



CECRI NEWS

(A monthly newsletter of CSIR-CECRI)
compilation of significant happenings

India International Science Festival 2023

CSIR-Central Electrochemical Research Institute (CSIR-CECRI), Karaikudi organized Outreach Programme and Nobel Day Celebration during December 21 & 22, 2023 as part of 9th edition of India International Science Festival 2023 (IISF 2023) - India's Mega Science Fair which is scheduled during January 17-20, 2024 in Translational Health Science and Technology Institute (THSTI) and Regional Centre for Biotechnology (RCB) of Department of Biotechnology in Faridabad. With the theme of '*Science and Technology Public Outreach in Amrit Kaal*', IISF 2023 aims to provide a platform for inspiring public at large and individuals with diverse levels of interests like students, educators, scientists, researchers, industry professionals, entrepreneurs and science communicators and will have a total of 17 themes to showcase scientific achievements offering diverse benefits to participants/general public.



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*Science and Technology Public
Outreach in Amrit Kaal*

**- Theme of India International
Science Festival 2023**



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The event holds interface among all stakeholders through various activities such as seminars by national and international experts, interactions with speakers, exhibitions, competitions, workshops, knowledge-sharing activities, technology shows, etc. The IISF is dedicated towards fostering creativity in Science, Technology and Innovation for the advancement of prosperous India initiated under the visionary leadership of our Hon'ble Prime Minister Shri. Narendra Modi through collaborative efforts of the Ministry of Science and Technology, Ministry of Earth Sciences and Vijnana Bharati. Since 2015, the IISF has hosted eight editions in different geographical regions of India. In 2021, the Department of Space and the Department of Atomic Energy became an integral part of IISF.

Day 1 of CSIR-CECRI's Outreach Programme:

CSIR-CECRI organized an Outreach Programme in association with Alagappa Government Arts College, Karaikudi on December 21, 2023 under the guidance of Dr. K. Ramesha, Director, CSIR-CECRI and Dr. A. Pethalakshmi, Principal, Alagappa Government Arts College jointly coordinated by JIGYASA and AcSIR, CSIR-CECRI. The main objective of this event was to create awareness among the undergraduate and graduate science students on the importance of basic and applied science that could be converted into technologies.

Dr. S. Angappan, Sr. Principal Scientist & Nodal, JIGYASA, CSIR-CECRI welcomed the gathering. The event began with an introduction to IISF by Dr. N. Lakshminarasimhan, Sr. Principal Scientist, CSIR-CECRI. He highlighted the importance and components of IISF 2023 and about the basic scientific inventions that helped humankind with few examples. Dr. S. Murugesan, Principal i/c., Alagappa Govt. Arts College, shed light on the steps taken by CSIR-CECRI and IISF 2023 for the outreach programme at their college for the benefit of the student community. In his keynote lecture on *Decarbonising India: Charting & Pathway for sustainable future*, Dr. S. Vasudevan, Chief Scientist, CSIR-CECRI emphasized the causes of CO₂ emission especially emitted from the industry and transport sector and its impact on climate change. Further, he

explained the importance of green Hydrogen energy, its generation and application as fuel. The on-going R&D activities of CSIR-CECRI in this direction and in line with the National Hydrogen Mission as announced by Hon'ble Prime Minister of India during the 75th Independence Day celebrations were also explained. Dr. P. Murugan, Sr. Principal Scientist, Coordinator, AcSIR, CSIR-CECRI proposed the vote of thanks.

To kindle the scientific fervour among students, the following three Do It Yourself (DIY) kits developed by AcSIR research scholars of CSIR-CECRI - Light Emitting Diode (LED), Supercapacitor and Electronic Gadgets were demonstrated and distributed to the students of Alagappa Govt. Arts College. A quiz programme was also conducted for the students and the winners were awarded with books on emerging areas in science.

Day 2 of CSIR-CECRI's Outreach Programme:

Inauguration of AcSIR Science Club & Nobel Day Celebrations

As in previous years, the 2023 Nobel Day was celebrated at CSIR-CECRI, Karaikudi on December 22, 2023 as a part of IISF 2023 activity. The objective of Nobel Day is to popularize among school and college students, research scholars, scientific and non-scientific staff members the Nobel Prize winning works and about the Nobel Laureates of the year.

Dr. K. Ramesha, Director, CSIR-CECRI welcomed the gathering and highlighted the importance of the celebrations. Prof. Manoj Kumar Dhar, Director, AcSIR, Ghaziabad was the Chief Guest and in his address he emphasized that innovative approaches in S&T will pave the way to the development of country and society. He also inaugurated the Science Club of AcSIR at CSIR-CECRI for the benefit of AcSIR scholars of CSIR-CECRI and released Science Club Booklet that encompass the annual activities planned for the forthcoming year. Dr. P. Murugan, AcSIR Coordinator, CSIR-CECRI explained the reason for the Nobel Day celebrations every year at CSIR-CECRI. Dr. S. Angappan, Nodal, JIGYASA proposed the vote of thanks. The inauguration was followed by invited lectures on the six Nobel Prize award winning works and about the Nobel Laureates.





Prof. Manoj Kumar Dhar delivered the lecture on **2023 Nobel Prize in Physiology or Medicine**. In his lecture, he introduced what are mRNA and the research of the Nobel Laureates **Katalin Kariko and Drew Weissman** for their discoveries concerning nucleoside base modifications that enabled the development of effective mRNA vaccines against COVID-19 which helped the humankind during the recent pandemic.

Prof. K. Manimegalai, Director, Department of Women's Studies, Alagappa University, Karaikudi explained meticulously about 2023 Nobel Prize winning work in Peace. The **2023 Nobel Prize in Peace** was awarded to **Narges Mohammadi** for her outstanding contributions to fight against the oppression of women in Iran and promoting human rights and freedom to all, she said. **Prof. Vinod Balakrishnan**, Department of Humanities & Social Sciences, National Institute of Technology, Tiruchirappalli addressed the gathering with his inspirational lecture on **2023 Nobel Prize in Literature** and about the Nobel Laureate **Jon Fosse** and his work. Prof. Vinod explained the contribution of Jon Fosse through his innovative plays which gave voice to the unsayable.

Dr. N. Lakshminarasimhan, Senior Principal Scientist, CSIR-CECRI, Karaikudi in his lecture on **2023 Nobel Prize in Chemistry** explained to the audience the contributions of the Nobel Laureates **Moungi G Bawendi, Louis E Brus and Aleksey Yekimov** for their

discovery and synthesis of quantum dots. He explained in detail about how these tiny particles have unique optical properties that find applications in television screens, LED lamps, and in medical fields.

The lecture on **2023 Nobel Prize in Economics** was delivered by **Prof. Shalini Velappan**, Finance and Accounting, Indian Institute of Management, Tiruchirappalli. She explained in an easily understandable manner Nobel Prize winning work **Claudia Goldin** for having advanced our understanding of women's labour market outcomes. Prof. Shalini accentuated Claudia Goldin's research that has given us new and often surprising insight into women's historical and contemporary roles in the labour market.

Dr. V. Saranyan, Senior Scientist, CSIR-CECRI, Karaikudi explained the participants on the **2023 Nobel Prize in Physics** shared by **Pierre Agostini, Anne L Huillier and Ferenc Krausz** for their work on experimental methods that generate attosecond pulses of light for the study of electron dynamics in matter. He highlighted the work of Nobel prize winners that a way to create extremely short pulses of light that can be used to measure the rapid processes in which electrons move or change energy.

More than 100 school and college students from nearby areas of Karaikudi, 120 AcSIR scholars, 40 B.Tech. students, and Staff of CSIR-CECRI attended the event.

Business Development Leads

- ❖ Online Meeting with Vimano EWA Pvt. Ltd. Bangalore [Dec 6]
- ❖ Meeting with MNRE on Green Hydrogen [Dec 14]
- ❖ Project Discussion with V-Guard [Dec 18]
- ❖ Meeting with Eastern Electrolyser Ltd., Delhi [Dec 22]
- ❖ Meeting with BHEL [Dec 27]

Patent Granted

- ❖ Indian patent *A Process for the Preparation of Biodegradable Amorphous Alloy Thin Films for Biomineralization* with inventors Dr. B. Subramanian, B. Thankarajan, M. Karthika, CSIR-CECRI filed by CSIR on 30.06.2016 has been granted on 14.12.2023.

Non Disclosure Agreement Signed

- ❖ *Developments of Indigenous Sensors for Agro Market* with M/s. Zettaone Technologies India Pvt. Ltd. [Dec 12]

Official Events

- ❖ ATAL Faculty Development Programme [Dec 8]
- ❖ CSIR ISTAG Meeting with ISTAG of all Labs [Dec 12]
- ❖ Works Committee Meeting to review the on-going Civil & Electrical works [Dec 13, 19]
- ❖ NABL Annual Management Review Meeting [Dec 18]
- ❖ Official Language Implementation Committee Meeting [Dec 18]
- ❖ Lab Strategic Group Meeting [Dec 12, 21]
- ❖ 74th Meeting of the Management Council of CSIR-CECRI [Dec 27]

Skill Development Activities

Skill Development Training Programmes:

- ❖ Five days Tailor-made Special Industry Oriented Refresher Course was conducted by CSIR-CECRI on **Lithium-ion battery: Materials to Manufacturing** during December 11-15, 2023. 11 nos. of participants from Padmaja Greentech Pvt. Ltd., Hyderabad, one from Terracarp Pvt. Ltd., Coimbatore, one from Jayachandran Industries Pvt. Ltd., Coimbatore and one self-sponsored participant attended this Training Programme.

JIGYASA:

Lab@School programme:

- ❖ 30 Students and 10 Faculty Members from Alagappa Govt. Polytechnic College, Karaikudi and 50 students with 4 Faculty Members from Dept. of Chemistry, St. Mary's College, Thoothukudi visited CSIR-CECRI and

gained valuable insights on the ongoing R&D activities [Dec 1].

- ❖ Staff Members and AcSIR Scholars of CSIR-CECRI visited Kendriya Vidyalaya, Coimbatore and delivered awareness lectures [Dec 8] to the students and teachers. They also demonstrated and distributed the Do-It-Yourself Kit to the students. More than 100 students and 4 teachers attended this event enthusiastically.
- ❖ Staff Members and AcSIR Scholars of CSIR-CECRI visited the following schools and delivered awareness lectures [Dec 9]:
 - 1) Nirmala MHSS, Ooty
 - 2) N S Iyah Memorial Hr. Sec. School, Nilgiris
 - 3) St. Joseph's HSS, Ooty

More than 150 students and 8 teachers took active part in the programme.

CFE and AcSIR Highlights

- ❖ PhD Viva Voce Examination for Mr. R. Vinoth, AcSIR Scholar - Thesis Title: *Development of Wearable Microfluidic Sensors for Electrochemical Monitoring of Biomarkers in Body Fluids* (Guide: Dr. A.M. Vinu Mohan) [Dec 1]
- ❖ Synopsis Submission of Ms. N. Mohanapriya AcSIR Scholar - Thesis Title: *Imine as constructional units for organic-inorganic hybrid structures for energy applications* (Guide: Dr. C. Naveen Kumar) [Dec 4]
- ❖ Synopsis Submission of Ms. S. Jayachitra, AcSIR Scholar - Thesis Title: *Exploring Chalcogenides-based Nanomaterials*

as Co-catalyst for Enhanced Photocatalytic Hydrogen Production Over TiO₂ Photocatalyst (Guide: Dr. P. Murugan) [Dec 4]

- ❖ DAC-I Meeting of IDDP Scholar, Mr. Dasari Muthya Venu (Guide: Dr. G. Sreedhar) [Dec 19]
- ❖ PhD Comprehensive Examinations for AcSIR PhD Scholars [Dec 14, 15, 27 & 28]
- ❖ DAC-III Meeting of Ms. P. Viji (Guide: Dr. V. Ganesh) [Dec 29]
- ❖ B.Tech. Final Year Placement Interview [Dec 28]

Invited Lecture

Prof. D. Ragupathy, Pondicherry University delivered a lecture at CSIR-CECRI, Karaikudi on **Nanoscience and Nanotechnology: A Bird's Eye View** [Dec 1]. He detailed about materials of various types produced at nanoscale level. Depending on the overall shape, these could be classified into 0D, 1D, 2D or 3D and its properties could be altered dramatically. Properties such as solubility, reactivity, spectroscopy, electrical and magnetic, transport through membranes etc. are generally different from those of the same materials with large particle size. The applications of nanomaterials have escalated in the recent past and has broad applications in performance materials, consumer products, energy, health, water and information technology.



Awareness Workshop

On December 12, 2023, the Complaints Committee for Prevention of Sexual Harassment of Women at Work Places, CSIR-CECRI organised an **Awareness Workshop on Prevention of Sexual Harassment at Workplace**. Mrs. Ramaharan, a certified POSH trainer and external member for many Institutes including Anna University, CSIR-CLRI, Institute of Company Secretaries of India, Madras School of Economics was the external expert. Topics covered included what constitutes harassment, what are the ways to prevent it and what are some of the options available for the victims of harassment. The session was highly interactive and provided answers to all the practical questions that both Men & Women face in this regard. A large number of staff members, scholars, B.Tech. students and others (including Men

and Women) took part and got enlightened on the Topic.



Honours and Awards



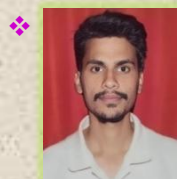
Dr. Subbiah Alwarappan, Principal Scientist, EEC Division has been conferred with the **2023 MRSI Medal** by Materials Research Society of India during its 34th MRSI Conclave held at IIT (BHU), Varanasi, UP during December 13-16, 2023.



Mr. S. Hari Prasad, AcSIR Scholar, EME Division (Guide: Dr. S.M. Senthil Kumar) has won the **Best Oral Presentation Award** in the **Indian Conference on Carbon Materials (ICCM-2023)** held during November 30 - December 2, 2023, at Mumbai for the work entitled *Development of Cobalt oxide decorated N, S-dual doped hollow carbon spheres as a bifunctional electrocatalyst for ORR and OER applications*.



Ms. V. Varshini, AcSIR Scholar, ECPS Division (Guide: Dr. P. Ragupathy) has won the **3rd Prize in Paper Presentation** in the **20th National Conference on Corrosion Control** held at Jenneys Residency, Coimbatore, during December 7-9, 2023 for the work entitled *Structural modification of membrane with high electrochemical corrosion resistance in Zinc- Bromine flow battery*.



Mr. Shubham Pant, IDDP Research Scholar, EPE Division working under the guidance of Dr. V. Ravi Babu has won the **Best Oral Presentation Award** in the **17th International Conference on Polymer Science and Technology (SPSI-MACRO-2023)** held at IIT Guwahati during December 10-13, 2023. Springer Nature also awarded him with a Gift Voucher of EUR 150.

Best Poster Presentation Awards in the National Conference on New and Renewable Energy Resources for Sustainable Future held at Yogi Vemana University, Vemanapuram during December 7-8, 2023



Ms. Anjali Sunny

DST-INSPIRE-JRF & AcSIR Scholar (Guide: Dr. A. Pandikumar)

Title: *MXene/Co₃O₄ nanocomposite materials as efficient electrocatalyst for alkaline water electrolysis for hydrogen and oxygen generation*



Mr. V. Bharathi Mohan

DST-INSPIRE-JRF & AcSIR Scholar (Guide: Dr. M. Sathish)

Title: *Utilizing metal telluride as an effective co-catalyst for P-doped g-C₃N₄ to boost the photocatalytic performance towards hydrogen generation*



Ms. S. Rajalekshmi

DST-INSPIRE-JRF & AcSIR Scholar (Guide: Dr. A. Pandikumar)

Title: *Tailoring electronic structure of NiFe LDH via Mn insertion for highly stable overall electrocatalytic water splitting*

20th National Conference on Corrosion Control

National Corrosion Council of India (NCCI), a forum for effective dissemination of knowledge on corrosion and its control is functioning at the premises of CSIR-Central Electrochemical Research Institute (CSIR-CECRI), Karaikudi since 1990. NCCI organised **20th National Conference on Corrosion Control (20th NCCC)** in collaboration with **CSIR-CECRI** and **GAIL (India) Ltd.**, Noida, New Delhi during December 7-9, 2023 at Hotel Jenneys Residency, Coimbatore. NCCC provides a rare opportunity for academia and industry to come together and deliberate on issues related to corrosion and its control. This conference included comprehensive technical sessions on various topics such as industrial corrosion, protective coatings, inhibitors, corrosion resistant materials, refinery corrosion and corrosion fundamentals etc.

Dr. K. Ramesha, Patron, NCCI & Director, CSIR-CECRI, Karaikudi welcomed the delegates and highlighted corrosion an omnipresent adversary in our industrial landscape and requires an effective management for the progress of the nation. **Dr. V. Saraswathy**, Chairman, NCCI & Head of Corrosion and Materials Protection Division, CSIR-CECRI, Karaikudi explained the genesis of NCCI and its role in stimulating the national level research in corrosion science & engineering.

Shri. A. K. Tripathi, Executive Director (Projects) GAIL (India) Ltd., Noida and Chairman, 20th NCCC presided over the function and in his address, he highlighted corrosion as a major threat to oil & gas industries and the gap in corrosion management can lead to catastrophic consequences to the structures, risking public properties and adverse economic loss. Thus, the need of the hour is to integrate the initiatives and innovation of new ways to find customised solutions.

Shri. N. Senthil Kumar, Director (Pipelines) Indian Oil Corporation Ltd., Noida, Chief Guest offered his inaugural address and highlighted the loss of Rs. 2 lakh crore in India due to corrosion. **Shri. Pankaj Kumar**, Director (Productions), ONGC Ltd., New Delhi released the 20th NCCC Souvenir and highlighted that corrosion not only affects our daily life but also industries. He informed that more than 30000 km of ONGC pipeline is

affected by well fluid and requires the development of sustainable materials to mitigate corrosion ensuring safety as well. **Prof. Sunil K Singh**, Director, CSIR-National Institute of Oceanography, Goa inaugurated the Exhibition and **Shri. G.C. Rout**, Vice President, Electrotherm (India) Ltd. Gujarat offered his felicitation during the function. **Dr. Rakesh Barik**, Secretary, NCCI expressed sincere gratitude to all the dignitaries and delegates. In his address, he conveyed a heartfelt appeal for collective efforts to ensure the conference's grand success through the exchange of knowledge and insights in the field of corrosion mitigation.

Two plenary and 13 keynote talks covering the sustainability of metals through corrosion research and control strategies, industrial corrosions (refineries, upstream and downstream oil and gas), cathodic protections, microbial induced corrosion, green corrosion inhibitors, coatings and linings, etc. were arranged. More than 115 technical papers were presented by various sectors such as Oil & Gas (GAIL, IOCL, HPCL, BPCL, OIL, CPCL), aerospace, chemicals, coating industry and students and faculties from academics (IIT, NIT, Universities, CSIR labs etc.) More than 300 participants from all over the country viz., Industrialists, MSME members, Researchers, Scientists, Engineers, Technocrat, Students and Academicians got immensely benefited and updated themselves.

Shri. S. Mowar, Executive Director, GAIL (India) Ltd., (O&M-SR/ZNL) offered his Valedictory Address as the Chief Guest on the third day of event and expressed his delight over the programme. **Dr. K.J. Sreeram**, Director, CSIR-Central Leather Research Institute, Chennai, graced the occasion as the esteemed Guest of Honour. In his address, he eloquently underscored the pivotal role played by CSIR-CECRI in demonstrating unwavering commitment to the crucial cause of corrosion mitigation. Dr. Sreeram's insights added a significant dimension to the conference, emphasizing the importance of collaborative efforts between CSIR labs and industries in advancing corrosion research and solutions. The mega event concluded with a Vote of Thanks by **Dr. S. Muralidharan**, Principal Technical Officer, CSIR-CECRI & Treasurer, NCCI.



Snapshots



74th Meeting of the Management Council of CSIR-CECRI



NABL Annual Management Review Meeting-2023



Participants of Refresher Course on Lithium-ion Battery



Farewell and Felicitation Function to Retiree



Group Photo of 20th NCCC Organizers and Delegates

- ❖ Indigenous Li-ion battery
- ❖ Indigenous Sodium Ion Battery
- ❖ Performance Improved Lead Acid Battery
- ❖ CO₂ capture under flue gas conditions
- ❖ Integrated Corrosion Monitoring Sensor Gadget accessible through a Mobile App
- ❖ Thermal Barrier Coatings for Strategic Applications
- ❖ Electrochemical Production of Sodium Hypochlorite as a Disinfectant (against COVID-19)
- ❖ Tri-layered reusable face mask with antibacterial coating
- ❖ Polymer Electrolyte Membrane (PEM) fuel cell
- ❖ Triboluminescent Coating and Smart Camera for Crack Detection in Structural Components
- ❖ Electrochemical Defluoridation of Drinking Water
- ❖ Solar Powered Proton Exchange Membrane (PEM) Based Water Electrolyser for Hydrogen Generation
- ❖ Cement-Polymer Composite Coating System for Corrosion Protection of Reinforcing and Prestressing Steels
- ❖ Solid Lubricant Coatings for Brahmos Missile Application
- ❖ Li Spheres for Torpedo Applications
- ❖ Electrowinning and Recovery of Tin from Primary Ore and Secondary Sources
- ❖ Electroplating of Gold, Copper and Nickel, Chromium, Zinc-Nickel Alloy; Anodizing of Aluminium; Electropolishing of Stainless Steel
- ❖ Electro-catalytic Conversion of CO₂ and butadiene to Adipic Acid; CO₂ to Formic Acid; CO₂ to Oxalic Acid.
- ❖ Farmer Friendly Soil Health (predictive) Analyzer
- ❖ Three Coat System for Steel Structures
- ❖ Inhibitor Cement Slurry Coating for Rebars
- ❖ Electrochemical Preparation of DL-Homocysteine Thiolactone Hydrochloride from DL-Homocystine
- ❖ Electrochemical Perfluorination of Sulfolane to Perfluoro Butane Sulfonyl Fluoride
- ❖ Electrochemical Preparation of Calcium Lactobionate and Calcium Gluconate
- ❖ Electrochemical Production of KIO₃
- ❖ Degradable Amorphous Alloy Coatings by Sputtering for Bioimplants
- ❖ Multicoat Protective Schemes for Concrete Structures and Bridges
- ❖ Moisture Compatible Coating for Cooling Towers
- ❖ Temporary Protective Coating for Maraging Steel & 15CDV6
- ❖ Corrosion Resistant Thermal Coating for Hydroclaves
- ❖ Al-Zn-In Galvanic Alloy Anode for Cathodic Protection
- ❖ Formulation of Neutral Paint Removing Jelly
- ❖ Corrosion Resistant Inhibitive Admixtures for Portland Pozzolana Cement
- ❖ Inhibitor Admixture for Concrete
- ❖ Cost Effective Metallic Coatings to Rebars Embedded in Concrete Structures
- ❖ Redox Active Polymer Encapsulated Lamellar (REL) Compound based Anticorrosive Coating for Reinforcement Bars
- ❖ Extraction of Calcium, Magnesium by Molten Salt Electrolysis
- ❖ Extraction of Zinc oxide and Metallic Zinc from Galvanizer Ash
- ❖ Extraction of Rare Earths and Alloys by Molten Salt Electrolysis

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