CECRI NEWS

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National Technology Day

The **National Technology Day** was celebrated in **CSIR-Central Electrochemical Research Institute (CSIR-CECRI), Karaikudi** on May 27, 2024 with a great zeal. Since 1998, National Technology Day is being celebrated every year on May 11 to commemorate India's technological prowess as demonstrated by the **i)** Pokhran Nuclear Test (*Operation Shakti*), **ii)** successful test firing of the *Trishul* short range surface-to-air Missile and **iii)** Test Flight of First Indigenous Composite Aircraft *Hansa-3*, of CSIR on May 11, 1998. Operation Shakti in 1998 marked a significant milestone in India's technological and scientific capabilities and established the country as a nuclear power. Trishul reassured our prowess in military systems. Hansa-3 proved CSIR's scientific and technological strengths and the confidence reposed on us by our stakeholders. These landmarks prompted our former Hon'ble Prime Minister **Shri. Atal Bihari Vajpayee** to add ***Jai Vigyan*** to the existing slogan of ***Jai Jawan, Jai Kisan*** by our former Hon'ble Prime Minister **Shri. Lal Bahadur Shastri**.

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CSIR-CECRI
CSIR-CENTRAL ELECTROCHEMICAL RESEARCH INSTITUTE
Your Destination for Innovative Research

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Shri. Narendra Modi, Hon'ble Prime Minister and President, CSIR further enriched it with ***Jai Anusandhan*** during his inaugural address in the Indian Science Congress-2019. *Our Scientists must commit themselves to addressing problems of affordable healthcare, housing, clean air, water and energy, agricultural productivity and food processing*, he said. He further added - *While Science is universal, technology must be local for providing solutions relevant to local needs and conditions*.

CSIR has a long legacy of strong portfolio of technologies – to name a few – starting from the development of infant milk food, popularly known as the Amulspray, to the indelible ink used in the elections worldwide, to the more recent ones - Hydrogen Fuel Cell Technology, Indigenous Lithium-ion Battery production, Vegetable waste to biogas, Bio-jet fuel, transforming biomedical waste to soil additives, India's own footwear sizing system, vegan leather production, India's first compact and women-friendly e-tractor CSIR PRIMA ET, Technology for controlled blasting, autonomous underwater vehicle for coral reef monitoring, Hansa-3 (NG), solar-powered UAVs for high altitude, rejupave technology - road construction at sub-zero temperatures, seaweed cultivation & processing and the more promising steel slag road technology.

During the NTD-2024 Event at CSIR-CECRI, Karaikudi on May 27, 2024, **Dr. K. Ramesha**, Director, CSIR-CECRI, welcomed the gathering and in his welcome address, he provided a brief overview of National Technology Day. He detailed the seminal technological contributions that CSIR and CSIR-CECRI has made towards Nation building. Further, he highlighted technological advancements made by CSIR-CECRI in the field of environmental technologies such as CO_2 capture, electrolyzers, water purification, electroplating, NPK sensors, fuel cells, corrosion mitigation, and corrosion inhibitor technologies used in the Pamban bridge. He proudly mentioned CSIR-CECRI's role in human resources development activities through its B.Tech. programme, AcSIR PhD programme, Skill Development, and Jigyasa.

Dr. Deependra Singh, Chairman and Managing Director, IREL (India) Ltd., Mumbai, graced the occasion as the Chief Guest. In his National Technology Day lecture on ***Energy Transition Materials and Rare Earths***, Dr. Singh covered the critical materials, which are in short supply and crucial in the value chain. He projected the demand for Li, Cu, Al, Co, Ni, and other battery-related materials in 2030 and 2040. He stated that there is a need to identify materials that would become critical in next 10-15 years and find solutions from now. He further said that the grand challenges of rare earths lie in separation, smelting, and understanding the f-electron.

The role of critical materials in energy security and the challenges of a clean energy transition are the key areas, he added. Dr. Singh stated that there is an increase in demand for minerals like lithium, cobalt, nickel, copper, and rare earth materials. He highlighted the availability of rare earths globally and in India and provided an overview of applications of rare earth elements in the emerging clean energy technologies including wind turbines and EV motors. He detailed the activities of IREL and the availability of feedstock resources in India and explained various methods and stages of the extraction process. Dr. Singh also presented an overview on the genesis of IREL, the transformation it has undergone over the years, the landmarks it has scaled, present areas of interest and its future goals.

Dr. A. Palaniappan, Sr. Principal Scientist, CSIR-CECRI proposed the vote of thanks and the programme concluded with National Anthem.

Recent Research Projects Sanctioned

Industry Funded:

- Bipolar concrete penetrating corrosion inhibiting admixture for embedded steel against corrosion in concrete structures, M/s. Crimen Tech Pvt. Ltd., Coimbatore, Rs. 12.78 Lakhs, 9 months wef 14-05-2024 [SSP 03/2024]
- Physical, chemical and electrochemical testing of indigenously developed precursor materials for lithium ion cells, M/s. Bridge Green Upcycle Pvt. Ltd., Chennai, Rs. 23.96 Lakhs, 12 months wef 16-05-2024 [SSP 05/2024]

Govt-Aided Projects (GAP):

- Development of seaweed-derived cellulose and phytochemicals as cost-efficient additive composite for medical-grade textiles, Ministry of Textiles under National Technical Textile Mission, Rs. 51.48 Lakhs, 3 years wef 28-05-2024 [GAP 04/2024]
- Composite yarns embroidered e-textile wearable systems for health and sports application, Ministry of Textiles under National Technical Textile Mission, Rs. 55.54 Lakhs, 3 years wef 28-05-2024 [GAP 06/2024]
- Development of oxidation resistant iridium-rhenium (Ir-Re) coatings for satellite thrusters, Science & Engineering Board (SERB), Rs. 42.74 Lakhs, 2 years wef 24-05-2024 [GAP 07/2024]
- Selective laser melted low modulus β titanium alloy (Ti-Nb) bone implant with surface bio functionalization, Science & Engineering Board (SERB), Rs. 36.32 Lakhs, 3 years wef 27-05-2024 [GAP 08/2024]
- IoT based water and soil health monitoring systems with affordable indigenous sensors for intensive aquaculture, Department of Biotechnology (DBT), Rs. 78.42 Lakhs, 3 years wef 24-05-2024 [GAP 09/2024]

CSIR Funded:

- Electrochemical synthesis of organic intermediates: synthesis of 3,4,5-trimethoxy benzaldehyde (TMBA), 4-tert-butylbenzaldehyde (TBBZA) from their corresponding toluenes and p-benzoquinone (p-BQ) and 1,4-hydroquinone (HQ) from phenol, Rs. 50.86 Lakhs, 2 years wef 03-05-2024 [FBR030301]
- Pilot scale molten salt electrowinning of light metal and rare earths, Rs. 10 Crore, 2 years wef 07-05-2024 [PPP240001]
- Self-powered flexible electrodes for biosensor applications and for disease analysis, Rs. 65 Lakhs, 2 years wef 21-05-2024 [FBR070303]
- Design and development of 12 V mechanically rechargeable zinc and aluminium-air batteries, Rs. 25 Lakhs, 2 years wef 14-05-2024 [RDSF-IHP002401]
- Electro winning of green Fe and Cr from their metal salts extracted from ferro-chrome slag, Rs. 25 Lakhs, 2 years wef 14-05-2024 [RDSF-IHP002402]
- Process development for the paired electrosynthesis pf phthalide I 4-tertbutylbenzaldehyde and phthalide I tolylaldehyde dimethylacetal, Rs. 25 Lakhs, 2 years wef 14-05-2024 [RDSF-IHP002403]
- Imaging of functional interface: a scanning tunneling microscopic study, Rs. 25 Lakhs, 2 years wef 14-05-2024 [RDSF-IHP002404]

Business Development and CSIR Theme Leads

- Meeting on MSME Projects [May 2]
- Meeting on Redox Flow Battery Mission Project [May 3]
- Discussion on printable photovoltaics with M/s. Powered Electron Pvt. Ltd. [May 3, 13]
- Meeting with M/s. Vishnu Chemicals Ltd. on R&D collaboration [May 7]
- Discussion with M/s. IEC Fabchem Pvt. Ltd. on project proposals [May 9]
- Discussion with M/s. DST Tech Pvt. Ltd. on project proposals [May 13]
- Meeting with Officials of M/s. Siemens Digital Industries to discuss collaborative R&D [May 14]
- Meeting with Cochin Shipyard Limited on R&D projects [May 17]
- Meeting of Project Leaders of CSIR's Specialty Chemicals Mission with Dr. S. Kannan, Director, CSIR-CSMCRI [May 20]
- Meeting with TATA Steel on MnO_2 [May 21, 22]
- Meeting with TCS Research Officials, Pune [May 22]
- Discussion on R&D collaboration with M/s. Reneonix Pvt. Ltd. [May 28]

Skill Development Activities

Skill Development Training Programmes:

- A Skill Development Training Programme on ***Chromatography and Spectroscopy*** was organized by CSIR-CECRI during May 13-17, 2024. 44 participants took part in this programme.

JIGYASA:

- Gearup Meeting on Energy Literacy Training and reducing energy consumption (REC) [May 30]
- JIGYASA - ELT Team: Review Meeting on REC with DG, CSIR HQ and ESF Team [May 31]

Swachhata Pakhwada 2024

As per the directives of the Government of India and CSIR Headquarters, **Swachhata Pakhwada 2024** was observed across all the CSIR laboratories during May 1-15, 2024. In CSIR-CECRI, various activities were organized as per the planned schedule (given below) which commenced with the administering of Swachhata Pledge to all the staff members and scholars on May 1, 2024.

Event/Division/Venue of Cleanliness Drive	Date
Administration of Swachhata Pledge	1st May 2024
Corrosion and Materials Protection	1st and 2nd May 2024
Director's Office/PPMG/TTBD	3rd May 2024
Shramdhan Event (near CECRI CC Gate)	4th May 2024
Electrodics & Electrocatalysis	6th and 7th May 2024
Administration, Finance and Stores	8th and 9th May 2024
Electrochemical Process Engineering	10th May 2024
Cleaning of "J" and "K" Quarters	11th May 2024
Electro-organic & Materials Electrochemistry and Electroplating & Metal Finishing	13th and 14th May 2024
Engineering and Technical Services	14th May 2024
Electrochemical Power Sources	15th May 2024

A common appeal was made to the CSIR-CECRI fraternity to commit and volunteer themselves for this noble cause. Banners were also displayed at appropriate places in the Institute to increase awareness about the mission. A **Shramdhan** event was organized to clean the institute premises on May 4, 2024 (Saturday) which witnessed active participation of staff members, research scholars, students and temporary staff.

Thorny Bushes and Weeds were cleared off in the campus and **five acres of unused land** containing wild vegetations were identified and cleared for plantation drive, in which **250 saplings** consist of coconut and fruit bearing trees such as pomegranate, guava, fig, mango etc. were planted.

A **special cleaning drive** in addition to the existing cleaning activities was taken up to clean the campus and quarters areas in **J** & **K** road on May 11, 2024 (Saturday). Fumigation with insecticides was carried out in the Institute and Residential Area in the campus to prevent the breeding of mosquitoes and insects. Old records that have outlived the retention period were identified and action has been taken to weed them out in a phased manner. E-wastes such as empty toners and cartridges were sent for possible recycling/safe disposal.

Overall the initiative turned out to be a huge success with the active participation all the members of CSIR-CECRI fraternity and proved to be an inspirational initiative for the future generation.

AcSIR Science Club: Expert Talk

With an aim to motivate research scholars and inculcate a comprehensive understanding on the latest advancements in chemistry, particularly focusing on research careers, **AcSIR Science Club**, CSIR-CECRI Karaikudi has envisaged an Expert Talk Series with lectures by experts in their area of eminence. The Series also aims to inspire the student community of CSIR-CECRI by exposing them to cutting-edge scientific discoveries and the broader implications of electrochemistry exploration.

In this regard, the Expert Talk by **Dr. Kannan Srinivasan,** Director, CSIR-Central Salt and Marine Chemicals Research Institute (**CSIR-CSMCRI**), Bhavnagar, a renowned chemist, celebrated for his groundbreaking work in the discovery and study of heterogeneous catalysis, was arranged on May 20, 2024.

Dr. K. Ramesha, Director, CSIR-CECRI, briefly introduced Dr. Kannan, highlighting his significant contributions to heterogeneous catalysts and their salt and marine applications. He lauded AcSIR Science Club for the efforts, appealed to the scholars to make the most of the opportunity and to continue to organize such inspiring and thought-provoking talks.

Dr. Kannan began his talk by putting forth the role of researchers in their respective fields, addressing both their interests and the challenges they face, particularly in development of technologies. He gave interesting examples in a number of areas including the use of potassium-based materials which are frequently used in research but are majorly imported due to India's insufficient potassium production. He highlighted a process where sugarcane bagasse is converted to ethanol and discussed recent studies on extracting potassium from sugarcane bagasse. This extraction method could significantly enhance NPK fertilizer production, benefiting agriculture, he said.

Dr. Kannan discussed the use of seaweeds as growth promoters for plants. Various algae, commonly used as thickening agents and preservatives, have been proven to be effective fertilizers, he added. He also highlighted on the upcoming establishment of a large-scale plant near Rameswaram, which will implement CSIR-developed technology to harness these benefits for agriculture.

The insights shared by Dr. Kannan Srinivasan sparked a renewed enthusiasm for scientific exploration among the participants including all AcSIR students, a large number of researchers and staff members. The organizers from AcSIR Science Club, CSIR-CECRI assured the audience of more such interesting events in the near future.

Official Events

- Selection Committee Meeting for the Engagement of Project Personnel [May 7,8]
- Meeting of the Annual Report Editorial Committee [May 1, 7, 17]
- Meeting of the Standing Publications, Ethics and Scientific Vigilance Committee [May 10]
- Meeting on data compilation for Innovation Excellence Indicators [May 9, 10]
- Training for all staff members on ACCESS Software [May 9]
- Hindi Workshop [May 10]
- RC Sub-Committee Meeting [May 15, 16]
- Laboratory Strategic Group Meeting [May 10, 27]
- Performance Review Meeting for Technical Assistants [May 21]
- Hindi Meeting [May 31]

CFE and AcSIR Highlights

- B.Tech. Final Year Project Review Meeting [May 9]
- B.Tech. Admission under Other State Quota for 2024-25 [May 21]
- DAC-I Meeting of Mr. Arunmuthukumar [May 1]
- DAC-III Meeting for Mr. K. Vinoth [May 1]
- DAC-I Meeting for Mr. G. Dineshkumar [May 8]
- Synopsis Submission of Mr. Gaurav Rajkumar Pandey (Thesis Title: *Phytochemical(s)-functionalized molybdenum oxide in theranostics: bio-nanointerfaced system for cellular oxidative stress control and inflammatory biomarker detection*; Guide: Dr. V. Murugan) [May 8]
- Shortlisting Committee Meeting for AcSIR PhD & IDDP admission - August 2024 Session [May 9]
- DAC-I Meeting for Mr. A. Muthukrishnan [May 14]
- DAC-I Meeting of Ms. M. Narmadha [May 17]
- DAC III Meeting of Ms. M. Kowsalya [May 28]
- DAC-I Meeting of Ms. A. Varsha [May 29]
- Synopsis Submission of Ms. P. Packiyalakshmi (Thesis Title: *Custom designed electrodes and binders for electrochemical energy storage applications*; Guide: Dr. N. Kalaiselvi) [May 29]
- Synopsis Submission of Mr. M.K. Nikhil Chandran (Thesis Title: *Designing potential electrode materials for high-rate sodium-ion batteries*; Guide: Dr. M. Sathish) [May 30]

Training on CSIR's Access S&P Software

CSIR has introduced ***Application for Comprehensive CSIR Enterprise for Stores & Supplies*** **(ACCESS)**, a new Stores & Purchase Software for all procurement activities and implemented across all CSIR labs with effect from May 2, 2024. A demo & awareness session by **Mr. K.P.S. Ganapathy**, Stores and Purchase Officer, CSIR-CECRI on the SOPs to be followed was organized on May 9, 2024. All the participants (Project Leaders, Indentors, Users, Staff) gained valuable insights especially on the Dos and Donts and the online flow of the procurement processes. A live demo on the operations of the software was also presented.

Blood Donation Camp

CSIR-CECRI Health Centre organized a Blood Donation Camp on May 4, 2024 (Saturday) in association with Government Head Quarters Hospital, Karaikudi. A large number of volunteers including staff members, scholars and contractual staff took part actively in this act of benevolence.

Honours and Awards

Dr. Subrata Kundu, Principal Scientist, EPE Division served as a Guest Editor for the Themed Collection on ***Surface Engineering of Transition Metal Based 2D Materials*** of the RSC Journal-**Materials Advances** (available online along with his editorial article):

https://pubs.rsc.org/en/journals/articlecollectionlanding?sercode=ma&themeid=bd04cdf6-a7c4-40a1-9573-94c35205d6ed

Superannuation

The following staff members of CSIR-CECRI superannuated on April 30, 2024 after a long illustrious service:

Mr. M. Nehru Pandiaraj
Private Secretary
AO's Secretariat

Mr. S. Rajendran
Sr. Technician (3)
EMFT Division

Mr. S. Stephenson
Sr. Technician (2)
CIF Division

Mr. A. Kasi
Sr. Technician (2)
EMFT Division

Mr. CT. Ganesamurthy
Sr. Technician (2)
PPMG Division

Snapshots

RC Subcommittee with CMP and ECPS Divisions

Discussion with TCS Research Team, Pune on R&D collaboration

Discussion on R&D collaboration with M/s. Reneonix Pvt. Ltd.

Swachhata Pakhwada 2024 activities

Gearup meeting on Energy Literacy Training

Blood Donation Camp

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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