UNITED NATIONS DECADE ON ECOSYSTEM RESTORATION 2021-2030

LiFE Lifestyle for Environment

National Conference
on

# ENVIRONMENT, WATER, AGRICULTURE, SUSTAINABILITY AND HEALTH (EWASH-2024):

## INTEGRATED INDIGENOUS TECHNOLOGICAL ADVANCEMENT FOR ATMANIRBHAR BHARAT

**13-14 DECEMBER 2024**

**Department of Applied Sciences**
**Visvesvaraya Technological University**
**Muddenahalli, Chikkaballapur – 562101, Karnataka, India**

# SOUVENIR

**Organized by**

**Department of Applied sciences**
**Visvesvaraya Technological University**
**Muddenahalli, Chikkaballapur - 562101**

**Save The Environment**
**Kolkata / Gurugram**

**Damodar Academy of Scientific**
**&**
**Educational Research, New Delhi**

**Sponsored by**

**Defence Research**
**Developement**
**Organization, Delhi**

**Canopus Instruments,**
**Maharashtra**

# CONTENT

# FOREWARD

It is our great pleasure to extend our heartiest welcome to all the delegates in "National Conference on Environment, Water, Agriculture, Sustainability, and Health **(EWASH 2024)**" organized by the Department of Applied Sciences, Visvesvaraya Technological University- Muddenahalli, jointly with Save The Environment (STE) Kolkata/Gurugram and Damodar Academy of Scientific & Educational Research (DASER), New Delhi.

The conference aims to bring together experts, innovators, thought leaders, researchers, scientists, engineers, academicians and industry professionals to discuss the latest innovations and breakthroughs in materials that matter for environment, water, agriculture, sustainability and health system applications. This event aims at various sectors to explore and discuss the latest trends, challenges, and opportunities in overall sustainability. The symposium covers a wide range of topics and features, invited lectures from experts, exhibitions, Industry academia pavilion, as well as poster presentations showcasing the latest research findings. It will also include networking opportunities for participants to exchange ideas and foster collaborations. The conference is timely organized to promote areas of research where researchers are closely connected to maximize opportunities to collaborate and grow jointly. It is also anticipated that this Academic, Scientific and Industrial amalgamation will provide an excellent platform for collaborative endeavor, exchange of ideas and interaction among scientists and technologists involved in research in allied areas of Materials Science and allied fields all over the world.

We express our profound gratitude to the Vice-Chancellor, Registrar, Registrar (Evaluation), Academic Council Members of VTU, office bearers of Save The Environment and DASER, New Delhi. We also thank the delegates from corporate sectors, research and academic communities who have enthusiastically participating. We also express deep appreciation to all the advisory, organizing committee members and STE delegates / members along with student organizing committee members from VTU.

There will be expertises and vision on a variety of topics, setting the tone for our discussions and sparking new ideas. Talks and discussions will enrich our understanding and inspire thought-provoking conversations. Furthermore, the conference will feature up to 40 poster presentations, allowing researchers and practitioners to share their work in a dynamic and interactive format.

We deeply acknowledge the gratitude for the generous financial support received from Defense Research and Development Organization (DRDO), and Canopus Instruments and the advertisers as listed in the abstract book to make this event a grand success.

**Organizing Chair**
**Prof. Dinesh Rangappa**
**Professor, VTU Muddenahalli**

**Organizing Secretary**
**Dr. Prasanna D Shivaramu**
**Assistant Professor, VTU Muddenahalli**

**Convener**
**Dr. Sushil K Singh**
**Scientist F, DRDO, New Delhi**

# MESSAGE

ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ
("ವಿ ಟಿ ಯು ಅಧಿನಿಯಮ 1994" ರ ಅಡಿಯಲ್ಲಿ ಕರ್ನಾಟಕ ಸರ್ಕಾರದಿಂದ ಸ್ಥಾಪಿತವಾದ ರಾಜ್ಯ ವಿಶ್ವವಿದ್ಯಾಲಯ)
Visvesvaraya Technological University
(State University of Government of Karnataka Established as per the VTU Act, 1994)
"Jnana Sangama", Belagavi - 590 018, Karnataka State

*Dr. Vidyashankar S.*, B.E., M.E., Ph.D.
*Vice Chancellor*

Phone : (0831)2405454
(0831)2498223

## MESSAGE

*I am delighted to extend my warmest greetings and best wishes for the **National Conference on Environment, Water, Agriculture, Sustainability, and Health (EWASH-2024)**, jointly organized by the Department of Applied Sciences, VTU, Muddenahalli, and **Save the Environment, Kolkata.** This Conference, scheduled for 13–14 December 2024, is a remarkable platform for bringing together researchers, academicians, policymakers, and industry experts to address some of the most pressing issues of our time.*

*The themes of EWASH-2024 reflect our shared commitment to fostering sustainable solutions and advancing knowledge in critical areas such as environmental conservation, water management, agricultural innovation, public health, and sustainability practices. I am confident that the deliberations and insights from this event will pave the way for meaningful collaborations and actionable outcomes.*

*My heartfelt appreciation goes to the organizing teams for their dedication and efforts in curating this impactful conference. I wish all participants a highly productive and enriching experience and I look forward to seeing the innovative ideas and research outcomes that will emerge from this gathering.*

*Dr. Vidyashankar S.*
**Vice Chancellor**

# MESSAGE

Raj Kumar Goel Group of Institutions

Date: 11/12/2024

**Message**

The 'Atmanirbhar Bharat Abhiyaan'- the vision of self-reliant India was launched in 2020 at a time when the whole world was grappling with the pathos of the pandemic. As the saying goes, adversities evoked the best technological ideas and innovation that were quintessential for improving healthcare and sustainability. This vision will continue for the times to come because ideas and innovation are indefinite; Atmanirbhar Bharat is making its place solid on the global innovation map.

With this in context, I heartily welcome our esteemed guests, invited speakers and participants to The National Conference on Environment, Water, Agriculture, Sustainability and Health (EWASH-2024): Indigenous Technological Advancement for Atmanirbhar Bharat, being organized on 13th-14th December, 2024 at the Department of Applied Sciences, VTU, Karnataka.

I am honored to be Patron of this crucial conference, which shall witness dignitaries from academia, science & research, industry and policymaking coming together to address the pressing environmental and health challenges of our time. The sub-themes chalked out for EWASH-2024 are relevant to the present generation where young minds are exhibiting commitment towards solution-seeking with various startup ideas.

As we gather here today, we are reminded of the urgent need for collective efforts for bluer water and greener earth by managing climate change, biodiversity loss and environmental degradation.

I believe that the discussion sessions and outcomes of EWASH-2024 will spur meaningful collaborations and initiatives to create a greener earth and more sustainable future for all.

Wishing you all very happy Christmas and New Year-2025.

Prasad 11.12.2024.

**(Dr.Laxman Prasad)**
**GP Advisor, RKG Group**
**Ghaziabad, U.P.**

# MESSAGE

Dr SK Varshney

Professor Emeritus, Vinayaka Mission Research Foundation

And Former Adviser, Department of Science & Technology

Government of India, New Delhi

Dear colleagues,

I am delighted to note that Save The Environment (STE) is organizing National Conference on Environment, Water, Agriculture, Sustainability and Health (EWASH-2024): Integrated Indigenous Technological Advancement for Atmanirbhar Bharat, in partnership with Visvesvaraya Technological University, Chikkaballapur and Damodar Academy of Scientific & Educational Research, New Delhi.

STE is have been organising E-WASH conferences in different parts of the country to sensitize academicians and common person on needs for sustainability and required practices for the same, as India is committed to honour most of the Sustainable Development Goals (SDGs) by 2030.

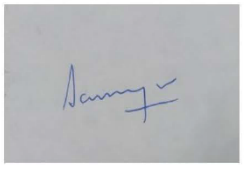
In 2024 edition, focus will be on Water, our life line and this would be diagnosed from different perspectives, biological impurities and treatments, its implication on health, plastic and microplastics, applications of various modern technologies, environmental factors and green approaches.

We all need to take a pledge that we need to keep our earth in more healthier form than it is at present and do our bit for maintaining sustainability. Each little effort will contribute in India realizing its commitment on SDG by 2030, which is now only five years away.

My good wishes for very healthy discussions in the conference followed by implementation at various points by several researchers across the country and taking the message to the common person.

With regards

Sincerely yours



# MESSAGE

ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ
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**Visvesvaraya Technological University**
(State University of Government of Karnataka Established as per the VTU Act, 1994)
"Jnana Sangama" Belagavi-590018, Karnataka, India

**Prof. B. E. Rangaswamy,** Ph.D.
**Registrar**

**Phone : (0831) 2498100**
**Fax : (0831) 2405467**

**MESSAGE**

I extend my heartfelt congratulations to the Department of Applied Sciences, VTU, Muddenahalli, and Save the Environment, Kolkata, for organizing the **National Conference on Environment, Water, Agriculture, Sustainability, and Health (EWASH-2024)**. This initiative is a significant step toward addressing critical global challenges and fostering interdisciplinary collaboration for sustainable development.

May this conference serve as a platform for exchanging innovative ideas, sharing impactful research, and inspiring solutions that will contribute to a healthier, more sustainable future. Wishing all the participants and organizers great success in making EWASH-2024 a memorable and impactful event.

10/12/24

**REGISTRAR**

# MESSAGE

**National Conference on**
**ENVIRONMENT, WATER, AGRICULTURE,**
**SUSTAINABILITY AND HEALTH (EWASH-2024):**
**INTEGRATED INDIGENOUS TECHNOLOGICAL ADVANCEMENT FOR ATMANIRBHAR BHARAT**
**13-14 DECEMBER 2024**
**Visvesvaraya Technological University**
**Muddenahalli, Chikkaballapur, Karnataka, India**

Date: 11.12.2024

## MESSAGE

On behalf of the **Save The Environment (STE),** I am excited to invite you to the National Conference on **Environment, Water, Agriculture, Sustainability and Health (Ewash-2024): Integrated Indigenous Technological Advancement for Atmanirbhar Bharat** to be held at the **Visvesvaraya Technological University (VTU), Chikkaballapur, Bengaluru** on **13-14 December 2024**. This conference showcases our collective commitment in addressing the critical issues related to environmental sustainability and health and hence promoting meaningful discussions and actionable solutions.

The venue for this conference is one of the largest Technological Universities in India with 20 years of tradition of excellence in Engineering & Technical Education, Research, and Innovations. VTU stands as a beacon of academic excellence, innovation, and technological advancement. Its state-of-the-art facilities and serene campus provide the perfect environment for fostering meaningful discussions and collaborations.

In today's rapidly evolving global landscape, the theme of the conference highlights a transformative vision for India's self-reliance and sustainable growth. It emphasizes the strategic need to harness indigenous innovation and integrate advanced technologies across sectors to drive economic, social, and environmental progress. EWASH 2024 serves as a platform for students, researchers, experts, and policymakers to exchange innovative ideas and best practices to mitigate environmental challenges and enhance global health outcomes. The theme resonates deeply with the pressing need for a balanced ecosystem that supports sustainable living and promotes wellness for future generations.

I extend my heartfelt gratitude to all the stakeholders and collaborators of this conference including the organizers from the **VTU** for their relentless efforts in curating a diverse and impactful program and collaborators including **Damodar Academy of Scientific & Educational Research, New Delhi** for valuable insights that have been instrumental in making this event a resounding success.

Let us use this opportunity to build collaborations, spark innovations, and strengthen our resolve to create a healthier, more sustainable world.

Wishing everyone a successful and enriching conference experience.

**(Dr. Kshipra Misra)**
President, Save The Environment (STE), NGO, Kolkata
www.stenvironment.org;
Former Additional Director & Head
Department of Biochemical Sciences (DBCS), Defense Institute of Physiology and Allied Sciences (DIPAS), DRDO, Lucknow Road, Timarpur Delhi-110054
Mobile: 919871372350

**Jointly organized by**

DEPARTMENT OF APPLIED SCIENCES
VISVESVARAYA TECHNOLOGICAL UNIVERSITY
MUDDENAHALLI, CHIKKABALLAPUR, KARNATAKA

DAMODAR ACADEMY OF SCIENTIFIC & EDUCATIONAL RESEARCH, NEW DELHI

SAVE THE ENVIRONMENT
A Society for Research Awareness and Social Development

# MESSAGE

ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ
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Visvesvaraya Technological University
(State University of Government of Karnataka Established as per the VTU Act, 1994)
"Jnana Sangama" Belagavi-590018, Karnataka, India

**Dr. Dinesh Rangappa**
Professor and Chairperson
Department of Applied Sciences ,
Muddenahalli, Chikkaballapur – 562101

Mobile: +91 9632764659
Email:dineshranhgappa@gmail.com

**10th December, 2024**

## MESSAGE

It gives me immense pleasure to welcome you all to the **National Conference on Environment, Water, Agriculture, Sustainability, and Health (EWASH-2024)**, jointly organized by the Department of Applied Sciences, VTU, Muddenahalli, and Save the Environment, Kolkata, West Bengal. Scheduled for 13–14 December 2024, this conference promises to be a vibrant platform for the exchange of innovative ideas, research findings, and transformative solutions in these critical domains.

The themes of EWASH-2024 highlight the interdisciplinary nature of today's challenges and the need for collaborative approaches to address issues related to environmental sustainability, water resources, agricultural advancement, and public health. I am confident that this gathering will inspire fruitful discussions, foster partnerships, and contribute to the global mission of sustainable development.

I extend my heartfelt gratitude to all the speakers, participants, and organizing teams for their valuable contributions and efforts in making this conference a reality. Wishing everyone a successful, insightful, and enriching experience at EWASH-2024.

Warm regards,

(Dr. Dinesh Rangappa)
Organizing Chair, EWASH - 2024

# MESSAGE

**Dr. Sushil Kumar Singh**
Scientist "F", D.O.-Acoustic Sensor Division
Solid State Physics Laboratory, Lucknow Road, Timarpur, Delhi- 110054, INDIA
**Convener, EWASH - 2024**

## MESSAGE

It is with great enthusiasm and pride that I welcome all esteemed participants, speakers, and delegates to the **National Conference on Environment, Water, Agriculture, Sustainability, and Health (EWASH-2024)**, jointly organized by the Department of Applied Sciences, VTU, Muddenahalli, and Save the Environment, Kolkata, West Bengal, on 13–14 December 2024.

EWASH-2024 serves as a vital platform for bringing together experts and innovators from diverse fields to share their insights and explore solutions to some of the most pressing challenges of our times. By focusing on key themes such as environmental conservation, sustainable agriculture, water resource management, and health, this conference aims to foster interdisciplinary collaboration and inspire impactful outcomes.

I extend my heartfelt gratitude to all contributors, including the organizing team, sponsors, and participants, for their dedication to making this event a success. May EWASH-2024 pave the way for meaningful exchanges, transformative research, and actionable ideas that will contribute to a sustainable and healthy future for all.

Warm regards,

# MESSAGE

ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ
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Visvesvaraya Technological University
(State University of Government of Karnataka Established as per the VTU Act, 1994)
"Jnana Sangama" Belagavi-590018, Karnataka, India

**Dr. Prasanna D. Shivaramu**
Assistant Professor,
Department of Applied Sciences , Muddenahalli, Chikkaballapur – 562101
Mobile: +91 9449282192
Email:prasuds@gmail.com

**10th December, 2024**

## MESSAGE

It is with immense pride and enthusiasm that I present the foreword for the **National Conference on Environment, Water, Agriculture, Sustainability, and Health (EWASH-2024)**, jointly organized by the Department of Applied Sciences, VTU, Muddenahalli, and Save the Environment, Kolkata, West Bengal, during 13–14 December 2024.

This conference aims to address some of the most pressing challenges of our time, focusing on environmental sustainability, water resource management, advancements in agriculture, and public health. By bringing together a diverse array of participants, including researchers, academicians, industry experts, and policymakers, EWASH-2024 provides a unique platform for knowledge exchange and collaborative dialogue.

The themes explored in this event underscore the urgent need for innovative approaches and interdisciplinary solutions to ensure a sustainable and healthier future. I am confident that the ideas, discussions, and outcomes of this conference will significantly contribute to shaping policies and practices in these critical domains.

I extend my heartfelt thanks to the organizing team, our collaborators, sponsors, and every participant for their valuable contributions and unwavering commitment to the success of this conference. It is through such collective efforts that we can make meaningful strides toward addressing global challenges.

Wishing all attendees a stimulating, insightful, and productive conference experience.

Warm regards,

(Dr. Prasanna D Shivaramu)
Organizing Secretary, EWASH- 2024

# MESSAGE

School of Chemical Technology
Kalinga Institute of Industrial Technology (KIIT)
Deemed to be University U/S 3 of UGC Act, 1956

Date: 10.12.2024

## *Message*

I am delighted to extend my best wishes for the success of the upcoming 6th Annual Meet of Save the Environment (STE) and the National Conference on Environment, Water, Agriculture, Sustainability, and Health: Integrated Indigenous Technological Advancement for Atmanirbhar Bharat (EWASH-2024), scheduled to be held on December 13–14, 2024, at the Department of Applied Sciences, VTU, Karnataka, India.

EWASH-2024 is poised to be a remarkable event, offering an exceptional platform for interdisciplinary discussions among industry leaders, scientists, environmentalists, academicians, policymakers, and young researchers. This conference's focus on addressing critical issues of environmental protection and public health through collaborative research and dialogue is truly commendable. The event promises to deliver an enriching experience through its diverse range of activities, including insightful keynote lectures, thought-provoking oral talks, and engaging poster presentations. These opportunities will not only foster the exchange of ideas but also inspire innovative solutions to the pressing challenges of sustainability, water management, and health.

I sincerely appreciate the efforts of Save the Environment, the Department of Applied Sciences at VTU, and all the collaborators who have come together to make this conference a reality. Special thanks are due to the dedicated members of the organising committee for their hard work and commitment to ensuring its success.

I am confident that EWASH-2024 will leave a lasting impact by fostering meaningful connections, encouraging knowledge-sharing, and driving actionable outcomes that contribute to the vision of Atmanirbhar Bharat. Wishing the conference resounding success and a fruitful exchange of ideas for the benefit of all stakeholders.

**Dr. Sankha Chakrabortty**
Joint Organizing Secretary
EWASH-2024

'A' Category as per notification of Ministry of HRD, Govt. of India | 'Tier1' Accreditation (Washington Accord) by NBA for Engineering Streams | Accredited by NAAC in 'A Grade' | Accredited by IET, U.K. (B.Tech. Programme)
At/PO: KIIT Campus- 11, Bhubaneswar-751 024(Odisha), India
Tel:91-674-2725466,2725349 Fax:91-674-2725732 E-mail: institute@kiitbiotech.ac.in Website: www.kiitbiotech.ac.in

# VISVESVARAYA TECHNOLOGICAL UNIVERSITY

Visvesvaraya Technological University (VTU), established in 1998, is one of India's leading technological universities, headquartered in Belagavi, Karnataka. Named after Sir M. Visvesvaraya, a distinguished engineer and visionary, VTU is dedicated to fostering excellence in technical education, innovation, and research. The university aims to produce highly skilled professionals who contribute to India's technological and industrial growth.

Key Highlights:

1. **Affiliations and Scope**: VTU oversees over 200 engineering colleges across Karnataka, enrolling more than 4 lakh students annually in undergraduate, postgraduate, and doctoral programs. Its comprehensive academic portfolio spans engineering, architecture, management, and technology disciplines.
2. **Academic Excellence**: VTU maintains a forward-thinking curriculum, integrating emerging fields such as Artificial Intelligence, Robotics, Internet of Things (IoT), and Data Science. Regular updates ensure alignment with global industry standards.
3. **Research and Innovation**: The university houses several Centers of Excellence, focusing on cutting-edge fields like geospatial technology, nanotechnology, and sustainable energy. It actively collaborates with industry and international institutions to promote groundbreaking research and development.
4. **Infrastructure**: VTU's campuses feature state-of-the-art facilities, including advanced laboratories, digital libraries, and incubation centers. Its centralized academic and administrative systems enhance efficiency and transparency.
5. **Global Recognition**: VTU degrees are recognized worldwide, and the university fosters international collaborations for academic exchange, joint research, and training programs.
6. **Community and Impact**: Through initiatives like rural development programs, skill development workshops, and entrepreneurship training, VTU plays a vital role in societal upliftment and economic progress.

VTU's commitment to excellence in technical education and its focus on innovation have positioned it as a key driver of technological advancement in India, making it a beacon of knowledge for aspiring engineers and technologists.

# DEPARTMENT OF APPLIED SCIENCES, VTU

The **Department of Applied Sciences**, previously known as the **Department of Nanotechnology**, at Visvesvaraya Technological University (VTU), is a hub for interdisciplinary research and education. Situated at the university's main campus in Belagavi, Karnataka, this department plays a pivotal role in advancing applied sciences and cutting-edge technologies to address real-world challenges.

**Evolution and Focus**

Initially established as the Department of Nanotechnology, its focus expanded to encompass a broader range of disciplines under applied sciences. This evolution reflects the growing need to integrate fields such as physics, chemistry, material science, and nanotechnology to foster innovative solutions for industrial, environmental, and societal challenges.

**Academic Programs and Research**

The Department is offering M.Tech. in Nano Science and Technology, M.Sc. in Chemistry and Ph.D. programs. The department encompasses highly qualified dedicated faculties who imbibe and nurture the students with all practical skills apart from the Teaching-learning process. The courses offered by the department are M.Tech. in Nanotechnology and Ph.D. in Applied Sciences. The faculty members of the Department are having ongoing funded research projects from various funding agencies of both state and central Govt. and also International Collaborative Research Projects.

**State-of-the-Art Facilities**

The department houses sophisticated research laboratories equipped with tools for material characterization, nanofabrication, and computational modeling. These facilities are instrumental in enabling high-quality research and innovation.

**Collaborations and Achievements**

The department has forged collaborations with industry leaders, research institutions, and universities, both nationally and internationally. These partnerships have facilitated joint research projects, academic exchange programs, and technology transfer initiatives. Faculty members are actively involved in publishing high-impact research papers and securing patents, contributing significantly to the scientific community.

**Commitment to Sustainable Innovation**

With a focus on sustainable technologies, the Department of Applied Sciences emphasizes eco-friendly and energy-efficient solutions, aligning with VTU's mission to foster responsible engineering practices. The department continues to serve as a center of excellence, nurturing talent and driving innovation to meet the demands of the modern technological landscape.

**Facilities available in the Department**

State of the art Nanomaterials Synthesis Lab

- ✓ X-ray Diffractometer
- ✓ Scanning Electrom Microscope
- ✓ Atomic Force Microscope
- ✓ FT-Infrared Spectometer
- ✓ UV-Vis-NIR Spectrophotometer
- ✓ TG-DTA
- ✓ Spray Pyrolysis
- ✓ Chemical Vapor Deposition Unit
- ✓ Spin Coating Unit
- ✓ Dip Coating Unit
- ✓ Ball Milling
- ✓ Battery Fabrication and Testing Facility

# SAVE THE ENVIRONMENT

Save The Environment (STE) was founded and registered on 19th November 1990 [Reg no. S/66/489 of 1990-91]. Since then, STE has been privileged to collaborate with organizations and departments of repute, like WWF (India), AIIHPH, Indo-Canada environment facility, DST and DRDO to counter the long-standing issue of arsenic poisoning of water, especially in rural areas of West Bengal, India. STE has also been actively engaged in spreading awareness among general public for environment protection and water management. For further details please visit: **http://stenvironment.org**

**International Journal of Environment and Health Sciences:** This journal is being published by Save the Environment. Send your manuscripts for peer-review by e-mail. The authors must mention address, Contact Nos. and E-MAIL ID in their forwarding letter. Proof will be sent for correction before publishing. A pledge for originality will be signed by the authors.

We are pleased to announce that the DOI prefix for International Journal of Environment and Health Sciences is now available from Crossref, the official Digital Object Identifier (DOI). The journal is now indexed in International Scientific Indexing (ISI).

For further details, please contact Chief Editor at: ijehseditor@gmail.com or visit our website: **www.stenvironment.org**

# ORGANIZING COMMITTEE

***Chief Patrons***

**Prof. S. Vidya Shankar**
Vice Chancellor, VTU, Belagavi
**Prof. Arunabha Majumder**,
Chairman, STE, Emeritus Prof., Jadavpur University and Former Dir., AIIHPH, Kolkata

***Patrons***

**Prof. B.E. Rangaswamy**,
Registrar, VTU, Belagavi
**Prof. T. N. Sreenivasa**,
Registrar (Evaluation, VTU, Belagavi
**Dr. Laxman Prasad**,
GP Advisor, RKG Group, Ghaziabad, U.P.
**Shri S.K. Varshney**,
Former Scientist 'G' & Head, (Intl. Cooperation) DST, Govt. of India

***Co-Patron***

**Dr. Kshipra Misra**,
President, Save the Environment, Gurugram / Kolkata

***Organizing Chair***

**Prof. Dinesh Rangappa**
Department of Applied Science, VTU, Muddenhalli

***Convener***

**Dr. Sushil Kumar Singh**
Scientist-F, Solid State Physics Lab., Lucknow Road, Timarpur, Delhi

***Co-Convener***

**Mrs. Chhanda Basu**
Secretary, Save The Environment, Kolkata, West Bengal
**Mr. Sanjit Mitra**
Save The Environment, Kolkata, West Bengal

***Organizing Secretary***

**Dr. Prasanna D. Shivaramu**,
Department of Applied Sciences, VTU, Muddenhalli

***Joint Organizing Secretaries***

**Dr. Sankha Chakraborty**
Kalinga School of Chemical Engineering, KIIT Deemed to be University, Bhubaneswar
**Dr. Bushra Parveen**
Department of Pharmacology, School of Pharmaceutical Education and Research, Jamia Hamdard, New Delhi

## *Local Organizing Committee*

| Dr. Chitrabhanu C P | Mrs. Rashmi P | Ms. Shaheeda |
|---|---|---|
| *Faculty* | *Faculty* | *Faculty* |
| **Mr. Kunal Roy** | **Mr. Sumanth Shetty** | **Mrs. Shilpa V A** |
| *Research Scholar* | *Research Scholar* | *Faculty* |
| **Ms. Sowmyashree** | **Ms. Sowmya S N** | **Mr. Manjesh D M** |
| *Faculty* | *Faculty* | *Research Scholar* |
| **Mr. Manjunath** | **Mr. Sadananda** | **Mr. Priyadarshan S** |
| *Clerk* | *Research Scholar* | *M.Tech* |
| **Ms. Amulya C R** | **Mr. Manikanta P N** | **Mr. Chandrashekar** |
| *Faculty* | *Research Scholar* | *Faculty* |
| **Ms. Sushma S A** | **Mr. Tathagata Sardar** | **Ms. Shilpa V S** |
| *Faculty* | *Research Scholar* | *Faculty* |
| **Ms. Shabnam** | **Mr. Surya H N** | **Mr. Vinay A N** |
| *Faculty* | *M.Tech* | *Faculty* |
| **Mr. Mohith B R** | - | - |
| *Faculty* | - | - |

# SESSION PLAN

| | |
|---|---|
| 09.00 am - 10.00 am | REGISTRATION |
| 10.00 am - 11.30 am | INAUGURATION AND AWARD CEREMONY |
| 11.30 am -12.00 noon | TEA BREAK |
| Session – I<br>Session Chair: Dr. Kshipra Misra, President, STE<br>Co-Chair: Dr. Pankajakshi R, Associate Professor, VTU | |
| 12.00 noon – 12.40 pm | KEY NOTE ADDRESS – I<br>Interlinkages between plastics and endocrine-disrupting chemicals: Risk Assessment and Sustainable Technologies<br>**Dr. Paromita Chakraborty**<br>*Professor & Head, Centre for Research in Environment, Sustainability Advocacy and Climate Change Directorate of Research, SRM Institute of Science and Technology, Kattankulathur-603203, Tamil Nadu, India* |
| 12.40 pm – 1.05 pm | Invited Talk – 1<br>Indigenous acoustic emission technology for real time early warning system for natural disasters<br>**Dr. Sushil Kumar Singh**<br>*Scientist "F", D.O.-Acoustic Sensor Division, Solid State Physics Laboratory, Lucknow Road, Timarpur, Delhi- 110054* |
| 01.05 pm - 01.30 pm | Invited Talk – 2<br>Sustainable production of kojic acid using renewable resources<br>**Dr. Saurabh Jyoti Sarma**<br>*Associate Professor & Interim Head, Department of Biotechnology, Bennett University (Times of India Group) Cabin No. 160, M-Block, First Floor Plot No. 8-11, Techzone-II, Greater Noida.* |
| 01.30 pm - 02.15 pm | LUNCH BREAK |
| Session – II<br>Session Chair: Dr. Sushil Kumar Singh, Scientist, DRDO, New Delhi<br>Co- Chair: Dr. N Chikkanna, Professor, VTU | |
| 02.15 pm – 2.40 pm | Invited Talk – 3<br>Artificial Intelligence for environment, water and agriculture<br>**Dr. Mallikarjun Kodabagi**<br>*Nagarjuna College of Engineering and Technology, Devanahalli* |
| 02.40 pm – 03.05 pm | Invited Talk – 4<br>Supercritical carbon dioxide assisted ecofriendly dyeing of textiles: Future perspectives<br>**Dr. M. S.Yogendra Kumar**<br>*Scientist, Defence Bio-Engineering and Electromedical Laboratory, Defence Research and Development Organisation, Ministry of Defence, C V Raman Nagar, Bengaluru-560093* |
| Session – III<br>Session Chair: Dr. H. P. Nagaswarupa, Professor, Davanagere University<br>Co- Chair: Dr. Baswaraj, Associate Professor, VTU | |
| 03.05 pm 03.30 pm | Invited Talk – 5<br>Semiconducting Nanostructures for Sensor and Catalytic Dye Degradation applications<br>**Dr. H. C. Ananda Murthy**<br>*School of Applied Sciences, Papua New Guinea University of Technology, Lae, Morobe Province, Papua New Guinea* |
| 03.30 pm – 03.55 pm | Invited Talk – 6<br>Nanomaterials in health care<br>**Dr. Navya Rani M**<br>*Nagarjuna College of Engineering and Technology, Devanahalli* |
| 03.55 pm – 04.15 pm | Presentation by Industry Representatives: Canopus; Metrohm |
| 04.15 pm - 05.00 pm | TEA BREAK AND POSTER SESSION |
| ORAL PRESENTATION<br>Session Chair: Dr. K. G. Basava Kumar, Director, R&D, VTU<br>Co-Chair: Dr. H. H. Ramesh, Associate Professor, VTU | |
| 05.00 pm – 06.00 pm | OPA-01 to OPA-06 |
| 06.00 pm to 07.30 pm | CULTURAL PROGRAM |
| 07.30 pm – 08.30 pm | DINNER |





DEPARTMENT OF APPLIED SCIENCES
Visvesvaraya Technological University
Muddenahalli, Chikkaballapur - 562101

SAVE THE ENVIRONMENT
(A Society for Research Awareness and Social Development),
Gurugram/Kolkata

DAMODAR ACADEMY OF SCIENTIFIC & EDUCATIONAL RESEARCH (DASER)
New Delhi

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| **Session – IV** | | |
| **10.00 am - 10.40 am** | **KEY NOTE ADDRESS – II**<br>**Prof. Arunabha Majumder**<br>*Chairman, STE, Emeritus Prof., Jadavpur University, Kolkata and Former Dir., AIIHPH, Kolkata (Online)* | |
| **10.40 am to 11.05 am** | **Invited Talk – 7**<br>**Recycling of Molybdenum from Industrial Wastewater using Membrane-integrated Hybrid Technology**<br>**Dr. Ramesh Kumar**<br>*Bioenergy & Environmental Remediation Laboratory (BERL)*<br>*Department of Earth Resources and Environmental Engineering*<br>*Hanyang University, Seoul, Korea (Republic of) 04763 (Online)* | |
| **Session – V**<br>**Session Chair: Dr. Dinesh Rangappa, Professor, VTU**<br>**Co-Chair: Dr. H. P. Thirtha Prasad, Associate Professor, VTU** | | |
| **11.05 am – 11.30 am** | **Invited Talk – 8**<br>**Nano Iron-pyrite Seed Stimulant for Sustainable Agriculture**<br>**Dr. Kalpana Bhargava**<br>*Scientist G, Technology Director, Advanced Technology*<br>*High Energy Material Research Lab (HEMRL), Defense Research and Development Organization (DRDO), Ministry of Defence, Government of India, Sutarwadi, Pashan, Pune, Maharashtra 411021* | |
| **11.30 pm – 11.55 am** | **Invited Talk – 9**<br>**Valorisation of process waste for the removal of organic dyes from water**<br>**Dr. Suraj K. Tripathy**<br>*Associate Dean, School of Chemical Engineering, Associate Professor, School of Biotechnology*<br>*Kalinga Institute of Industrial Technology, Bhubaneswar Odisha 751024, India* | |
| **11.55 am – 12.15 pm** | **TEA BREAK** | |
| **Session – VI**<br>**Session Chair: Dr. Sanjeev Chaudhary, IIT Bombay**<br>**Co- Chair: Dr. Thanuja T C, Professor, VTU** | | |
| **12.15 pm – 12.40 pm** | **Invited Talk – 10**<br>**Impact of Climate Change on Precipitation and Stream Flow**<br>**Dr. Nagraj S Patil**<br>*Visvesvaraya Technological University, Belagavi* | |
| **12.40 pm – 01.05 pm** | **Invited Talk – 11**<br>**Valorization Metal-Based Phosphates for Sustainable Water Management: Advancing SDG 6 Goals**<br>**Dr. Amita Somya**<br>*Amity University, Bengaluru* | |
| **01.05 pm – 02.00 pm** | **LUNCH BREAK** | |
| **ORAL PRESENTATION**<br>**Session Chair: Dr. Navya Rani M, Associate Professor, NCET**<br>**Co-Chair: Dr. Nirmala Hiremani, Assistant Professor, VTU** | | **Online Presentation OPA-13 to OPA-20** |
| **02.00 pm – 03.00 pm** | **OPA - 07 to OPA - 12** | |
| **Session – VII**<br>**Session Chair: Dr. Prasanna D. Shivaramu, Department of Applied Sciences, VTU**<br>**Co-Chair: Dr. Binoy Mathew, Associate Professor, VTU** | | |
| **03.00 pm - 03.25 pm** | **Invited Talk – 12**<br>**Therapeutic prospective of biogenic Ag based nanocomposite systems for healing Methicillin-resistant Staphylococcus aureus infected wounds**<br>**Dr. Amrita Mishra**<br>*School of Biotechnology, Kalinga Institute of Industrial Technology (KIIT), Bhubaneswar 751024, Odisha, India* | |
| **03.25 pm – 03.50 pm** | **Invited Talk – 13**<br>**Transforming Healthcare with Artificial Intelligence**<br>**Dr. Lohith J J**<br>*Nagarjuna College of Engineering and Technology, Devanahalli* | |
| **03.45 pm – 04.30 pm** | **TEA BREAK AND POSTER SESSION** | |
| **04.30 pm – 05.30 pm** | **VALEDICTORY AND AWARD CEREMONY** | |





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# LIST OF SPEAKERS

| Address | Speaker | Title |
|---|---|---|
| Keynote Speaker – I | Dr. Paromita Chakraborty (SRMIT, Tamil Nadu) | Interlinkages between plastics and endocrine-disrupting chemicals: Risk Assessment and Sustainable Technologies |
| Keynote Speaker – II | Prof. Arunabha Majumder (STE, Kolkata) | Public Water Supply: A few issues for consideration of Urban Local Bodies |
| Invited Speaker – I | Dr. Sushil Kumar Singh (DRDO, New Delhi) | Indigenous acoustic emission technology for real time early warning system for natural disasters |
| Invited Speaker – II | Dr. Saurabh Jyoti Sharma (Bennett University (ToI Group), Noida | Sustainable Production of Kojic Acid Using Renewable Sources |
| Invited Speaker – III | Dr. Mallikarjun Kodabagi (NCET, Devanahalli, Bengaluru) | Artificial Intelligence for environment, water and agriculture |
| Invited Speaker – IV | Dr. M S Yogendra Kumar (DRDO, Bengaluru) | Supercritical carbon dioxide assisted ecofriendly dyeing of textiles: Future perspectives |
| Invited Speaker – V | Dr. H. C. Ananda Murthy (PNGUT, Papua New Guinea) | Semiconducting Nanostructures for Sensor and Catalytic Dye Degradation applications |
| Invited Speaker – VI | Dr. Navya Rani M (NCET, Devanahalli, Bengaluru) | Nanomaterials in Health Care |
| Invited Speaker – VII | Dr. Ramesh Kumar (Hanyang University, South Korea) | Recycling of Molybdenum from Industrial Wastewater using Membrane-integrated Hybrid Technology |
| Invited Speaker – VIII | Dr. Kalpana Bhargava (DRDO) | Nano Iron-pyrite Seed Stimulant for Sustainable Agriculture |
| Invited Speaker – IX | Dr. Suraj K. Tripathy (KIIT, Bhubaneswar, Odisha) | Valorisation of process waste for the removal of organic dyes from water |
| Invited Speaker – X | Dr. Nagraj S Patil (VTU, Belagavi) | Impact of Climate Change on Precipitation and Stream Flow |
| Invited Speaker – XI | Dr. Amita Somya (Amity University, Bengaluru) | Metal-Based Phosphates for Sustainable Water Management: Advancing SDG 6 Goals |
| Invited Speaker – XII | Dr. Amrita Mishra (KIIT, Bhubaneswar, Odisha) | Therapeutic prospective of biogenic Ag based nanocomposite systems for healing Methicillin-resistant Staphylococcus aureus infected wounds |
| Invited Speaker – XIII | Dr. Lohith J J (NCET, Devanahalli, Bengaluru) | Transforming Healthcare with Artificial Intelligence |

# KEYNOTE ADDRESS - I

**Dr. Paromita Chakraborty**

Environmental Science and Technology Laboratory, Centre for Research in Environment, Sustainability Advocacy and Climate Change (REACH), Directorate of Research, SRM Institute of Science and Technology, Kattankulathur, Chengalpattu District, Tamil Nadu 603203

**Title: Interlinkages between plastics and endocrine-disrupting chemicals: Risk Assessment and Sustainable Technologies**

Openly dumped waste plastics have been evidenced as a potential source for endocrine disrupting chemicals (EDCs) along the tropical riverine regions of India. Furthermore, Corona Virus Disease – 19 (COVID-19) Pandemic resulted in subsequent addition of personal protective equipment (PPE) related single use plastics in the waste stream. Given such newer challenges associated with waste plastics, we have investigated the risk associated with the EDCs interlinked with waste plastics. EDCs in plastics such as additives (phthalic acid esters, PAEs) brominated flame retardants (polybrominated diphenyl ethers, PBDEs, and polychlorinated biphenyls (PCBs), are evidenced as the primary conduits from the hotspot regions where open burning of municipal solid waste and the informal recycling of plastic waste, encompassing electronic and electrical waste were prevalent. During the COVID-19 pandemic, the surge in plastic-based PPE and dumped e-waste in the open dumps along the tropical riverine catchments are the possible reasons for the increase in atmospheric and riverine priority PAEs, tetra and penta homologs of PCBs and PBDE homologs compared to the pre-pandemic period. Prolonged environmental release of the EDCs was found to bio-accumulate in locale cattle, leading to increased concentrations of EDCs in bovine milk after about three years of pandemic compared to pre-pandemic levels. Multi-pathway exposure to EDCs is an emerging health concern, especially for the marginalized communities living along the riverine regions of India. We suggest nature-based product system to trap these EDC and remediate them in an integrated model system.

**Profile:**

Dr. Paromita Chakraborty is a Top 2% Most Cited Researcher and the Professor and Head of Centre for Research in Environment, Sustainability Advocacy and Climate Change (REACH) at SRM Institute of Science and Technology, Kattankulathur, Tamil Nadu, India. Her research domains include multimedia transport of legacy and new persistent organic pollutants, the bioavailability of organic contaminants, environmental chemistry, transformation and remediation of endocrine-disrupting compounds and other emerging contaminants. Dr. Chakraborty has worked extensively on many Indian riverine ecosystems, including the transboundary rivers of Ganga and Brahmaputra. She is a big proponent of wastewater-based epidemiology for disease outbreak preparedness and has successfully completed several projects on developing an early warning system for SARS-CoV-2. Dr. Chakraborty's research is funded by numerous international organisations such as the Research Council of Norway, the Norwegian Embassy and the Swiss Agency for Development and Cooperation as well as the scientific wings of the Department of Science and Technology, Govt. of India. She has guided 6 PhD students and is currently guiding 6 PhD scholars. She has over 100 journal publications till date and has published several book chapters. Dr. Chakraborty has also edited 3 books by Springer and Elsevier including one on POPs in India. She is the proud recipient of prestigious honours including the ACS Early Career Chemist Award, Eminent Young Scientist for the Year 2015 and the Hiyoshi Environmental Award 2020.

# KEYNOTE ADDRESS - II

**Prof. Arunabha Majumder**

Chairman, STE, Emeritus Prof., Jadavpur University, Kolkata
Former Dir., AIIHPH, Kolkata

**Title: Public Water Supply: A few issues for consideration of Urban Local Bodies**

The objective of public water supply system is to provide safe and clean water as per requirement and conveniently as possible. Water quality has direct link with the health of the consumers. Urban local bodies (ULBs) have to ensure sustainable water supply system with provision of adequate water and acceptable water quality as prescribed by Bureau of Indian Standard. The water supplied must be free from pathogenic organisms and chemical contamination, clear, palatable and also free from undesirable taste and odor. In addition, the source of water must be sustainable and accordingly extensive studies need to be carried out on the availability of water whether surface water or groundwater throughout the year as well as years to come in future. Water quality monitoring and surveillance address to keep a careful watch at all times from public health point of view, over the safety and reliability of drinking water supply. To ensure acceptable quality and reliability of water supply system in urban areas, ULBs must put adequate emphasis on developing a regular system of water quality testing at consumer's end, risk assessment of contamination, sanitary survey, remedial and preventive measures to control contamination etc. The most effective means of consistently ensuring the safety of drinking water supply is through the use of a comprehensive risk assessment and risk management approach that encompasses all steps in water supply from catchment to consumers. A Water Safety Plan (WSP) comprises three essential actions that are the responsibility of public water suppliers (ULBs) in order to ensure that drinking water is safe and these are (i) a system assessment, (ii) effective operational monitoring, and (iii) management. It is important that participation of citizens during planning, execution and, operation of water supply projects shall be ensured by ULBs to achieve equity in water distribution system. The emphasis must be on establishing network which brings professionals and communities into closer dialogue and partnership, helping civic authorities to move from being providers of systems to become promoters and facilitators of program and in the process communities should act as clients and not only users.

**Profile:**

Prof Majumder has more than 45 years experience in the field of Water Supply, Water Purification, Water Conservation, Water Quality monitoring, Water management, Rural Sanitation, Sewerage and Drainage, Municipal Sewage Treatment systems, Industrial Waste Water Management, Water Pollution Control, Air pollution Control, Solid Waste Management, Hazardous Waste Management, Environmental Impact Assessment etc. He was a faculty member at All India Institute of Hygiene and Public Health, Government of India and associated with Post-Graduate teaching in Public Health Engineering, Research and Consultancy. He was superannuated as Director-Professor of All India Institute of Hygiene & Public Health. Currently he is associated as Professor- Emeritus at the School of Water Resources Engineering, Jadavpur University. Prof. Majumder is a Fellow of Indian Water Works Association, Institution of Public Health Engineers, India, and West Bengal State Academy of Science & Technology. Prof. Majumder was awarded 'Best Environmental Engineer for the year 2007' by the Institution of Engineers (India). He published more than 100 scientific articles in International and National Journals.

# INVITED TALK - I

**Dr. Sushil Kumar Singh**

Additional Director & Sc. F
Proof of Concept & Sub-System Development (PoC&SSD)
Solid State Physics Laboratory (SSPL)
DRDO, Ministry of Defence, Delhi
E-mail: sk.singh.sspl@gov.in

**Title: Indigenous acoustic emission technology for real time early warning system for natural disasters**

Acoustic emission (AE) technology, a non-destructive testing method, has emerged as a promising tool for structural integrity evaluations in various industries, including defense. This study explores the development and potential applications of indigenous AE technology for futuristic structural health monitating/defense applications. We will discuss the principles of AE, its advantages over traditional methods, and the specific challenges and opportunities faced in its implementation within the defense sector. Key components to be covered are development of indigenous AE sensors with advancements in sensor design and materials for enhanced sensitivity and durability, robust AE data acquisition and analysis system for accurate AE detection and characterization, potential applications of AE technology in structural health monitoring, damage detection, and failure prediction of critical defense assets such as aircraft, tanks, and ships, and futuristic applications in early wanring systems for natural disasters incuding landslides, snow avalanches, glacial lake outbursts, erarthquakes etc. We has designed and developed indigenous broadband AE sensors (20-80 kHz) and AE data acquisition and analysis system for snow avalanche monitoring, which are currently deployed at multiple snow avalanche prone sites in Himachal Pradesh and Jammu & Kashmir. Indigenous low power wireless AE sensor system has also been developed for slope monitoring in remote areas. Currently, we are working on realization of protoypes for landslide early warning system using their indigenous AE sensor systems. Laboratory studies have been reported for AE behavior of active waveguide systems under different deformation dynamics. AE technology is a viable stratergy for provoding a unique solution to the real time early warning system for natural disasters applications.

**Profile:**

Dr. Sushil Kumar Singh is presently working in Proof of Concept & Sub System Development Division at Solid State Physics Laboratory, DRDO, Delhi. He is also HR Head and Chairman Officer Club, SSPL. He obtained his doctoral degree in Superconducting at Barkatullah University, Bhopal in 1993. In 1994, he received a Leverhulme postdoctoral fellowship to work at Warwick University on Oxide thin films (CMR materials). He joined as a faculty at G. G. D. University, Bilaspur in 1997. He has been awarded Commonwealth teacher fellowship in 2001 to work at Warwick University on Thin Film Technology. Tokyo Institute of Technology invited him as a JSPS invited fellow in 2004 and he is being engaged in research of ferroelectric thin films for non-volatile memory application. He worked as a senior researcher in Next Generation FeRAM project jointly run by Tokyo Institute of Technology and Fujitsu, Japan. Since 2008, he is working in Solid State Physics Laboratory, DRDO, Delhi. He has been engaged in R&D Projects such as SiC bulk single crystal growth, MEMS based adaptive mirrors, Multifunction thin films and $CeO_2$ nanoparticles for defence application and so on. Recently, PoC&SSD Division, SSPL developed Indigenous Acoustic Emission (AE) Sensors & AE Data Acquisition and Analysis System. AE Sensor System deployed at snow avalanche prone sites at Manali-Lah Axis for snow avalanche monitoring. He received DRDO Agni Award for developing the Indigenous AE Sensor System Technology. Presently, he is the Project Director of "Prototype realization of a Landslide Early Warning System (LEWS) based on acoustic emission (AE) technology" He is Life member of Materials Research society of India, National Environment Science Academy and Save the Environment (STE). He is an author of more than 100 research publications in peer review international journals and written 3 book chapters.

# INVITED TALK - II

**Dr. Saurabh Jyoti Sharma**

Associate Professor & Interim Head
Department of Biotechnology, Bennett University (Times of India Group)
Cabin No. 160, M-Block, First Floor Plot No. 8-11, Techzone-II, Greater Noida

**Title: Sustainable Production of Kojic Acid Using Renewable Sources**

Lignin is a major part of lignocellulosic biomass such as agricultural residues. Cellulose and hemicellulose of lignocellulosic biomass can be converted to sugars for potential use in fermentation. However, lignin part is not useful for such application. Therefore, there is a need to find alternative application of lignin. Castor oil is a renewable resource mostly produced in India. According to some reports India produces around 80% of the castor oil produced worldwide. Therefore, there is a need to explore different ways to convert castor oil to other valuable products. A study was conducted to isolate microbial strain capable of producing valuable products by utilizing lignin and castor oil. By molecular biological techniques, the isolated strain was identified as a strain of *Aspergillus*. With the help of different techniques such as $^{13}C$ and $^{1}H$-NMR, HPLC, UV and Mass Spectrometry, FTIR, and XRD, the major metabolite produced by the strain was identified as kojic acid. Various process engineering approaches were followed to enhance the product yield. The study showed that the production of kojic acid could be a sustainable way to utilize lignin and castor oil.

**Profile:**

Prof. (Dr.) Saurabh Jyoti Sarma, is a professor in the department of biotechnology, Bennett University, Greater Noida. He has obtained his Ph.D. from University of Quebec/INRS, Canada. He was a postdoctoral fellow at the University of Calgary, Canada, and a research fellow at IIT Guwahati. He has around 16 years of research experience and 7 years of teaching experience. He has published around 50 articles in international journals, 23 book chapters, 2 books and 5 patents. Two students have completed their Ph.D. research under his supervision, and currently he has been guiding 5 other Ph.D. students. He is the founder and associate editor of "Nanotechnology for Environmental Engineering", a Scopus indexed international journal published by Springer Nature.

# INVITED TALK - III

**Dr. Mallikarjun Kodabagi**

Nagarjuna College of Engineering and Technology (NCET), NGI
Devanahalli, Bengaluru

**Title: Artificial Intelligence for environment, water and agriculture**

Artificial Intelligence (AI) is transforming key sectors such as environment management, water conservation, and agriculture by providing innovative solutions to global challenges. In environmental protection, AI enhances the monitoring and prediction of climate change impacts, helps manage natural resources, and supports biodiversity conservation through advanced data analytics and machine learning models. In water management, AI is utilized to optimize irrigation, detect leaks, forecast water demand, and improve flood and drought predictions, contributing to more sustainable water usage. In agriculture, AI-driven technologies, including precision farming, crop monitoring, and automated machinery, enable more efficient use of resources, increase crop yield, and reduce the environmental footprint. Integrating AI in these sectors holds the potential to address the increasing demand for food, water, and sustainable land management while mitigating the effects of climate change. This paper explores the intersection of AI and its applications in promoting environmental sustainability, improving agricultural productivity, and optimizing water resource management.

**Profile:**

Dr. Mallikarjun M Kodabagi is working as a Professor and Head, in the Department of Computer Science and Engineering, Nagarjuna College of Engineering and Technology, Bengaluru, Karnataka, India. He completed his Ph.D. from the Department of Computer Science and Engineering, Visvesvaraya Technological University, Belgaum, Karnataka (India). He received his M. Tech. Degree in Computer Science and Engineering from University of Mysore. Completed B.E. in Computer Science and Engineering form Basaveshwar Engineering College, Bagalkot, Karnataka (India). He has 21 years of teaching and research experience. His areas of interest are AI, Machine Learning, Deep Learning and NLP. He has 30 publications in international and national journals, 41 conference papers, 2 book chapters and 8 patents.

# INVITED TALK - IV

**Dr. M S Yogendra Kumar**

Defence Bioengineering and Electromedical Laboratory, DRDO, C V Raman Nagar,
Bengaluru – 560093, India
E-mail: msyogendra.debel@gov.in & msyogendra@gmail.com

**Title: Supercritical carbon dioxide assisted ecofriendly dyeing of textiles: Future perspectives**

According to the UN World Water Development Report 2023, 26% of the world's population do not have access to safe drinking water. Approximately 60% of the humankind cannot reach clean water resources and moreover changing climate and environmental conditions may result in harsh droughts in the future leading to more water scarcity for more people; therefore, water sustainability is very critical for world sustainability. Roughly 100-150 litres clean water and 450g of chemicals are required to process 1 kg of textile materials. Increasing consideration of ecologic consequences of industrial processes as well as legislation, enforcing the avoidance of environmental pollution causing conventional technologies. During the last three decades, supercritical fluids, which are characterized by exceptional physico-chemical properties, have been used in the extraction of natural substances for the production of drugs, cosmetics, spices, synthesis of chemicals, dyeing textiles, etc. In textile industry, supercritical carbon dioxide (SCCO2), possessing liquid-like densities and gas like diffusion property find an application in textile dyeing processes. Its gas-like low viscosities and diffusion properties resulted in shorter dyeing periods in comparison with the conventional water based dyeing methods. Supercritical carbon dioxide dyeing is an anhydrous dyeing method, use less energy and chemicals in comparison to conventional water dyeing methods leading to a potential of up to 50% lower operation costs. Carbon dioxide is the most investigated and used supercritical fluid. It is a naturally occurring fluid that is chemically inert, physiologically compatible, and relatively inexpensive and is readily available for industrial consumption. Advantages of supercritical carbon dioxide dyeing method as waterless dyeing technology will encourage the textile industries to adopt this green method for commercial benefit and regulatory compliance for sustainable and eco-friendly textile industry.

**Profile:**

Dr. Yogendra Kumar M S has completed Ph. D in Chemistry from University of Mysore in 2007. He joined Defence Institute of Physiology and Allied Sciences, DRDO, Delhi in 2006 as Scientist 'B' and started working in the area of Phytochemistry, particularly in the field of subcritical water and supercritical carbon dioxide extraction of bioactive compounds from the natural products and chemical standardization. He joined Defence Bio-Engineering and Electromedical Laboratory, Bengaluru in 2011. Currently he is working as Scientist 'E' in the department of Protective Equipment and Clothing Technology at DEBEL and working in the area of technical textiles (Flame retardant fabrics & NBC Products). Specifically, in the development of nanotechnology based antimicrobial flame-retardant high-performance technical textiles and NBC protective products for Defence application. Dr. Yogendra Kumar M S has published more than 35 research articles in the reviewed National/International journals/Conferences that have been cited over 1000 times and he is a member of American Chemical Society and European Society of Medicine.

# INVITED TALK - V

**Dr. H. C. Ananda Murthy**

School of Applied Sciences
Papua New Guinea University of Technology, Lae, Morobe Province, 411
Papua New Guinea

**Title: Semiconducting Nanostructures for Sensor and Catalytic Dye Degradation applications**

The formation of a heterogeneous semiconductor by doping with non-metal elements and transition metal oxides is suggested as a promising technique for multiple applications due to many benefits like low cost, non-toxic, easy sample preparation, energy efficiency, environmental safety, and recyclability. A facile gas-templating method was developed to realize the synchronous nano structuring sulphur doped g-C3N4 NCs (S-doped g-C3N4) in one step. It uses the bottom-placed (NH4)2SO4 as a bi-functional gas template source and doping agent to transform the up-placed urea into S-doped g-C3N4 nanosheets. From the TGA/DSC result, the calcination temperature of 550 oC was found to be ideal for degrading impurities in the preparation S-dope g-C3N4 host and binary CuO@S-dopedg-C3N4 (CuO=5,10,20,30%), ZrO2@S-doped g- C3N4 (ZrO2=5,10,20,30%) and ternary CuO/ZrO2 @S-doped g-C3N4 NCs (CuO and ZrO2= 5,10,20, 30%). The structural features, the crystallite size, and the purity, of the synthesized NCs were deduced from XRD and FTIR, the position of Sin S-doped g-C3N4 studies visualized with DFT using optimized structures in which powder XRD results indicate the average crystallite sizes of S-dopedg-C3N4, ZrO2@S-doped g-C3N4 and CuO/ZrO2 @S-doped g-C3N4 to be 13.23,6.50, 6.99 and 3.36 nm respectively. The optical properties and the effect of CuO and ZrO2 NPs on the S-doped g-C3N4 based binary and ternary NCs on the separation efficiency of electron-hole pairs was investigated by UV-vis/DRS and PL studies. The porous nature, distribution of pore sizes and the surface area of the optimized NC was synchronized via BET analysis. The morphology and the presence of monoclinic CuO and in CuO@S-dopedg-C3N4, cubic ZrO2 in ZrO2@S-doped g-C3N4 NCs and both in ternary CuO/ZrO2 @S-doped g-C3N4 NCs was confirmed by HRSEM/EDS and TEM study. The formation of flower shaped S-dopedg-C3N4 was verified by HRSEM investigations. The presence of the predictable CuO and ZrO2 and the chemical composition of the optimized NCs was confirmed by HRTEM and XPS analysis respectively. In the sensing of 4-NP analysis, the electrochemical reaction taking place at the binder free electrodes was a diffusion-controlled process in the scan rate range of 0.1 to 200 mV $s^{-1}$. The sensor investigation on 4-NP with the ternary CuO/ZrO2@S-doped g-C3N4(30%)/FTOE shows satisfactory sensitivity of 0.004 μAμM −1cm−2 and LOD 14.9 μM. The LOD, LOQ, and sensitivity of ternary NC was superior to those of synthetic binary NCs, making it a better BPA sensor at pH=5. The photocatalytic degradation efficiency of MB by ternary NCs increases in the sequence of CuO/ZrO2@ S-doped g-C3N4(5%) < CuO/ZrO2@ S-doped g-C3N4(10%) < CuO/ZrO2@ S-doped g-C3N4(20%) < CuO/ZrO2@ S-doped g-C3N4(30%). These results generally support the notion that the synthesized binary and ternary NCs have good promise for multifunctional uses as catalysts, sensors, and photocatalysts.

**Profile:**

Dr. H. C. Ananda Murthy, Ph.D., FRSC-UK is currently working as Professor of Inorganic Chemistry, School of Applied Sciences, Papua New Guinea University of Technology, Lae, Morobe Province, 411, Papua New Guinea. He is also serving as Adjunct Professor at Saveetha University, India. He worked at various prestigious universities in India, Tanzania and Ethiopia for the last 26 years. He has taught various chemistry courses to UG, PG, and Ph.D. students of the universities. He has published over 200 articles in the journals of international repute (H-Index = 33, i-10 index = 105 and citations = 4213). He has authored 12 books, 24 book chapters & 6 compendia. He has carried out several projects and guided 16 UG students, 7 PG students and 4 PhD students. At present 4 PhD students are working under his supervision in the areas related to the synthesis of inorganic metal oxides-based nanomaterials for the biomedical and environmental applications. He had successfully completed a research project granted by ASTU, Ministry of Science and Technology, Government of Ethiopia in the year 2021. He is currently involved in 3 projects granted by the Ministry of Education, Government of Ethiopia, one project granted by University of Technology, Papua New Guinea and one project by Telecom Malaysia for the development of Electrochromic smart windows. He is a member of ISTE, IRI, ECSI, CSI, NESA (India), CSE (Ethiopia), ACS (USA) and newly elected member of International Council on Materials Education, University of North Texas-USA. Dr. H.C. Ananda Murthy has recently been elected as Fellow, Royal Society of Chemistry, London, U.K. (FRSC-UK) in the year 2022. He has served as a guest editor for Results in Chemistry, Journal of nanomaterials, Evidence-based Complementary & Alternative Medicine, Frontiers in Food Science and Technology, Journal and Micro-machines journals. He has received best paper presentation award, Certificate of Excellence for community service and Certificate of Excellence by Elsevier Researcher Academy. He has recently received Excellent researcher award at Asia's Science, technology and research awards congress held at Tirchy, Tamilnadu, India in July 2023. His research interest mainly includes synthesis and applications of composite materials and Nano-materials for biomedical, Sensor and Environmental applications.

# INVITED TALK - VI

**Dr. Navya Rani M**

Associate Professor, Research and Development Centre
Nagarjuna College of Engineering and Technology (NCET), NGI
Devanahalli, Bengaluru

**Title: Nanomaterials in Health Care**

Nanomaterials have emerged as a promising frontier in healthcare, offering novel approaches for diagnostics, treatment, and drug delivery. In addition to their medical benefits, the application of nanomaterials in healthcare has significant environmental advantages, aligning with the growing emphasis on sustainability in the medical field. This presentation explores the role of nanomaterials in healthcare with a focus on their environmental benefits, highlighting their potential to reduce toxic waste releasing into water by improve the sustainability of safe medical practices. We discuss the use of biocompatible and biodegradable nanoparticles, such as those derived from natural materials (Natural antioxidants and phytochemicals) are designed for minimal environmental impact, in areas including targeted drug delivery,biosensors, imaging, water filters and wound care. Furthermore, we explore how nanomaterials can reduce the reliance on harmful chemicals and bulk materials, offering more precise, effective treatments with fewer side effects and lower environmental footprints. By promoting the use of nanomaterials that are both effective in clinical applications and environmentally sustainable, this research supports a huge shift toward greener, more efficient healthcare practices. However, challenges remain, including the need for further studies on the long-term environmental impacts of nanomaterials and their scalability in real-world healthcare settings. Continued interdisciplinary collaboration and research are essential for translating these sustainable nanomaterials into practical healthcare applications, ultimately improving patient outcomes while reducing the environmental impact of the healthcare industry.

**Profile:**

Dr. Navya Rani M is currently working as an Associate Professor and Associate Dean in the Department of Research and Development at Nagarjuna College of Engineering and Technology, Bengaluru, Karnataka, India. She also worked for three years in the Department of Microbiology, Biotechnology, and Genetics at Dayananda Sagar university. She served as a Junior Research Fellow in the Department of Biochemistry at the Indian Institute of Science under the guidance of Prof. A. Jagannatha Rao, as well as in the Department of Molecular Reproduction and Developmental Genetics under Dr. Polani B. Seshagiri at IISc Bangalore. Later, she moved to Japan and joined Tohoku University as a researcher in Biomolecular Science under the guidance of Dr. Hiroshi Sagami, Associate Professor at IMRAM, Japan. She also worked in Hosei University, Japan as researcher. Dr. Navya Rani completed her Ph.D. in Applied Science (Nanotechnology) from Visvesvaraya Technological University in the year 2020. Dr. Navya Rani has nearly 20 years of teaching, research, and industrial experience at national and international universities, institutions, and startups in the MSME sector. She has authored or co-authored approximately 37 research papers in international and national journals and conference proceedings and 7 patents have been publishred. Additionally, she has received several awards for poster and oral presentations at various national and international conferences. Her research interests encompass Biotechnology, Nanotechnology, Nanobiotechnology, Bioorganic Chemistry, Biosensors, Nanomaterials, anticancer and antimicrobial research, Nanotoxicology, and 2-Dimensional Nanostructures. Dr. Navya Rani has received extensive training in microchip preparations, fluorescent gel electrophoresis, protein blotting (Western blotting), and the biosynthesis of nanoparticles using medicinal plants. As an entrepreneur, she is the co-founder and director of two startups namely, Re-BATT Energy Solutions Pvt. Ltd., and M-xene Materials India Pvt. Ltd. Re-BATT Energy Solutions Pvt. Ltd has awarded best Elevate 100 Startup Grants in 2021, and the runner-up for the Elevate 100 Startup Grants in 2023, awarded by the Department of IT, BT and science and Technology, Government of Karnataka.

# INVITED TALK - VII

**Dr. Ramesh Kumar**

Department of Earth Resources & Environmental Engineering
Hanyang University
222-Wangsimni-ro, Seongdong-gu, Seoul 04763
Republic of Korea

**Title: Recycling of Molybdenum from Industrial Wastewater using Membrane-integrated Hybrid Technology**

Many industrial manufacturing processes inevitably generate various types of wastewater from different sources enriched with precious metals; however, most of the resources are not recovered without a specifically designed treatment system due to technical and economic limitations. Technological developments for the resource retrieval (e.g., water, energy, and valuable metals) from industrial or domestic wastes need a paradigm shift by replacing the present 3-R concept, i.e., Recycle, Reuse, and Recovery with a new P-R-R concept, i.e., Partition-Release-Recover using a membrane-based hybrid system. Membrane separation technology is an emerging technique that has the potential to be environmentally friendly, economically feasible, technologically advanced, operationally flexible, and capable of waste valorization. A membrane-assisted hybrid system has been proposed to separate and recover molybdenum from potential industrial wastewater. A crossflow membrane (hollow fiber) module of ultrafiltration and nanofiltration (NF) membranes was used to reduce the total dissolved solids concentration and retain the molybdenum (>95%) from wastewater. The system was operated in a concentrated mode to increase the molybdenum concentration from 1.2 g/L to 10 g/L while reducing >90% of the initial volume (250 L) using the VNF-1 NF membrane. The concentrated molybdenum solution was recovered as high-purity ammonium molybdate precipitates using ammonium salt in acidic conditions, which was subsequently converted into industrial useful molybdenum trioxide compound by thermal decomposition (500 °C). The membrane-based system promotes the circular economy by regenerating and reusing valuable resources from industrial wastewater.

**Profile:**

Dr. Ramesh Kumar works as a Brain Korea-Research Associate Professor at the Department of Earth Resources and Environmental Engineering, Hanyang University, South Korea. He obtained his Ph.D. from the Chemical Engineering Department at the National Institute of Technology Durgapur, India. He has more than 10 years of post-PhD research and teaching experience. He got some research funding from India (DST-SERB Fast Track Young Scientist and Kothari PDF from UGC, New Delhi, India) and the Republic of Korea under the Creative and Challenging Research Program of the National Research Foundation (NRF). His interdisciplinary research interests include environmental biotechnology, biomass valorization, $CO_2$ storage and sequestration, resource recovery from wastewater, and membrane-based advanced separation technology. He has authored/co-authored over 95 peer-reviewed publications (80 Journals and 15 book chapters publications; Citations 2900; h-index 29), granted three patents, and two technology transfers.

# INVITED TALK - VIII

**Dr. Kalpana Bhargava**

Scientist G, Technology Director, Advanced Technology
High Energy Material Research Lab (HEMRL)
Defense Research and Development Organization (DRDO),
Ministry of Defence, Government of India

**Title: Nano Iron-pyrite Seed Stimulant for Sustainable Agriculture**

Sustainable agricultural innovations are required to feed the exploding human population through natural or artificial resources. Though light is ample on earth, two-third of unavailable ocean and one-third of available soil are major limiting factors to free growth. Excessive fertilizer usage is irreversibly altering the chemical ecology of soil, further reducing the available area. Seed metabolism might be a potential answer to this resource crunch. Without genetic modification and thus maintaining the existing biodiversity, manipulation of seed metabolism at the very onset of germination is a sustainable alternative. The current work presents seed priming with iron pyrite ($FeS_2$) prior to sowing as one such sustainable and innovative intervention to reduce fertilizer consumption in vegetable (beetroot, carrot), spice (fenugreek), fodder (alfalfa), and oilseed (mustard, sesamum) crops. A 12 h seed pre-treatment in an aqueous suspension of nano-iron disulfide/pyrite ($FeS_2$) resulted in significant yield increase in the above crops. While agriculturists aim to restore the natural genomic diversity of different domesticated crops, environmental engineers require technologies to reduce fertilizer consumption without compromising agricultural yields, thereby making the planet more sustainable. This nanoscale seed pre-treatment approach using $FeS_2$, otherwise a benign earth abundant mineral, suggests the sustainable opportunity to translate this technology to other crops thereby enhancing the global agricultural production.

**Profile:**

Dr. Kalpana Bhargava completed her Ph.D in Peptide Chemistry from Banaras Hindu University in a joint collaboration with Indian Institute of Science, Bangalore in 1999. After her Ph.D she perused 10 years of multidisciplinary research in academics and R & D environment from USA. Dr. Bhargava joined DRDO in April 2008. She has almost thirty years of research experience in a wide range of areas which includes: anti-oxidant peptides, anti-microbial peptides, free radical biology, mitochondrial biology,nano-conjugate chemistry, protein biochemistry, proteomics, ribosomal biology and synthetic medicinal chemistry. She has almost 95 international, peer reviewed journal publications, one book, two book chapters, threepatents and several scientific awards/honours to her credit. Her research work includes Proteomic evaluation of biomarker for high altitude related maladies. Use of nano ceria for high altitude application & Development & evaluation of Propellants & Cartridge Case Technology for Gun Ammunition system.

# INVITED TALK - IX

**Dr. Suraj K. Tripathy**

Associate Dean, School of Chemical Engineering
Associate Professor, School of Biotechnology
Kalinga Institute of Industrial Technology, Bhubaneswar, Odisha 751024

**Title: Zinc-Activated Phosphogypsum for Cost-Effective Adsorption of Malachite Green: Optimization and Toxicity Assessment of Treated Water**

Malachite green is extensively utilized in many industries, especially as a fungicide in aquaculture, because to its simple manufacturing process and high market demand. Water-soluble malachite green must be eradicated using deployable and economical methods because to its inherent toxicity and possible long-term health effects. In this study, malachite green was extracted from an aqueous solution using chemically activated phosphogypsum, a byproduct of fertilizer manufacture. The cost of adsorption-based processes may be greatly decreased by using phosphogypsum as a sorbent material because of its abundance and low cost. Additionally, because of its structural resilience, recycling may be done effectively without undergoing severe distortion during reactivation. However, because of its unfavorable surface chemistry, untreated phosphogypsum has little effectiveness in adsorbing synthetic colors. According to our research, Zn activation caused the pore volume to noticeably expand from 0.03 to 0.06 cm3/g. With a sorbent dose of 60 mg/L, a pH of 7, 150 rpm, and an operating temperature of 30°C, 99% quantitative sorption efficiency was achieved. By verifying experimental values, response surface methods and artificial neural networks were employed to optimize process parameters. When exposed to the treated water, Escherichia coli showed no discernible harm.

**Profile:**

Dr. Tripathy is an Associate Professor at the School of Chemical Technology, KIIT, and leads the Chemical & Bioprocess Engineering Lab (CBEL). His research focuses on sustainability, waste valorization, catalysis, water treatment, and biomedical systems. He has a PhD in Materials Science & Engineering from Chonbuk National University, South Korea, and has held various academic and research positions in India and South Korea. He has received notable awards, including the Eminent Scientist of the Year Award (2021) and the DST INSPIRE Faculty Award (2013). Dr. Tripathy has worked on several international and national projects, focusing on issues like antibiotic resistance, nitrogen recycling, and resource recovery. He is an active member of several professional societies and has taught courses on chemical process technology, plant design, and transport phenomena.

# INVITED TALK - X

**Dr. Nagraj S Patil**

Associate Professor, Department of Civil Engineering
Visvesvaraya Technological University, Belagavi

**Title: Impact of Climate Change on Precipitation and Stream Flow**

The present study has been taken up to quantify the possible impacts of the climate change on the precipitation using the outputs of global climate models over the Ghataprabha Sub-basin. The precipitation data from the five selected global climate model datasets were downscaled using change factor method under two representative concentration pathway (RCP 4.5, and 8.5) scenarios for future periods near-century (2010-2039), mid-century (2040-2069), and end-century (2070-2099). The downscaled results of all the five models were ensembled using multi-model ensembling method to reduce the uncertainty in the projected results and the percentage change in the precipitation was shown with respect to the historical/baseline period (1961-1990) using spatial plots and histograms. The future projected results shows that percentage change in the annual mean precipitation with respect to the historical (1961-1990), is decreasing for most of the grids in the study area during the near-century while during mid and end centuries it shows an increasing trend across RCP scenarios. Further, study also analysed the percentage change in 100-year return level over the study area.

**Profile:**

Dr. Nagraj S. Patil, Associate Professor in the Department of Civil Engineering at Visvesvaraya Technological University (VTU), Belagavi, is a distinguished academician and researcher whose contributions to the field of civil engineering have been instrumental in both academic and practical advancements. With over two decades of experience, Dr. Patil's work in engineering research, consultancy, and education has made a significant impact in shaping the landscape of modern civil engineering. Dr. Patil's academic portfolio is marked by a substantial number of research outputs, including 58 international journal papers, 66 conference papers, 22 national conference papers, and several book chapters and manuals. He holds a patent for one of his innovative engineering solutions, underscoring his creativity and commitment to advancing technology. His research expertise spans a wide array of civil engineering topics, including geospatial technologies, micro-irrigation, and sustainable construction practices. Dr. Patil's leadership in research and innovation is evident in his successful management of research and consultancy projects worth ₹2.65 crores and ₹82.45 lakhs, respectively. His dedication to fostering interdisciplinary research has led to the establishment of key research centers, such as the Centre of Excellence in Geospatial Technology, funded by the Government of Karnataka, and the Digital Farming Center for Micro-Irrigation. As an educator, Dr. Patil has mentored numerous students, supervising four Ph.D. candidates (with five more currently in progress). Dr. Patil has made significant contributions to rural development through initiatives like the Unnat Bharat Abhiyan program, training 260 farmers in micro-irrigation techniques, and organizing QGIS skill development programs for students. Dr. Patil's holistic approach to education and innovation is further exemplified by his administrative roles. He currently serves as the Chairperson of the Department of Civil Engineering and Director (I/c) of the Centre for Scientific Research and Industrial Consultancy (CSRIC) at VTU, where he has driven reforms in teaching and research.

# INVITED TALK - XI

**Dr. Amita Somya**

Department of Chemistry, Amity School of Applied Sciences
Amity University, Bengaluru-562110, Karnataka, India
(somya.amita@gmail.com)

**Title: Metal-Based Phosphates for Sustainable Water Management: Advancing SDG 6 Goals**

Achieving Sustainable Development Goal 6 (SDG 6), which focuses on ensuring clean water and sanitation for all, necessitates the development of innovative and efficient materials for water treatment. Metal-based phosphates, particularly those derived from Cerium(IV), Tin(IV), Thorium(IV), and Zirconium(IV), have garnered significant attention due to their unique properties, including chemical stability, high adsorption capacity, and non-toxic behavior. These materials exhibit excellent potential in addressing pressing water challenges such as the removal of heavy metals, nutrient recovery, and pathogen mitigation. This study explores the synthesis, characterization, and applications of Cerium(IV), Tin(IV), Thorium(IV), and Zirconium(IV)-based phosphates in water treatment processes. Their roles in adsorbing hazardous contaminants like mercury, lead, and cadmium, as well as their efficiency in recovering critical nutrients like phosphates, are highlighted. The advantages of these materials, such as their structural versatility and ability to function under diverse environmental conditions, are critically analyzed. The paper also examines challenges such as scalability, cost-effectiveness, and environmental compatibility. Strategies for overcoming these limitations, including the adoption of green synthesis methods and the integration of these materials with advanced technologies like nanotechnology and IoT-based monitoring systems, are discussed. By demonstrating their potential in advancing SDG 6 targets, this study emphasizes the importance of Cerium(IV), Tin(IV), Thorium(IV), and Zirconium(IV)-based phosphates in achieving global water security and promoting sustainable development.

**Profile:**

Dr. Amita Somya is working as Professor, Department of Chemistry, Amity University, Bengaluru since 19.09.2023 having over two decades of invaluable experience in teaching and research, coupled with an impressive track record of intellectual contributions and scholarly achievements. Her journey in academia is marked by a relentless pursuit of excellence and a profound commitment to advancing knowledge in her field. With a wealth of expertise spanning teaching and research, Dr. Amita has honed her skills to become a respected authority in Applied Chemistry, specifically in environmental pollution control. In the realm of research, Dr. Amita has made significant contributions that have shaped the landscape of her field. Her prolific output includes 02 Indian Patents in the field of water purification, 30+ research publications in peer reviewed journals, 20+ book chapters, and 20+ presentations in various National/International conferences each offering novel insights and pushing the boundaries of knowledge. Her research endeavors have not only garnered widespread recognition but have also been instrumental in addressing pressing societal challenges, particularly in the areas of water pollution control, corrosion science, biofuel production, and environmental remediation.

Dr. Amita impact extends beyond the confines of academia, as evidenced by her involvement in various research and university projects. Her leadership and expertise have been instrumental in the successful completion of numerous projects aimed at tackling real-world problems and fostering sustainable development. Furthermore, she has served as a resource person for 03 invited talks, sharing her expertise with peers and stakeholders and contributing to the dissemination of knowledge in their field. In recognition of her outstanding contributions, she has been granted 02 research projects and has received a copious awards from National and International bodies in her academics and research career including, Women Scientist Award, Best Research Paper Presentation Award, Young Scientist Award, Felicitation prize, Prof. A.K. Dey Memorial Award, Excellence in Education Award, Rajendra Kishore Mittal Gold Medal, Loiwal Gold Medel, Shri Shanti Swarup Memorial Award etc. underscoring her standing as a trailblazer in her field. She has been felicitated by Vice Chancellor of Aligarh Muslim University, Aligarh for being an active research scholar. She has been University topper in M.Sc. (Chemistry) and U.P. Topper in 12$^{th}$ in Hindi subject. Dr. Amita is a Life/Fellow and active member of esteemed professional bodies, such as International Congress of Chemistry and Environment (Indore), Chemical Research Society of India (Bangalore), Indian Science Congress Association (Kolkata), Indian Council of Chemists (Agra), Institute of Smart Materials and Structures (ISSS, Bangalore) highlight her standing as a respected authority in her field. Additionally, Dr. Amita contributes significantly to scholarly discourse through editorial roles in renowned academic journals and publishing houses. Serving as Editor for the International Journal of Applied and Analytical Chemistry, book editor under Springer nature and as a Member of the Editorial Board for the Research Journal of Chemistry and Environment, she plays a crucial role in disseminating research work and promoting innovation in research and education. Moreover, Dr. Amita actively contributes to the quality of academic publications as a regular reviewer for esteemed journals like JTAC and Elsevier. Her outstanding achievements, including prestigious scholarships such as the Senior Research Fellowship granted by CSIR, New Delhi and the Research Scholarship granted by UGC, New Delhi underscore her unwavering commitment to excellence and scholarly pursuits.

# INVITED TALK - XII

**Dr. Amrita Mishra**

Associate Professor, School of Biotechnology
Kalinga Institute of Industrial Technology, Bhubaneswar 751024, Odisha
Tel: +91-674-2725466, Mobile: +918763354811
E-mail ID: amritamishrabio@gmail.com, amrita.mishra@kiitbiotech.ac.in

**Title: Therapeutic prospective of biogenic Ag based nanocomposite systems for healing Methicillin-resistant Staphylococcus aureus infected wounds**

Owing to their susceptibility to infection by drug-resistant bacteria, refractory wounds pose a formidable risk to the well-being of patients with diabetes and other immune-compromised conditions, and their management poses significant economic distress to the healthcare system, particularly in low and middle-income countries. Therefore, deployable interventions for rapid and effective management of such wounds are needed. In the present study, we report the processing of sprayable biogenic Ag-collagen nanocomposites (Ag-Col NCs) with cogent antibacterial and healing activity in *Acinetobacter baumannii (A. baumannii) infected* wounds under hyperglycemic conditions. Silver nanoparticles (Ag NPs) has been synthesized by using the plant extract of *Urginea indica (U. indica)*, which was further used for the processing of Ag-Col NCs. Synthesized NCs were found to have notable broad spectrum antibacterial activity against clinically significant strains (*A. baumannii, Staphylococcus aureus* and Methicillin-resistant *Staphylococcus aureus*) and appreciable biocompatibility towards RAW 264.7 and 3T3 mouse fibroblast cell lines. The sprayable NC system was found to promote the wound healing activity in mouse model (Balb/c) not only in normal but also in hyperglycemic conditions. Our experimental findings suggest the potential of the Ag-Col NC spray in chronic wound management and an exploitable option in both clinical and personalized settings.

**Profile:**

Dr. Amrita Mishra is a highly accomplished academic and researcher with extensive expertise in bio nanotechnology. She holds a PhD in Food Science and Technology from Chonbuk National University, South Korea (2012), and an MSc in Microbiology from Orissa University of Agriculture & Technology, India (2005). Currently, Dr. Mishra serves as an Associate Professor in the School of Biotechnology at KIIT Deemed University, India, a position she has held since 2013. Her research focuses on the optimization of biogenic nanomaterials for applications such as smart packaging for food preservation, wound healing hydrogels, and photocatalytic wastewater treatment. Dr. Mishra has previously worked as a researcher and doctoral student at Chonbuk National University, South Korea, and as a Project Assistant at the Regional Research Laboratory in Bhubaneswar, India. Her exceptional contributions have earned her numerous accolades, including the Bio-Care Scientist and Young Scientist Research Grant from the Government of India, as well as the Women Excellence Award in 2021 and 2023. Through her innovative research, Dr. Mishra continues to make significant strides in advancing sustainable technologies in food science, health, and environmental sectors.

# INVITED TALK - XIII

**Dr. Lohith J J**

Professor and Head of CSE (Artificial Intelligent & Machine Learning)
Nagarjuna College of Engineering and Technology (NCET)
Devanahalli, Bengaluru

**Title: Transforming Healthcare with Artificial Intelligence**

Artificial Intelligence (AI) is transforming the healthcare sector, offering groundbreaking solutions to some of its most pressing challenges. This talk explores how AI is enhancing patient care, streamlining medical workflows, and accelerating research and innovation. From predictive analytics and precision medicine to automated diagnostics and virtual health assistants, AI is redefining how we approach healthcare delivery. We will delve into specific applications, such as the use of AI algorithms for early disease detection, personalized treatment recommendations based on patient data, and drug discovery processes that significantly reduce development timelines. Additionally, the talk highlights the role of AI in addressing resource challenges in underserved areas through telemedicine and AI-driven triage systems. Ethical considerations, including data privacy, bias in algorithms, and the importance of human oversight, will also be discussed. Real-world case studies and success stories will demonstrate the profound impact AI is having on improving healthcare outcomes and accessibility. Join us as we uncover the vast potential of AI to not only revolutionize healthcare but also make it more inclusive, efficient, and patient-centered.

**Profile:**

Dr. Lohith J J Currently working as Professor and Head of CSE (Artificial Intelligent & Machine Learning) department in Nagarjuna College of Engineering & Technology. He completed his Ph.D. degree in Computer Science & Engineering from National Institute of Technology, Trichy. He received the M.Tech degree in Computer Network & Engineering, B.E. degree in Computer Science & Engineering, India in 2009 and 2005, respectively from VTU University, Karnataka In 2011, he joined the Department of Computer Science & Engineering, BMS College of Engineering as a Lecturer, and in 2012 became an Assistant Professor. He has seven years of Research experience in the field of Blockchain technology. He is having 18 years of teaching experience. He has published many conference and journal papers in national and international conferences. He holds Two Q2 SCIE Non-paid publications in Springer journal. He has served as Resource person in the area of Blockchain in more than 25 FDP sponsored by AICTE and workshops conducted across India including NIT Trichy, Manipal Institute of technology and BMSCE. He is Life member of ISTE, CSI and CRSI. He is member for Editorial board for MAT Journals. He is reviewer of many conferences and journals namely wiley, Springer.

# LIST OF ORAL PRESENTATIONS

| OPA ID | Presenting Author | Title | Email |
|---|---|---|---|
| OPA - 01 | Poornima B | Advanced Bisumth-Doped Ferrite-Based Nnomaterials For The Production of Hydrogen and Water Splitting | 74111pooripoornapapu@gmail.com |
| OPA - 02 | Karthik.S.J | Graphene enhanced nanoparticles of copper : water purification & desalination. | klesncchem1963@gmail.com |
| OPA - 03 | Shruthi R G | Morphometric Analysis of the Kabini River Basin, Karnataka, India | shruthiravikumar98@gmail.com |
| OPA - 04 | A S Jagadheeswari | Marine derived biopolymers as potential bioplastics, an ecofriendly alternatives | jagakec@gmail.com |
| OPA - 05 | Kunal Roy | Phase-Controlled Construction of Copper-Leaf-like 2D NiS for Enhanced Supercapacitor Performance | roykunal.0112@gmail.com |
| OPA - 06 | Sahithya K | Nanofertilizers and Nanopesticides: The next generation of agrochemicals for agricultural and environmental sustainability | sahikandimalla@gmail.com |
| OPA - 07 | Manjesh D. M | Defect rich ZrO2-X @ MXene Nanocomposite for high-performance hybrid supercapacitors | manjeshdm09@gmail.com |
| OPA - 08 | Deepa H M | Photocatalytic study of novel calcium zinc titanate nanoparticle via solution combustion method. | deepadivya996@gmail.com |
| OPA - 09 | Devaraju Bilidegalu | Piperizine-Benzimidazole Hybrids derivatives – Synthesis, Characterization, Biological and Molecular Dynamic simulation | devarajubn@gmail.com |
| OPA - 10 | Manikanta P N | Preparation and Evaluation of MWCNT/NiS Heterostructure as a Superior Electrocatalyst | pnmkanta@gmail.com |
| OPA - 11 | Vijendra Kumar K B | A Comparative analysis of Potential of Avocado-Derived Proteases in industrial applications | vijendrakumarkb@gmail.com |
| OPA - 12 | Deepak Kumar | Indigenous Landslide Early Warning System for Environment and Human Safety | dkumar@physics.du.ac.in |
| OPA – 13 | Murthy M | Molybdenum disulfide – reduced grapheme oxide (MoS2-RGO) hybrid nanocomposites for water splitting application | murthy.m@nmit.ac.in |
| OPA – 14 | V. V. Deshmukh | A brief overview of technological innovation and the application of AI for water conservation | vaishalideshmukh27@gmail.com |
| OPA – 15 | D.M Tejashwini | Bismuth Cobalt Ferrite Nanoparticles: A Sustainable Photocatalyst for Wastewater Treatment and Plant Growth Enhancement | tejadm1519@gmail.com |
| OPA - 16 | Vinayak Sunagar | Monoclinic Calcium tungstate Nanoparticles: A Rising material for Environment Applications | vinayaksunagr@gmail.com |
| OPA – 17 | Indumukhi. B. C | Photocatalytic study of Barium Magnesium Phosphate Nanoparticles synthesized by combustion method | indumukhibc@gmail.com |
| OPA – 18 | Kavyashree GS | V2O5 metal based electrocatalysts for high performance alkaline sea water electrolysis | kavyags218@gmail.com |
| OPA – 19 | H.V. Harini | Eco-Friendly Synthesis of Copper-Zinc-Aluminate for High-Performance Supercapacitors and sensing | harini24hv@gmail.com |
| OPA - 20 | Ishwarya S | Photocatalytic studies of Calcium magnesium vanadate (Ca5Mg4V6O24–CAMV) | ishwaryasdvg@gmail.com |

## Oral Presentation Abstract – 01

### Advanced Bisumth-Doped Ferrite-Based Nanomaterials for the Production of Hydrogen and Water Splitting

**Poornima B** [1] and Yuvaraj T C M [1]*
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Electrocatalytic water splitting has emerged as a sustainable green technology for producing hydrogen and oxygen. However, large-scale uses of these electrocatalysts in useful commercial water electrolysers are hampered by the high cost and limited availability of noble metals. Noble metal-based electrocatalysts, such as Pt for hydrogen evolution reaction (HER) and RuO2/IrO2 for oxygen evolution reaction (OER), have been demonstrated to be state-of-the-art in water electrolyzers, and electrocatalytic water splitting has emerged as a sustainable green technology for producing hydrogen and oxygen. However, large-scale uses of these electrocatalysts in useful commercial water electrolyzers are hampered by the high cost and limited availability of noble metals. On the other hand, due to their intriguing catalytic performance, affordability, and wide availability, transition metal-based electrocatalysts have garnered a lot of interest. However, due to agglomeration and disintegration in the hostile operating environment, their long-term stability in water splitting devices is inadequate. The production of H2 from water has become a significant substitute for fossil fuels. Numerous materials have been studied in this context as electrocatalysts for water reduction. Encapsulating transition metal (TM)-based materials in stable, highly conductive materials is one way to potentially address this problem. In this work, BiCuFe2S5 has been found to be an excellent catalyst, producing 500mV and 1.2mV overpotential which gives current density of mA and 320 mA respectively. BiCuFe2o4 producing 700Mv and 1.2mV overpotential gives current density of 50 mA and 225 mA respectively good oxygen and hydrogen evolution activity.

## Oral Presentation Abstract – 02

### Graphene enhanced nanoparticles of copper: water purification & desalination

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Sustainability is the most challenging aspects as per the increasing needs of population i.e,. Considering the interconnections of environment, agriculture and health, the nano-technology plays a major role for cleaner water and greener earth. Graphene, one of the smart material being derived from graphite, widely used in the industrial sector.The study of physiochemical properties of graphene having the high surface area, electron mobility address the need for sustainability. Copper coated Graphene nanoparticles (CGNPs) emerges as a wonder in the field of water purification and desalination. Graphene enhances the biocompatibility and stability and helps in efficient targeting. CGNPs also exhibit electrochemical performances. The study of CGNPs shows the application as removal of contaminants, heavy metals and bacteria very efficiently. Synthesis and characterization by particle size analyzer of copper doped graphene nanoparticles helps to explore the potential of removing contaminants. Copper doping enhances the adsorption activity and its microbial property. CGNPs exhibit desalination process, with the high salt rejection rate. The synthesized material also shows huge reduction in the water borne diseases in the crops. The CGNPs exhibiting greater recyclability, reusability and stability makes it a promising material for large scale water purification and desalination application. Ultimately, this research aims to contribute for more sustainable future where the interconnections of the globe align with the human prosperity, economic viability and environmental integrity.

## Oral Presentation Abstract – 03

### Morphometric Analysis of the Kabini River Basin, Karnataka, India

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Kabini River Basin is one the important tributary of the Cauvery River Basin in Southern India and has significant contribution to the hydrology of the area. This study carries out a detailed morphometric analysis of the basin to assess its drainage attributes and the resulting landform development. The river, with an extent area of 4710 km² and running around perimeter of 460.5 km, starts at Wayanad District of Kerala and is flowing eastwards and merging with Kaveri River at Tirumakudalu Narasipura in Karnataka. The geographical off sets of the basin centroid are in latitude 12.214918° N and longitude 76.714198° E. The analysis follows the linear, aerial, and relief framework to assess the characteristics of the basin. Linear attributes refer to more descriptions of the stream network such as its order, its length, bifurcation ratio, and stream length ratio. These parameters give information on the degree of hierarchy and level of subdivision of the drainage net. Aerial aspects investigates how effective the ramp and basin carving is from the point of view of water drainage. Drainage density, stream frequency, circularity ratio, elongation ratio, and number of forms ratio are also determined. These metrics unveil the overall geometric extent of the basin and the dominant pattern of the drainage system as well as the crust permeability and effectively in producing runoff. Relief aspects provide information concerning the basin's vertical distribution and its slope. Values including relief ratio, ruggedness number, and hypsometric integral numbers are produced. This particular morphometric analysis of the Kabini River will endeavour to describe the nature of drainage pattern, physiographic factors as well as possible potential of erosion susceptibility. The developmental outcome of the findings will help to advance the adoption of rational water resource management practices, flood control measures, and sustainable development policies in the basin.

## Oral Presentation Abstract – 04

### Marine derived biopolymers as potential bioplastics, an ecofriendly alternatives

**A S Jagadheeswari**
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Now a days Plastic items are increasingly used in everyday life. As a result, we must find ways to cut our plastic consumption while being cost effective. As a result, plastics are transformed into bioplastics from marine trash byproducts. It will be an innovative and cost-effective approach to use. Extraction of polysaccharide/protein from marine sources in the form of a biopolymer. Marine sources include brown algae, red algae, fish, crabs, and microorganisms. Biopolymers such as chitosan, chitin, agar, gelatin, and alginate are mixed and processed to produce bioplastics. Bioplastic is used in a variety of end applications, including tissue engineering and packaging.

## Oral Presentation Abstract – 05

### Phase-Controlled Construction of Copper-Leaf-like 2D NiS for Enhanced Supercapacitor Performance

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This research presents a fast and efficient method for fabricating phase-controlled two-dimensional NiS nanosheets using the supercritical fluid (SCF) technique. Structural and morphological evaluations reveal that the single-phase NiS nanosheets possess a rough, hierarchical surface, which could provide a broad electroactive area suitable for energy storage applications. The electrochemical performance of the resulting NiS-based supercapacitors was tested in both three-electrode and two-electrode systems. In an asymmetric supercapacitor (ASC) configuration with H2SO4 electrolyte, α-NiS exhibited a notably high specific areal capacitance of 1664.61 $mF.cm^{-2}$ at a current density of 1 $mA.cm^{-2}$. Additionally, NiS nanostructures delivered an impressive volumetric energy density of 1953.61 $mWh.cm^{-3}$ at a peak power density of 45.5 $W.cm^{-3}$ in ASC mode. The materials also demonstrated excellent cycling stability, retaining 95.77% of their performance after 5000 cycles at a high current density of 10 $mA.cm^{-2}$.

## Oral Presentation Abstract – 06

### Nanofertilizers and Nanopesticides: The next generation of agrochemicals for agricultural and environmental sustainability

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Agriculture is the strength of several developing countries, which plays very important role primary drivers of economy. The increasing use of mineral fertilizers and toxic pesticides endanger the health of farmers, consumers and the environment. Research into nanotechnology applications for use in agriculture has become increasingly popular over the past decade, with a particular interest in developing novel nano-agrochemicals in the form of so-called “nanopesticides” and “nanofertilizers.” Nanoparticles (NPs) have been found effective for use in agrifood production with their use as nanopesticides, nanofertilizers, nanoremediation and nanobiosensors. The fertilizers, pesticides, herbicides and fungicides are encapsulated with different a NPs which help in slow release of fertilizers and pesticide resulting in exact dosage availability to the plants. Nanofertilizers increase the nutrients usage efficiency, minimize nutrient losses, decrease soil toxicity and reduce the ill effects connected with over dosage along with decreasing the frequency of treatments. The uses of nanoformulations in agriculture minimize nutrient losses in fertilization, increase the seed germination, help in water and nutrient management and bring down the amount of spread chemicals. The modern nanotechnology-based systems have the prospective to concentrate on many problems and the risk assessment of agronomy and modernize this sector.

## Oral Presentation Abstract – 07

### Defect rich $ZrO_{2-X}$ @ MXene Nanocomposite for high-performance hybrid supercapacitors

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Defect engineering in the materials is of great interest in the recent year because of the ability to tune the property of the materials as per the needs. The unique layered structure of two-dimensional (2D). The ZrO2 is interesting material due to its high-power energy storage property. However, it's having the low conductivity due to its wide band gap. In this paper, we present the defect rich zirconium oxide-titanium carbide nanocomposites (ZrO2-X-Ti3C2) that were synthesized via simple hydrothermal method for electrochemical supercapacitor applications. The $ZrO_{2-X}$-$Ti_3C_2$ nanocomposite 2D stacked $Ti_3C_2$ Mxene nanosheets improved the efficiency of charge by reducing the bandgap of the ZrO2 required to reach the electron quakily form VB to CB. In-situ defect rich engineering of Zirconium oxide using mild reducing agent evaluated with EPR, Raman spectroscopy, UV-vis spectroscopy, AFM, DRS, FTIR and XRD methods. The ZrO2-X-Ti3C2 Nanocomposite show the high-level performance of charge – discharge with long term durability and cyclability. The cyclic voltammetry was done by three electrode system using the electrolyte of KOH to study the specific capacitance of 620F/g at 1 A/g impressive capacitive retention of 90% even after 100 charge-discharge cycles. This study revealed that about 67% increase in the capacitance whencompared to pure $ZrO_2$ nanoparticle.

## Oral Presentation Abstract – 08

### Preparation and Evaluation of MWCNT/NiS Heterostructure as a Superior Electrocatalyst

**Manikanta P N**[1], Navya Rani M[2], Tathagata Sardar[1], Kunal Roy[1], Umeshwari Bisen[3], K K Nanda[4], Dinesh Rangappa[1,*]
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Carbon nanotubes (CNTs) and Metal Sulfide (MS) nanocomposite have garnered significant interest in various scientific and technological fields due to their exceptional properties, including high thermal conductivity, tensile strength, elastic modulus, and electrochemical stability. Recently, efforts have focused on synthesizing CNT/MS composites for electrochemical energy storage applications. These composites leverage the enhanced electronic conductivity and long-term stability provided by CNTs. In this study, we successfully synthesized MWCNT/Nickel Sulfide (NiS) heterostructures with different concentration of MWCNT from 1 to 15 weight percent using one-step solvothermal method. The resulting nanocomposites were characterized using XRD, SEM, Raman, and FTIR spectroscopy. All the synthesized samples were then evaluated for electrocatalytic properties including hydrogen evolution reaction (HER) and oxygen evolution reaction (OER). It was observed that HER and OER activities depends on the concentration of MWCNT. Notably, the MWCNT/NiS-12% nanocomposite exhibited a highest overpotential of -1.014 V corresponding to the current density of -1.39 $mA.cm^{-2}$ for HER activity and 0.776 V at the current density of 3.16 $mA.cm^{-2}$ during OER activity. Further, the Tafel slope was found to be of 264 mV/dec for OER and 383 mV/dec for HER in a basic electrolyte media. This demonstrate promising electrocatalytic performance of MWCNT/NiS nanocomposite. Hence, this can be considered as a promising electrocatalyst for HER activity compare to OER activity and MWCNT/NiS-3% is more active towards OER performance.

## Oral Presentation Abstract – 09

### Photocatalytic Study of Novel Calcium Zinc Titanate Nanoparticle via Solution Combustion Method

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CZT nanomaterial was prepared using solution combustion method and characterized using X-ray diffraction (XRD), Scanning electron microscopy (SEM), and UV-visible diffuse reflectance spectroscopy (UV-DRS). Analysis of the results of these characterizations of CZT nanomaterial reveals that, it has a polycrystalline nature with crystallite size~ 48 nm and spherical in shape with distinct particles. The presence of tri metallic components (Ca, Zn, Ti) was confirmed by Energy Dispersive X-ray Analysis (EDAX). The optical properties of the CZT nanomaterial were analysed by UV-DRS and band gap was estimated to be 3.25 eV. Narrow band gap and tri metallic components with high surface area demonstrates effective photocatalytic dye degradation of Congo red and methyl blue (MB) dyes under UV conditions. The CZT NPs material proved to be an efficient photocatalyst by degrading 80% and 78.12% respectively congo for red and MB dyes under UV light. Treated dye water was used to plant and grow pigeon peas to validate the sustainability process. The sustainable and scalable Calcium Zinc Titanate (CZT) nanomaterial exhibits excellent photocatalytic degradation efficiency, making it a promising candidate for environmental and energy applications.

## Oral Presentation Abstract – 10

### Piperizine-Benzimidazole Hybrids derivatives –Synthesis, Characterization, Biological and Molecular Dynamic simulation

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A series of imidazole containing Piperizine-Benzimidazole derivatives have been designed and synthesized. The synthesized compounds were investigated in vitro for their antibacterial and antioxidant activities. The synthesized compounds were confirmed by different spectral techniques such as $^{1}$H-NMR, $^{13}$C-NMR and LCMS. *In silico* property of synthesized compounds such as molecular docking, ADME and PASS were investigated using respective software. The primary report shows that all the synthesized compounds exhibited potent activity against both gram-positive and gram-negative bacteria. Investigate the MIC value in the range of 03.67± 093 to 11.78±0.65µg/ml respectively. Among twelve synthesized compounds the derivative attached with nitrile and fluro gave remarkable and broad spectrum against methicillin-resistant *Staphylococcus aureus* (MRSA). Further we validate the antibacterial effect of potent molecule nitrile and fluro synthesized compounds using membrane damage and cellular content leakage assay and antioxidant property of all synthesized hybrid imidazole-piperizine compounds were tested and reported.

## Oral Presentation Abstract – 11

### A Comparative Analysis of Potential of Avocado-Derived Proteases in Industrial Applications

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Avocado is not only a popular superfood but also has significant medicinal and health-promoting benefits. Its rich nutrient profile and bioactive compounds make it a valuable addition to a health-conscious diet. In the present study, other than nutritional efficiency, the protease activity among ripen and unripen avocado was explored for its potential industrial applications. For the studies, the phosphate buffer extract of Persea americana (avocado) pulp in its unripe and ripe stages, were utilized in its crude and partial purified forms. Ammonium sulphate precipitation method was used for partial purification of proteins content. The proteolytic efficiency of the samples was screened using caseinolytic assay. Confirming the proteolytic activities of the samples, it was subjected to milk-clotting, destaining and dot blot analysis to understand its potency in industrial applications. Among both the samples, ammonium sulphate precipitation showed higher protein yield of 15% than crude samples 6.5%. Whereas ripen crude and partially purified sample showed increased protease activity of 975.0 U/ml and 462.5U/ml. On exploring application of these proteases by dot blot, destaining assay and milk clotting assay, ripen partially purified and crude extracts showed noticeable application of intensive protease activity than the commercially available controls. The study concluded the effect of using ripen avocados in the industrial applications by showing its potent protease activity and content. This study also underscores the importance of the ripening stage in optimizing protease applications and suggests future research on enhancing enzyme stability and broadening their industrial utility.

## Oral Presentation Abstract – 12

### Indigenous Landslide Early Warning System for Environment and Human Safety

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Landslides pose a significant threat to lives, infrastructure, and the environment, particularly in regions prone to heavy rainfall and steep slopes. To mitigate these risks, robust and reliable landslide early warning systems (LEWS) are essential. This study proposes an innovative LEWS that integrates indigenous acoustic emission (AE) sensor technology with rainfall data and other sensor systems. AE sensors, known for their sensitivity to subtle ground movements, provide real- time insights into slope deformation dynamics, including displacement, velocity, and acceleration. Rainfall, being the most prominent triggering factor for landslides, necessitates simultaneous monitoring of water content or rainfall thresholds to complement AE-derived geotechnical assessments. By combining this data with rainfall measurements, we can accurately assess the risk of slope failure and issue timely warnings. Our approach involves real-time slope monitoring by utilizing AE sensors to continuously monitor slope stability. Rainfall data integration are incorporated using automatic weather stations. Data analysis and decision-making tools are used for developing advanced algorithms to analyse sensor data and generate alerts. This integrated system addresses the limitations of traditional monitoring methods and offers a comprehensive solution for landslide hazard mitigation. By providing early warnings, we can help protect communities and infrastructure from the devastating impacts of landslides.

## Oral Presentation Abstract – 13

### Molybdenum disulfide – reduced grapheme oxide ($MoS_2$-RGO) hybrid nanocomposites for water splitting application

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Molybdenum disulfide ($MoS_2$)-based hybrid nanostructures have emerged as promising alternatives to platinum-based catalysts for the hydrogen evolution reaction (HER). However, their catalytic performance is often constrained by limited conductivity and surface area. In this study, we present the synthesis of $MoS_2$ and reduced graphene oxide (RGO) hybrid nanostructures ($MoS_2$-RGO) via an in-situ one-pot supercritical hydrothermal method, which is easy, cost-effective, and time-efficient. The resulting hybrid nanostructures, prepared in various $MoS_2$-to-RGO ratios, were characterized using X-ray diffraction (XRD), high-resolution transmission electron microscopy (HR-TEM), and X-ray photoelectron spectroscopy (XPS) to confirm their crystal structure, morphology, and chemical interactions. The catalytic performance of the $MoS_2$-RGO hybrids was evaluated for HER in water splitting applications. The unique composition and structure of the $MoS_2$-RGO hybrids significantly enhanced their HER catalytic activity compared to pristine $MoS_2$, highlighting their potential as efficient and scalable electrocatalysts for sustainable hydrogen production.

## Oral Presentation Abstract – 14

### A brief overview of technological innovation and the application of AI for water conservation

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Population expansion, climate change, and ineffective water management techniques are all contributing factors to the rising worldwide problem of water shortage. Promising solutions for sustainable water conservation are provided by technological advancements, especially the use of artificial intelligence (AI). This study offers a thorough analysis of cutting-edge AI applications and technology targeted at improving water efficiency in a number of industries. IoT-enabled water meters, AI-powered leak detection, and smart irrigation systems are revolutionizing water management in homes, businesses, and agriculture. Accurate water demand forecasting, early leak identification, and wastewater treatment process optimization are made possible by AI-driven predictive analytics in conjunction with real-time data from sensors and satellite imaging. Furthermore, smart appliances and AI-enhanced desalination technologies encourage water efficiency and reduce environmental effect. By describing important developments and their practical uses, this article not only offers insights into future research and development for sustainable water resource management, but it also emphasises the critical role that AI plays in addressing global water challenges.

## Oral Presentation Abstract – 15

### Bismuth Cobalt Ferrite Nanoparticles: A Sustainable Photocatalyst for Wastewater Treatment and Plant Growth Enhancement

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Bismuth cobalt ferrite (BCF - $BiCoFe_2O_4$) nanoparticle was synthesized in the current study by solution combustion technique using celery as a fuel. X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FT-IR), UV diffuse reflectance spectroscopy (UV-DRS), scanning electron microscopy (SEM), energy dispersion X-ray diffraction analysis (EDAX), and transmission electron microscopy (TEM) analysis are used to validate the synthesized nanoparticles (NPs). The crystallite size of BCF nanocomposite is found to be ~28 nm computed by using Debye-Scherrer equation. The measured band gap for BCF NPs was found to be 2.8 eV, confirmed by the UV-DRS technique. The findings of the investigations have been validated by applications in photocatalytic degradation. The usage of BCF NPs as a catalyst for the degradation of Acid black-52 (AB-52) dye being subjected to visible light by sonocatalysis at ambient temperature results in improved photocatalytic response for BCF NPs was 96.38% for 120 minutes. Notably, the environmental impact of the entire technique has been examined in terms of the development of green gram plants displaying effective seed germination and plant growth using the treated dye wastewater.

## Oral Presentation Abstract – 16

### Monoclinic Calcium tungstate Nanoparticles: A Rising material for Environment Applications

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Monoclinic Calcium tungstate (CW-$CaWO_4$) nanoparticles have been synthesized through a simple solution combustion process. The synthesized nanoparticles were characterized using PXRD, FTIR, SEM, and UV-DRS, revealing an average crystallite size of 21 nm and a band gap of 3.7 eV, indicative of a monoclinic structure. Their multifunctional applications were explored through dye degradation applications. Photocatalytic degradation of Acid Black-52 (AB-52) dye was conducted using CW nanoparticles under UV light.

## Oral Presentation Abstract – 17

### Photocatalytic study of Barium Magnesium Phosphate Nanoparticles synthesized by combustion method

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Metal Phosphate nanomaterials are the major class of compounds having extensive applications. Barium Magnesium Phosphate was synthesized by chemical combustion method and the particle size was 47nm in diameter. As prepared $BaMgP_2O_7$ nanomaterial was confirmed by XRD, UV-DRS and FTIR spectroscopic methods. Barium Magnesium Phosphate showed a very good catalytic activity towards photocatalytic decomposition of Acid Red-88 dye which is used in textile industries. The AR-88 dye showed 93%

decomposition under UV-light. The dye degradation water and distilled water shows similar effect on ecological system which is confirmed by plant growth.

## Oral Presentation Abstract – 18

### $V_2O_5$ metal based electrocatalysts for high performance alkaline sea water electrolysis

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Seawater is one of the most abundant natural resources on Earth. The electrolysis of saltwater has significance not only for its potential for generating clean hydrogen energy but also for desalinating seawater. Robust and efficient electrocatalysts with the ability to enduring seawater splitting, chlorine expansion, electrode corrosion, and other side reactions, particularly at the anode, are essential for saltwater electrolysis operations. This paper presents a trimetallic oxide vanadium-based catalyst uniformly decorated with Nickel foam. The current research highlights difficulties related to catalysts, notably that the design of catalysts with elevated catalytic activity and stability can directly influence the rate and efficacy of seawater splitting. This catalyst is a highly durable and reliable catalyst for the oxygen evolution reaction in alkaline seawater electrolysis. In the context of alkaline seawater splitting, we have attained current densities of 10 and 250 mA cm−2 at exceptional voltages of 500 mV and 1.25 V, respectively while utilizing a very effective hydrogen evolution reaction catalyst composed of a vanadium-based nanocomposite. The findings signifies an important breakthrough in seawater electrolysis for large-scale production. Our research constitutes a considerable progression towards the generation of green hydrogen and the attainment of a sustainable energy future.

## Oral Presentation Abstract – 19

### Eco-Friendly Synthesis of Copper-Zinc-Aluminate for High-Performance Supercapacitors and sensing

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This research explores the eco-friendly synthesis of copper zinc aluminate (CZA) nanostructures using lime juice as a reducing and stabilizing agent. The synthesized CZA exhibits a mixed-phase structure comprising $ZnAl_2O_4$ spinel and $Cu_2ZnAl_2O_4$ phases. The material possesses a wide band gap of 5.2 eV and a rod-like morphology. Electrochemical studies reveal that CZA demonstrates promising specific capacitance and excellent cyclic stability, making it a potential candidate for supercapacitor applications. Furthermore, the material exhibits high selectivity towards heavy metal ions, suggesting its potential for environmental sensing applications. This eco-friendly approach to CZA synthesis offers a sustainable and efficient route to produce advanced functional materials with potential applications in energy storage and environmental monitoring.

## Oral Presentation Abstract – 20

# Photocatalytic studies of Calcium magnesium vanadate ($Ca_5Mg_4V_6O_{24}$–CAMV)

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We present the synthesis of Calcium Magnesium Vanadate ($Ca_5Mg_4V_6O_{24}$ - CAMV) nanoparticles (NPs) achieved through a straightforward chemical combustion method. The physical characteristics of the resulting sample were examined using various techniques, including X-ray diffraction (XRD), scanning electron microscopy (SEM), energy-dispersive X-ray spectroscopy (EDAX), and UV-visible spectroscopy. The conducted studies confirmed the presence of CAMV NPs in their pure phase, demonstrating an average size of 32 nm. Additionally, UV-DRS analysis revealed an energy band gap (Eg) of 3.2 eV for the calcium magnesium vanadate nanoparticles. The degradation assessment focused on Acid Red-88 (AR-88) dye, showcasing the photocatalytic activity of CAMV NPs under UV-light exposure for 0–75 minutes. The investigation indicated the removal of 83% of AR-88 dye, employing CAMV NPs with first-order kinetics and a photocatalyst.

# LIST OF POSTER PRESENTATIONS

| Poster No. | Presenting Author | Title | Email |
|---|---|---|---|
| **PPA-01** | Roopa M C | Green Synthesis, Characterization of CuO and rGO/CuO Nanocomposites via Reflux Method | rmc.enviscience@gmail.com |
| **PPA-02** | Umadevi K.M | Assessment of physiochemical, heavy metals, and Biological Characteristic of Bellandur lake water bodies in Karnataka | umadevikm19@gmail.com |
| **PPA-03** | Shilpa, P. Raikar | Unveiling the Impact of Azolla filiculoides Supplementation on Poultry Growth and Feed Efficiency | shilu.raikar@gmail.com |
| **PPA-04** | Chitrabanu C. P | Saponin stabilized silver nanoparticles as a colorimetric sensor for metal ions | chitrabanucp@gmail.com |
| **PPA-05** | Vidhya S L | Synthesis and molecular docking studies of di peptide attached xanthanone as potential antibacterial and antioxidants | shreevidhyas55@gmail.com |
| **PPA-06** | S. Nikhil | Fabrication of $gC_3N_4$-$Bi_2MoO_6$ Nanocomposite for High-Performance Supercapacitor Application | 8055nikhils@gmail.com |
| **PPA-07** | R. Karthik | Synthesis of $V_2O_5$-$TiO_2$ Hetero structure Nanocomposite for High-Performance Supercapacitor Application | karthikr2101@gmail.com |
| **PPA-08** | E. Vinay Kumar | Facile green synthesis of CuO-$MoO_3$ pn junction nanocomposite and its photocatalytic activity towards Methylene blue dye | vinivinay704@gmail.com |
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| **PPA-10** | Pooja N | Eco-friendly extraction of hemp fibers and their characteristics | pooja.n@nmit.ac.in |
| **PPA-11** | Ritu Chakraborty | Artificial Intelligence Techniques for the Advancement of Chemical Processes' Sustainability | rituchakraborty218@gmail.com |
| **PPA-12** | Tathagata Sardar | Formation of Zeolite NaA/rGO Composite for Enhanced Supercapacitor Application | tathagatasardar1@gmail.com |
| **PPA-13** | Rachana L | Green synthesis, characterization of silver nanoparticles with Citrus peel extracts and their application as antioxidants | rachanatl2000@gmail.com |
| **PPA-14** | Prashantagouda T Patil | Green synthesis, characterization of copper nanoparticles of Capsicum extracts, and their application as antioxidants | 248patilprashant@gmail.com |
| **PPA-15** | Sumanth Shetty | Synthesis and Characterization of $TiO_2$-Multi Walled Carbon Nanotube Nano-Composites and its Effect on Engine Oil Viscosity | shettysumanth53@gmail.com |
| **PPA-16** | Divya R | Optimization of Diamond Like Carbon (DLC) Coatings Using RF – Plasma Enhanced Chemical Vapor Deposition (PECVD) | divyar1026@gmail.com |
| **PPA-17** | Rakshaa. P | Study of antibacterial and antioxdant properties of ganoderma lucidium | rakshaap.bt22@rvce.edu.in |





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| **PPA-19** | B.R. Mohith | Triboelectric nanogenerator based on PVC-$MoO_3$ nanocomposites for sustainable energy harvesting | mohithbr66@gmail.com |
| **PPA-20** | Shilpa V Allipur | Green Synthesis and Characterization of Calcium-Doped Bismuth oxide Nanoparticles understanding Their Structure and Potential Uses | shilpava97@gmail.com |
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| **PPA-22** | M Nagalakshmee | Synthesis and Characterization of rGO/$CuWO_4$ Nanocomposite and Its Application for Supercapacitor | nagalakshmee2000@gmail.com |
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| **PPA-25** | Sudha Chalawadi | Sewage water treatment by using natural coagulant | sudhachalawadi956@gmail.com |

## Poster Presentation Abstract – 01

### Green Synthesis, Characterization of CuO and rGO/CuO Nanocomposites via Reflux Method

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This study focuses on the green synthesis of copper oxide (CuO) and reduced graphene oxide-doped copper oxide (rGO/CuO) using a reflux method. The synthesized materials were characterized using various techniques, including X-ray Diffraction (XRD), Scanning Electron Microscopy (SEM), Energy Dispersive X-ray Analysis (EDX), Fourier Transform Infrared Spectroscopy (FT-IR), UV-Vis's spectroscopy, and High-Resolution Transmission Electron Microscopy (HR-TEM). The analysis revealed particle sizes of approximately 29.35 nm for CuO and 23.56 nm for rGO/CuO. Internal and surface morphology studies confirmed the well-developed particles formed on rGO sheets. UV-Vis's analysis provided absorbance data and band gap values, while elemental analysis confirmed the presence of copper, oxygen, and carbon. FT-IR spectra identified metal-oxygen bonds within the 600–400 $cm^{-1}$ range in both CuO and rGO/CuO. These materials demonstrate broad potential applications, including photocatalysis, antioxidant and antifungal activities, sewage and industrial dye water treatment, energy storage, and corrosion resistance.

## Poster Presentation Abstract – 02

### Assessment of physiochemical, heavy metals, and Biological Characteristic of Bellandur lake water bodies in Karnataka

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The significance of water in lakes goes well beyond being just a liquid; it plays a crucial role in temperature regulation, supports aquatic ecosystems, and enables vital processes such as nutrient cycling. The study provides an in-depth examination of the physical, chemical, and biological parameters of lake in Karnataka, India, including Bellandur Lake, highlighting their overall health and pollution levels. The analysis of water quality parameters indicates differing conditions and varying degrees of pollution within these freshwater ecosystems. While certain parameters, such as pH and fecal coliform counts, meet acceptable standards, others point to potential environmental concerns, including high levels of turbidity, total dissolved solids, and chemical oxygen demand. Moreover, the presence of unpleasant odors and disagreeable tastes further emphasizes the influence of pollution sources on the sensory qualities of the water. The findings reveal the unique characteristics of heavy metal presence in Bellandur Lake, suggesting potential mineral enrichment in one and contamination sources in the other. The fluctuating levels of fecal coliform highlight the need for ongoing monitoring and management. This research emphasizes the urgency of adopting remedial measures to improve water quality and maintain the ecological balance of these lakes. Continuous vigilance and proactive measures are crucial to reducing pollution risks and ensuring the long-term sustainability of the region's freshwater reservoirs.

## Poster Presentation Abstract – 03

### Unveiling the Impact of *Azolla filiculoides* Supplementation on Poultry Growth and Feed Efficiency

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*Azolla filiculoides*, a nutrient-rich aquatic fern, was evaluated for its potential as a dietary supplement to enhance weight gain and feed conversion efficiency (FCR) in poultry. The study was conducted over an 18-week period using 300 chicks, randomly divided into six groups of 50 each. The groups included a control (0% *A. filiculoides*) and five experimental groups supplemented with varying levels of *A. filiculoides* (5%, 10%, 15%, 20%, and 25%). The results demonstrated a significant improvement in growth performance and feed efficiency with increasing supplementation levels. The 25% *A. filiculoides* group achieved the highest weight gain of 1.8139 kg and the lowest FCR of 1.02, compared to the control group, which recorded a weight gain of 1.212 kg and a higher FCR. A clear inverse relationship was observed between FCR and weight gain, indicating enhanced feed utilization efficiency with higher inclusion levels of *A. filiculoides*. The lower supplementation levels (5% and 10%) showed minimal effects on growth performance, whereas higher levels (15%, 20%, and 25%) significantly improved weight gain and feed efficiency. These findings highlight the potential of *A. filiculoides* as an economical, sustainable, and nutritionally effective feed additive for poultry. The study underscores its viability in reducing feed costs while optimizing growth performance, particularly at the 25% inclusion level, making it a promising candidate for sustainable poultry nutrition systems.

## Poster Presentation Abstract – 04

### Saponin stabilized silver nanoparticles as a colorimetric sensor for metal ions

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The use of metal nanoparticles in sensing is attracting the interest of many researchers. We report here an eco friendly method for the synthesis of silver nanoparticles using Simarouba saponin and a facile colorimetric sensor-based assay for the detection of metal ions in aqueous solution. The colorimetric sensing of metal ions was carried out for different metal ions viz. $Ba^{2+}$, $Cu^{2+}$, $K^{+}$, $Ni^{2+}$, $Co^{2+}$, $Mn^{2+}$, $Li^{2+}$, $Fe^{2+}$ and $Fe^{3+}$. The study is based on the discoloration of the nanoparticle solution which was monitored spectrophotometrically by taking Uv-vis spectra in the range of 300 to 600 nm. The results showed that the synthesized silver nanoparticles exhibited good selectivity towards $Fe^{2+}$ and $Fe^{3+}$ ions. The experiment was also conducted at different concentrations of detected metal ion and also in the presence of several other metal ions in order to check the sensitivity and selectivity. The nanoparticle solution showed a strong absorbance at around 420 nm and the intensity of the absorbance decreased as the concentration of metal ion increases and the presence of other metal ions didn't affect the sensing assay. The study thus suggested the ability of synthesized silver nanoparticle in the detection of iron with good sensitivity and selectivity.

## Poster Presentation Abstract – 05

### Synthesis and molecular docking studies of di peptide attached xanthanone as potential antibacterial and antioxidants

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Xanthones- diphenylene ketone oxides, are secondary metabolite are widely applicable and explored by pharmaceutical firms, as they are predominant in insight and conspiring of advanced drug fragments. Novel scaffolds with four xanthone derivatives were synthesized and characterized by $^{1}H$ & $^{13}C$ NMR and LCMS spectral studies. All synthesized xanthone derivatives were screened for antimicrobial potential and anti-inflammatory activities. Synthesised compound Tryptophan, proline lysine, valine etc conjugated with xanthone showed excellent antimicrobial activities Molecular docking studies were performed for all the synthesised compounds. Among which compounds tryptophan attached xanthone derivative compound showed the highest docking score for antimicrobial activity. Different di peptide conjugated xanthone derivatives were synthesised and evaluated for their invitro biological activities. The conjugation was found to play a major role in improving biological activities of those compound. This letter furnishes systematic prospective to synthesize xanthone derivatives such as antimicrobial studies and antioxidant ability for the further study.

## Poster Presentation Abstract – 06

### Fabrication of $gC_3N_4$-$Bi_2MoO_6$ Nanocomposite for High-Performance Supercapacitor Application

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The $gC_3N_4$-$Bi_2MoO_6$ nanocomposite were synthesized by using a simple sol-gel technique. The crystal structure, phase purity, morphology, and optical properties of the composite material were investigated using X-ray diffraction, Fourier transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), energy dispersive X-ray analysis (EDAX), UV-visible spectroscopy (UV-Vis), and photoluminescence (PL). Using galvanostatic charge-discharge tests, cyclic voltammetry testing, and electrochemical impedance spectroscopy, the electrochemical behavior of the composite was investigated. At a current density of 5 mA/cm$^2$, a specific capacitance of approximately 1669 mF/cm$^2$ has been measured for this $gC_3N_4$-$Bi_2MoO_6$ composite electrode. The obtained results reveals that pure $Bi_2MoO_6$ NCs shows less specific capacitance compared to $gC_3N_4$-$Bi_2MoO_6$ nanocomposite. Galvanostatic charge-discharge experiments after 3000 continuous cycles of operation show a respectable cycling stability together with capacitance preservation. The $gC_3N_4$-$Bi_2MoO_6$ composite is a promising electrode material for supercapacitors, according to these studies.

## Poster Presentation Abstract – 07

### Synthesis of $V_2O_5$-$TiO_2$ Hetero structure Nanocomposite for High-Performance Supercapacitor Application

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This study used a simple hydrothermal approach to synthesize $V_2O_5$/$TiO_2$ hybrid nanocomposite. X-ray diffraction, Fourier transform infrared spectroscopy (FTIR), Scanning electron microscopy (SEM), Energy Dispersive X-ray Analysis (EDAX), Transition electron microscopy (TEM), UV-visible spectroscopy (UV-Vis), and Photoluminescence (PL) were used to examine the composite material's crystal structure, phase purity, morphology, and optical characteristics. The electrochemical behavior of the composite was examined using galvanostatic charge-discharge measurements, cyclic voltammetry testing, and electrochemical impedance spectroscopy. For this $V_2O_5$-$TiO_2$ composite electrode, a specific capacitance of about 1330 mF/cm$^2$ has been obtained at a current density of 3 mA/cm$^2$. Following 3000 cycles of continuous charge-discharge operation, galvanostatic charge-discharge measurements indicate a reasonable cycling stability together with capacitance preservation. These results indicate that the $V_2O_5$-$TiO_2$ composite is a promising electrode material for supercapacitors.

## Poster Presentation Abstract – 08

### Facile green synthesis of CuO-$MoO_3$ pn junction nanocomposite and its photocatalytic activity towards Methylene blue dye

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One of the major risks to the ecosystem is the pollution of water resulting from organic dyes. For scientists, the elimination of dyes from water has remained a challenge. The development of heterostructure photocatalysts featuring enhanced photogenerated charge carriers has attracted significant interest in recent times. The development of a trustworthy, reliable, affordable, and environmentally friendly process for the fabrication of photocatalysts is the main motivation for this research project. CuO-$MoO_3$ nanocomposites were successfully synthesized by facile one-step green solution combustion method using *Butea monosperma* leaves extract. The analytical techniques X-Ray diffraction spectroscopy, Fourier-transform infrared spectroscopy, Scanning electron microscopy, Transmission electron microscopy, Photoluminescence, UV-Visible spectroscopy used to characterize the crystal structure, composition, morphology and bandgap of the synthesized products. The photocatalytic activity of CuO-$MoO_3$ nanocomposite was investigated using Me dye at various concentrations and observed remarkable progress. After four recycling runs, this composite catalyst still showed outstanding chemical stability and reusability. According to experimental findings, this report may provide a simple, convenient and low-cost method for the photocatalytic degradation of organic pollutants.

## Poster Presentation Abstract – 09

### Nitrogen sulphur co-doped carbon quantum dots decorated on $TiO_2$ nanoparticles towards efficient photocatalysts for hydrogen evolution

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The solar-to-hydrogen conversion photocatalysts based on carbon quantum dots based nanomaterials have demonstrated significant promise in the realm of renewable energy. Here in, we reported a facile synthesis of nitrogen Sulphur co-doped carbon dots decorated $TiO_2$ nanoparticles (NSCT) as robust and efficient photocatalyst for visible light driven photocatalytic hydrogen production, and also its photocatalytic $H_2$ production activity has been related with nitrogen doped carbon quantum dots decorated $TiO_2$ nanoparticles (NCT), sulphur doped carbon quantum dots decorated $TiO_2$ nanoparticles (PCT), carbon quantum dots decorated $TiO_2$ nanoparticles (CT), NSCQDS and $TiO_2$ nanoparticles. The developed NSCT nanocomposite showed 11 times higher generation of hydrogen as compared with bare $TiO_2$ nanostructures. The enhanced hydrogen production activity of NSCT nanocomposite is due to its improved absorption capacity in the visible region and due to suppression in the decay life time of photogenerated electrons as well as reduction in the work function(WF) of NSCT nanocomposites compared to other nanocomposites.

## Poster Presentation Abstract – 10

### Eco-friendly extraction of hemp fibers and their characteristics

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The increasing production and consumption of mushrooms has led to the generation of significant quantities of spent mushroom compost (SMC), a by-product of mushroom cultivation. This compost serves as a valuable source of industrially important enzymes, including pectinase, amylase, protease, and cellulase. These enzymes are critical in breaking down non-cellulose components such as pectin, lignin, and proteins, thereby yielding cellulose-rich fibers. These cellulose fibers, known for their strength, hold great potential as reinforcement materials in biocomposites. The development of biocomposites offers a promising avenue for replacing non-biodegradable materials in various industries, advancing sustainability efforts in multiple applications. This study was conducted to achieve efficient extraction of lignocellulolytic enzymes from spent mushrooms and extraction of hemp fibers from bast hemp fibers and studying the physio-chemical characterization of extracted fibers.

## Poster Presentation Abstract – 11

### Artificial Intelligence Techniques for the Advancement of Chemical Processes' Sustainability

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Improving chemical industry sustainability through the use of artificial intelligence (AI) technology in chemical processes is a revolutionary strategy. Chemical process optimization, real-time monitoring, and predictive analytics are all made possible with the help of artificial intelligence technologies like optimization techniques, neural networks, and machine learning. With the use of these technologies, sustainable practices can be greatly improved by reducing waste, increasing resource usage, and decreasing energy consumption. Artificial intelligence (AI) improves the design and operation of chemical processes by using previous data to forecast outcomes. This enables the rapid discovery of optimal reaction and separation conditions. The capacity to reduce reliance on trial-and-error approaches improves yield and selectivity. In addition, models and simulations powered by AI allow for the investigation of new reaction routes and catalysts, which promotes innovation in green chemistry. By improving logistics, inventory management, and production scheduling, artificial intelligence (AI) in chemical supply chain management helps minimize carbon footprints and improve sustainability. Furthermore, AI makes it easier to analyze lifecycle impacts, which aids firms in evaluating and reducing environmental impacts linked to their processes. Aligning with global sustainability goals, promoting sustainability, and tackling issues like resource depletion and environmental degradation are all possible outcomes of incorporating AI approaches into chemical processes. Artificial intelligence (AI) can help the chemical industry become more sustainable, which is good for both the firm's bottom line and the environment.

## Poster Presentation Abstract – 12

### Formation of Zeolite NaA/rGO Composite for Enhanced Supercapacitor Application

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Zeolites are porous aluminosilicates that include silica and alumina. The usual applications for zeolites are as absorbents or catalysts; however, little is known about their potential as an electrochemical material. This research reveals how zeolite and zeolite-rGO based nanocomposites are prepared and perform electrochemically. The cyclic voltammetry (CV) was measured in 3(M) KOH aqueous electrolyte, and the synthesized Zeolite NaA-rGO electrode demonstrates greater electrochemical stability than pristine Zeolite NaA and pristine rGO. The optimized Zeolite NaA-rGO electrodes delivered a high specific capacitance of 436 $F.g^{-1}$ at a current density of 1 $mA.g^{-1}$ which is immensely higher than pristine Zeolite NaA, and Pristine rGO. The superior Performance of Zeolite NaA-rGO nanocomposite as a potential electrode material for supercapacitors is because of the synergetic effect of the heterostructure in the nanocomposite. A good percentage of cycle retention was found after 3000 cycles.

## Poster Presentation Abstract – 13

### Green synthesis, characterization of silver nanoparticles with Citrus peel extracts and their application as antioxidants

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Ascorbic acid scavenges reactive oxygen species, such as singlet oxygen and lipid peroxy radicals, because of its antioxidant qualities. Although ascorbic acid's many physiological roles offer therapeutic potential, its stability and absorption problems make effective distribution difficult. In recent decades, a great deal of research has been conducted on the use of nanotechnology in pharmaceutical applications. As with nano pharmaceuticals, the use of nanotechnology for better nutraceutical delivery has led to the development of a new class of nanomaterials called nano nutraceuticals. Citrus peels were boiled, and the extract was then added to a solution of silver nitrate (3mM) for green synthesis. In addition to being evaluated for antioxidant potential using DPPH, Ferrozine, Ferric reducing antioxidant power assay, and reducing power assay, the produced silver nanoparticles were characterized using Nanoparticle tracking analysis (NTA), UV spectroscopy, and FTIR. The UV spectroscopy approach revealed a peak at 452.86nm from the characterisation tests, and the NTA analysis revealed that the average size of the NPs was 55.24nm. Bands at 3445.5, 1645.11, 1089 and 524cm$^{-1}$ were visible in the FTIR spectra. The green synthesized AgNPs demonstrated 75% and 53.23% DPPH scavenging assay and ferrozine reduction scavenging ability at 50µg/ml doses ($P<0.05$). At comparable concentrations, the FRAP and RP methods revealed 1330µmol/ml and 80%, respectively. Comparing each test to the positive control at 100µg/ml revealed that they were all very significant ($P<0.05$). The current study successfully synthesized composite AgNPs and validated the composite particles' possible antioxidant properties. Comparing the composite particles to other controls, they did show increased antioxidant activity.

## Poster Presentation Abstract – 14

### Green synthesis, characterization of copper nanoparticles of Capsicum extracts, and their application as antioxidants

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Among the various metal nanoparticles (NPs), copper nanoparticles (CuNPs) have attracted more attention due to their electrical conductivity, photocatalytic activity, and reduced electrochemical migration. They can be used in various applications, such as wastewater treatment plants, DNA analysis, antioxidants, and antibacterial agents. A few earlier works of literature emphasize the efficiency of green synthesis in achieving improved photocatalytic and biological activities, even though CuNPs can be produced physico-chemically. This study employed green chemistry to synthesize copper nanoparticles (CuNPs) using fresh capsicum boiled extract. For green synthesis, capsicum was cut into fine pieces, boiled and the extract was then added to a copper sulfate (3mM) solution. The generated Copper nanoparticles were characterized (size, shape, morphology, and stability of resultant CuNPs) using Nanoparticle Tracking Analysis (NTA), UV-visible, and FTIR spectra and assessed for antioxidant capability utilizing DPPH, Ferrozine, Ferric reducing antioxidant power assay, and reducing power assay. The UV-Vis absorption spectra show maximum absorption at 558.36 nm, and FTIR showed the presence of biological molecules responsible for reducing $Cu^{+}$ ions. In NTA analyses, the average diameter of the synthesized NPs was found to be 58.24nm. The synthesized nanoparticles are characterized using FTIR

spectra showing bands at 3423.11, 1615.77, 1419.18, and 863.66cm-1. The green-produced CuNPs showed ferrozine reduction scavenging ability at 50µg/ml dosages (P<0.05) and 59% and 77.66% DPPH scavenging assay. The FRAP and RP techniques showed 1050µmol/ml and 66%, respectively, at similar doses. Each test was very significant (P<0.05) compared to the positive control at 100µg/ml. Current study shows that green-produced CuNPs have strong antioxidant potential. This research could help to uncover other therapeutic properties of CuNPs.

## Poster Presentation Abstract – 15

### Synthesis and Characterization of $TiO_2$-Multi Walled Carbon Nanotube Nano-Composites and its Effect on Engine Oil Viscosity

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The present study describes the synthesis and characterization of $TiO_2$ nanoparticles conjugated with Multi Walled Carbon Nanotube (MWCNT), Sodium DodecylSulfate (SDS), and Cetyltrimethylammonium Bromide (CTAB) and its effect on engine oil viscosity. The material was characterized with X-Ray Diffraction (XRD), Scanning Electron Microscopy (SEM), Fourier Transform Infrared (FTIR), and (UV-VIS) spectroscopy. Prepared nanoparticles were mixed with 50 ml of 15W40 engine lubricant oil evaluated the influence of nanoparticles on viscosity of the oil at different temperature. The dynamic and kinematic viscosity of various combinations of suspended nanoparticle-lubricant combinations was measured using a redwood viscometer at three temperatures (34 °C, 44 °C, and 54 °C). Test revealed that Bare $TiO_2$ nanoparticles increased the viscosity of base oil, while $TiO_2$ treated with CTAB, SDS and MWCNT decreased the viscosity of base oil up to 27% in cases considered.

## Poster Presentation Abstract – 16

### Optimization of Diamond Like Carbon (DLC) Coatings Using RF – Plasma Enhanced Chemical Vapor Deposition (PECVD)

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DLC Coatings are immensely desirable because of their extraordinary properties such as hardness, low friction coefficient (COF) and chemical inertness, making them suitable for a wide range of applications in industries such as automotive, aerospace and biomedical. The proposed study involves the deposition of Diamond like Carbon (DLC) coatings using Radio – Frequency Plasma Enhanced Chemical Vapor Deposition RF – PECVD method where the thin film is achieved by using DC negative bias, RF power in the presence of $CH_4$ and Ar gas mixture at 1:2 ratios for about 5 hrs deposition time. The obtained coating is then characterised using EDX, FE – SEM, Raman spectroscopy, nano hardness test, scratch test. Thickness of the obtained DLC layer is 523 nm, scratch test indicated no chipping or peeling and hardness measured is about ±18 GPa. The COF of plain SS 304 is around 0.44 after DLC deposition it came down to 0.08 which shows the wear resistance study of the thin film coating.

## Poster Presentation Abstract – 17

### Study of antibacterial and antioxidant properties of Ganoderma lucidium

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*Ganoderma lucidum*, a versatile medicinal mushroom, has long been valued for its rich bioactive compounds, primarily polysaccharides and triterpenoids, which exhibit remarkable therapeutic potential. This study highlights a unique approach to harnessing *G. lucidum* as a natural source of antimicrobial and antioxidant agents, emphasizing its untapped potential in pharmaceutical development. The research involved a systematic methodology, including Soxhlet extraction, simple distillation, and UV-Visible spectroscopy, to isolate and analyse the bioactive compounds. Antibacterial assessments demonstrated significant activity against *Escherichia coli* and *Pseudomonas aeruginosa*, supported by the identification of rutin and other non-polar antibacterial molecules in $CHCl_3$ extracts. Antioxidant properties were validated through a DPPH assay, yielding a high absorbance value of 1.214, indicative of potent radical scavenging activity. Further, an absorbance maximum of 2.808 at 420 nm suggests the presence of bioactive compounds like phenolic acids and flavonoids, contributing to the extract's antioxidant and anti-inflammatory potential. This study uniquely combines analytical techniques with targeted biological evaluations to validate the pharmacological properties of *G. lucidum*. The findings underscore its potential as a natural source of bioactive compounds for therapeutic applications, offering insights into its mechanisms of action and opening pathways for novel drug discovery. By exploring natural remedies, this research paves the way for sustainable approaches to modern healthcare challenges.

## Poster Presentation Abstract – 18

### Synthesis of silver nanoparticles from paan extract: characterization and applications

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This study reports the green synthesis of silver nanoparticles (AgNPs) using paan (betel leaf + areca nut) extract and evaluates their multifunctional applications in methylene blue dye degradation, hydrogen peroxide sensing, and antimicrobial activity. The AgNPs were synthesized using an eco-friendly approach, with the bioactive compounds in paan extract acting as reducing and stabilizing agents. Characterization of the nanoparticles was performed using UV-Vis spectroscopy and scanning electron microscopy (SEM), confirming the successful formation of stable AgNPs. The catalytic potential of these nanoparticles was demonstrated by the effective degradation of methylene blue dye within 2 hours. Additionally, the AgNPs exhibited high sensitivity in hydrogen peroxide detection, making them suitable for chemical sensing applications. The antimicrobial activity of the AgNPs was tested against *Bacillus subtilis*, *Pseudomonas aeruginosa*, and *Escherichia coli*, showing significant inhibitory effects. This work underscores the potential of paan extract-mediated AgNPs as sustainable and versatile agents for environmental and biomedical applications.

## Poster Presentation Abstract – 19

### Triboelectric nanogenerator based on PVC-$MoO_3$ nanocomposites for sustainable energy harvesting

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In this work, a low-cost and a novel methodology of polyvinyl chloride (PVC) and Molybdenum trioxide ($MoO_3$) is proposed for the fabrication of triboelectric nanogenerator. The Composite films based on $MoO_3$ and PVC matrix with different $MoO_3$ filler quantities are fabricated, optimized, and characterized for successful synthesis and evaluated for triboelectric nanogenerator application. The TENG with 0.5 g of $MoO_3$ filler generated maximum output of 47.3 V and 5.56 µA respectively and a power of 49 µW at an optimal load resistance of 30 MΩ. The humidity-related studies are carried out at a higher humidity range and observed that the device deported as a humidity sensor. Furthermore, the as-fabricated device is capable of powering LEDs and a digital watch through a rectifier bridge. This work will serve as a comprehensive pathway from the synthesis of $MoO_3$ nanosheets with an economical, facile technique to fabricating a TENG for powering wearable smart electronics.

## Poster Presentation Abstract – 20

### Green Synthesis and Characterization of Calcium-Doped Bismuth oxide Nanoparticles understanding their Structure and Potential Uses

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In the current work, celery leaf is used as fuel to create Calcium doped Bismuth oxide nanoparticles by the sol-gel method. X-ray diffraction (XRD), Fourier-transform infrared spectroscopy (FTIR), and Scanning electron microscopy (SEM) are used to confirm synthesized nanoparticles. With a particle size of 35 nm, XRD analysis verified the alkali earth doped metal oxide nanoparticles' crystallinity. The architecture of the nanoparticle was revealed by SEM images to be floral in nature. The clean and crystalline nature of the produced nanoparticles suggested that they are suitable for biological applications. The antibacterial capabilities of nanoparticles were examined against fungi, gram positive and gram-negative bacteria, using the standard disc diffusion method.

## Poster Presentation Abstract – 21

### Aging Study of Ge-Coated Black Polyimide for Sunshield Application of Spacecraft

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The development of both passive and active multifunctional elements is essential for spacecraft applications, aiming to enhance spacecraft performance and durability in the challenging environment of space. The passive elements are designed to optimize thermal control, structural stability, and radiation shielding, ensuring the spacecraft's resilience during extended missions. For instance, a sunshield is used as a passive thermal control element to protect the antenna from the heat, radiation, and various environmental conditions in space. Due to exposure to challenging environments in space, these elements gradually degrade over time, directly affecting their various properties like Thermo-optical, Electrical, Mechanical properties etc. which leads to the loss of communication between spacecraft and ground station. In this study, we focus on the aging or degradation study of a Germanium-coated black polyimide sunshield is carried. Therefore, indigenized Germanium-coated black polyimide (GBP) sample and foreign samples are placed in four different atmospheres with various particle counts and humid condition, and over 16 weeks of test has been carried. In the observation both samples exhibited good thermo-optical and electrical properties with no significant differences in thermo-optical and electrical properties about 16 weeks of testing. However, the aging profile of both indigenized and foreign samples are comparable.

## Poster Presentation Abstract – 22

### Synthesis and Characterization of rGO/CuWO4 Nanocomposite and its Application for Supercapacitor

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The report investigates the broad topic of nanotechnology with a focus on the synthesis, properties, and applications of nanoparticles, specifically copper tungstate. The premise correlates the mainstream transition of nanotechnology from prevalent theories in the mid-20th century to modern applications informed by increased industrialization and the discovery of remarkable behaviors of nanostructured materials. The study sought to identify the characteristics of $CuWO_4$ in various synthesis to highlight its components of note and its benefits in supercapacitors and electrochemical sensors. The report highlights significant findings made by researchers in the field of nanoparticles, showing the remarkable characteristics of nanomaterials that significantly depart from bulk properties. The report also explores the main conclusion statements in the report that may inform those interested in the development and application of nanoparticles. The report deals with experimental procedures referring to the synthesis of $CuWO_4$ and its composites. Besides, it considers using nanoparticle manipulation, such as hydrothermal synthesis and sonication, for the purpose of achieving the required nanoparticle features and functions. It will evaluate available information on the use of nanoparticles in supercapacitors as a part of nanotechnology applications. The next-generation energy storage solutions are to incorporate supercapacitors that are expected to have high power density and must be rapidly charged and discharged. Besides, the report may include the potential environmental effects and toxicological considerations about the given nanoparticle. The findings concerning the use of nanoparticles in supercapacitors can be summarized as follows: they affect supercapacitors' specific capacitance, rate capability, and stability.

## Poster Presentation Abstract – 23

### Solid Particle Erosion Resistant Cr/CrN Multilayer Coating on Ti6Al4V by Four-Cathode Reactive Unbalanced Direct Current (DC) Magnetron Sputtering System

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In this present study, to control the solid particle erosion rate of turbine blades we deposited chromium/chromium nitride (Cr/CrN) multilayer coatings on Ti6Al4V substrates by using a four-cathode reactive unbalanced pulsed direct current (DC) magnetron sputtering system. The multilayer structure, consisting of alternating Cr and CrN layers, with different flow rate of $N_2$. The ultrathin multilayer is designed to combine the toughness of metallic chromium with the hardness of chromium nitride, aiming to optimize the solid particle erosion resistance of the coating. Important variables, including nitrogen flow rate and deposition time, were carefully tuned to see how they impacted the mechanical properties, resistance to erosion, and microstructure of the coating. The results of the coatings were characterized using several techniques such as X-ray diffraction (XRD), field emission scanning electron microscopy (FESEM). The scratch test carefully carried out to evaluate cohesive or adhesive failures, and the hardness of the coating material is measured using a nano-hardness tester. Additionally, erosion tests were conducted using high-velocity alumina solid particles to assess the wear resistance of the coatings.

## Poster Presentation Abstract – 24

### Synthesis and Characterization of NiS@MXene Nanocomposite by Solvothermal synthesis Process and its Electrochemical Study

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MXenes are widely sought after in many scientific and technical domains because to their remarkable features, which include large surface area and great electrochemical stability. MXenes, such MXene/Metal Sulfides, have been thoroughly investigated for their improved electrode stability and electrical conductivity in electrochemical energy storage systems, especially in nanocomposite applications. In this work, we successfully used a solvothermal technique to synthesis MXene/NiS. FTIR, UV-DRS, SEM, and XRD methods were used to thoroughly analyze the synthesized MXene/NiS nanocomposite. Electrochemical analyses showed that the MXene/NiS nanocomposite had a specific capacitance of 527 F/g in KOH electrolyte, which is encouraging for supercapacitor applications. The potential of MXene-based nanocomposites to further energy storage systems is highlighted by this performance.

## Poster Presentation Abstract – 25

# Sewage water treatment by using natural coagulant

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The treatment of wastewater using chemical coagulants are considered to be very expensive and over dosage causes harmful effects on human beings. And for limiting the chemical used in treatment of wastewater natural coagulants can be the best substitute. The study aimed to evaluate the efficiency of natural coagulants like Moringa Oleifera powder for the evaluation of purity in collected wastewater sample. Three characteristics of water sample are tested this include Turbidity, pH, and TDS. Jar test apparatus was used for determining the optimum dosage of natural coagulants. After the preparation and application of coagulants in the collected sample a dosage of 0.6g of natural coagulant is best suited for purification. Since natural coagulants are environmental friendly and low cost it could be widely used in future. While using the Moringa Oleifera as natural coagulant the optimum results were found to be pH-8.3 and 7.9(88.29% and 84.04%), Turbidity- 14 NTU(53.84%) and TDS- 610mg/l(74%).

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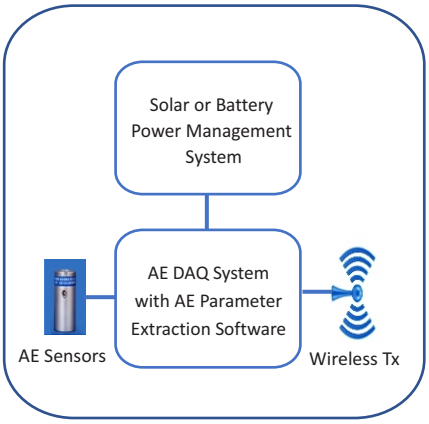



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