CECRI NEWS

(A monthly newsletter of CSIR-CECRI)

July 2024 Vol. 5 Iss. 7

77th Foundation Day of CSIR-CECRI

The **77th Foundation Day of CSIR-Central Electrochemical Research Institute (CSIR-CECRI)** was celebrated on 25th July, 2024 with a great enthusiasm and fervour. ***Padma Bhushan* Dr. V.K. Saraswat**, Hon'ble Member, NITI Aayog, New Delhi graced the occasion as Chief Guest and delivered the Foundation Day Lecture at CSIR-CECRI, Karaikudi. Earlier, **Dr. K. Ramesha**, Director, CSIR-CECRI welcomed the august gathering. In his welcome address, he gave a brief overview of the historical development of CSIR-CECRI since its inception in 1948 and recalled the efforts of the great visionary **Dr. RM. Alagappa Chettiar** who was responsible for establishing this premier research laboratory at Karaikudi. He also highlighted the significant ongoing research activities in CSIR-CECRI on various research areas *viz.* corrosion mitigation, CO_2 capture, biosensors, green hydrogen generation, recycling of batteries, molten salt technologies for rare earths, etc., towards **Viksit Bharat** – the visionary dream of our Hon'ble Prime Minister and President of CSIR, Shri. Narendra Modi.

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CSIR-CENTRAL ELECTROCHEMICAL RESEARCH INSTITUTE
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He proudly stated that in addition to its R&D efforts, CSIR-CECRI supports human development and nurturing young researchers through its academic activities such as B.Tech. & Ph.D. programmes and providing skill development training for youth and JIGYASA programmes for school children.

In his informative lecture on ***Science and Technology for Sustainable Development***, Dr. Saraswat covered widely on various areas of science towards sustainable development. He recalled his earlier association with CSIR-CECRI in the 1980s when he approached for Mg alloys and multiplier aluminium research. He highlighted various developments that took place in India since 1960s in the fields of agriculture (green revolution & white revolution), space, atomic energy, defence, computer technology, molecular simulation, modelling, digital technology, machine learning, big data & accelerated discoveries (AI generated hypothesis, autonomous testing and scientific knowledge at scale).

Dr. Saraswat stated that *Science is the only force that can transform society and is a tool for solving problems in society*. Combining fundamental and applied science can help tackle a number of issues, he added. Economic, societal and environmental are the three pillars of sustainability. Energy security, energy equity and environmental sustainability are the balancing energy trilemma, he said.

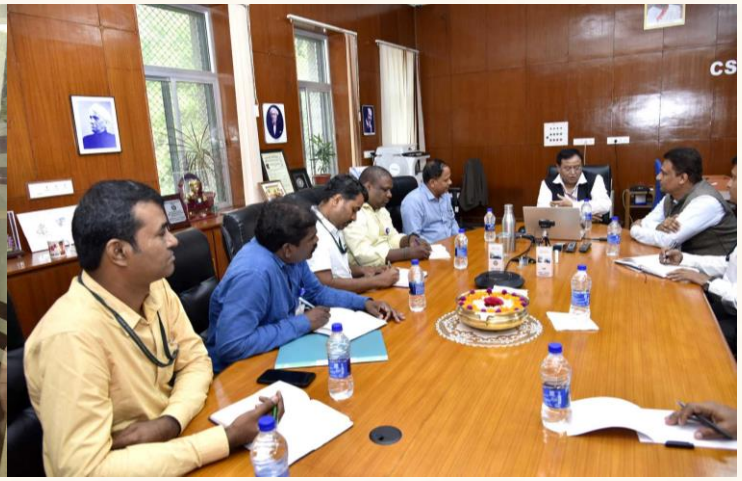
Digital revolution, smart cities, food, biosphere & water, human capacity & demography, consumption & production, decarbonization & energy are the transformation for achieving sustainable development goals, he added. He also mentioned that circular economy is the way for sustainability as it requires faster, more efficient processes with less resources.

He further remarked that the future of electrochemical technologies is a canvas splashed with vibrant possibilities and scientists are relentlessly pursuing the development of next generation batteries with even higher densities allowing to store more power in smaller packages and enabling faster charging times. Electrochemical research is making exciting strides in energy conversion technologies and suggested the future direction on various areas of electrochemistry. *Electrosensing is one of the rapidly developing areas with exciting potential for the future*, he said.

Applications in corrosion studies is likely to see further miniaturization of probes and sensors, enabling real time monitoring of corrosion in hard-to-reach areas. Beyond lithium batteries, scientists should explore alternative battery using sodium, magnesium or potassium ions, as these materials offer potential advantages like lower cost and abundance, he further added.

He appreciated the R&D efforts of CSIR-CECRI especially on lithium batteries, fuel cells, hydrogen generation, corrosion, sensors, recycling of batteries and CO_2 capturing. On this occasion Dr. V.K. Saraswat inaugurated the Molten Salt Electrometallurgy Laboratory at CSIR-CECRI premises and visited other research divisions.

The event concluded with vote of thanks by Dr. J. Mathiyarasu, Chief Scientist, Electrodics and Electrocatalysis Division, CSIR-CECRI, Karaikudi.



Business Development and CSIR Theme Leads

- Discussion on research collaboration with M/s. BOSCH, Bengaluru [July 2]
- Meeting with M/s. Mothers Dental Officials [July 2]
- Lab Strategic Group Meeting [July 3]
- Internal Review Meeting on Redox Flow Battery [July 3, 4]
- Project Meeting with M/s. Bharat Heavy Electricals Ltd., Trichy [July 4]
- Meeting with M/s. Reliance Industries Ltd. [July 12]
- Monthly Review Meeting-NTTM Project & CSIR-4M-FBR-Project [July 15]
- Meeting with CSIR Project Investigators [July 16]
- Internal Meeting on Redox Flow Battery [July 18]
- Meeting with DST Tech. Pvt. Ltd. [July 18]
- Review of Ongoing Rare Earth Projects [July 19]
- Meeting with M/s. Lucas TVS [July 19]
- Project Discussion Meeting with ICAR-Central Institute of Brackish Aquaculture (CIBA) and M/s. Vel Tech [July 26]
- Internal Review Meeting of Green Hydrogen Mission Project [July 31]

Honours and Awards

Dr. S. Vasudevan, Chief Scientist, Electrochemical Process Engineering Division, CSIR-CECRI has been appointed as one of the Academic Editors of the Journal - ***International Journal of Electrochemistry*** published by Wiley.

https://onlinelibrary.wiley.com/page/journal/2607/homepage/editorial-board

Dr. Subrata Kundu, Principal Scientist, EPE Division served as a Guest Editor for the Themed Collection on ***1D Fibrous Materials for Advanced Energy Storage and Conversion*** of the RSC Journal-**Materials Advances** (*Call for papers open till December 11, 2024*):

https://blogs.rsc.org/jm/2024/07/04/open-call-for-papers-1d-fibrous-materials/?doing_wp_cron=1720090456.3010540008544921875000

Recent Research Projects Sanctioned

Industry Funded:

- Development of an Electrocatalyst for Anion Exchange Membrane Water Electrolyzers for Large-Scale Hydrogen Production, M/s. Ganganu Technologies Pvt. Ltd., Bengaluru, Rs. 14.80 Lakhs, 12 Months wef 12-07-2024 [SSP 11/2024]
- Testing of PEM (membrane) supplied by M/s. GFCL Solar and Green Hydrogen Products Ltd. for Water Electrolyzer for M/s. GFCL Solar and Green Hydrogen Products Ltd., Gujarat, Rs. 47.92 Lakhs, 5 Months wef 18-07-2024 [SSP 12/2024]
- Tailor made Physical Training Course on *Cross Country Pipelines Cathodic Protection and Survey Methods* for M/s. Bharat Petroleum Corporation Ltd., Cochin, Rs. 7.08 Lakhs, 2 Months wef 26-06-2024 [TSP 04/24]
- Evaluation of Si nanocomposite as an anode material and fabrication of 150 nos. of prototype 18650 NMC/Si-Graphite cells, M/s. Cellark Powertech Pvt. Ltd., Odisha, Rs. 15.85 Lakhs, 6 Months wef 11-07-2024 [TSP 05/24]

CSIR Funded:

- Battery to Battery: Recovery of Metal value from Spent Lithium-Ion Batteries and Fabrication of New Lithium Ion Batteries, Rs. 763.5 Lakhs, 3 years wef 05-07-2024 [MMP 085201]
- Development of highly efficient visible light driven photo catalyst: A thin film approach for solar hydrogen production, Rs. 30.11 Lakhs, 2 years wef 01-07-2024 [FBR 060301]
- Ultra-Low Platinum Alloy Catalyst for Polymer Electrolyte Membrane Fuel Cells, Rs. 77 Lakhs, 2 years wef 01-07-2024 [NCP060302]
- State of Health Forecasting of Battery using AI methods, Rs. 54 Lakhs, 2 years wef 01-07-2024 [FBR060303]
- Mapping and Tapping of Critical Metals & Minerals (MapTapCrM), Rs. 200 Lakhs, 3 years wef 25-07-2024 [MMP085202]
- Decoupled Water Electrolyzer for Independent Hydrogen and Oxygen Production, Rs. 85.58 Lakhs, 2 years wef 25-07-2024 [FIR060304]
- Understanding the Site-specific Activity and Rational Designing of Non-noble Metal Oxide-supported Single Atom Catalysts: A Time-resolved Electrochemical Tip-enhanced Raman Spectroscopy Study, Rs. 84 Lakhs, 2 years wef 25-07-2024 [FIR060305]
- Exploring the Lead free and Highly stable Halide Perovskites for Ultra-sensitive UV Photodetector Applications, Rs. 46.08 Lakhs, 2 years wef 25-07-2024 [FIR080304]

Skill Development Activities

Skill Development Training Programmes:

- A Skill Development Training Programme on ***Chromatography and Spectroscopy*** was organized by CSIR-CECRI during July 1-5, 2024. A total of 51 participants took part in this training programme.
- A Skill Development Training Programme on ***Cathodic Protection and Pipeline Corrosion*** was organized by CSIR-CECRI during July 8-12, 2024. 47 participants took part in this training.
- A Skill Development Training Programme on ***Electrochemical Power Sources: Lithium ion battery - Science and Technology*** was organized by CSIR-CECRI during July 29 - August 2, 2024. 33 participants got trained under this training programme.

JIGYASA:

- **Summer Internship Programme for School Students** [July 8-12, 2024]: 69 School Students (IX to XII Std. - 50 boys and 19 girls, 13 teachers) attended this programme and got benefitted.
- **Lab Visit** [July 18, 2024]: 109 Students (59 boys, 50 girls and 8 teachers) from Sethu Matriculation Higher Secondary School, Thuvarankurichy visited the following Labs in CSIR-CECRI and had a glimpse of ongoing R&D activities:
  - Electrochemical power storage
  - Hydrogen
  - Electroplating
  - Electroorganic and Materials Chemistry
  - Central Instrumentation Facility.

MoU Inked

Karpagam Academy of Higher Education (KAHE), Coimbatore and **CSIR-Central Electrochemical Research Institute (CSIR-CECRI)**, Karaikudi entered into a **Memorandum of Understanding (MoU)** to foster collaborative research, skill development, and knowledge sharing in advanced areas of science and technology.

The ceremony was held at CSIR-CECRI, Karaikudi on July 1, 2024 and the MoU was signed by Prof. Dr. B. Venkatachalapathy, Vice-Chancellor of KAHE, and Dr. K. Ramesha, Director of CSIR-CECRI, in the presence of esteemed dignitaries from both the institutions.

Prof. Venkatachalapathy remarked - *We are excited for this collaboration which will provide our students with unique opportunities to engage in groundbreaking research projects and enhance their academic journey. The partnership will leverage the strengths of both institutions, combining their facilities, expertise, and experience to achieve mutually beneficial goals* – said Dr. Ramesha.

The MoU aims to establish a framework for joint research projects, skill development programs, and research training, with a focus on practical skill development in battery technology, corrosion, and corrosion protection. Students and faculty from KAHE will have the opportunity to visit CSIR-CECRI's state-of-the-art R&D laboratories, enhancing their hands-on experience and expertise.

This collaboration is poised to drive innovation, skill development, and research excellence in the region, paving the way for a brighter future in science and technology.

CFE and AcSIR Highlights

- Management Affairs Committee Meeting of CFE [July 16]
- PTOC/Synopsis Submission (DAC-IV) of Mr. R. Naresh, AcSIR Scholar – *Title: Investigation on the Performance Characteristics of Zinc-Bromine Redox Flow Battery* (Guide: Dr. P. Ragupathy) [July 5]
- SAC Meeting [July 5]
- Meeting on AcSIR Science Club activities [July 10]
- DAC-III meeting of Mr. Anadebe Valentine Chikaodili (Guide: Dr. Rakesh Barik) [July 10]
- PTOC/Synopsis Submission (DAC IV) of Ms. T. Aswathi, AcSIR Scholar (Guide: Dr. Aiswarya Bhaskar) [July 11]
- DAC-I meeting for Ms. Urvashi Saini (Guide: Dr. R.Sindhuja) [July 11]
- DAC-III Meeting for Ms. Ann Mary Mathew [July 15]
- PhD Comprehensive Examinations [July 18]
- PTOC/Synopsis Submission (DAC IV) of Mr. K. Mariyappan, AcSIR Scholar (Guide: Dr. P. Ragupathy) [July 19]
- PhD Comprehensive Examinations [July 22, 23]
- DAC-III meeting [July 23]
- PhD & IDDP Comprehensive Examinations [July 26]
- DAC-I Meeting for Mr. S. Hariramakrishnan, AcSIR Scholar (Guide: Dr. P. Tamilarasan) [July 29]

76th Meeting of the Management Council

The 76th Meeting of the Management Council of CSIR-CECRI was convened at CSIR-CECRI, Karaikudi on July 29, 2024. Dr. K. Ramesha, Director, CSIR-CECRI & Chairman, Management Council presided over the Meeting. Members of the Management Council, CSIR-CECRI including Dr. K.J. Sreeram, Director, CSIR-CLRI, Chennai discussed the Agenda Item in detail on the progress of the Institute.

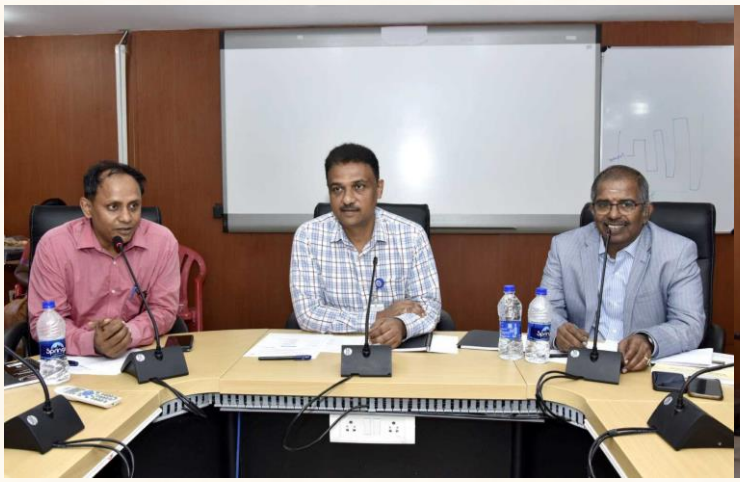
Special Training Course for BPCL

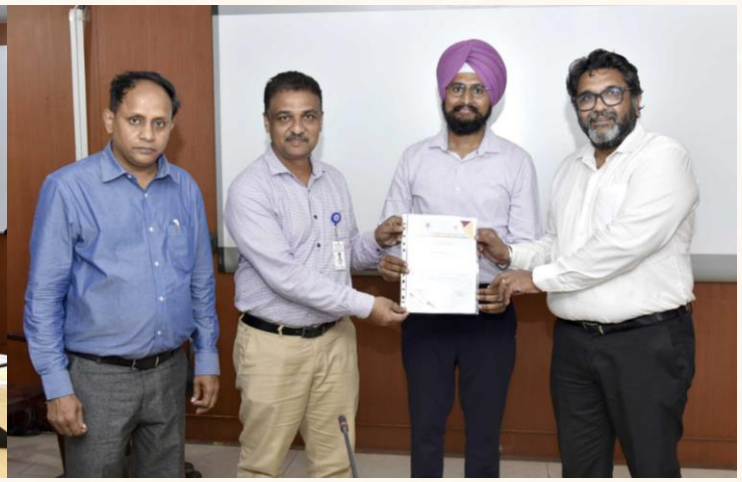
CSIR-CECRI, Karaikudi conducted an Exclusive Training Programme on ***Cross Country Pipelines-Cathodic Protection and Survey Methods*** for **BPCL** Engineers and Senior Officials from all over India during July 1-5, 2024 at Karaikudi. **CSIR-CECRI** is the **Knowledge Sharing Partner** on Corrosion and Materials Protection for BPCL Pipelines which is looking for capability enhancement in pipeline corrosion and mitigation measures.

The Training Programme included 15 theory and 13 practical classes covering basic aspects of corrosion, testing & monitoring, pipeline metallurgy & failure analysis, coatings, biological corrosion, cathodic protection (CP), design of CP, stray current, instrument & maintenance of CP systems, CP case studies, and trouble shootings in CP systems.

Dr. Rakesh Chandra Barik, Head, Corrosion and Materials Protection Division, CSIR-CECRI & Course Coordinator welcomed the gathering and explained about the course contents. **Dr. K. Ramesha**, Director, CSIR-CECRI inaugurated the Course and highlighted the long-standing loyal relationship between CSIR-CECRI and BPCL. **Shri. S. Krishnakumar**, Head, Southern Region Pipelines, BPCL, Cochin graced the occasion as the Chief Guest and expressed BPCL's gratitude to CSIR-CECRI for the continued support and guidance through R&D collaboration.

All the participants attend the course with lot of interest and gained valuable insights in this critical area. During the Valedictory Event, **Dr. Rakesh Chandra Barik**, Head, Corrosion and Materials Protection Division, CSIR-CECRI presented a summary of the Course. **Shri. Biju Gopinath**, Executive Director (Pipelines) BPCL, Mumbai delivered the Valedictory Address and distributed the certificates to the course participants, **Dr. K. Ramesha**, Director, CSIR-CECRI presided over. The event ended with a Vote of Thanks by **Dr. S. Muralidharan**, Principal Technical Officer and Course Co-coordinator.





Official Events

- Meeting with CSIR HQ [July 9]
- Manpower Planning Committee meeting [July 10]
- OLIC Meeting [July 10]
- Organizing Committee Meeting for CSIR-CECRI's 77th Foundation Day [July 15]
- TOLIC Meeting [July 16]
- CSIR JRF Examination Meeting [July 22]
- Walk-in-Interview for Apprenticeship [July 30, 31]

Superannuation

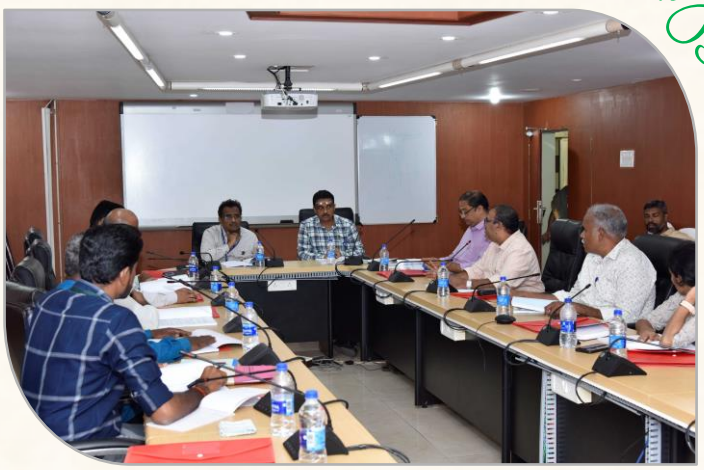
The following staff members of CSIR-CECRI superannuated after a long illustrious service:

Dr. R. Vedalakshmi
Sr. Principal Scientist
Civil Engineering Section
[Date of Retirement: 30/06/2024]

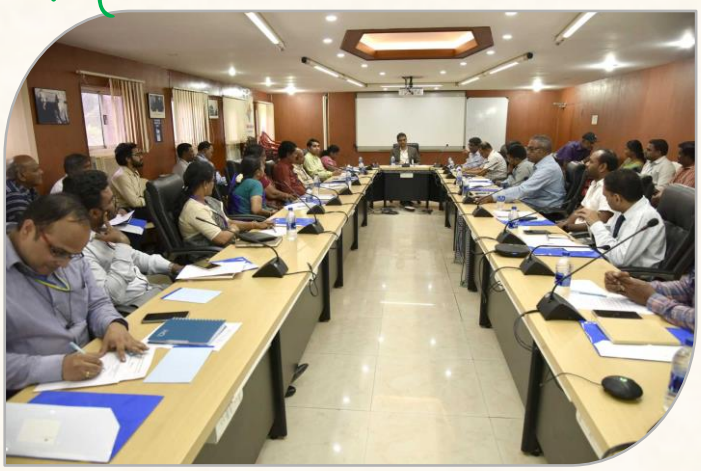
Mr. G. Chandrasekaran
Sr. Technician (2)
ETS Division
[Date of Retirement: 30/06/2024]

Mr. V. Venkatesan
Principal Technical Officer
CSIR-CECRI Chennai Unit
[Date of Retirement: 31/07/2024]

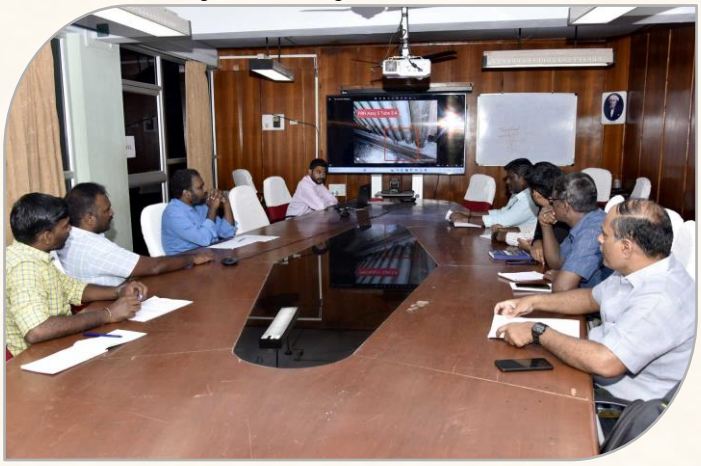
Snapshots



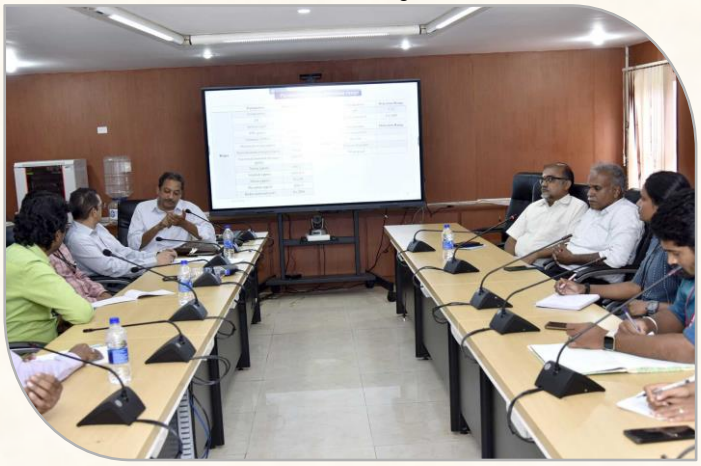
76th Meeting of the Management Council of CSIR-CECRI



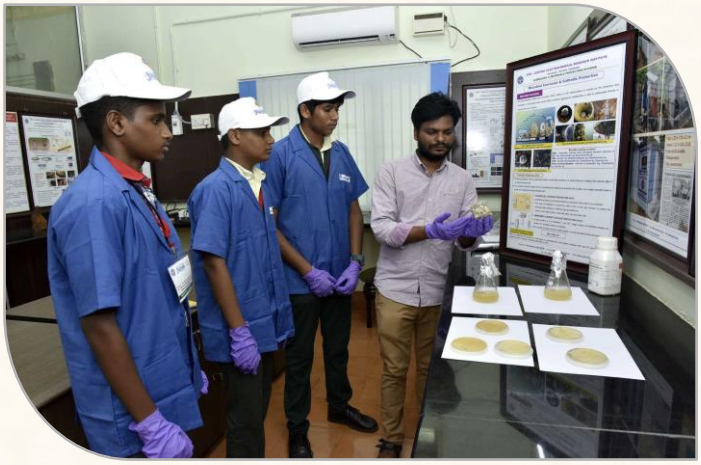
TOLIC Meeting



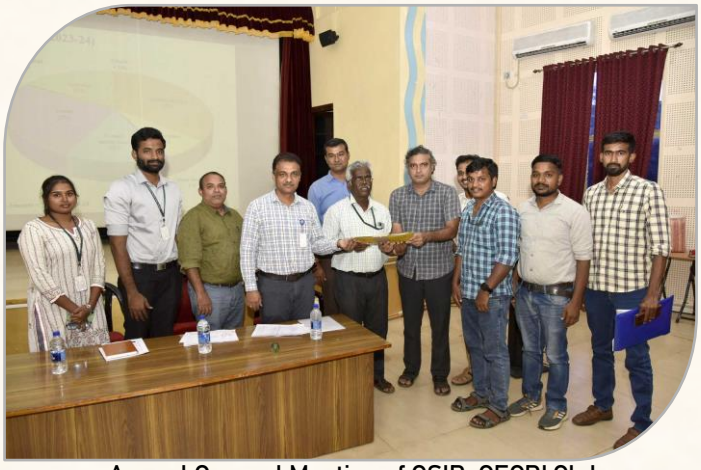
Discussion with BHEL, Trichy on R&D collaboration



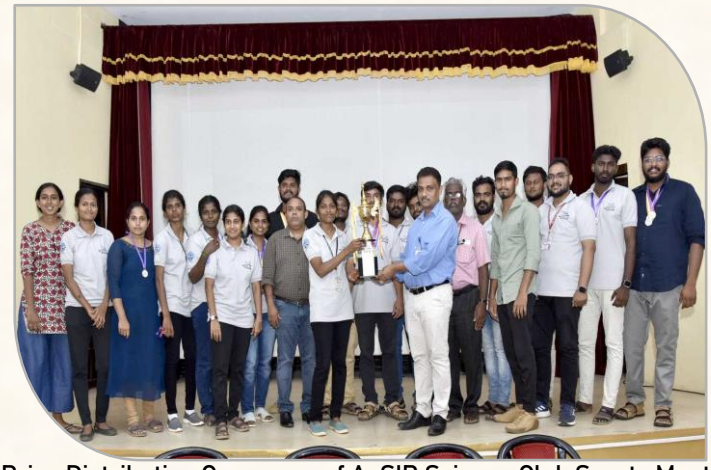
Discussion on R&D collaboration with ICAR and Vel Tech



Summer Internship Programme for School Students



Annual General Meeting of CSIR-CECRI Club



Prize Distribution Ceremony of AcSIR Science Club Sports Meet

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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Published by: PPMG Section, CSIR-CECRI, Karaikudi – 630003 (Tel: 04565-241204; Email: medianodal@cecri.res.in)