CECRI NEWS

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The Materials Research Society of India (MRSI) – 2024 Medal

Dr. M. Sathish, Principal Scientist, Electrochemical Power Sources (ECPS) Division has been awarded with the **MRSI-2024 Medal** by **The Materials Research Society of India** (MRSI). The Award was conferred during the **35th Annual General Meeting of MRSI** at the International Union of Materials Research Societies-International Conference in Asia (**IUMRS-ICA-2024**) held at Devi Ahilya Vishwavidyalaya, Indore during December 3-6, 2024. Dr. Sathish joined CSIR-CECRI, Karaikudi in April 2012 and his research is primarily focused on the development of advanced materials for energy conversion and storage. He has published more than 190 research articles in reputed international Journals, 7 book chapters, 160+ conference presentations and has two patents to his credit. He has a *h*-index of 55, i10-index of 152 and total citations of 11100+. He has so far guided 7 Ph.D. students (6 students in progress) and several M.Sc. and M.Tech. students for their dissertation project work.

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Workshop on "X-Ray Diffraction: Fundamentals to Applications"

CSIR-CECRI in association with In association with International Center for Diffraction data (**ICDD**), Philadelphia, USA & Vivertana Distributors Pvt. Ltd., Bengaluru, India and The Electrochemical Society-CECRI (**ECS-CECRI**) Student Chapter & Academy of Scientific and Innovative Research (**AcSIR**) Science Club, CECRI conducted a two day Workshop on ***X-Ray Diffraction: Fundamentals to Applications*** during December 10 &11, 2024 at CSIR-CECRI, Karaikudi.

The Workshop was aimed at: the techniques and applications of powder X-ray diffraction, which is widely used for the structural analysis and characterization of materials. The principles of PXRD, data collection, and interpretation, offering valuable insights for researchers working in material science and crystallography was the main agenda for the participants and comprised of highly interactive, combining lectures with hands-on sessions where participants could solve problems ranging from basic to advanced, reinforcing key concepts. The Workshop also covered both data mining using the ICDD PDF-5+ database and methods of analysis embodied in ICDD PDF-5+ Sieve+ and ICDD MDI JADEPro software. Hands-on access to PDF-5+ and JADEPro were also made available through a remote desktop server via web access.

The objective of the first day of the workshop was to present the PDF databases, database overview, features, datamining capabilities and Sieve+ for phase identification. The second day was reserved for qualitative and quantitative XRD analyses using MDI JADEPro software. In addition, a demonstration of materials characterization using the JADEPro Toolkit features was also arranged. The event emphasized the critical role of X-ray Diffraction (XRD) technique as a fundamental analytical characterization tool for understanding the structural phase formation and relate the structure and properties in solid state materials.

The resource persons of this workshop were **Dr. Sooriya N. Kabekkodu**, Editor-in-Chief of ICDD, USA, and **Prof. T. N. Guru Row**, Emeritus Professor, Solid State Structural Chemistry Unit, Indian Institute of Science, Bengaluru and Co-Founder of Vivertana Distributors Pvt. Ltd., Bengaluru and **Mr. Kishorkumar Sindogi**, Manager-Instrumentation Facility, Prayoga, Bengaluru. About 70 research scholars from CSIR-CECRI and Alagappa University, Karaikudi registered and received hands-on-training during the workshop which also included participants from **High Energy Batteries Ltd., Tiruchirappalli**.

Dr. K. Ramesha, Director, CSIR-CECRI in his inaugural address emphasized the importance of X-ray diffraction technique and its applications in energy storage and conversion materials. Hands-on-training session was conducted by Dr. Soorya N. Kabekkodu and it focused on advanced XRD techniques, including data mining, phase identification, and quantitative phase analysis using ICDD PDF-5+ Sieve+ and ICDD MDI JADEPro software with the Rietveld refinement method.

Participants also explored crystallinity measurement, crystallite size analysis, and micro-strain analysis, equipping them with essential skills to analyze experimental data and address material challenges in electrochemical systems. **Dr. N. Lakshminarasimhan** and **Dr. P. Murugan**, CSIR-CECRI were the Convener and Co-Convener, respectively, in conducting this workshop.

India International Science Festival (IISF) - 2024

India International Science Festival (IISF) is to celebrate the science with common public and popularize the importance of Science. IISF began its journey in the year 2015 and its 10th Edition was held between November 30 and December 3, 2024 at the **Indian Institute of Technology (IIT)** Guwahati, Assam. The Mission of IISF 2024 was ***A Prosperous Bharat in Harmony with Modern Infrastructure and Nature, Giving Opportunities for All Citizens of all Regions to Reach Their Potential through Science and Technology***. The Theme of IISF 2024 was ***Transforming India into a Science and Technology Driven Global Manufacturing Hub***.

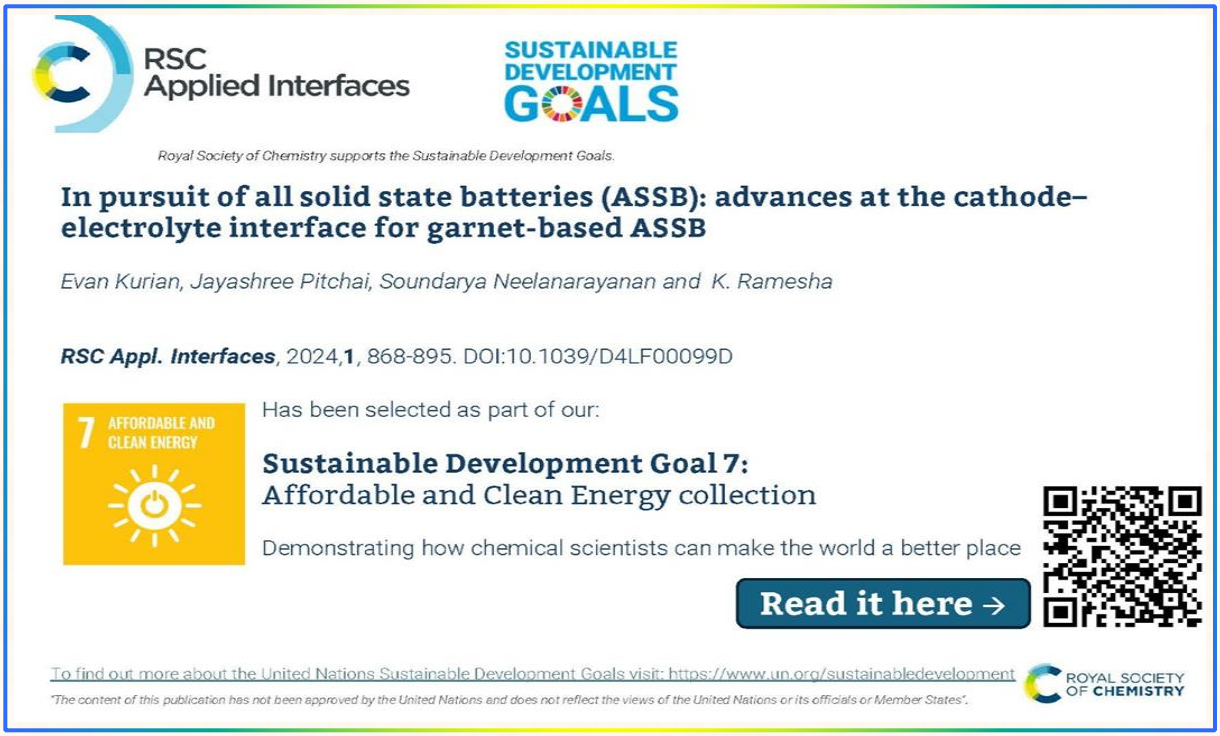
IISF-2024 included 25 different thematic events like Chandrayaan, Sci-Tech Expo, Science Odyssey, Make in India, Make for the World, The New Nalanda, Nari Shakti, Young Scientists Conclave, The Gurukula, Mission Start-up, Vigyanika, Media Conclave, North East Symphony, and so on. **CSIR-CECRI** represented IISF 2024 in its various events. The thematic event **Media Conclave: Science & Technology Media and Communicators Conclave** held during December 1 & 2, 2024 with panel discussions and workshop on science journalism was coordinated by CSIR-NIScPR, CSIR-CDRI, CSIR-CECRI, DBT, & VIBHA. **Dr. N. Lakshminarasimhan**, Sr. Principal Scientist, CSIR-CECRI was the Co-Convener. Panel discussions were on: (i) S&T Dissemination in North-East Media, (ii) Impact of Science Based Feature Films for Creating Awareness among Masses, (iii) S&T Coverage in Media: Interaction Amongst Scientist, Media Professional & Public, (iv) Science Journalism & Media Ethics in the Age of Artificial Intelligence (AI), (v) S&T Reporting: Synergy between Scientists & Journalists, and (vi) Disseminating S&T Content in Media through various formats.

Dr. K. Ramesha, Director, CSIR-CECRI, the Guest of Honour during inauguration of the Media Conclave and Students Science Village: The New Nalanda on December 1, 2024, stressed the importance of communication of science not only in peer reviewed journals but also in media which translates the scientific technical content into an easily understandable language by the common public. He also highlighted the role of science journalists and communicators for the same. During the inaugural session, an article by CSIR-NIScPR on IISF-2024 published in the Employment News was released.

Awareness Session

On December 6, 2024, the Complaints Committee for Prevention of Sexual Harassment of Women at Work Places, CSIR-CECRI organised an **Awareness Session** on Prevention of Sexual Harassment at Workplace. **Mrs. Ramaharan**, a certified POSH trainer conducted the Session spoke on what constitutes harassment, what are the ways to prevent it and what are some of the options available for the victims. The session was highly interactive providing answers to all practical questions that both Men & Women face in this regard. A large number of staff members, scholars, B.Tech. students and others (Men & Women) took part and gained awareness in this subject.

Featured Article



A publication of **Dr. K. Ramesha**, Director, CSIR-CECRI has been included in **Royal Society of Chemistry Applied Interfaces - *Sustainable Development Goal 7: Affordable and Clean Energy Collection*** dedicated to highlighting impactful work taking place across the world to meet the global SDGs.

In pursuit of all solid state batteries (ASSB): advances at the cathode–electrolyte interface for garnet-based ASSB - Evan Kurian, Jayashree Pitchai, Soundarya Neelanarayanan and K. Ramesha, RSC Applied Interfaces 1 (2024) 868, https://doi.org/10.1039/D4LF00099D

CFE and AcSIR Highlights

- Selection Committee Meeting for PhD under AcSIR - January 2025 Session [Dec 9]
- DAC-III Meeting for Ms. S. Narmatha, DST-INSPIRE SRF (Guide Dr. R. Thangamuthu) [Dec 4]
- DAC-II Meeting for Ms. K. Ramya, DST-INSPIRE SRF (Guide Dr. V. Murugan) [Dec 3]
- DAC-I Meeting for Mrs. P. Sangavi, AcSIR Scholar (Guide: Dr. V. Ganesh) [Dec 12]
- PhD Viva Voce Examination for Ms. P. Packiyalakshmi, AcSIR Scholar (Guide: Dr. N. Kalaiselvi) [Dec 13]
- Synopsis Submission of Ms. E. Harsha, AcSIR Scholar (Guide: Dr. Aiswarya Bhaskar) [Dec 13]
- SRF Upgradation Meeting for Ms. A. Tamil Elakkiya (Guide: Dr M. Pandiaraj) [Dec 16]
- Comprehensive Exam for PhD Scholars [Dec 18]
- DAC-III Meeting for S. Narmatha, AcSIR Scholar (Guide: Dr. R. Thangamuthu) [Dec 18]
- Invited Lecture by Prof. Annamalai Senthilkumar, VIT Vellore [Dec 18]
- DAC-II Meeting for Mr. M. Siva Ananth (Guide: Dr M. Pandiaraj) [Dec 19]
- DAC-III Meeting for Ms. K. Nivedha, DST-Inspire SRF (Guide: Dr. B. Subramanian) [Dec 23]
- DAC-II Meeting for Ms. D. Manjubashini (Guide: Dr. B. Subramanian) [Dec 26]
- DAC-I Meeting for Mr. E. Praveenraj (Guide: Dr. R. Malini [Dec 30]
- Synopsis Submission of Mr. K. Balamurugan, AcSIR Scholar (Guide: Dr. B. Subramanian) [Dec 30]
- DAC-II Meeting for Mr. S. Hari Prasaad, AcSIR Scholar (Guide: Dr. S. M. Senthil Kumar) [Dec 31]

New Members in CSIR-CECRI Family

Dr. Ramulu Dhanavath
Scientist
Electro-Organic and Materials Electrochemistry Division
Date of Joining: 13/11/2024

Mr. A.S. Mohan Kumar
Technical Assistant
(on Transfer from CSIR-CDRI)
Central Instrumentation Facility
Date of Joining: 28/10/2024

Business Development Leads

- Internal Review Meeting on H2T Project [Dec 3, 18]
- Meeting with EEL on MNRE-CoE [Dec 4]
- Meeting with Reliance Industries [Dec 9]
- MOU Discussion with Matter Motors [Dec 9]
- Project Review Meeting with DRDO [Dec 10]
- Progress Review Meeting with LPG Equipment Research Centre (LERC) [Dec 11]
- Online project discussion with CSIR-NAL [Dec 11]
- Meeting with M/s. IOCL [Dec 12]
- Discussion with Ganganu technology Pvt. Ltd., Bangalore [Dec 13]
- Meeting on Batteries to Batteries Project [Dec 13]
- Meeting with Naveen Engineering and Speciality Coating Pvt. Ltd. [Dec 16]

Recent Research Projects Sanctioned

Industry Funded:

- Performance Evaluation and Optimization of Reliance Graphene for Li-ion capacitor and Al-ion battery Application, Reliance Industries Ltd., Mumbai, Rs. 40.33 Lakh, 12 Months w.e.f. 09-12-2024 [SSP 17/24]

Govt Funded:

- Functional Textiles for Flame Retardant Application: Use of non-halogenated Organophosphorus and Nitrogen Composite, Ministry of Textiles, New Delhi under National Technical Textiles Mission (NTTM), Rs. 49.99 Lakh, 15 Months w.e.f. 26-11-2024 [GAP 18/2024]
- Soft-Organic Thermoelectrics: Emerging Green Energy Materials for Body Heat Harvesting and Temperature Control, Department of Science and Technology, New Delhi, Rs. 112.40 Lakh, 60 Months w.e.f. 10-06-2024 [GAP 19/2024]

Agreement Signed

- Heat and Energy Balance Study for 2.4 kW Air Cooled Stack *via* Modelling with High Energy Batteries (India) Ltd., Chennai

Honours and Awards

Dr. G.C. Shivaraju, former AcSIR Research Scholar (Guide: Dr. A.S. Prakash, CSIR-CECRI Chennai Unit) has been awarded the prestigious ***Prof. Baldev Raj Memorial Award – 2023 for Best Performance in PhD*** under **Academy of Scientific and Innovative Research (AcSIR), India – The Royal Melbourne Institute of Technology (RMIT) University, Australia Joint PhD Programme**.

The Ph.D. Thesis titled ***Rational design and fabrication of bismuth based photoanodes for photoelectrocatalytic water splitting*** submitted by **Dr. C. Murugan**, Former AcSIR Research Scholar under the supervision of **Dr. A. Pandikumar**, Electro Organic and Materials Electrochemistry Division, CSIR-CECRI, Karaikudi has been selected for the **AcSIR Best Thesis Award-2023** under ***Chemical Sciences*** Category

Mr. E. Praveenraj, CSIR JRF & AcSIR Scholar (Guide: Dr. R. Malini, Electrochemical Process Engineering Division, CSIR-CECRI) has won a Poster Prize for ***Impact of Cell Architecture on the Performance of Membrane-stacked Flow Electrode based Capacitive Deionization Cell for Continuous Desalination***, in the **International Conference on Water for Life - 2024** organized by **IIT-Madras** during December 12-14, 2024.

Ms. Athira Prakash, AcSIR Scholar (Guide: Dr. R. Malini, Electrochemical Process Engineering Division, CSIR-CECRI) has won the First Prize in Poster Presentation on ***Enhanced Electrochemical Desalination by Activated Carbon Derived from Sprouted Palm Shell - Waste to Wealth*** in **International Conference on Water (ICW 2024)** organized by Mahatma Gandhi University, Kottayam during December 13-15, 2024.

Skill Development Activities

Skill Development Training Programmes:

- A Skill Development Training Programme on ***Solar Energy Materials: Fundamentals to Device Fabrication*** was organized by CSIR-CECRI during December 16-20, 2024. 36 participants (belonging to Tamil Nadu, Kerala and Uttarakhand) got trained in this programme.
- A two-days DST-SERB Sponsored Research Facility Training for Graduates on ***Solar Energy Materials: Fundamentals to Device Fabrication*** was organized by CSIR-CECRI during December 16-20, 2024. 7 participants from all over Tamil Nadu took part in this programme.
- A two-days DST-SERB Sponsored Upskilling Faculty Development Programme on ***Solar Energy Materials: Fundamentals to Device Fabrication*** was organized by CSIR-CECRI during December 16-17, 2024. 28 participants from all over Tamil Nadu took part in this programme.
- A two-days DST-SERB Sponsored Research Facility Training for Graduates on ***Designing Electrocatalyst Materials: Theory and Methods Training*** was organized by CSIR-CECRI during December 18-19, 2024. 7 participants from all over Tamil Nadu took part in this programme.
- A two-days DST-SERB Sponsored Upskilling Faculty Development Programme on ***Designing Electrocatalyst Materials: Theory and Methods Training*** was organized by CSIR-CECRI during December 18-19, 2024. 20 participants from all over Tamil Nadu took part in this programme.

Under the **CSIR-JIGYASA** Banner, the following events were organized:

- **Lab at School Programme:** Our Scientists, Staff Members and AcSIR Scholars visited the following schools and delivered awareness talks on science and the various activities being carried out by CSIR-CECRI under the banner of CSIR Jigyasa – the Student-Scientist connect initiative of CSIR. The Lab at School programme also included practical demonstrations, DIY Kits demonstration & distribution, career guidance and quiz competition: i) Green Valleys Mat. Hr. Sec. School, Hosur, Krishnagiri Dt., ii) Govt. Girls Hr. Sec. School, Polur, Tiruvannamalai Dt. and iii) Govt. High School, Meppathurai, Tiruvannamalai Dt. [Dec 2] and i) Avvaiyar Govt. Girls Hr. Sec. School, Dharmapuri, ii) Govt. Girls Hr. Sec. School, Pappireddipatti, Dharmapuri Dt. and iii) Govt. Hr. Sec. School, Theerthamalai, Dharmapuri Dt. [Dec 9]. More than 250 students and 50 teachers took part.

- 55 Chemistry teachers from various government schools in Tamil Nadu visited our Institute as a part of **Teacher Professional Development Programme** by State Council of Educational Research and Training, Chennai and gained valuable insights on the ongoing R&D activities and recent technological achievements [Dec 4].
- A Felicitation Event was organized for the participants of **EPIC Hackathon and Scientific Aptitude Assessment** conducted by CSIR HQ for IX Std students. Participants: 27 students and 2 teachers [Dec 20].

Official Events

- Laboratory Strategic Group Meeting [Dec 4]
- Sensitization Workshop on Prevention of Sexual Harassment at Workplace; and Quarterly Meeting of SHW Committee [Dec 6]
- Meeting with TATA Chemicals [Dec 6]
- Fifth Monthly Utilization Monitoring Meeting (MUMM) [Dec 13]
- iSAEST-13: Souvenir Committee Meeting [Dec 22]; Technical Committee Meeting [Dec 3, 17]; Organizing Committee Meeting [Dec 10, 23]
- Patent Committee Meeting [Dec 23]
- Technical Assistant Probation Confirmation Meeting [Dec 26]
- Training for Apprentice Trainees [Dec 20, 26, 27]
- Selection Committee Meeting for the Engagement of Project Personnel [Dec 27, 30]

Snapshots

Exchange of Agreements on Know-How Transfer

Workshop on *X-Ray Diffraction: Fundamentals to Applications*"

Inauguration of Skill Development Training Progamme

Invited Lecture by Prof. Annamalai Senthilkumar, VIT Vellore

Lab Visit by Chemistry Teachers of TN Govt. Schools

Jigyasa: EPIC Hackathon & Scientific Aptitude Assessment

TECHNOLOGY COMPENDIUM OF CSIR-CECRI

- Indigenous Li-ion battery
- Indigenous Sodium Ion Battery
- Performance Improved Lead Acid Battery
- CO_2 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 CO_2 and butadiene to Adipic Acid; CO_2 to Formic Acid; CO_2 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 Perfluro Butane Sulfonyl Fluoride
- Electrochemical Preparation of Calcium Lactobionate and Calcium Gluconate
- Electrochemical Production of KIO_3
- 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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