laxman N. Bhoye, and Mahendra S. Shinde
STPP - 06	Green synthesis and antibiofilm of ZnO nanostructure: Experimental and Density Functional theory studies	Abhinay Mandawade, Krushna Zoting, Mahendra Shinde, Haribhau Gholap
STPP - 07	Optimizing Cr_2O_3 Thin Films for Optoelectronic Devices using DC Magnetron Sputtering	Gowravi S, Dhananjaya Kekuda
STPP - 08	Photocatalytic Degradation of Methyl Orange Dye Using Aluminium Doped Zinc Oxide Nanoparticles	C. Shalini, K. K. Nagaraja, S. Pramodini
STPP - 09	Single Step Fabrication of Flexible PVA/Ag_2S Nanohybrid Films for UV Shielding Applications	Sumukha M, Shoshankumar N, Shilpa M P
STPP - 10	Effect of Molarity on tailoring Spray-deposited Mn_3O_4 thin films for Supercapacitor applications	Gokul R, Selvakumar M., Mahesha M. G.
STPP - 11	WLED's applications of $CaSiO_3:Eu^{3+}$ nanophosphors synthesized by low temperature Solution combustion technique	Sathisha. S, Manohara. B. M

STPP - 12	Study on the effect of drying temperatures on the properties of CeO_2 thin films	Shrinatha M B, Dr Mohan Rao K
STPP - 13	Synthesis and Characterization of Rare Earth Halide Hybrid Materials for Next-Generation Solar-Cells	Pooja P.Naik, Nagaraja N
STPP - 14	Synthesis and characterization of PVP-coated Dy_2O_3/Pr_2O_3 nanocomposites for multifunctional applications	Kartik Gopal, Sunitha D V
STPP - 15	Silver Quantum Dots: Temperature-Driven Optimization for Advanced Bio sensing and Antimicrobial Efficacy	Kavya H M, Sunita D V
STPP - 16	Electrical properties of the Ni/n-GaN Schottky diode RF-magnetron sputtering Ga_2O_3 interlayer	Aswini, K. Munirathnam and V. Manjunath

STPP – 01: Synthesis And Characterization of Sm^{3+} Doped Alkaline Earth Silicate Phosphors for LED Applications

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Abstract

Recently, there has been a growing interest in luminescence materials triggered with rare-earth ions for application in solid state lighting. However, due to their competing demands for thermal responsiveness, it is difficult to accomplish the aforementioned numerous functions in a single material. The luminescent materials are of great significance in the fields of biological imaging, anti-counterfeiting, solid state lighting applications. Using the solid-state reaction technique, single phase cool light emitting silicate phosphors are effectively synthesized. Using different chemical precursor, grinded well and calcinated to get final product. X-ray diffraction, scanning electron microscopy, Optical analysis and thermal dependent photoluminescence studies have been done to become familiar with the prepared phosphors thermal, optical, morphological, and structural characteristics. XRD confirms the pure monoclinic structure. SEM observations reveal the agglomerated and irregular shape of prepared phosphors. Diffused reflectance spectra were utilized to calculate the material's band gap. Under 403 nm excitation, the as-prepared phosphors show different emissions which correspond to the Sm^{3+} ion transitions such as, $^4G_{5/2}$ à $^6H_{5/2}$, $^4G_{5/2}$ à $^6H_{7/2}$, $^4G_{5/2}$ à $^6H_{9/2}$, and

$^4G_{5/2}$ à $^6H_{11/2}$. Thermal dependent PL revealed optical thermal stability of prepared phosphor at elevated temperature. Thermogravimetry analysis confirms the thermal stability of structure of phosphor at higher temperature. All of these results show that phosphor prepared using the high temperature solid state reaction method shows excellent efficiency and stability to be used in LED applications. The optical thermal stability shows that the phosphors can also be used for optical thermometry applications on further investigation.

Keywords: Phosphors, Luminescence, solid state lighting, Rare earth, Silicates

STPP – 02: Spatial Distribution of ^{210}Po in Soil and Aquatic Vegetation along the Coastal Regions of Udupi, Karnataka, India

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Abstract

The coastal area of Karnataka, India, is distinguished by its abundant biodiversity, distinctive ecosystems, and considerable socio-economic significance. The region is shaped by a variety of land use practices, such as agriculture, fishing, and urban development, all of which have significant effects on environmental health and sustainability. The interplay between natural processes and human actions has resulted in challenges including pollution, habitat destruction, and alterations in biodiversity. This study presents data on activity concentration, transfer factors, and the radiological hazards related to ^{210}Po in aquatic plants located in Brahmavara taluk, Udupi, Karnataka. Alpha scintillation counter was employed to determine the concentration of polonium following its separation by radiochemical analytical methods. The average ^{210}Po activity concentration of soil in that region was found to be 5.8±0.5 Bq Kg^{-1} and of selected aquatic plant varies between 7.3– 64.9 Bq Kg^{-1}. Transfer factor of ^{210}Po in the aquatic vegetations was found to vary from 1.4 to 12.7. Selective accumulation of ^{210}Po was observed in some aquatic vegetation species. The results of this systematic studies are presented and discussed in the paper.

Keywords: Activity Concentration, ^{210}Po, Transfer factor, Aquatic plant, Radiological Hazard.

STPP – 03: Activity of ^{210}Po in home-grown spices in site specific regions of the foothills of western ghats in southern Karnataka

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Abstract

The soil on the foothills of the western ghats is rich in minerals, which supports a diverse range of plant species. Plants absorb minerals from the soil through their roots, and radionuclides are absorbed together with the minerals. Activity concentration, transfer factors, and radiological hazards associated with ^{210}Po are provided by this study for spices and other locally grown food items in Sullia taluk, Dakshina Kannada, Karnataka. Alpha scintillation counter was used to find the activity of Polonium followed by its radiochemical separation. The average ^{210}Po activity concentration in soil of the region was found to be 4.11 ± 0.42 Bq Kg^{-1}. The activity in selected spices varied in the range 3.0 – 7.63 Bq Kg^{-1}. The transfer factor of ^{210}Po in the spice samples was found to be in the in the range 0.72 – 1.85.

Keywords: Activity Concentration, ^{210}Po, Transfer factors, Spices, western ghats.

STPP – 04: Substrate dependent study of properties of surface acoustic waves with symmetric Inter digital transducer: A Multiphysics simulation study

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Abstract

This paper presents a comparative study of two Interdigital Transducers (IDTs) constructed on quartz and lithium niobate substrates. Using COMSOL Multiphysics, we simulated and analyzed key performance metrics, including resonant frequency, electromechanical coupling, and signal transmission. The results revealed significant differences in how acoustic waves propagate through each substrate, primarily due to their distinct material properties. Quartz demonstrated better temperature stability, while lithium niobate exhibited higher electromechanical coupling efficiency, making it a strong candidate for high-frequency applications. These findings provide practical insights into the design and optimization of IDTs for use in sensors and communication devices.

Keywords: Interdigital Transducers (IDTs), Quartz vs. Lithium Niobate, Acoustic Wave Propagation.

STPP – 05: Preparation and gas sensing properties of Zirconium Dioxide (ZrO2) thin films by solgel

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Abstract

In this research work, Zirconium dioxide (ZrO2) nanostructures were successfully synthesized using the sol-gel method. The preparative parameters for nanocrystalline Zirconium Dioxide (ZrO_2) thin films were meticulously optimized. Various characterization techniques, including UV-Vi's spectrometry, Scanning Electron Microscopy (SEM), and X-ray Diffraction (XRD), were employed to comprehensively analyze the synthesized material. UV-Visible analysis revealed a distinct energy band gap value of 4.3 eV for the Zirconium Dioxide (ZrO_2) thin films produced by the sol-gel method. The morphological properties, investigated using SEM, confirmed the formation of nanoparticles. XRD analysis confirmed the presence of the synthesized materials, revealing an amorphous structure at temperatures of 300°C and 500°C. These findings highlight the significant impact of calcination temperature on the structural properties of the Zirconium Dioxide (ZrO_2) nanostructures. The gas-sensing properties of Zirconium Dioxide (ZrO_2) thin films synthesized via the sol-gel method were evaluated using domestic gas sensor units. The films demonstrated significant responsiveness to various gases, including LPG, H2S, NH3, methanol, ethanol, and NO2, over a temperature range from room temperature to 250°C. Notably, the Zirconium Dioxide (ZrO_2) thin films synthesized by the Sol-gel method exhibited the highest sensitivity to LPG gas.

Keywords – Zirconium dioxide (ZrO_2), Thin film, Sol-gel, Gas sensor, Nanoparticles.

STPP – 06: Green synthesis and antibiofilm of ZnO nanostructure: Experimental and Density Functional theory studies

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Abstract - In the present study, we synthesized ZnO nanostructure by using Dioscorea Bulbifera plant tuber extract (DBTE). The green synthesis approach has excellent features such as facile, non-toxic, environment friendly and economical. XRD analysis shows the wurtzite crystal structure and crystallite size determined by using the Debey Scherrer formula, which was found to be 28 nm. UV-Vis spectroscopy reveals a band gap energy of 3.33 eV. PL spectra provide insight into the ZnO nanostructure's defect states and oxygen vacancies. FESEM study reveals mushroom-like surface morphology. In addition to this structural and optical properties studies, we performed an efficiently computational study using density functional theory

(DFT) to demonstrate the electronic properties of ZnO. The calculations done by using LDA approximation with Hubbard U method. The first principal calculations shown the energy band gap value close to the absorption value. The total density of state (TDOS) of ZnO shows all possible orbitals of Zn and O are contributing. We further studied the effectiveness of ZnO nanostructure to inhibit the biofilm formation of Candida albicans (C.albicans). It shows that our sample efficiently inhibited the attachment on the surface and formation of biofilm in C.albicans at very low concentrations of the sample, which was previously not studied very well. The ability of ZnO nanostructure to inhibit biofilm formation may be explored in many other applications in the biological and biomedical fields.

Keywords: ZnO Nanostructure, DBTE, biofilm, candida albicans, Density Functional theory

STPP – 08: Optimizing Cr_2O_3 Thin Films for Optoelectronic Devices using DC Magnetron Sputtering

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Keywords: Chromium Oxide Thin Films, Optoelectronic Devices, p-Type Conductivity, DC Magnetron Sputtering

Abstract

Chromium oxide (Cr_2O_3) thin films, known for their hardness, wear resistance, and insulating properties, have been the subject of recent research due to their potential as p-type transparent conducting materials (TCMs) when doped. This study investigates the deposition and characterization of Cr_2O_3 thin films, optimized for integration into electronic devices like p-n junctions, transistors, and optoelectronic applications.

Using DC magnetron sputtering with varying oxygen percentages (14% to 24%) and an $Ar+O_2$ gas flow ratio of 6 sccm, chromium oxide thin films were deposited onto glass substrates. The structural, morphological, optical, and electrical properties of the films were analyzed using XRD, SEM-EDS, UV-Vis spectroscopy, photoluminescence, and Hall measurement. XRD confirmed the presence of a hexagonal Cr_2O_3 phase with improved crystallinity after annealing at 400°C, while SEM revealed uniform, pinhole-free films with well-packed grains. Optical measurements showed significant absorption in the visible range and band gaps between 2.69 and 3.07 eV, depending on the oxygen flow rate and annealing conditions. Hall measurements indicated p-type conductivity with a carrier density in the range of 10^{15}–10^{17} cm^{-3} across all samples. The results highlight the critical role of oxygen flow rate in tuning the structural and electronic properties of Cr_2O_3 thin films, making them promising candidates for use in transparent electronics and optoelectronic devices.

STPP – 08: Photocatalytic Degradation of Methyl Orange Dye Using Aluminium Doped Zinc Oxide Nanoparticles

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The present work focuses on the photocatalytic degradation of Methyl Orange (MO) dye using Aluminium Doped Zinc Oxide (AZO) nanoparticles. AZO nanoparticles with aluminium dopant with concentration of 3 wt.% was synthesized using sol-gel synthesis method. Structural analysis is performed using X-ray diffraction (XRD) spectroscopy, bandgap of the nanoparticles is calculated using Tauc's plot and chemical bonds are detected using Fourier transform infrared (FTIR) spectroscopic analysis. Using XRD results the crystallite size is found to be 37 nm. The bandgap of the AZO nanoparticles is calculated to be 2.9 eV and the maximum absorption wavelength of MO is found to be 464 nm, using UV-vis absorption spectra. The FTIR analysis revealed the presence of Al-O bonds along with Zn-O bonds in the nanoparticles and confirms the doping. The photocatalytic degradation of MO dye is been studied under UV light for 75 minutes with 50 mg AZO loading. MO dyes showed 99.24 % at the rate of 0.048757 min^{-1} (Figure 1).

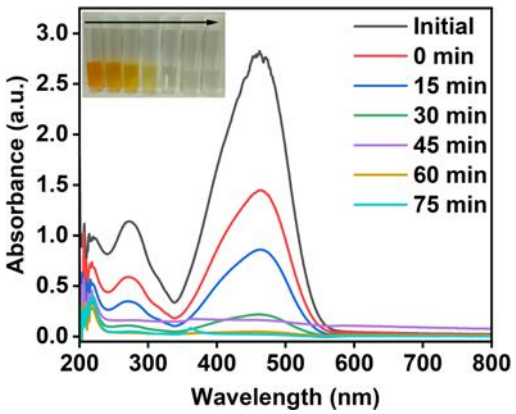

Figure 1. Photocatalytic degradation of MO dye in 75 minutes with 50 mg AZO loading.

Keywords: Photocatalysis, Undoped and Aluminium doped Zinc Oxide, Dye degradation.

STPP – 09: Single Step Fabrication of Flexible PVA/Ag_2S Nanohybrid Films for UV Shielding Applications

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In the current study, the optical, structural, and morphological properties of polyvinyl alcohol (PVA) and silver sulphide (Ag_2S) composites were studied and tested their suitability for UV shielding application. Pure PVA and various weight percentages (0.5, 1, 3%) of PVA/Ag_2S flexible and free-standing

nanocomposite films were synthesized via the solution casting method. The structural, optical and morphological features of composite films were examined using X-ray diffraction (XRD), Fourier transform infrared (FTIR) spectroscopy, UV-visible spectroscopy, and Field emission scanning electron microscopy (FESEM). XRD analysis confirmed the semi-crystalline structure of plain PVA and PVA/Ag_2S composites. The FTIR spectra revealed various bands corresponding to the different bonds in PVA, as well as those resulting from the interaction between PVA and Ag_2S. The surface morphology of the prepared samples obtained using confirmed the formation of composite films with spherical Ag_2S nanostructures. The variation of absorbance, transmittance, bandgap, and Urbach energy as a function of wavelength were investigated via UV-visible spectroscopy. As shown in the absorption spectra, the addition of Ag_2S to PVA significantly increased absorbance in the UV region (200–400 nm) while maintaining transmittance in the visible range, making the composite suitable for UV-shielding applications.

Keywords: Ag_2S; PVA; UV-shielding; Urbach energy

STPP – 10: Effect of Molarity on Tailoring Spray-Deposited Mn_3O_4 Thin Films for Supercapacitor Applications

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Abstract

Energy storage technologies have become increasingly critical in modern energy systems, enabling the integration of renewable energy sources, enhancing grid stability, and improving energy utilization efficiency. Manganese oxide (Mn_3O_4) is a promising material for energy storage applications like supercapacitors due to its mixed valence states, enabling reversible redox reactions. In this study, Mn_3O_4 thin films were synthesized via pneumatic spray pyrolysis on stainless steel (SS-304) substrates using manganese acetate ($Mn(CH_3COO)_2 \cdot 4H_2O$) as a precursor, with varying concentrations (0.1M to 0.4M). All samples were annealed at 400°C, an optimized temperature through thermogravimetric analysis (TGA) and differential scanning calorimetry (DSC), ensuring the formation of Mn_3O_4. Characterization by Grazing Incidence X-ray Diffraction (GI-XRD) confirmed the formation of the cubic hausmannite Mn_3O_4 phase, with improved crystallinity at higher precursor concentrations. Scanning Electron Microscopy (SEM) revealed porous, wire-like morphologies with larger pore sizes corresponding to increased precursor concentrations. Electrochemical characterization demonstrated pseudocapacitive behavior, including cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS). The highest specific capacitance of 8.34 F/g was observed for the sample with a 0.1M precursor concentration. Additionally, EIS results showed low charge transfer resistance (Rct) and series resistance (Rs), confirming favorable electrochemical performance.

These findings suggest that Mn_3O_4 thin films annealed at 400°C, particularly those synthesized with a 0.1M precursor, possess excellent properties for supercapacitor electrodes.

Keywords: Energy Storage, Supercapacitors, Manganese Oxide (Mn_3O_4), Spray Pyrolysis.

STPP – 11; WLED's applications of $CaSiO_3:Eu^{3+}$ nanophosphors synthesized by low temperature Solution combustion Technique

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Abstract

$CaSiO_3:Eu^{3+}$ (9 mol %) red emitting nanophosphors have been synthesized by a low-temperature solution combustion technique. The phosphors have been well characterized by powder X-ray diffraction (PXRD), Field emission scanning electron microscopy (FESEM), Fourier transform infrared spectroscopy (FTIR) and UV Visible spectroscopy. PXRD patterns reveal monoclinic $CaSiO_3$ phase which can be obtained for calcining the samples at 900 °C for 3 h and the average particle size of the prepared samples is about 30 nm as calculated by Scherer's formula. The FESEM micrographs show that crystallites are of irregular shape. Fourier infrared (FTIR) spectroscopic analysis confirms the material and identifies the chemical functional groups in the sample. The energy band gap of all samples are in the range of (5.6) eV. Photoluminescence spectra (PL) of the phosphors recorded for excitation wavelength at 316 nm show characteristic emission 615 nm of transition $^5D_0 \rightarrow {}^7F_9$ of the Eu^{3+} ions. Since CIE and CCT values are situated in the red regions, prepared phosphor might be useful in red component of WLED's and can also be used in solid state display applications.

Keywords: Nanophosphor; Solution combustion; Emission spectra; Red LED.

STPP – 12: Study on the effect of drying temperatures on the properties of CeO_2 thin films

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This study explores the influence of drying temperatures on the structural, optical, and electrical properties of spin-coated ceria (CeO_2) thin films. X-ray diffraction (XRD) analysis confirms a cubic crystal structure with a predominant (111) orientation, where higher preheating temperatures result in increased crystallite

size, indicative of enhanced crystallinity. Surface morphology investigations using FESEM and AFM show that the films' smoothness and uniformity improve as the preheating temperature rises from 200°C to 300°C. The films exhibit high transparency, with a slight increase in the energy band gap corresponding to a decrease in Urbach energy, pointing to reduced structural disorder. Photoluminescence (PL) spectra reveal emission peaks between 350 and 500 nm associated with oxygen vacancies. Additionally, the electrical resistivity of the films decreases with rising drying temperatures, particularly between 250°C and 300°C, due to reduced grain boundary scattering. These results demonstrate that drying temperature plays a crucial role in tailoring the properties of ceria thin films, making them potential for various technological applications such as sensors and catalysis.

Keywords: Cerium oxide, thin films, spin coating, pre-heating, oxygen vacancies

STPP – 13: Synthesis and Characterization of Rare Earth Halide Hybrid Materials for Next-Generation Solar-Cells

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Abstract:

In this research work, we prepared Europium di-iodide (EuI_2) rare-earth iodides by using an Environmentally friendly thermal treatment using Vacuum desiccation mechanism. To develop and apply these scintillators effectively, it is crucial to have an efficient and economical method to produce high-purity Europium di-iodide (EuI_2). We conducted a comparative study on the solid-state synthesis mechanism of Europium di-iodide by using X-ray Diffraction (XRD) and fluorescence spectroscopy. The powdered samples shows the Orthorhombic crystal system. The photoluminescence excitation spectrum of Europium di-iodide at 365nm is recorded and studied, because of their luminescent features like, most emission intensity peaks, and high color intensity at higher wavelengths.The High temperature synthesis process of individual Europium iodide was found to be as EuI_2. Europium di-iodide is a versatile electron transfer agent, exhibiting unique properties. The importance of EuI_2 will be discussed. This study presents a groundbreaking, environmentally friendly approach to synthesizing Europium di-iodide (EuI_2) rare-earth iodides is used in solid-state lasers for infrared emission and also improves LED colour quality and efficiency. Rare-earth iodides, particularly Europium di-iodide (EuI_2), have garnered significant attention for their potential applications in scintillation technology, which requires efficient and economical production methods. Scintillators are materials that emit light when excited by radiation, making them crucial in medical imaging, nuclear physics, security screening, and environmental monitoring.

Keywords: (Rare-earth, EuI_2, Photo Luminescence, Scintillators, X-ray diffraction.)

STPP – 14: Synthesis and characterization of PVP-coated Dy_2O_3/Pr_2O_3 nanocomposites for multifunctional applications

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Abstract

This study presents the synthesis and characterization of Dy_2O_3/Pr_2O_3 nanocomposites prepared through a solution combustion method, followed by coating with polyvinylpyrrolidone (PVP) polymer using a simple solution method. The Dy_2O_3/Pr_2O_3 nanocomposites were synthesized using metal nitrates as precursors and urea as fuel. Characterization techniques such as X-ray diffraction (XRD), scanning electron microscopy (SEM), and energy-dispersive X-ray spectroscopy (EDS) confirmed the successful formation of Dy_2O_3/Pr_2O_3 nanocomposites with well-defined crystalline phases and surface morphology. Fourier transform infrared (FT-IR) spectroscopy revealed the presence of PVP on the nanocomposite surface, contributing to enhanced stability and dispersibility. The PVP-coated nanocomposites exhibited promising properties for a range of advanced applications. In particular, their luminescent characteristics make them highly suitable for **Light-emitting diodes (LEDs),** where they will be employed to enhance energy efficiency and color tunability. Additionally, the PVP-coated Dy_2O_3/Pr_2O_3 nanocomposites demonstrate significant potential in **anti-counterfeiting** technologies, leveraging their unique optical properties for secure labeling and tracking. Furthermore, their application in **latent fingerprinting** offers new opportunities for forensic science, where the nanocomposites can enhance contrast and resolution. This research contributes to the development of multifunctional nanomaterials with tailored properties, advancing technological applications in LEDs, anti-counterfeiting measures, and forensic fingerprint applications.

Keywords: Light Emitting Diodes (LEDs), Anti-Counterfeiting, Latent Fingerprinting, Solution Combustion Method

STPP – 15: Silver Quantum Dots: Temperature-Driven Optimization for Advanced Bio sensing and Antimicrobial Efficacy

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Abstract

Silver quantum dots (AgQDs) have received a lot of attention due to their outstanding optical, electronic, and antimicrobial properties, which make them promising candidates for bio sensing and antimicrobial applications. In the work presented here, the synthesis and optimization of AgQDs by the careful variation of temperature and reaction time are explored. Synthesis of AgQDs is also carried out through a simple wet-chemical method. Here, 0.02 grams of silver nitrate $AgNO_3$is dissolved in 25 ml of DI and 2 grams of sodium hydroxide NaOH is introduced under continuous stirring for 2 hours. Optimization of the reaction was carried out at three different temperatures: 140°C, 160°C, and 180°C, and reaction times: 6, 8, and 12 hours

for studying the effects of size, shape, and photo-luminescence properties on AgQDs. The characterizations of the synthesized quantum dots were further performed through several techniques such as UV-Vis spectroscopy, X-ray diffraction (XRD), transmission electron microscopy (TEM), and dynamic light scattering (DLS). These methods revealed that the crystalline structure and particle size were systematically sensitive to temperature and time, crucial parameters for optimizing both the bio sensing and the antimicrobial efficacy of AgQDs. AgQDs synthesized at 160°C for 8 hours were the best for bio sensing because of their superior stability and enhanced fluorescence. Meanwhile, antimicrobial efficacy of AgQDs was also performed against a large number of strains of bacteria, showing appreciable antibacterial activity, placing AgQDs as promising candidates for biomedical and surface sterilization uses.

Keywords: Silver Quantum Dots, Bio sensing, Antimicrobial Efficacy, Temperature Optimization, Photoluminescence

STPP–16: Electrical properties of the Ni/n-GaN Schottky diode RF-magnetron sputtering Ga_2O_3 interlayer

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Abstract:

We report on the influence of incorporation of Ga_2O_3 interlayer at the interface of Ni/GaN MS diode by means of RF-Magnetron sputtering technique. The fabricated Ni/Ga_2O_3/n-GaN MOS diodes have been analysed using I–V measurements and were extended to a voltage range of ± 4 V. The Schottky diode parameters for instance schottky barrier height (Φ_b), ideality factor (n) and series resistance (R_S) values are evaluated using I–V curves at room temperature. The Φ_b and n values of the MS and MOS diodes were estimated to be 0.78 eV and 1.35, and 0.83 eV and 1.11, respectively. A higher Φ_b was attained for the MOS diode compared to the MS, which enabled the Ga_2O_3 interlayers to alter Φ_b. The Φ_b values are derived from the I–V, Hernandez, Cheung, and surface potential methods and the derived values were comparable to one another, which indicates their consistency and validity. The density of the interface state (N_{SS}) of the MOS diode decreased compared to MS, which indicates that the interlayer influence the N_{SS} of the MS boundary. The forward bias log (I) − log (V) curve of the MS and MOS Diode revealed the ohmic nature in low-voltage regimes and space-charge-limited conduction in high-voltage regimes. The results show that the Poole–Frenkel emission dominates the reverse leakage current of the MS and MOS diode. These outcomes indicate that Gallium oxide (Ga_2O_3) interlayer can be chosen as dielectric materials in the construction of MOS devices.

Keywords: MOS devices, Gallium oxide (Ga_2O_3), barrier height(Φ_b), GaN semiconductor, Electrical properties.

ABSTRACTS FOR ORAL PRESENTATIONS (PHYSICS)

Abstract ID	Title of the Abstract	Authors
STPO-01	Crystal structure, Hirshfeld surface analysis, DFT and Molecular docking studies of ethyl 5-amino-2-bromoisonicotinate	Harish Kumar M Devarajegowda H. C, Palakshamurthy B. S, Santhosh Kumar S and Harishkumar S
STPO-02	Synthesis and Luminescence properties of $Ca_2MgWO_6:Eu^{3+}$	Kiran R, Princy A, S Masilla Moses Kennedy, Sudha D Kamath
STPO-03	Hafnium Oxide Thin Films: A Comprehensive Review on Deposition Techniques and Functional Applications	Jayashri Kori, Ashith V K
STPO-04	Experimental and Theoretical Study of Mn doped Ceria	Chaitanya Khade, Krushna Zoting, Haribhau Gholap
STPO-05	Zn_2SnO_4 nanoparticles for photocatalytic degradation of antibiotics: Experimental and Density Functional theory studies	Haribhau Gholap, Maya Khater, Abhinay Mandawade, Krushna Zoting, Babita Agarwal, Rutuja Lahane
STPO-06	Study of Cu and Al doped CdS quantum dots for thermoelectric energy conversion	Krushna Zoting, Om Jadhav, Ankit Kumar, Haribhau Gholap
STPO-07	Enhancing Space Navigation and Control Through Quaternion Applications	S.Shreemathi Giri, Chandana S.Naik
STPO-08	Designing a Wearable Solid-State Supercapacitor with Nanostructured Polypyrrole Composite	Vijeth H, Yashaswini M, Devendrappa H
STPO-09	Phosphorus and boron Co-Doped TiO_2 Nanoparticles Anchored on Graphitic Carbon Nitride Nanosheets: Enhancing Photocatalytic Activity for Environmental Remediation	U. J. Ramesh and Babu, K. Mahendra
STPO-10	Effect of temperature on structural and optical properties of carbon quantum dots	Rajeshwari.B.Rotti, Nanditha.E, Nagaraju G, Girish M Gouda, D.V Sunitha

STPO-11	Effect of Agate-Mortar activation on the development of Calcium Copper Titanate based Electroceramics	Saptarshi Mukherjee, Soumya Mukherjee
STPO-12	Synthesis of Novel $SrMoO_4$ doped Er(III) nanocomposite for the enhanced Photocatalytic dye degradation application	Arpitha H J, Sunitha D V
STPO-13	Bottom electrode dependent Resistive switching based on Titanium dioxide	Vindya Shetty, P. Anjaneyulu, Deepak K
STPO-14	Current Voltage (I-V) Characteristics of Chromium Based Metal Organic Framework	Udumu Mounika Reddy, Deepak K
STPO-15	Synthesis, Characterization and Studies of Electrical conductivity of Polyaniline – Activated Carbon nanocomposites	Basheerabegum Faniband, Sarvesha Chandra S, Jayadev Pattar
STPO-16	Synthesis of Zinc Vanadium Oxide (ZnV_2O_6) nanoparticles for Photocatalytic Degradation of Methylene blue dye.	Anand S, Manu V, Mounika N, Vinutha N and Jyothi T P
STPO-17	Average Size and Shape of Dengue Fever Virus effected Pediatric Red Blood Cells by Laser Diffraction Technique	Syed Mohammed Shoaib, Kaleem Ahmed Jaleeli, H Aleem Basha, R Jeevan Kumar, and Adeel Ahmad
STPO-18	Sustainable Railway Sleepers: A Comparative Study on Mechanical Properties of Recycled Concrete Aggregate and Natural Aggregate Sleepers	Premlatha K Naidu, Jagdish Godihal
STPO-19	Enhanced device performance of $CuBi_2O_4/SnS_2$ solar cell by addition of ZnO as window layer	Puneeth Kumar P, Kunal J Tiwari, Piraviperumal Malar, Prem Kumar D S

STPO-01: Crystal structure, Hirshfeld surface analysis, DFT and Molecular docking studies of ethyl 5-amino-2-bromoisonicotinate

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Abstract

In the title compound $C_8H_9BrN_2O_2$ the torsional angle between isonicotine and ethyl group (C6-O1-C7-C8) is -179.99(2)°. The molecule in the crystal is stabilized by N—H···N interaction forming S(5) zigzag chain along [010]. In addition, there are N—H···O and C—H···O intra molecular interactions that stabilizes the molecular structure. The most significant contributions to the Hirshfeld surface arise from H···H (33.2%), Br···H/H···Br (20.9%), O···H/H···O (11.2%), C···H/H···C(11.1%) and N···H/H···N(10%) contacts. Topology of 3D energy framework is generated to calculate total interaction energy using B3LYP/6-31G(d,p) model. The net interaction energy for the title compound are E_{ele}=59.2 kJmol^{-1} and E_{pol} =15.5 kJmol^{-1}, E_{dis}= 140.3 kJmol^{-1} and E_{rep}= 107.2 kJmol^{-1} with a total interaction energy E_{tot}=128.8kJmol^{-1}. Therefore, E_{dis} is more. The molecular structure is constructed and optimized by density functional theory (DFT) at the B3LYP/6–311+G(d,p) level. The theatrical and experimentally obtained parameters are compared. the frontier molecular orbitals HOMO and LUMO are generated. The energy gap ΔE is 4.0931eV. The MEP is generated to identify active sites in the molecule. The molecular docking was carried out with the title compound (ligand) and the breast cancer protein (PDB ID:6NM0), that reveals a moderate binding affinity of -5.4kcalmol$^{-1.}$

Keywords: crystal structure, Hirshfeld surface, DFT studies, Molecular docking, isonicotinate.

STPO-02: Synthesis and Luminescence properties of $Ca_2MgWO_6:Eu^{3+}$

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Abstract

In the present study, we have synthesized $Ca_2MgWO_6:Eu^{3+}$ phosphors using the solid-state reaction method. We began by accurately weighing calcium carbonate ($CaCO_3$), magnesium oxide (MgO), tungsten trioxide (WO_3), and europium oxide (Eu_2O_3). These materials were ground together for 1 hour to ensure homogeneity. The mixture was subsequently subjected to thermal treatment in a furnace, first at 600 °C for 5 hours, followed by a second firing at 1200 °C after intermediate grinding. Following the synthesis, we confirmed the successful formation of the desired product using X-ray diffraction (XRD) analysis. To optimize the concentration of Eu^{3+} ions within the Ca_2MgWO_6 matrix, we use photoluminescence emission spectroscopy to determine the optimal dopant concentration for enhanced emission. Additionally, we performed FTIR to analyze the functional groups present, while SEM provides insights into the morphological characteristics of the synthesized materials. Furthermore, we employed thermoluminescence (TDPL), diffuse reflectance spectroscopy (DRS), and thermogravimetric analysis (TGA) to investigate the

optical performance and thermal stability of the phosphors. The findings from these studies indicate that $Ca_2MgWO_6:Eu^{3+}$ can be used for lighting applications.

Keywords: Phosphor, Luminescence, Thermal sensing, Optical properties, LED

STPO-03: Hafnium Oxide Thin Films: A Comprehensive Review on Deposition Techniques and Functional Applications

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Abstract

Hafnium oxide (HfO_2) thin films have garnered significant attention due to their exceptional thermal stability, high dielectric constant, and wide bandgap, making them highly suitable for a variety of applications such as gate dielectrics, optical coatings, ferroelectric devices, and photovoltaics. This review provides an in-depth analysis of the synthesis and characterization of HfO_2 thin films fabricated through chemical deposition techniques. Emphasis is placed on understanding the structural, optical, and electrical properties of these films and their influence on photovoltaic performance. Key factors such as film thickness, surface morphology, and optical absorption are critically examined to optimize the efficiency of HfO_2-based devices. Additionally, recent advancements and future perspectives are discussed, highlighting strategies to enhance the performance of HfO_2 thin films for next-generation solar cells and other advanced technologies.

Keywords: Oxides, Thin Films, Deposition Techniques, Applications, Sustainable Energy

STPO-04: Experimental and Theoretical Study of Mn doped Ceria

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Abstract: -

Ceria (CeO_2) or cerium oxide is a versatile material widely used in various catalytic and electronic applications. Doping CeO_2 with transition metals, such as manganese (Mn), is a promising approach to enhance its efficiency and stability. Ceria and Mn doped ceria was synthesis by simple Co-precipitation route. XRD shows ceria-based crystal shows cubic structure and no indication of additional peaks occurs due to impurities. UV-Vis Abs spectra show absorption peak with broader shoulder could be identified in the wavelength scope of 460 and 475 nm for the pure and the doped samples. The evaluated band gap values for the pure and the Mn-doped ceria on basis of touc function and it's observed at 2.7 and 2.6 eV, respectively. FESEM determine the surface morphology, and it is clearly observed that the particles that

are highly aggregated are of permeable nature. This affirms the decrease in crystalline size essentially by adding Mn particles to CeO2 host. Density Functional theory (DFT) is used to analyse a theoretical aspect of Ceria and Mn doped ceria. First principle calculation is done for calculating total energy of system by Schrodinger's equation. Were band structure calculation gives shifting between band gap of ceria and Mn-doped ceria and in case of Mn-doped new energy state form near conductional band (CB). Partial density of state shows 5d orbital of Ce has more contribution in CB in total density of state. While 2p orbital contributes in VB. In Mn-doped Ceria CB has contribution of 3d orbital of Mn.

Keywords: Cerium oxide (CeO_2), Mn doped Ceria, DFT, Band Structure, PDOS.

STPO-05: Zn_2SnO_4 nanoparticles for photocatalytic degradation of antibiotics: Experimental and Density Functional theory studies

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Abstract: In the present study we successfully synthesized Zn_2SnO_4 nanoparticles (ZTO NPs) by a green approach using Aegle marmelos leaf extract. The synthesized Zn_2SnO_4 NPs were characterized by various techniques XRD study confirmed the phase purity with the inverse spinel structure and average crystallite size of 11.04 nm. The optical property of sample was examined by UV-Vis spectroscopy the energy band gap was found to be of 3.80 eV which was higher owing to the quantum size confinement effects. XPS spectra confirms the presence of Zn, Sn and oxygen and surface chemistry of ZTO NPs. The FESEM pictures show spherical morphology. The TEM and HRTEM images show 10-15 nm size of nanoparticles and SAED patterns also support to XRD about the crystal structure. DFT calculations was done GGA-PBE approximation and effective energy. The first principle calculations shown the energy band gap value very close to the experimental value. The photocatalytic degradation of antibiotics as an environmental application of ZTO NPs for the degradation of Norfloxacin, Metronidazole and Tetracycline is focused in this study highlighting their photocatalytic transformation under various reaction conditions. Effect of various physical parameters like temperature, time, pH, and rate of agitation were studied for photocatalytic degradation of Norfloxacin, Metronidazole and Tetracycline by ZTO NPs Considering the high efficiency of this process under real conditions, it can be used for the removal of antibiotic pollutants from wastewater.

Key words: ZTO NPs, DFT, Norfloxacin, Metronidazole, Tetracycline

STPO-06: Study of Cu and Al doped CdS quantum dots for thermoelectric energy conversion

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Abstract: - CdS QDs have created a lot of interest in recent years as a potential material for thermoelectric applications due to their unique electrical and thermal transport functions at the nanoscale. In this study we synthesized Cu doped and Al doped CdS QDs by simple wet chemical route at room temperature. The synthesized doped materials are characterized by techniques such as XRD illustrate that both Cu and Al doped CdS QD crystals have the cubic zinc-blende structure; lattice structure is unaffected by doping. The minor difference between the lattice parameters is due to the substitution of by and ions. The PL spectra show that CdS QDs have a broadband surface trapped defect emission centered at 487 nm, whereas Cu doped QDs show a broad Cu-emission centered at 488 nm and Al doped QDs show a broad Al-emission centered at 490 nm, indicating that nonradiative recombination is suppressed, verifying the Cu and Al doping. A density functional theory (DFT) investigation reveals that CdS with VB largely contributes 2P orbital of S and CB contributes 2P orbital of Cd, but in the case of a doped sample, additional states emerging from Cu orbitals and Al orbitals near the VB maxima. The partial density of states (PDOS) reveals that Cu and Al have orbital contributions in the energy scale is according to their electronegativity. Here we are optimizing the carrier concentration as well as engineering the bands to achieve high thermoelectric properties.

Keywords: - CdS, Quantum dots, doped, DFT, Thermoelectric.

STPO-07:Enhancing Space Navigation and Control Through Quaternion Applications

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Abstract

Quaternions have become an essential mathematical tool in the field of space navigation and control, offering distinct advantages over conventional methods such as Euler angles and rotation matrices. This paper examines the diverse applications of quaternions within aerospace engineering, focusing on their roles in attitude representation, inertial navigation systems (INS), and satellite orientation control. By providing a compact and singular representation of three-dimensional orientations, quaternions effectively eliminate issues like gimbal lock and enable smooth interpolation between different orientations. Additionally, they enhance control algorithms, allowing for precise adjustments in spacecraft orientation and improving the

integration of data from multiple sensors. Through a detailed analysis of these applications, this study underscores the importance of quaternions in enhancing navigation accuracy and efficiency in complex aerospace environments, thereby contributing to the reliability and success of contemporary space missions.

Key words: Quaternions, Eulers angles, Gimbal lock, Navigation.

STPO-08: Designing a Wearable Solid-State Supercapacitor with Nanostructured Polypyrrole Composite

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Abstract

Nickel oxide (NiO) is a promising electrode material in supercapacitor (SC) applications, but the poor electronic conductivity and weak electrochemical stability of NiO limits the fast charge/discharge rate and long-time reuse. Herein we report a core-shell nanostructure formed by NiO nanoparticles decorated on polypyrrole nanotube (PNT) through a chitosan (CS) layer (NiO/CS-PNT), as a supercapacitor electrode material. The PNT is synthesized using a self-degradable soft-template approach. The one-dimensional (1D) nanotube structure gives increased surface area to polypyrrole (PPy). The inevitable aggregation of the NiO nanoparticles is reduced by the incorporation of CS, thereby increasing the surface area of the active material and bringing the higher electrochemical performance. NiO/CS-PNT core-shell nanostructure is found to have a large surface area, low charge transfer resistance (R_{ct}) and high specific capacitance (C_{sp}) as compared with that of NiO/PNT and pure PNT. Besides, an all-solid-state symmetric supercapacitor (SSC) was fabricated with NiO/CS-PNT as positive and negative electrode, which shows high power density (PD) of 4045.69 Wkg^{-1} at an energy density (ED) of 27.80 Wh Kg^{-1}. Also, an outstanding cyclic stability was found with capacitance retention of 84.90 % even after 10000 cycles. The results demonstrate that the NiO/CS-PNT core-shell nanostructure is a favorable electrode material for supercapacitors.

Keywords: Polypyrrole, Nickel Oxide, Nanotube, Supercapacitor, Energy density.

STPO-09: Phosphorus and boron Co-Doped TiO_2 Nanoparticles Anchored on Graphitic Carbon Nitride Nanosheets: Enhancing Photocatalytic Activity for Environmental Remediation

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Abstract

This study presents the synthesis and characterization of phosphorus - boron co-doped titanium dioxide (TiO_2) nanoparticles anchored onto graphitic carbon nitride (g-C_3N_4) nanosheets via direct sonochemical method. The primary goal of the current study was to increase photocatalytic activity for use in environmental remediation. A simple and scalable method for creating composite photocatalysts with distinct structures using sonochemical method. The successful anchoring of phosphorus-boron co-doped TiO2 nanoparticles onto g-C_3N_4 nanosheets was confirmed by structural and chemical analyses using X-ray diffraction (XRD), transmission electron microscopy (TEM), and Fourier-transform infrared spectroscopy (FT-IR). With its unique Z-Scheme heterojunction structure, the resultant composite allowed for effective charge separation and improved photocatalytic activity. Methylene blue and methylene orange, which are model organic pollutants that are exposed to both UV and visible light, were used to measure the photocatalytic activity. The phosphorus - boron co-doped TiO_2/g-C_3N_4 composite demonstrated significantly improved efficiency compared to pristine TiO_2 and g-C_3N_4 counterparts, showcasing its potential for environmental remediation.

Keywords: TiO_2 nanoparticles; Graphitic carbon nitride; Photocatalysis.

STPO-10: Effect of temperature on structural and optical properties of carbon quantum dots

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Abstract

Carbon quantum dots (CQDs) are novel class of material, grabbed a lot of engrossments as a promising light emitting material. CQDs have drawn attention due to unique properties such as bio-compatible, cost efficient, non-toxic. They exhibit a tunable band gap and emission due to size dependent and quantum confinement effect. CQDs are synthesized using lemon juice by hydrothermal synthesis at different temperatures and time periods. The colloidal solution obtained is dried in a hot air oven. Further, CQD were characterized to understand the structural, optical and luminescence properties. The powder x-ray diffraction, fourier transform infrared spectroscopy and UV-Visible results reveals the effect of synthesis temperature and time on structural and optical properties of CQDs. In addition, PL studies were carried out to optimize the synthesis temperature of CQDs for optoelectronic applications.

STPO-11: Effect of Agate-Mortar activation on the development of Calcium Copper Titanate based Electroceramics

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Abstract

Calcium copper Titanate (CCTO) is a novel electro-ceramic material with exceptionally high dielectric permittivity, making it a promising candidate in the field of energy storage and capacitors. In this work, we synthesized CCTO by mixing AR-grade precursors of CaO, CuO, and TiO_2 in a molar ratio of 1:3:4 which were subjected to a dry agate-mortar activation to optimize phase evolution through a solid-state process. In the first case, the mixture was activated for three hours, which was followed by a step annealing process at various temperatures and durations. X-ray diffraction (XRD) analysis indicated the presence of the CCTO phase along with some impurities from unreacted oxide precursors. In the second case, the activation duration was extended to 15 hours, after which the material was annealed at 950°C for 24 hours with a controlled heating schedule. XRD results showed significantly improved CCTO phase formation with negligible impurities. The crystallite size was estimated at approximately 59 nm using Scherrer's formula. The bonding was studied using FTIR analysis in the pellet form which confirmed the presence of the required M-O coordination for the synthesized sample. The morphological analysis was done using SEM which revealed a dense structure with particulate being polygonal, spade-like or irregular in shape. The low porosity noted in the sample indicates an interlocked microstructure.

Keywords: Agate mortar, CCTO, Phase, Morphology, Bonding

STPO-12: Synthesis of Novel $SrMoO_4$ doped Er(III) nanocomposite for the enhanced Photocatalytic dye degradation application

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Abstract

Photocatalytic degradation of organic dyes was analysed using $SrMoO_4$ and Er^{3+} doped $SrMoO_4$ from aqueous solutions and meanwhile photoluminescence properties of the doped and pure was screened. Hydrothermal method was used for the synthesis, further the composite was eventually characterized using, Powder X-ray diffraction (XRD), Fourier-transform infrared spectroscopy (FT-IR), UV-Vis diffuse reflectance spectroscopy (UV-vis DRS), Scanning electron microscopy (SEM), Transmission electron microscopy (TEM), and photoluminescence properties. Further, the photocatalytic activity of the composites was examined and it degraded the carcinogenic methyl orange dye under UV light for a time duration of 180 minutes, 84 % of degradation was obtained. The potential of catalyst towards different pH level was investigated a pH of 11 was the optimum where the degradation was achieved when compared to all other dopant concentration with time duration of 180 minutes. Dye degradation efficiency was checked for Methyl orange (MO) and was more efficient in the uptake process.

Keywords: Photocatalytic degradation, photoluminescence, Hydrothermal

STPO-13: Bottom electrode dependent Resistive switching based on Titanium dioxide

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Abstract

This paper investigates the impact of the bottom electrode material on the resistive switching characteristics of titanium dioxide (TiO_2) nanosheet-based memory devices. In this work, metal-insulator-metal (MIM) - like structure device is fabricated where TiO_2 nanosheet is active layer with silver (Ag) as top contact and bottom contacts used are Fluorine doped tin-oxide (FTO), Indium doped tin-oxide (ITO), Platinum (Pt) and Gold (Au). It is observed that resistive switching of two orders is obtained for device Ag/TiO_2/FTO (D1) and Ag/ TiO_2/ITO (D2) with bottom contacts as FTO and ITO. Space charge limited conduction (SCLC) mechanisms are dominated conduction mechanisms for D1 to D2. Negligible resistive switching has been observed for devices Ag/ TiO_2/ Pt (D3) and Ag/ TiO_2/ Au (D4) where Pt and Au are the bottom electrodes. Schottky emissions are the dominant conduction mechanism for D3 and D4. Since D1 and D2 are showing resistive switching of two orders which makes it suitable for memory applications.

Keywords: resistive switching, memory devices, bottom electrodes, Space charge limited conduction (SCLC), Schottky emission.

STPO-14: Current Voltage (I-V) Characteristics of Chromium Based Metal Organic Framework

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Abstract

In this study, we investigate the electrical characteristics of Chromium-based Metal Organic Frameworks (Cr-MOFs) synthesized through a co-precipitation method. The resulting solution is optimized and deposited onto a conductive surface using spin coating, yielding uniform thin films. A simple two-terminal device architecture is fabricated, comprising a Metal/MOF/Metal structure, where Silver (Ag) serves as the top electrode and Fluorine-doped Tin Oxide (FTO) as the bottom electrode, with the Cr-MOF acting as the active material. Our electrical characterization involves Current-Voltage (I-V) measurements at room temperature, revealing distinct conduction mechanisms: ohmic conduction predominates at positive voltages, whereas Space Charge Limited Conduction (SCLC) mechanism governs at negative voltages.

Keywords: Metal Organic Framework, ohmic conduction, Space Charge Limited Conduction

STPO-15: Synthesis, Characterization and Studies of Electrical conductivity of Polyaniline – Activated Carbon nanocomposites

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Abstract

Activated carbon doped polyaniline nanocomposites was synthesised using in-situ chemical oxidative polymerization method of varies wt.% of activated carbon. The synthesised composites was further characterized by FTIR, XRD, SEM, DC and AC conductivity to investigate the charge transport mechanism and dielectric studies. AC conductivity and dielectric characteristics of the composites were analysed within the frequency range of 100 Hz – 2 MHz. At higher frequencies all samples obey Jonscher's power law. The DC conductivity increases with addition of activated carbon up to 20 wt.% due to hopping of charge carriers from low level to high energy level, further decreases due to blocking of charge carriers at interfaces. The dielectric constant and dielectric loss was increased up to 20 wt.% and thereafter the value decreases with respect to applied frequency.

Keywords: Polyaniline, Nyquist Plot, AC conductivity, Dielectric properties, Activated Corban.

STPO-16: Synthesis of Zinc Vanadium Oxide (ZnV_2O_6) nanoparticles for Photocatalytic Degradation of Methylene blue dye

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Abstract

Zinc Vanadium Oxide Nanoparticles were synthesized by varying temperature through solution combustion method using zinc nitrate and ammonium meta vanadate as raw materials and urea as fuel. For the photocatalytic degradation of methylene blue dye due to its high toxicity effect in water resources. Most of the chemicals involved in the preparation of methylene blue dye produces toxic gases after their use in the industries. The potential of Zinc Vanadium Oxide which acts as photo catalyst was investigated by degrading methylene blue dye by photocatalytic activity. To degrade such harmful chemicals released in the water resources Zinc Vanadium Oxide nanoparticles plays a crucial role on photocatalytic degradation process. In this study, we discussed about the Zinc Vanadium Oxide nanoparticles on photocatalytic degradation of methylene blue dye. The thermally treated material subjected to PXRD (Powder X-ray diffraction) studies confirms monoclinic structure which corresponds to the plane miller indices with (1,1,0), (2,2,0), (1,1,1) and (3,1,1) respectively (According to JCPDS NO: 74- 1262) The grain size of zinc vanadium oxide nano powder is calculated by using Debye-Scherrer's formula calculated to be average crystallite size is 21.3nm. The band gap of the sample determined by Diffusion reflectance spectra by plotting Kubelka Munk function versus energy. E_g is found to be 2.38eV. The FTIR spectrum of Zinc Vanadium Oxide Nanoparticles was found to consists of characteristic absorption peaks. It is a well known demonstrated for the high level application for the degradation of organic pollutants under visible radiation. The degradation of methylene blue dye was

performed at different conditions of variables like catalyst dose, reaction time and dye initial concentration shows a valuable effect on dye degradation under UV light radiation. The photocatalytic degradation of methylene blue dye is studied under uv-visible light. The zinc vanadium oxide photocatalyst it clearly shows that breaking of the dye bonds.

Key Words: Solution combustion synthesis, Energy band gap, Zinc Vanadium Oxide Nanoparticles, photocatalytic degradation

STPO-17: Average Size and Shape of Dengue Fever Virus effected Pediatric Red Blood Cells by Laser Diffraction Technique

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Abstract

The paper describes a simple technique for determination of the shape and size of Red Blood Cells (RBC) of dengue virus effected paediatric patient of age group from 7 months to 13 years old by PC based Laser Diffraction Technique. The Diffraction pattern is a function of the size, shape, orientation of the diffracting particles with respect to the direction perpendicular to the incident LASER beam. In the present investigation we calculate and compare the average size and shape of dengue fever virus effected children's Red Blood Cells (6.75 ± 2.13 µm) with normal healthy children (7.25 ± 0.57 µm). A significant variation was observed. It is for the first time that dengue fever virus effected children's RBC size & shape was measured and reported by us in our Laboratory by using this PC based Laser Diffraction Technique in South India. However, Laser Diffraction Method is very rapid low cost and very accurate one in assessing the average size & shape of RBC and at a glance picture of diffraction pattern gives an insight in to diffraction of light by small particles. In future this Laser Diffraction Technique may help in diagnosis of dengue fever virus effected paediatric patient's health problems.

Key Words: Red Blood Cells, Dengue fever virus and Laser Diffraction Technique.

STPO-18: Sustainable Railway Sleepers: A Comparative Study on Mechanical Properties of Recycled Concrete Aggregate and Natural Aggregate Sleepers

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Abstract

Railway sleepers play a critical role in ensuring the safety, efficiency, and reliability of rail transportation systems. Traditional railway sleepers are manufactured using natural aggregates (NA), which account for approximately 70% of the sleeper's total weight. However, the increasing demand for rail infrastructure and the environmental concerns associated with natural resource depletion have necessitated the exploration of sustainable alternatives. Recycled concrete aggregate (RCA) has emerged as a viable substitute for NA in construction applications, offering significant environmental benefits. RCA reduces waste di sposal costs, conserves natural resources, and decreases greenhouse gas emissions. Despite its potential, the use of RCA in railway sleepers remains largely unexplored. This study investigates the mechanical properties of railway sleepers manufactured using recycled concrete aggregate (RCA) and compares them to traditional natural aggregate (NA) sleepers. The research evaluates compressive strength, flexural strength, durability, and moisture absorption of RCA sleepers. Results show that RCA sleepers exhibit comparable compressive (23.4 MPa vs 25.1 MPa) and flexural strength (4.2 MPa vs 4.5 MPa) to NA sleepers. Durability testing reveals improved resistance to degradation for RCA sleepers. Life cycle assessment indicates a 30% reduction in embodied energy and 25% decrease in greenhouse gas emissions for RCA sleepers. The findings demonstrate that RCA sleepers are a viable, sustainable alternative to traditional NA sleepers, offering significant environmental benefits without compromising mechanical performance.

Keywords: Carbon Emission, Recycled Concrete Aggregate, Railway Sleepers, Mechanical Properties, Sustainability, Life Cycle Assessment.

STPO-19: Enhanced device performance of $CuBi_2O_4/SnS_2$ solar cell by addition of ZnO as window layer

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Abstract

In this study, SCAPS-1D simulator, is used to evaluate the effect of Al-doped ZnO as window layer on $CuBi_2O_4/SnS_2$ solar cell. Incorporating a window layer reduced the S-kink behavior in the J-V characteristics and increased the fill factor of the device. To understand the behavior of the proposed device, the thickness and carrier concentration of different layers, bulk defects, interface defects, series and shunt resistance, working temperature and back contact work function of the proposed $CuBi_2O_4$ solar cell is optimised. The device, optimized in terms of thickness and doping density, achieves a theoretical efficiency of 30%.

Keywords: Thin-film solar cell, Metal oxide, Kusachiite, AZO window layer, Efficiency, SCAPS-1D, Fill Factor.

Abstracts Chemistry

ABSTRACTS FOR POSTER PRESENTATION (Chemistry)

Abstract ID	Title of the Abstract	Authors
STCP-01	Exploring the synergy of magnetism and electrocatalysis: a comprehensive review on mechanisms, recent developments and future perspectives	Vishwanath Ankalgi
STCP-02	Nanocomposite of 1D $NiMoSe_2$ Nanotubule with Functionalized Carbon Nanotube and their Electrocatalytic Methanol Oxidation Reaction and Hydrogen Evolution Activity	Pramod Shiralkar,[a#] Siena Clemente,[a#] Thippeswamy B[a] Geetha R. Balakrishna[a*] and K. Pramoda [a*]
STCP-03	Flexible and Wearable thin films Based on Activated Carbon-Embedded PVA Composites for optoelectronic applications	Hamsini N K[1], Sumaiya Tabassum[2] and Santhosh Govindaraju[3*]
STCP-04	Design, synthesis, characterization and biological study of 6-substituted [1,2,4]triazolo [3,4-b] [1,3,4] thiadiazole derivatives	SUNDAR N
STCP-05	Synthesis of C_4-sulfenylated pyrazoles using SiO_2-I catalyst	Shalini B. C[a], Mohammed Imran Khan[b], Shivashankar K [*a] and Mahendra Madegowda [c]
STCP-06	Synthesis of Novel 1,2-Disubstituted Imidazole as cis peptide bond surrogates	Lokesh K. and Shivakumar M. D.
STCP-07	Insights on the effect of urea on manganese oxide phase formation and their application toward supercapacitor fabrication	Lavanya Golla and Ashoka S*
STCP-08	SYNTHESIS OF METAL OXIDE NANOPARTICLES AND IT'S APPLICATION IN WASTE WATER TREATMENT	Salmanul Faris*, Abhinav A.P*, Monika Bajpai *,
STCP-09	Transition-metal- and solvent-free borylation of alkenes and alkynes to access 1,2-bis- and 1,1,2-trisborylalkanes	Shivakumar R, Kiran S. Patil, and Shubhankar Kumar Bose*
STCP-10	Cu-Oxalate@Fe3O4: A Magnetic Versatile Copper Catalyst for One-Pot of Quinazolines, Quinazoline Choline Azide as Green Solvent''	Pravin Yashawant Kogale [1], Akshay S. Limaye [2], Dr. Gholap Somnath Suryabhan *[1], Dr. Ramesh B. Dateer*[2]

STCP-11	Synthesis, molecular docking studies, drug-like properties, and antioxidant activity of pyrimidines	Sushmitha RL, Madan CS , Vishnu Balaji K and Dr. Jeelan Basha N *
STCP-12	Zirconium-metal-organic frames/carbon nanotubes/nanocellulose based sensor for detection of furazolidone (FZ) and chloramphenicol (CP) in food samples	Abhishek K J[1], Raghavendra R B[1], Sathish Reddy[1*], and Lakshmi B[1]
STCP-13	Effect of Sm^{3+} substitution in Nickel ferrite on the structural, morphological and electrode for supercapacitor applications	Harikrishna K M, M Shivanna *
STCP-14	Synthesis and Characterization of green emitting Tb^{3+} ions doped $BaZrO_3$ nanopowders: Photoluminescence and electrochemical sensing applications	D.P. Aarti[1], M.B. Madhusudana Reddy[1], R.B. Basavaraj[2]
STCP-15	SYNTHESIS OF BENZOTHIAZOLE DERIVATIVES USING A SUSTAINABLE CATALYST	Jeena Susan George, Manoj P, Sandra Misquith, Melwin Colaco*
STCP-16	SYNTHESIS, CHARACTERIZATION AND BIOLOGICAL ACTIVITY OF SOME NOVEL VANILLIN DERIVATIVES	Shubha M R*, Basavaraja H S
STCP-17	Bridging Analytical Techniques with Sustainability: A Green Chemistry Perspective	Ayusha Jha, Dr. Swagata Haldar

STCP-01

Exploring the synergy of magnetism and electrocatalysis: a comprehensive review on mechanisms, recent developments and future perspectives

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Abstract

The development of sustainable techniques for electrocatalysis significantly depends on creating more efficient, cost-effective, and reliable electrocatalysts that can overcome the sluggish kinetics of the process and thereby accelerate the overall energy conversion. External stimuli such as magnetic field have been known to have an impact on material properties, presenting a promising route to enhance electrocatalytic processes, including the hydrogen evolution reaction (HER), oxygen evolution reaction

(OER), oxygen reduction reaction (ORR), and carbon dioxide reduction reaction (CO2RR). Recent studies have strongly supported the beneficial effects of magnetic field on the fabrication of electrocatalysts and electrocatalytic reactions. However, there is still a noticeable lack of interest and enthusiasm among the research community in this interdisciplinary field. Thus, this review emphasizes the importance of the combined effect of magnetic field and energy production. Initially, we thoroughly explain the fundamental mechanisms of the aforementioned electrocatalytic processes and then vividly elaborate the potential mechanisms underlying magnetic field-enhanced electrocatalysis. Finally, we highlight the recent advancements in this field, followed by the associated comprehensive current challenges and future perspectives.

Keywords: Magnetism, Electrocatalysis, Water-splitting reactions, Magnetic field, Energy conversion

STCP-02

Nanocomposite of 1D $NiMoSe_2$ Nanotubule with Functionalized Carbon Nanotube and their Electrocatalytic Methanol Oxidation Reaction and Hydrogen Evolution Activity

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Abstract

Direct methanol fuel cell (DMFC) commercialization demands the preparation and utilization of stable and efficient catalyst which is also cost effective. In the present study, nanocomposite of $NiMoSe_2$ nanotubes with functionalized multi-walled carbon nanotubes (f-CNT) is generated, by mixing colloidal dispersions of hydrothermally synthesized $NiMoSe_2$ with carboxyl-functionalized multi walled carbon nanotubes and utilized as bifunctional electrocatalyst for methanol oxidation reaction and water splitting application. Various microscopic and spectroscopic techniques are used for the morphological and physiochemical characterization of $NiMoSe_2$/f-CNT nanocomposite. The carboxyl functional groups on the nanotube surface enhances the uniform stacking of $NiMoSe_2$ on the f-CNT surface without causing aggregation, thereby utilizing the synergetic benefits of the two components in terms of electrical conductivity, more exposed active sites and high-efficiency for the methanol oxidation reaction (MOR). As a proof of concept, for direct methanol fuel cell application, $NiMoSe_2$/f-CNT is utilized as anode material for the MOR in alkaline medium (1 M KOH). MOR activity of $NiMoSe_2$/f-CNT is investigated using three electrodes set-up and the documented cyclic voltammetry is considered for accessing MOR activity. $NiMoSe_2$/f-CNT demonstrates significantly high methanol oxidation activity with a maximum current density of 247.0 mA/cm^2 at 1000.0 mV and an onset potential of 331.0 mV. The activity obtained with $NiMoSe_2$/f-CNT is comparable with some of the highest reported transition metal dichalcogenides in the

literature towards methanol oxidation reaction. Further, we investigated the $NiMoSe_2$/f-CNT for hydrogen evolution reaction (HER) and it shows marginally good HER activity with an overpotential of 260 mV at 10.0 mA/cm^2 current density and a Tafel slope of 131.0 mv/dec.

KEYWORDS: Direct methanol fuel cell, Electrocatalyst, Nanocomposite, Methanol Oxidation Reaction, Hydrogen Evolution reaction, Transition metal dichalcogenides

STCP-03

Flexible and Wearable thin films Based on Activated Carbon-Embedded PVA Composites for optoelectronic applications

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Abstract

The paper presents a positive alternative for optoelectronic applications using the potential PVA-doped deep eutectic solvent (PVA/DES) and activated carbon (AC) composites. PVA, a versatile polymer, shows various properties like biodegradability, biocompatibility, and film-forming ability. DES is a conventional alternative organic solvent due to its low toxicity, biodegradability, and tunable solvating properties. Incorporating AC for optoelectronic applications changes the thin film's mechanical, structural, morphological, and thermal stability. The conductivity and adsorption properties are found using characterising techniques like Fourier transform infrared radiation (FTIR), X-ray diffraction (XRD), Thermogravimetric analysis (TGA), and Scanning electron microscopy (SEM). The optical properties of the PVA-doped DES/AC composites were evaluated by measuring their transmittance and absorbance spectra. The results show that adding AC and DES to PVA reveals the potential use in electronic devices. Further studies will explore the fact that the PVA-doped DES and AC present promising developments in optoelectronic applications.

Key points: DES, AC, Optoelectronic applications

STCP-04

Design, synthesis, characterization and biological study of 6-substituted [1,2,4]triazolo [3,4-b] [1,3,4] thiadiazole derivatives

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Abstract

Heterocyclic scaffolds are frequently present as the common cores in the active pharmaceuticals and natural products. Statistically, more than 85% of all biologically active compounds are heterocycles. Recently, N-based heterocycles have attracted much interest of medicinal chemists and biologists due to broad range of biological activities and plentiful applications in the fields of pharmacy. We have synthesized a new set of 6-substituted [1,2,4]triazolo [3,4-b] [1,3,4] thiadiazole derivatives with diverse functional groups varying from electron donating to electron withdrawing group. Synthesis started from biphenyl carboxylic acids and involved five steps to reach the final compounds. These heterocycles were characterized by various analyses such as H-NMR, C13-NMR, HRMS, SXRD, etc. These new heterocycles docking studies and DFT studies were completed, which showed these molecules could be biologically active and potent molecules. Also, these compounds anti-microbial and anti-bacterial studies showed very good biological activities.

Keywords: heterocycles; thiadiazole; triazolo; docking studies; biological activity.

STCP-05

Synthesis of C4-sulfenylated pyrazoles using SiO_2-I catalyst

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Abstract:

This work introduces a novel and environmentally friendly multicomponent reaction (MCR) strategy for the synthesis of thiol-substituted pyrazoles using arylhydrazine, 1,3-diketones and thiols. Utilizing SiO_2-I as a heterogeneous catalyst, this method enables efficient cyclocondensation and C–H bond sulfenylation. This approach not only reduces synthetic steps, energy consumption and waste but also enhances the scope of pyrazole thioether derivatives, which have significant applications in medicinal chemistry.

Key words: pyrazoles, thioethers, sulphenylation, silica iodide and thiols

STCP-06

Synthesis of Novel 1,2-Disubstituted Imidazole as cis peptide bond surrogates

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Abstract

Imidazoles are one of the most important classes of heterocyclic compounds because of their wide utilities. They are often seen as a building block in numerous naturally occurring and synthetic molecules. Because of the wide range of biological activity, imidazoles has become an attractive compounds for an organic chemist. Replacement of peptide bond by 1,2,4-triazole and 1.5-disubstituted tetrazole have been proved to show the enhanced biological activity. Amino acid derived imidazoles are known where carboxyl and amino groups are modified to imidazole moiety. However there are no reports for the synthesis of 1,2-disubstituted imidazole as cis peptide bond surrogate. In this context, we synthesized the 1,2-disubstituted imidazole as peptide isostere through the cyclocondensation reaction of amino acid derived N^{α}-urethane protected amino aldehydes with glyoxal and amino acid methyl ester in the presence of ammonium acetate as NH_3 source. The reaction was carried out in a sealed tube condition at 80 ^{0}C for about 6 hr. The various catalysts with ammonia were screened and better results were obtained with the ammonium acetate without any catalyst. Eleven novel 1,2-disubstituted imidazoles as cis peptide bond surrogate were synthesized, purified using column chromatography, melting points were determined and compounds are characterised using IR, ^{1}H-NMR, ^{13}C-NMR and Mass spectroscopy.

Key words: Imidazole, Triazole, Tetrazole, Cyclocondensation, Peptide bond

STCP-07

Insights on the effect of urea on manganese oxide phase formation and their application toward supercapacitor fabrication

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The fabrication of advanced nanomaterials for the fabrication of high-power density supercapacitors are of global interest. This work presents the control of manganese oxide composition by adjusting the urea concentration during one pot synthesis protocol. This proposed method helps in tailoring surface properties of manganese oxide, suitable for supercapacitor application. The XRD and Raman results reveal that the low concentration of urea favours the formation of Mn_2O_3 while high concentration of urea favours Mn_3O_4

formation. The electrochemical results confirm that Mn_3O_4 NPs exhibit higher specific capacitance compared to Mn_2O_3 NPs. The Mn_3O_4 NPs demonstrates an impressive specific capacitance of 700 F/g at 1 A/g. The symmetric battery type pseudocapacitor assembly composed of Mn_3O_4 NPs exhibits maximum energy density of 25.18 Wh/Kg and power density of 258.17 W/Kg at 1A/g. Further, the symmetric battery type pseudocapacitor exhibits long durability of 7000 cycles with 80 % capacity retention.

Keywords: Manganese oxide, Surface properties, Phase formation, Supercapacitor, High energy density

STCP-08

SYNTHESIS OF METAL OXIDE NANOPARTICLES AND IT'S APPLICATION IN WASTE WATER TREATMENT

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Abstract:

Nanotechnology (NT) is the technology which has the widest effect on different biological research. In nanotechnology the developed particles should be in between 1 to 100 nm in range. Various physical and chemical methods have been formulated for the synthesis of nanoparticles (NPs) of desired shape and size. Water pollution is a serious concern and it has to be dealt in an efficient and sustainable way. The present studies focused on the different methods of synthesis of metal oxide nanoparticles and its application as a potential substance for waste water remediation. Iron oxide nanoparticles and zinc oxide nanoparticles were also prepared by green and chemical methods and the efficiency and reliability of this synthesis approaches were studied. The plant extract was prepared using carica papaya leaves. Chemical synthesis involves the use various solvents and precursors. Zinc oxide nanoparticles and iron oxide nanoparticles were synthesized using Sol-Gel method and Co-precipitation method. Both the synthesis methods got its own advantages and disadvantages. The efficiency of the prepared metal oxide nanoparticles as a photocatalyst was compared by photocatalytic degradation of organic dyes and drugs. Zinc oxide nanoparticles and iron oxide nanoparticles synthesized by chemical method showed better particle size and efficiency compared to green synthesized metal oxide nanoparticles. The green synthesis method is sustainable, cheap, faster and eco-friendly whereas chemical synthesis involves the use of toxic solvents. In conclusion, we can say that metal oxide nanoparticles are efficient catalyst and adsorbents. This properties of metal oxide nanoparticles makes them an efficient material for waste water treatment.

Key words: Metal oxide nanoparticles, water remediation, sustainable, photocatalytic degradation.

STCP-09

Transition-metal- and solvent-free borylation of alkenes and alkynes to access 1,2-bis- and 1,1,2-trisborylalkanes

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Abstract:

Multi(boronate) esters are useful building blocks in modern chemical synthesis. These boron derivatives also play pivotal roles in the pharmaceutical industry and functional materials.[1,2] Therefore, synthesizing these derivatives has been the foremost synthetic interest in the last few decades.[3] Herein, we have developed an efficient, transition-metal- and solvent-free method for the regioselective boration of alkenes and alkynes (Scheme 1). The alkali metal Lewis base (NaOMe)-mediated reactions using bis(pinacolato)diboron (B_2pin_2) as the boron reagent resulted in the diboration of alkenes at room temperature and triboration of alkynes at 60 °C to produce synthetically useful alkyl 1,2-bis(boronate) esters and 1,1,2-tris(boronate) esters, respectively, in excellent yields and regioselectivity. This environmentally benign protocol demonstrates broad substrate scope and good functional-group tolerance (EDG, EWG groups, heterocyclic compounds, cyclic compounds, aliphatic compounds) on alkenes and alkynes. The proposed catalytic cycle has been evaluated based on stoichiometric reactions and DFT studies. The key results will be discussed.

Keywords: boronate esters • borylation • triboration • Lewis base • transition-metal-free

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STCP-10

"Cu-Oxalate@Fe3O4: A Magnetic Versatile Copper Catalyst for One-Pot of Quinazolines, Quinazoline Choline Azide as Green Solvent''

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Abstract:

Herein we report a comparative study of copper-catalyzed synthesis of Quinoline and Quinazoline multi-component coupling of bromo Benzaldehyde and Acetophenone for quinoline and bromo benzaldehyde and benzyl amine for quinazoline using a Cu-Oxalate@Fe_3O_4. This synthesized catalyst was characterized by XPS and HE-TEM to understand the oxidation state (+2) of the metal centre and the morphology of the catalyst. Further, to quantify the amount the Cu present in the catalyst the ICP-OES analysis was carried out which revealed that 72% W/W of Cu is present in the catalyst. Detailed substrate screening and a few control experiments were performed to unveil the reaction sequence and understand the Advantages/disadvantages of these pathways. To prove the heterogeneous nature of the catalyst the recyclability study was carried out which did not show a drop in the activity of the catalyst.

Keywords: Cu-Oxalate@Fe_3O_4, Choline azide, Multi-component Synthesis, Quinoline and Quinazoline

STCP-11

Synthesis, molecular docking studies, drug-like properties, and antioxidant activity of pyrimidines

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Abstract

One of the DNA bases pyrimidines have been studied for antibacterial, anticancer, antiviral and antioxidant activities. Based on this importance and in continuation of our work on pyrimidines as anti-inflammatory and anti-viral agents, here reporting synthesis of pyrimidine analogs **3** (**a-c**) and **4** (**a-c**) from chloro pyrimidine (**1**). Obtained compounds are purified by column chromatography and characterized using spectral techniques. These compounds were docked with SARS COV-2 enzyme (**7t9l**) and cytochrome-c-oxidase (**1hrc**) to find their binding interaction with these proteins. Further, druglike properties of potent compounds were studied using SWISS ADME. Potent compounds were further screened for antioxidant potential using DPPH method. Among these compounds **3b** and **4a** have shown binding affinity and antioxidant activity which is like bioactive small molecule embelin.

Keywords: Pyrimidines, cytochrome-c-oxidase, SARS COV-2, and druglikeness, antioxidant agents.

STCP-12

Zirconium-metal-organic frames/carbon nanotubes/nanocellulose based sensor for detection of furazolidone (FZ) and chloramphenicol (CP) in food samples

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Abstract

The overuse of antibiotics leads to their accumulation in both the body and the environment, highlighting the need for effective detection techniques. Metal-organic frameworks (MOFs) have garnered attention due to their flexibility and large surface area. In this study, transition metal MOFs (specifically Zn, Zr, Ni, and Cu) were synthesized using a straightforward method and characterized through various spectroscopic techniques. Subsequently, these metal MOFs were combined with carbon nanotubes (CNTs) to create a sensing platform capable of detecting analytes such as $K_4[Fe(CN)_6]$, furazolidone (FZ), dopamine (DA), and chloramphenicol (CP). Among the MOFs studied, the Zr MOF/CNT-modified glassy carbon electrode (GCE) exhibited the best electrocatalytic performance, attributed to enhancements in active surface area, heterogeneous electron transfer rate, and potential difference (ΔE). To further improve the electrochemical performance, the Zr MOF/CNT composite was supplemented with nanocellulose. The composite was optimized by adjusting the mass ratios of Zr MOF, CNT, and nanocellulose. The electrochemical performance of the optimized Zr MOF/CNT/nanocellulose-modified electrode was assessed using square wave voltammetry (SWV) and cyclic voltammetry (CV). The CV data revealed significant increases in peak currents for both CP and FZ compared to a bare electrode. The Zr MOF/CNT/nanocellulose-modified electrode demonstrated low detection limits, high sensitivity, and excellent reproducibility and stability for detecting CP and FZ. Furthermore, the composite electrode successfully detected CP and FZ in samples of milk, honey, and pharmaceutical tablets with acceptably recovery rates. Thus, the modified electrode shows considerable promise as an effective electrocatalyst for the electrochemical detection of CP and FZ.

Keywords: Chloramphenicol, Furazolidone, Metal-organic framework, Nano-cellulose, Voltametric techniques

STCP-13

Effect of Sm^{3+} substitution in Nickel ferrite on the structural, morphological and electrode for supercapacitor applications

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Abstract:

This work focused on the synthesis of Sm^{3+} substitution in the nickel ferrite as $NiFe_{2-y}Sm_yO_4$ where y=0.0, 0.05 and 0.1 in the nano regime engineered via combustion route using a mixture of fuels carbamide and saccharum officinarum for the first time. Phase confirmation was made by employing powder x-ray diffractogram (PXRD), surface morphology of the nano regime samples was done with field emission scanning electron spectroscopy (FE-SEM) and sustainability as electrode material for supercapacitor applications was done with Cyclic voltammetry (CV), Electrochemical Impedance Spectroscopy (EIS) measurements using electrochemical analyzer. XRD reveals the synthesized samples crystallized in single phase with spinel cubic structure having space group Fd3m. FE-SEM results explores the samples are highly porous with agglomerated surface morphology. The elemental mapping was done from the analysis of EDAX data. Electrochemical performance reveals the substitution of Sm^{3+} into the $NiFe_2O_4$ enhances the specific capacitance and its is found that specific capacitance of 310 Fg^{-1} at a current density of 0.8 Ag^{-1} for y=0.1 sample. The present work suggests the synthesized single phased nanosized samples are good candidates for supercapacitance charge transport applications.

Keywords: XRD, Impedance, electrochemical, capacitance.

STCP-14

Synthesis and Characterization of green emitting Tb^{3+} ions doped $BaZrO_3$ nanopowders: Photoluminescence and electrochemical sensing applications

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Abstract

In this investigation, rare earth Tb^{3+} ions activated $BaZrO_3$ nanopowders (NP) were prepared by simple hydrothermal synthesis. The synthesized nanopowders were characterized by powder X-ray diffraction (PXRD) to evaluate the cubic crystal structure. Surface morphology of the NPs was studied by scanning electron microscopy (SEM) micrographs, which revealed the superstructures morphology. Further, the particle size was estimated using Transmission electron microscope (TEM) images and it was found to

be around 32 nm. Photoluminescence spectra (PL) exhibit a series of sharp peaks in the wavelength range of 475–650 nm, which are ascribed to $^5D_4 \rightarrow {}^7F_{3\text{-}6}$ transitions of the Tb^{3+} ions. The calculated chromaticity coordinates were found to be in the intense green region in the CIE diagram. The obtained chromaticity and the external quantum efficiency values suggests that, the NPs can be used as a green component in the fabrication of white LEDs. Further, the electrochemical sensing studied were carried out in detail. The cyclic voltametric (CV) studied were conducted to evaluate the electro sensing capability of $BaZrO_3:Tb^{3+}$ (9 mol %) NPs. The carbon paste electrode (CPE) modified ($BaZrO_3:Tb^{3+}$@CPE) compounds exhibited extraordinary sensitivity in the presence of chlorzoxazone drug in a phosphate buffer electrolyte system. The obtained nanopowders act as a better sensing electrode and which can be effectively used in the detection of bioactive molecules in the drug. Overall, the hydrothermal synthesized rare earth (Tb^{3+}) ions doped superstructures can be potentially used in the white LED fabrications and electrochemical sensing applications.

Keywords: Hydrothermal, surface morphology, luminescence, electrochemcial sensing, LED.

STCP-15

Synthesis of Benzothiazole Derivatives using a Sustainable Catalyst

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Abstract

Heterocyclic compounds are organic compounds that have heteroatoms as part of the ring. These compounds are synthetically important as precursors for many medicinal compounds. In this work, we have synthesized several benzothiazole derivatives by introducing different functional groups to the benzothiazole ring, which can act as fluorescent probes. The synthesis was carried out using a sustainable catalyst, a mixed metal oxide catalyst derived from industrial waste. The catalyst is basic in nature. The incorporation of heteropoly acids has imparted Lewis's acid as well as Brønsted acid character to the catalyst. The structures of the synthesized compounds have been confirmed by NMR, mass spectroscopy, and in some cases, by single crystal XRD. Molecular docking studies have been conducted for some of the synthesized compounds.

Based on the possible metal coordination with the ligand, the benzothiazole fluorescent probes can be used to detect various analytes. Among these, one of the derivatives displayed sensitivity towards metal ion in both absorbance and emission spectroscopic techniques in aqueous solutions. The limit of detection was in the range of 1.2×10^{-4}.

Keywords: Benzothiazole, sustainable catalyst, sensors, fluorescent probe, limit of detection.

STCP-16

Synthesis, Characterization and Biological Activity of Some Novel Vanillin Derivatives

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Abstract:

In search of effective and selective anti-inflammatory and anti-tubercular molecules a series of vanillin linked primary aromatic amines were prepared it yields **2(a-e)**. Further, Ullmann coupling reaction where Schiff base compounds was made to react with iodo-benzoic acid to give various biphenyl ethers **3(a-e)**. In the third step Iodobenzene was reacted with various Schiff bases to yield different biphenyl ethers **4(a-e)**. Synthesized compounds were screened for anti-inflammatory, anti-oxidant and anti-tubercular activities. Compounds **4a**(Z)-N-(3-methoxy-4-phenoxybenzylidene)aniline and **4b**((Z)-N-(3-methoxy-4-phenoxybenzylidene)-4-methylaniline) exhibited promising anti-inflammatory activity. Compounds **4b**(Z)-N-(3-methoxy-4-phenoxybenzylidene)aniline and **4d** (Z)-4-((3-methoxy-4-phenoxybenzylidene) amino) benzoic acid has shown better antioxidant activity. Some of the selected compounds were screened for their anti-tubercular activity. Compound **3b** (Z)-4-(2-methoxy-4-((p-tolylimino)methyl)phenoxy)benzoic acid and **4b**(Z)-N-(3-methoxy-4-phenoxybenzylidene) aniline showed excellent activity against M. Tuberculosis H37Rv strains.

Keywords: Vanillin, Biphenyl ethers, Anti-inflammatory, Antioxidant, antitubercular activity.

STCP-17

Bridging Analytical Techniques with Sustainability: A Green Chemistry Perspective

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Abstract

The field of analytical chemistry plays a crucial role in analyzing various samples for a wide range of applications. However, traditional analytical methods often rely on toxic and hazardous chemicals, raising significant environmental concerns. While advances in instrumentation have improved detection capabilities, sample preparation remains a persistent challenge. This research aims to address these issues by developing an innovative and robust technique for identifying and quantifying analytes across diverse matrices, while adhering to Green Analytical Chemistry (GAC) principles. The proposed method prioritizes sustainability, focusing on reducing resource consumption, promoting biodegradability, enhancing environmental friendliness, and improving both efficiency and adaptability. Key features include minimal or no solvent consumption, rapid and accurate analyte identification, and multi-analyte detection capability. The methodology will be structured around five core GAC principles: reducing sample sizes, minimizing solvent use, encouraging in-situ measurements, controlling analytical waste generation, and utilizing biodegradable materials. By aligning with these principles, the research seeks to establish a new standard in analytical chemistry, ensuring more environmentally responsible approaches to sample analysis without compromising on precision or versatility.

ABSTRACTS FOR ORAL PRESENTATION (Chemistry)

Abstract ID	Title of the Abstract	Authors
STCO-01	Photocatalytic study of Mg doped Ag_2O nanoparticles synthesized via Green combustion method using Mexican mint leaf extract	B. Chaithra[1,2], M. S. Shivakumar[1,*], C.R. Ravikumar[3,*], T. M. Sharanakuamr[3]
STCO-02	Study on the Influence of Eutectic Solvent Functionalized Carbon on the Structural, Optical, and Optoelectronic Properties of Doped Polyvinyl Alcohol Composites	Ramyashree N
STCO-03	Tailoring Semiconductor Properties in PVA-PVP Thin Films with DES-Doped SiO_2 Nanoparticles	Anushka Servesh[1], Sumaiya Tabassum[2] and Santhosh Govindaraju[3*]
STCO-04	"STRATEGIES FOR RECYCLING CONSTRUCTION WASTE- A REVIEW FOR SUSTAINABILITY"	[1]Sowmyashree T, [2]Chaitra J R, [3]Balachandan R, [4]Tejas S
STCO-05	PEREOVSKITES BASED HETEROSTRUCTURE FOR THE MEMORY APPLICATION	SHALOM KRUPA
STCO-06	Design, Synthesis, computational studies and biological studies of new fused-heterocyclic compounds containing Nitrogen	Anindita Bhattacharjee, Dr. Madhusudana Reddy MB
STCO-07	"Enhanced HER Activity of Porous NiCoP through the Aid of External Magnetic Field"	Mohammed Arkham Belgami[1], Vishwanath Ankalgi[1], Sang Mun Jeong[2], Chandra Sekhar Rout[1,2,*]
STCO-08	Fabrication of Highly Active bifunctional electrocatalyst for electrocatalytic water splitting.	Sahana R, Shivanna Marappa[*]
STCO-09	Zwitterionic functionalized iron oxide with superior antifouling property and its application for dye removal	Dasari Hindu Bhavani, Mahima S, Dr. D. H. Nagaraju*
STCO-10	Enhanced Electrocatalytic Performance of $CoMn_2O_4$-Based Nanocomposites for Water Splitting: Oxygen /Hydrogen Evolution Reactions	Suman Kumar, Shivanna M[*]
STCO-11	Photocatalytic degradation of Pharmaceutical Effluents by TiO_2 nanoparticles	Manali Kaladagi[1], Haribhau Gholap[2] , Maya Khater*[1]

STCO-12	Improved sodium ion conduction in mixed solid polymer electrolyte systems	P B Durgamba[1], S Radhakrishnan [1], P V Midhunlal [2], V R Sunitha [2]
STCO-13	Bismuth(III) Coordinated visible light active metallopolymeric photocathode for enhanced photoelectrocatalytic activity in protic electrolyte	Sarada K G, Prashanth Vishwa, Sakthivel Kandaiah*
STCO-14	A DUAL FLUORESCENT PROBE FOR SELECTIVE DETECTION OF METAL IONS	Subhasree Malakar[a], Anuradha Barik[a], Shubhra Majumder[b], Saumya Dasgupta[a] and Bandita Datta[a*]
STCO-15	Zinc phthalocyanine embedded Schiff-Base polymer-TiO2 composite for effective photo degradation of cationic and anionic dyes.	Dr. Shwetha R*
STCO-16	Boosting Hydrogen Generation with Glucose Oxidation Over Hexagonal NiS	Akshaya H M, Ashoka S, Nagarajaiah H
STCO-17	SURVEY AND ANALYSIS OF CO_2 EMISSIONS FROM LIGHT SOURCES IN SELECTED AREAS	Dr. S. Shreemathi Giri*,[2] Deepika P
STCO-18	Sustainable Nano-material technology and its applications in medicinal field – An overall Review in concern to impact on global health	Radhika M
STCO-19	Lithium-Integrated Spinel Catalysts for Efficient Alkaline Water Splitting: Unveiling the Electronic and Structural Synergies	Akshay Nag H.R., Srinivasa Budagumpi and Rangappa Keri*
STCO-20	Synthesis of Teixobactin analogs and biological evaluation by in-silico and in-vitro studies	Dalli Kumari, Govindappa Nagendra
STCO-21	Plant extract mediated green synthesis of CeO_2 nanoparticles for photocatalytic degradation of Pharmaceutical effluents.	Vaishnavi Umbrajkar*[1], Maya Khater*[1], Haribhau Gholap*[2], Abhinay Mandawade[3]
STCO-22	Comparative Analysis of Milk Samples using FTIR Spectroscopic Technique	[1]Dr. S. Shreemathi Giri*,[2] Deepika P, [3]Omkar Biswas , [4]Ashwini M Patil
STCO-23	"Unlocking the Potential of Gamma MnO_2 as an Intercalative Capacitive Deionization Device"	[1]Mahima.S[1]., D. H. Nagaraju[2]*

STCO-01

Photocatalytic study of Mg doped Ag_2O nanoparticles synthesized via Green combustion method using Mexican mint leaf extract

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Abstract

Ag_2O nanoparticles doped with Mg at concentrations of 2, 4, 6, 8, and 10 mol% were synthesized through a green combustion method using Mexican mint. The product exhibits a face-centered cubic structure with crystallite size of 11-12 nm confirmed by the powdered X-ray diffraction pattern analysis. The high energy electron microscopy techniques such as TEM and scanning electron microscopy (SEM) along with energy dispersive X-ray (EDAX), are used for the surface morphology and elemental analysis. The bandgap energy (E_g) values of prepared nanomaterials were determined using Diffuse Reflection Spectroscopy (DRS). The synthesized nanoparticles exhibit greater photodegradation efficiency when exposed to Acid orange -8 and Acid black dyes under UV light.

Keywords: Mg doped Ag_2O nanomaterials; Green combustion method; Photocatalytic activity; Acid orange -8; Acid black.

STCO-02

Study on the Influence of Eutectic Solvent Functionalized Carbon on the Structural, Optical, and Optoelectronic Properties of Doped Polyvinyl Alcohol Composites

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Abstract

With the growing demand for sustainable chemistry, the world is moving towards more environmentally friendly materials for optoelectronic applications. Hence, biodegradable and environmentally polyvinyl alcohol (PVA) is considered and doped to convert insulating PVA to semiconducting polymer. PVA matrix is incorporated with novel three-component deep eutectic solvent (3CDES) functionalized carbon to enhance the conductivity. The spin coating method is used for the fabrication of the films. The insulating PVA is converted into a semiconductor, which is suitable for

manufacturing optoelectronic devices. Characterization of the prepared films involves X-ray diffraction (XRD), Fourier-transform infrared spectroscopy (FTIR), and UV-vis spectroscopy, impedance analysis. These characterization techniques observe the structural pattern, form, energy gap, electrical properties, and optical behavior, resulting in efficient polymeric films for optoelectronic uses.

Keywords: Deep eutectic solvent, Polymeric film, Polyvinyl alcohol, Semiconductors, Activated carbon

STCO-03

Tailoring Semiconductor Properties in PVA-PVP Thin Films with DES-Doped SiO_2 Nanoparticles

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Abstract

In this study, we investigate the semiconductor properties of polyvinyl alcohol (PVA) and polyvinylpyrrolidone (PVP) composite thin films incorporating deep eutectic solvent (DES)-doped silicon dioxide (SiO_2) nanoparticles. The integration of DES enhances the dispersion and interaction of SiO_2 nanoparticles within the polymer matrix, leading to improved structural and electrical characteristics. Thin films were synthesized and followed by comprehensive characterization through Fourier Transform Infrared Spectroscopy (FTIR), Scanning Electron Microscopy (SEM), and electrical conductivity measurements. The incorporation of DES-doped SiO_2 nanoparticles significantly enhances the films' semiconductor behaviour, with notable conductivity and charge mobility increases. The optimal concentration of nanoparticles was identified, balancing the enhancement of electrical properties with mechanical stability. This work demonstrates the potential of DES-doped SiO_2 nanoparticles as effective modifiers in polymer matrices, paving the way for developing advanced materials for applications in flexible electronics and sensor technologies. Further studies will explore the underlying mechanisms influencing the observed semiconductor behaviour and the long-term stability of these composite films.

Keywords: DES (Deep Eutectic Solvent), Semiconductor Properties, Solvent-Casting Technique, Hybrid Materials, PVA (Polyvinyl Alcohol), PVP (Polyvinylpyrrolidone).

STCO-04

Strategies for Recycling Construction Waste- A Review for Sustainability

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Abstract:

Thus, the purpose of this study is to evaluate how usefully different approaches that focus on improving CWR are execution. Earlier research has offered several recommendations for raising construction waste recycling (CWR) rates. Nevertheless, selecting the tactics is difficult in the absence of a lateral comparison. CWR enhancement options were found through thorough literature research in order to accomplish this goal. Subsequently, data were gathered via questionnaire surveys from managers of construction projects [1]. The gathered data were subjected to factor analysis, overlap analysis, agreement analysis, normalization, and mean score ranking. Furthermore, an analysis of the data was done using a suggested algorithm for utilizing the cost, ease, and effectiveness values to calculate usability indexes. Three tactics have high usability indexes, according to the results Place makeshift containers in each construction zone, pinpoint construction operations that generate recyclable materials, and improve CWR-related business regulations. These high usability index tactics align with the overlapping low-cost, high-yield, and simple strategies. Researchers and practitioners can improve the application of CWR by using the best solutions that this study offers. Construction projects can achieve higher CWR rates by implementing efficient CWR improvement measures. The methodology used in this work to calculate usability indexes using questionnaire surveys can be replicated by future researchers.

Keywords**: Usability analysis, building waste recycling, sustainable development, sustainable construction, and decision-making**

STCO-05

Perovskites based Heterostructure for the Memory Application

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Abstract

The stable and reproducible electrical memory devices based on heterostructures fabricated memory device consist of the MIM Structure in which the Active layer consist of two layers. The transition metal oxides like nickelates, Cobaltite's, Ferrites perovskite oxide as one layer and two-dimensional nanomaterials as another layer are chosen as the active layers for the device. The above series of Perovskites will be placed on the various binary metal oxides (two dimensional nanomaterials) like TiO_2, NiO and Co_2O_3 and Fe_2O_3. The effect of the heterojunction order between the Perovskite oxide and the binary metal oxide will be

studied for the memristive performance and its mechanism will be analyzed. The preliminary work has been carried out for this application. The memristive device with Ag/Perovskite/Binary metal oxide/FTO structure was fabricated based on the heterojunction between Perovskite and Binary metal oxide. The device shows improved memristive characteristics with the optimum sweeping voltage of (4 to 7 V) and the switching ratio of ~ 13. The detailed investigation shows the presence of Negative Differential Resistance (NDR) in the sandwich device which is the anomalous current-voltage (I-V) characteristic region in which the current decreases as the voltage increases to a certain bias and then starts increasing with the bias. This work not only provides a feasible method for improving the memristive characteristics of the device but also helps to understand the influence of the interface effect thereby laying the foundation for the preparation of high-capacity and efficient memristive devices in the artificial intelligence applications. The materials proposed in the study are possible to make the see through memory devices. The miniaturization and multifunctional nature of these materials enable us to explore the potentiality of portable and compact storage devices like mobile phones, laptops, large data storage hard devices, and other handheld and wearable gadgets. These devices can also be tested for light sensing, water splitting, photo memory and photovoltaic purposes.

Keywords: Perovskites; Binary metal oxide; heterostructure; memristor; Resistive switching.

STCO-06

Design, Synthesis, computational studies and biological studies of new fused-heterocyclic compounds containing Nitrogen

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Abstract

The use of various fused heterocyclic compounds as a remedy for several diseases has been studied extensively. In this study, we report a multi-step synthesis of (2-(ethylthio)-4-(piperidin-1-yl)-5,6,8,9-tetrahydro-7H-pyrimido[4,5-d]azepin-7-yl)(substituted)methanone, a fused 6,7,8,9-tetrahydro-5H-pyrimido[4,5-d]azepine ring with different substituents attached to it. The synthesised products are characterized using ^{1}H NMR, ^{13}C NMR and mass spectral analysis. The synthetic route, mechanism and the spectroscopic data of the products as well as intermediates are presented and discussed. The ADMET studies, DFT calculations and molecular docking will reveal interesting details about the activities of such fused heterocycles.

STCO-07

Enhanced HER Activity of Porous NiCoP through the Aid of External Magnetic Field

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Abstract

The development of non-precious, high-efficiency, and durable electrocatalysts for hydrogen evolution in acidic environments is highly sought after. Significant research has been dedicated to enhancing electrocatalyst performance using methods such as defect engineering, composite formation, and doping. In this study, we present the improvement of NiCoP nanorods' electrocatalytic activity by applying an external magnetic field. The nanorods were synthesized through a straightforward hydrothermal process. When deposited on carbon paper, the NiCoP nanorods exhibited an overpotential of 100 mV at a current density of 10 mA cm^{-2}. Notably, when subjected to a weak magnetic field of 2000 G, the overpotential decreased to 62 mV at 10 mA cm^{-2} in 0.5 M H_2SO_4, indicating that the external magnetic field positively influences the kinetics of the NiCoP nanostructure. The enhanced mass transport due to the Lorentz force and the alignment of magnetic moments within the material under the magnetic field contribute to the improved HER performance. These findings highlight a promising approach to further enhance the HER properties of electrocatalysts through the use of an external magnetic field.

Keywords: Hydrogen Evolution Reaction, Electrocatalysis, Magnetic Field, Lorentz Force, Spin Polarization

STCO-08

Fabrication of Highly Active bifunctional electrocatalyst for electrocatalytic water splitting.

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Abstract

The main replacement for fossil fuels in the supply of energy in the future is hydrogen fuel, which is thought to be the cleanest renewable resource, via the splitting up of water. The main requirement for realizing the future hydrogen economy is sustainable hydrogen generation. Over the past few decades, much research has been done on the electrocatalytic oxygen evolution reaction (OER) and hydrogen evolution reaction (HER), which is a crucial stage in synthesizing H_2 from water electrolysis. Here we have synthesized the Cu-Co $(OH)_2$/ CNT/MoS_2 via simple co-precipitation. According to systematic experiments and

calculations, Cu-Co $(OH)_2$/ CNT/MoS_2 increased the electrochemical surface area, which resulted in increased OER and HER activity, overpotential 191mV and 178 mV at 10mA/cm^2, Tafel slope of 70mV /decade and 102 mV/decade, also the material was stable for about 40 hrs in alkaline medium.

Keywords: Water splitting, OER, HER, MoS_2, overpotential.

STCO-09

Zwitterionic functionalized iron oxide with superior antifouling property and its application for dye removal

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Abstract

Addressing water contamination, which threatens the availability of clean water for drinking and agriculture, remains a critical global challenge. This study presents an effective approach using zwitterionic functionalized iron oxide nanoparticles (Al-Fe-O) as an adsorbent for removing anionic dyes and water purification. Iron oxides have gained significant attention due to their chemical and structural versatility with various synthetic methods available to tailor their physicochemical properties. The Al-Fe-O nanoparticles were characterized by scanning electron microscopy (SEM), revealing their effectiveness. Al-Fe-O exhibited a high positive zeta potential (at pH 7.5), which contributed to its superior performance in adsorbing the anionic dyes Erichrome Black-T (EBT) and Alizarin Red (AR), achieving removal efficiencies of 94% and 99.9%, respectively. The following Freundlich isotherm (R^2 =0.9999) and pseudo-second-order kinetic (R^2 =0.9999) indicate the effective adsorption ability of the Al-Fe-O. When incorporated into a polysulfone (PSF) membrane, the Al-Fe-O nanoparticles created microvoids and functional groups that enhanced hydrophilicity and water permeability. The Al-Fe-O/PSF membrane showed a significant improvement in water flux, increasing from 1.9 L m^{-2} h^{-1} to 13.8 L m^{-2} h^{-1} and achieved a 98% removal rate for Alizarin Red dye. Additionally, the functionalized iron oxide demonstrates excellent regeneration and recyclability, maintaining efficiency over five consecutive cycles. This hydrophilicity enhancement could be also associated with the addition of many hydrophilic functionalities (-NH_2 and -COOH) onto the membrane surface (contact angle of 58.7˚) due to the presence of Al-Fe-O NPs. In addition, the nanocomposite membrane revealed outstanding antifouling performance with flux recovery ratio (FRR) of 87.9% towards bovine serum albumin (BSA). Therefore, the prepared novel nanocomposite membrane is a good candidate for the effective decolorization of wastewater containing dye.

Keywords: Iron oxide nanoparticles, Functionalized iron oxide, Adsorption, Membrane filtration, Mixed matrix membrane, Dye removal, Zwitterionic material, Bovine Serum Albumin, Antifouling.

STCO-10

Enhanced Electrocatalytic Performance of $CoMn_2O_4$-Based Nanocomposites for Water Splitting: Oxygen /Hydrogen Evolution Reactions

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Abstract

This research highlights the developing of easy to understand rapid, and cost-effective synthetic techniques for producing highly efficient, economical bifunctional electrocatalysts for oxygen and hydrogen evolution reactions (OER/HER), which present significant challenges for many electrochemical application , such as water splitting reactions, supercapacitors, sensor as well as metal-air batteries. This study presents an easy technique for analysing cobalt dimanganese oxide (CDO) nanocomposites, which acts as electrocatalysts in oxygen and hydrogen evolution reactions. A number of physical investigations have been employed to investigate the enhanced electrocatalyst CDO/MoS_2/CNT. The techniques that were applied for all electrochemical testing contained cyclic voltammetry (CV), linear sweep voltammetry (LSV), electrochemical impedance spectroscopy (EIS), Tafel slope analysis, electrochemical active surface area (ECSA) measurement, and chronopotentiometry. Our manufactured CDO-MoS_2/CNT demonstrates a lower 201 mV (OER) and 116 mV (HER) overpotential at a current density of 10 mA cm^{-2} while compared to CDO, indicating improved performance and Tafel slope for OER and HER is 38 $mVdec^{-1}$ and 78 mV dec^{-1}.

Keywords: Electrocatalysts, Water splitting, HER, $CoMn_2O_4$

STCO-11

Photocatalytic degradation of Pharmaceutical Effluents by TiO_2 nanoparticles

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Abstract:

Water pollution poses an increasingly dire threat to both public health and the environment, with pharmaceutical effluents emerging as significant chemical contaminants. This study focuses on the utilization of TiO_2-based photocatalysts for degradation of pharmaceutical effluents. The TiO_2 nanoparticles underwent comprehensive characterization using various techniques. X ray diffraction (XRD) revealed a

tetragonal structure, while Ultraviolet-Visible Diffuse Reflectance Spectroscopy (UV-DRS) unveiled the energy bandgap in the UV region. Field Emission Scanning Electron Microscope (FE-SEM) and Transmission Electron Microscope (TEM) images depicted a spherical morphology. X-ray Photoelectron Spectroscopy (XPS) analysis delved into the spin orbit components. The study investigated the impact of physical parameters like pH, temperature, time, and agitation rate on the photocatalytic degradation by TiO_2 nanoparticles. The effluents chosen were Amoxycillin, Ampicillin, Linezolid, Aspirin, Crocin. The basic principle of photocatalytic degradation is occurrence of Advanced oxidation processes which involve the generation of highly reactive species, such as hydroxyl radicals (•OH), by various means, including photolysis, photocatalysis, ozonation, and electrochemical processes. These ROS are highly reactive and can oxidize a wide range of organic compounds. TiO_2 NPs are stable, non-toxic, widely available, and low-cost. pH has an considerable impact on degradation with 5 being the optimum showing 75-80% degradation at 45 min. Temperature exhibit dependency, with 45^0C giving nearly 70% degradation. 120 RPM is the optimum agitation rate showing around 80% degradation. Overall degradation efficiency can be enhanced by non-irradiated and irradiated methods. This approach can be also utilized in degradation of diverse pollutants including dyes, pesticides, surfactants, etc.

[**Keywords**: Pharmaceutical Effluents, Photocatalysis, TiO_2 nanoparticles, Wastewater treatment]

STCO-12

Improved sodium ion conduction in mixed solid polymer electrolyte systems

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Abstract

Lithium-ion-based liquid electrolytes are the most suitable ion-transport materials for energy storage systems. However, they pose safety risks, and the limited availability of lithium in the Earth's crust prompts the search for alternative metal ions. Sodium, in particular, emerges as a promising candidate due to its abundant mineral reserves. Although sodium's specific energy and energy density are lower than lithium's, its economic advantages make it an attractive option for energy storage applications. In spite of the widespread use of organic liquid electrolytes in batteries, regardless of the metal ions used, their drawbacks—such as leakage and high flammability make them less ideal. Solid polymer electrolytes present a viable alternative to address these issues. This study proposes a novel sodium-ion-conducting solid polymer electrolyte, created by mixing high-molecular-weight ($1x10^6$) polyethylene oxide $(PEO)_6$ with low-

molecular-weight PEO ($1.25x10^5$) and polyvinyl alcohol (PVA) with molecular weight (122.44 g/mol)). Ionic conduction is known to be more efficient in the amorphous phase, which can be achieved by mixing polymers with different molecular weights. In this work, mixed solid polymer electrolytes were prepared by adjusting the ratio of low-molecular-weight polymers, and AC impedance studies were conducted to determine their bulk conductivity. The DC conductivity variation with temperature of mixed solid polymer electrolyte system follows Arrhenius relation and the variation of AC conductivities with frequency obeys Jonscher's power law.

Keywords: Polymer electrolytes, ionic conduction, Arrhenius relation, polyethylene oxide

STCO-13

Bismuth(III) Coordinated visible light active metallopolymeric photocathode for enhanced photoelectrocatalytic activity in protic electrolyte

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Visible light-active photoelectrode materials that can exhibit simultaneous photo and electroactivity are essential for photo-electrosynthesis. Herein, we report a coordination metallo-organic system based on bismuth with 2,5-Dimercapto-1,3,4- thiadiazole (DMcT) as a linker ligand which displays a p-type behavior with stable photoelectroactivity in neutral and protic electrolytes. The UV-visible spectral investigation reveals the systematic bathochromic shift with a gradual increment in the concentration of the Bi^{3+} ions to DMcT and the bandgap of 1.7 eV. The XPS, Raman, and FT-IR spectral data suggest the presence of -S-Bi-S- linkage in the c-Bi-DMcT coordination polymeric structures. Photocathode prepared by electrooxidation shows relatively less bismuth content with disulfide linkage and lower photoactivity compared to c-Bi-DMcT prepared by chemical synthesis. The observed photocurrent values are in the range of -25 to -30 µA cm^{-2} in protic electrolytes and evidence their p-type behavior and stability. The stabilization of photogenerated electron, its transfer towards electrolyte interface, and protonatable units of DMcT with a tautomeric shuttle, bismuth redox activity plays a crucial role in the enhancement of photoinduced multi-proton coupled electron transfer reactions (m-PCET) reactions in the protic electrolyte. In contrast, the electrodeposited e-BiDMcT shows a relatively lower p-type photocurrent response and metal-free poly-DMcT exhibits poor n-type photoelectrochemical responses in protic electrolytes. Furthermore, the Bi-DMcT thin film displays a good photoinduced oxygen reduction activity in both neutral and protic electrolytic conditions, which is essential for photoinduced m-PCET reactions.

Keywords : Photocathode, Bismuth thiadiazole, Photoelectrochemistry, Oxygen reduction

STCO-14

A Dual Fluorescent Probe for Selective Detection of Metal Ions

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Abstract:

For many technological applications, the development of extremely sensitive and selective chemosensors for the monitoring of physiologically and ecologically relevant metal ions is essential. Heavy metals are prominent environmental contaminants that pose a substantial hazard to human health, due to their nondegradable nature and ability to accumulate in the food chain. The human body contains copper, which is the third most abundant element and is essential to numerous physiological functions. However, prolonged exposure to copper has made it a toxic pollutant and responsible for diseases like dyslexia, Parkinson's disease, oxidative stress, anaemia, hypoglycaemia, severe neurological defects, gastrointestinal disease and Wilson's disease. A novel fluorescein-based probe was synthesized and characterized by different techniques. The fluorophoric probe displayed fluorescence signal at 554 nm. It exhibited both fluorescence quenching as signalling responses towards copper ions as well as fluorescence enhancing signals for aluminium among all the metal ions as an analyte. The sensing mechanism was investigated through the ^{1}H NMR spectra. The binding mode of 1:1 was confirmed by Job's plot and the LOD was found to be in nanomolar scale for both the metal ions. The probe also demonstrated low biological toxicity in biological studies, indicating that it might be used for Cu^{2+} ions imaging in living cells. The formation of the probe-Cu^{2+} ions complex at low micromolar concentrations under UV light is linked with a notable color shift, which makes this probe for field testing of trace Cu^{2+} ions. The probe can also be utilized for drug sample analysis for the presence of aluminium ions.

Keywords: Fluorophore, copper, aluminium, biosensor and drug sample.

STCO-15

Zinc phthalocyanine embedded Schiff-Base polymer-TiO2 composite for effective photo degradation of cationic and anionic dyes.

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Abstract:

In the present work, zinc phthalocyanine embedded Schiff-base polymer-TiO_2 hybrid photo catalyst has been synthesized. The photo catalyst was characterized using UV–Vis spectrophotometer, Fourier transform infrared spectroscopy (FTIR), powder X-ray diffraction (XRD), and scanning electron microscopy (SEM). Under identical experimental conditions, photocatalytic activities of the TiO_2 alone and hybrid material were evaluated for degradation of Methylene blue (MB) and Eosin Y (EY) as a model pollutant under visible light source. It was observed that sensitization of TiO_2 with ZnPc significantly enhanced the photocatalytic performance towards degradation of MB and EY. Around 95% of photochemical degradation of MB and EY was achieved in 60 min for 10 ppm of initial dye concentration for 30mg of hybrid photo catalyst dosage.

Keywords: Photo catalysis, dye degradation, dye degradation, Zinc Phthalocyanine, Schiff-Base Polymer.

STCO-16

Boosting Hydrogen Generation with Glucose Oxidation Over Hexagonal NiS

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Abstract

Developing a sustainable process for ultrapure hydrogen production is crucial for a carbon-free society, necessitating cost-effective, earth-abundant electrode materials. One such promising device is a hybrid water electrolyzer that enables the production of energy-efficient green hydrogen. Here, hexagonal NiS was synthesized via a rapid solution combustion method and utilized to fabricate a hybrid electrolyzer employing biomass-derived substrates like glucose, glycerol, and ethylene glycol. Electrochemical studies revealed the superior performance of hexagonal NiS, with $NiS_{glucose} > NiS_{glycerol} > NiS_{ethylene\ glycol}$, that are consistent with adsorption energy calculations favoring glucose. The glucose-based hybrid electrolyzer exhibited exceptional electrochemical activity, achieving a low onset potential of 92 mV and an overpotential of 250 mV at a high current density of 400 $mAcm^{-2}$ with an optimal glucose concentration of 50 mmol. By facilitating glucose oxidation at the anode, the hydrogen evolution reaction (HER) rate was accelerated, generating value-added product (formic acid). The hexagonal NiS used as a bifunctional electrocatslyst for cathodic HER and anodic glucose oxidation, required a modest input voltage of 1.45 V vs RHE at 100 mA cm^{-2}, reducing energy consumption by 0.26 V compared to conventional electrolyzers. By replacing the sluggish water oxidation reaction, glucose oxidation catalyzed by hexagonal NiS enhances hydrogen production efficiency with lower energy input.

Keywords: NiS, electrocatalyst, biomass-derived products, hydrogen production, low energy consumption

STCO-17

Survey And Analysis of CO_2 Emissions from Light Sources in Selected Areas

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ABSTRACT

This paper presents a comparative analysis of CO_2 emissions resulting from lighting in urban areas. The study investigates the types of light sources used, such as LED, fluorescent, and incandescent bulbs, and evaluates their energy consumption patterns. Urban areas, with their higher energy demand due to population density and modern infrastructure. By analysing the electricity generation methods (renewable vs. non-renewable) that power these light sources, this research offers insights into the environmental impact of lighting. The findings highlight actionable strategies for reducing CO_2 emissions by promoting energy-efficient technologies and sustainable practices in urban communities, aiming to contribute to global climate change mitigation efforts.

Keywords: 1.urban 2. Emissions 3.LED 4.incandescent 5.environment

STCO-18

Sustainable Nano-material technology and its applications in medicinal field – An overall Review in concern to impact on global health

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Abstract

This abstract explores sustainable nanomaterial technology and its diverse applications in the medicinal field. As demand for environmental friendly solutions rise, sustainable Nano-materials sourced from renewable materials, produced through green synthesis method has emerged as a critical focus in nanotechnology. This review underscores potential of defendable nanomaterial technology advance medical applications, while addressing environmental concerns. Integrating sustainability to development of Nano-materials, medicinal field can progress towards more responsible and effective healthcare solutions, ultimately contributing to a healthier planet.

Key words: Sustainable, Nano-materials, green synthesis, healthcare

STCO-19

Lithium-Integrated Spinel Catalysts for Efficient Alkaline Water Splitting: Unveiling the Electronic and Structural Synergies

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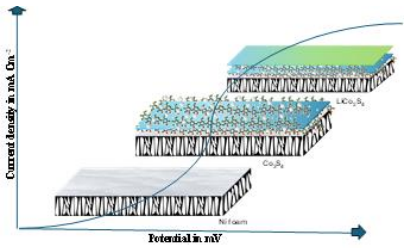
Abstract

The quest for sustainable energy alternatives has escalated as fossil fuels become scarcer and environmental concerns mount. Hydrogen is emerging as a popular energy carrier due to its high energy content and clean combustion. Creating efficient electrocatalysts for the oxygen evolution process (OER) is crucial for hydrogen synthesis via water electrolysis, as well as a wide range of energy conversion and storage technologies. Current OER catalysts frequently rely on expensive precious metal oxides such as platinum, iridium, or ruthenium, which are restricted in quantity and cost. This has fueled the hunt for non-precious metal alternatives, such as oxide and chalcogenide catalysts for hydrogen and oxygen evolution processes (HER). Spinel-type catalysts, distinguished by their AB_2X_4 structure, have showed tremendous promise due to their greater structural suitability for electrocatalytic activity. Recent attempts have centered on incorporating transition metals into cobalt-based sulfides to increase performance. However, determining the most effective crystal facet and understanding the impact of Co^{3+} ion spin state on OER activity remains difficult.

This study emphasizes the incorporation of lithium into the Co_3S_4 spinel lattice, resulting in a bifunctional catalyst, $LiCo_2S_4$, capable of increasing both HER and OER in alkaline settings. The new catalyst has outstanding electrocatalytic activity and stability, as indicated by its low overpotentials of just 57 mV and 393 mV at current densities of 10 mA cm^{-2} and 50 mA cm^{-2}, respectively, and its 161 and 76 mV dec^{-1} Tafel slope for HER and OER. A unique material is capable of acting as a bifunctional catalyst for total water splitting at current densities of 10 mA cm^{-2} and 50 mA, and it can reach a high current density of 400 mA cm^{-2}. Density-functional-theory (DFT) computations were used to examine the surface hydrogen and water absorption Gibbs free energy of various XRD facets, allowing us to interpret their unusual activity for the water splitting process. Surface symmetry of Co^{3+} ions provides further insight into catalytic mechanisms and the link between electronic structure and activity. This study contributes greatly to our understanding of catalysis principles and proposes an economical and efficient method for hydrogen production in alkaline electrolyzes.



Keywords: Spinel, Hydrogen evolution reaction, Oxygen evolution reaction, Density-functional-theory, Water Splitting

STCO-20

Synthesis of Teixobactin analogs and biological evaluation by in-silico and in-vitro studies

Dalli Kumari, Govindappa Nagendra

Teixobactin represents a new class of antibiotics with a novel structure and excellent activity against Gram-positive and Gram-negative bacterial and fungal pathogens. Herein, we describe systematically modified teixobactin analogs' design, synthesis, and antimicrobial evaluation. Replacing the N-Me-D-Phe[1] residue with halogenated D-Phe-OH, the D-allo-Ile[5] residue with L-allo-Ile, and removing the guanidino group at residue 10. An investigation was undertaken to determine the necessity of the enduracididine at the 10th position without having L-allo-End in synthesized TX analogs. Extensive antimicrobial susceptibility assessment against a panel of clinically relevant Staphylococcus aureus, Bacillus subtilis, E. Coli, Pseudomonas sp., Asperigillus and fusarium sp. led to the identification of the new lead compounds, TX1, TX2, TX3 with an excellent bactericidal activity with inhibition zone diameter (mm) 11.50 ±0.59, 10.27 ±0.29, 9.81 ±0.34 at 80 µg/ml compared to the standards Streptomycin(+ve) and DMSO(-ve). TX2, TX3, TX4, and TX5 with excellent antifungal activity with inhibition zone diameter (mm) 9.89 ±0.29, 10.23 ±0.30, 9.23 ±0.29, 9.51 ±0.30 at 80 µg/ml compared to the standards ketoconazole (+ve) and DMSO(-ve). Finally, we have done theoretical calculations using molecular docking and DFT studies.

TX analogs		R_1	R_2	R_3
TX1	2,4- dichloro-D-Phe	Cl	H	Cl
TX2	4-chloro-D-Phe$_1$	H	H	Cl
TX3	3-methoxy-D-Phe$_1$	H	OMe	H
TX4	4-fluoro-phenyl glycine	H	F	H
TX5	N-Me-D-Phe	H	H	H

STCO-21

Plant extract mediated green synthesis of CeO_2 nanoparticles for photocatalytic degradation of pharmaceutical effluents.

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Abstract:

Pharmaceutical and antibiotic effluent pollution in water systems produce significant environmental concern by widespread use and improper disposal of these compounds. They contribute in proliferation of

antibiotic-resistant bacteria, toxic effects, bioaccumulation, and disruption of biological processes. The study aims on eco-friendly nanotechnology-based approach to investigate Photocatalytic implications of CeO_2 nanoparticles (NPs) on evaluating factors such as pH, temperature, agitation, upon effluents, Aspirin, Crocin, Linezolid, Amoxicillin and Ampicillin and determine degradation efficiency. CeO_2 Nanoparticles (NPs) were synthesized using Justica adhatoda plant leaves. The Characterization of CeO_2 NPs; X-ray Diffraction (XRD) reveals cubic fluorite crystal structure with size 15 nm. UV-Vis spectroscopy shows absorption at 464 nm, energy bandage 2.66 eV. Fourier Transform Infrared Spectrometry (FTIR) shows various functional groups including flavonoids, terpenoids, proteins, reducing sugars and alkaloids, they act as stabilizing agents and prevent agglomeration of CeO_2 NPs. Raman spectrum provides sharp peaks at 464 cm^{-1} showing symmetrical stretching vibration mode. Field Emission Scanning Electron Microscopy (FESEM) provides a spherical shape and agglomerated surface morphology, Elemental analysis done by Energy dispersive X-ray analysis (EDAX) reveals presence of Ce and O without any impurity. Optimum, pH 7 played a crucial role in influencing the degradation process with a range of 78% degradation at optimum time 45 minutes. Temperature 45°C had a significant effect exhibiting 70% degradation and 120 RPM providing 75% degradation rate. The degradation efficiency can be further enhanced by use of non-irradtiated and irradiated treatment methods.

[**Keywords:** Pharmaceutical effluents, Photocatalytic activity, CeO_2 nanoparticles, Wastewater treatment]

STCO-22

Comparative analysis of Milk Samples using FTIR Spectroscopic Technique

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ABSTRACT

The presence of microplastics in food products, including milk, poses growing concerns about their health risks and environmental impact. This abstract outlines a study focused on detecting microplastics in milk using Fourier Transform Infrared (FTIR) spectroscopy, a powerful technique for identifying polymer compositions based on molecular vibrations. The process begins with sample preparation, where milk undergoes chemical digestion to remove organic matter, leaving behind potential microplastic particles. These residues are filtered and then analysed using FTIR spectroscopy, which produces a characteristic infrared absorption spectrum. The obtained spectra are compared against known polymer reference libraries to confirm the presence of microplastics, providing information on their size, type, and concentration of .FTIR offers a non-destructive and accurate method for characterizing microplastic particles, allowing for precise identification even at low concentrations. This study aims to establish a reliable protocol for applying

FTIR in the detection of microplastics in dairy products, assess contamination levels in commercial milk samples, and trace potential sources of plastic pollution. The results contribute to a broader understanding of microplastic contamination in the food chain and emphasize the need for preventive measures to safeguard consumer health.

Keywords: FTIR, Microplastics, Milk, Detection, Polymer Identification, Spectroscopy,

STCO-23

Unlocking the Potential of Gamma MnO_2 as an Intercalative Capacitive Deionization Device

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Abstract:

Capacitive Deionization (CDI) offers a transformative solution for water desalination and treatment, surpassing traditional methods in energy efficiency, cost-effectiveness, and environmental sustainability [1]. The study focused on synthesis of various polymorphs (α, β, and γ) of manganese oxide (MnO_2) for potential application of CDI, in which α and β MnO_2 were synthesized utilizing hydrothermal method, while gamma MnO_2 were prepared through a co-precipitation technique. Electrochemical analysis conducted in KOH electrolyte revealed that γ-MnO_2 exhibited superior capacitance of 704 F/g, significantly outperforming the α and β-MnO_2. Based on these results, γ-MnO_2 was selected for further investigation for CDI studies. The salt adsorption capacity (SAC) of gamma MnO_2 was evaluated at different concentrations of sodium sulphate, with the value of 16.94 mg/g in 900 ppm, these findings suggest that gamma MnO_2 synthesized by co-precipitation is a promising electrode material for CDI applications, demonstrating enhanced electrochemical performance and salt removal capabilities. Here we have demonstrated the scalable method of preparation of MnO_2 for Capacitive Deionization.

Keywords: Polymorph**,** Phase transition, Salt adsorption capacity, scalable, Transitional metal oxides

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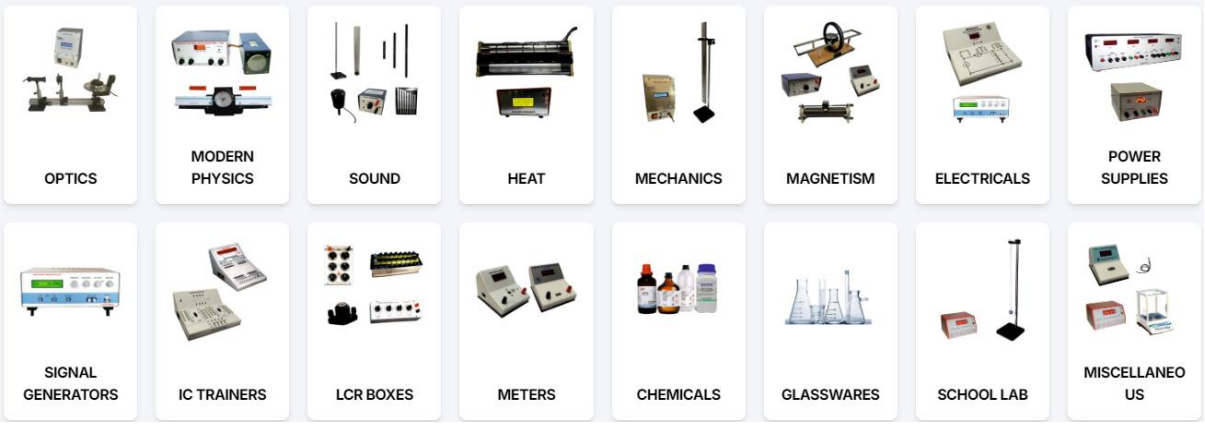

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