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CECRI NEWS

A monthly newsletter of CSIR-CECRI

Compilation of significant happenings

Corrosion Awareness Day - 2022

National Corrosion Council of India (NCCI) organized *Corrosion Awareness Day-2022* in collaboration with CSIR-Central Electrochemical Research Institute (CSIR-CECRI) on 21/04/2022 in a grand manner with festive fervour. This event was organized in line with the World Corrosion Organization's (WCO) goal – to increase the awareness of all issues related to corrosion among the industry, public and government sector. WCO has prescribed a customary celebration in the month of April every year as the *International Corrosion Awareness* program. NCCI embellished this year's celebrations with informative invited lectures by eminent experts in this field and propagated the programme's objective through thought-provoking poster competition among the research scholars of CSIR-CECRI.



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Mr. T. Ashok Balamurugan

“

*Mighty structures upon the ocean
Suffer from fouling and corrosion
And even those at the dockside
Are rapidly becoming oxide*

(Courtesy: Dr. M. Eashwar
former Chief Scientist
CMPD, CSIR-CECRI)

”

INSIDE THIS ISSUE

- Corrosion Awareness Day Celebrations
- Azadi Ka Amrit Mahotsav and CSIR-CECRI@75
- Honours & Awards
- Deputation Abroad
- New Member in CSIR-CECRI Family

National Corrosion Council of India (NCCI):

NCCI, a non-profit organization, is serving as a forum for effective dissemination of knowledge on corrosion and its control. NCCI is functioning in CSIR-Central Electrochemical Research Institute's (CSIR-CECRI) premises since 1990 and also collaborates with other focal bodies on research and development in the field of Corrosion Science and Engineering in the country. NCCI organizes National Conference on Corrosion Control periodically covering all aspects of Corrosion Science and Engineering at important places for enlightening and increasing the awareness about corrosion of metals and its remedial measures.

Corrosion Awareness Day 2022

In her Welcome Address, **Dr. V. Saraswathy**, Chairman, NCCI and Chief Scientist & Head, Corrosion & Materials Protection Division (CMPD), CSIR-CECRI profusely thanked the **Chief Guest, Prof. Gurmeet Singh**, Vice-Chancellor, Pondicherry University, for accepting the invitation at a short notice and his gracious presence, even though online. She also gave a glimpse on the spread and magnitude of corrosion related problems and its global impacts including the detriment effect on GDP. She also highlighted the various corrosion combat technologies and projects handled by CMPD.

Dr. N. Kalaiselvi, Patron, NCCI and Director, CSIR-CECRI delivered the Presidential Address in which she applauded the efforts of CMPD, CSIR-CECRI in controlling this global menace and contributing to our Nation's growth thereby serving the society as a whole. She also appreciated the active efforts of NCCI in arranging these kind of awareness events. **Dr. S. Sathiyarayanan**, Vice-Chairman, NCCI & Chief Scientist & Head, Project Planning and Monitoring Group (PPMG), CSIR-CECRI spoke about the genesis of Corrosion Awareness Day and the conduct of various programmes this year in commemoration of this significant day.

The Chief Guest, Prof. Gurmeet Singh in his address fondly recalled his scholar life during which he

frequently shunted to CSIR-CECRI especially CMPD for his experimentation part and to seek expert advice. He chronologically listed the key roles played by the then Directors and Experts of CSIR-CECRI in the field of Electrochemistry. Prof. Singh emphasized the importance of documenting the impacts of Corrosion on the global economy and increasing the awareness among all stakeholders. **Dr. Rakesh Chandra Barik**, Secretary, NCCI & Senior Scientist, CMPD, CSIR-CECRI proposed vote of thanks for this inaugural programme and the technical programme ensued.

Shri. Om Prakash Chaurasiya, Chief Manager (M&I) and **Shri. Ravi Shankar Yadav**, Assistant Manager (M&I), Western Region Office, Indian Oil Corporation Ltd., Mumbai delivered a lecture on *Soil side Corrosion of bottom plates of storage tanks at foreshore locations*. **Shri. Subodh Purohit**, Chief Research Scientist, Oil India Ltd., Duliajan, delivered a lecture on *Corrosion Management in upstream Oil Industry*.

Shri. S. Ravichandran, Senior Manager (T&D) - Protection, Berger Paints India Ltd., Kolkata, delivered a lecture on *Innovative coating technologies for current industrial needs*. **Shri. Salil Gadgil**, Technical Manager, Krishna Conchem Products Pvt. Ltd., Navi Mumbai, delivered a lecture on *Overview on Powder based VCI's for mitigating corrosion in hardened concrete*.

More than 250 participants from all over the country (*Industrialists, Researchers, Scientists, Engineers, Technocraft, Students and Academicians*) got immensely benefited and updated themselves in this event conducted on hybrid mode. In the Poster Presentation Competition conducted (offline), more than 40 students took part enthusiastically. Best poster awards (Gold, Silver, Bronze and Consolation Prizes) were presented to the winners during the valedictory function. The event concluded with a vote of thanks by **Dr. S. Muralidharan**, Principal Technical Officer, CSIR-CECRI & Treasurer, NCCI, Karaikudi.



List of Newly Sanctioned Projects

Projects Sanctioned	Sponsor	Principal Investigator(s)	Budget (Rs. in Lakhs)	Start Date	End Date
Centre for Rechargeable Energy Storage Systems for Augmenting Transportation and Electrification (CREATE)	SERB-DST (collaboration with IIT, Kanpur)	Dr. A.S.Prakash	142.04	11 Mar 2022	10 Mar 2027
Development of Chromium Coating using Trivalent Cr bath Electroplating process on Inner Bore of Tubes and Long Cylindrical Sections	DMRL, Hyderabad	Dr. N. Rajasekaran	359.69	29 Mar 2022	28 Jul 2024
Electroplating of Copper on HEBT Spiral Buncher High Vacuum Chambers (2 Nos.)	Inter University Accelerator Centre, New Delhi	Dr. N. Rajasekaran	30.57	02 Apr 2022	01 Jan 2023

Technology Transferred / Agreements / MoUs Signed

❖ Non-Disclosure Agreement (NDA):

M/s. Anabond Limited, Chennai

on *Novel Fuel Cell Development* (5 years) [Apr 04]

Recent Research Publication

- ❖ *Defect engineering of BiOX (X = Cl, Br, I) based photocatalysts for energy and environmental applications: Current progress and future perspectives*
S. Vinoth, Wee-Jun Ong and A. Pandikumar
Coordination Chemistry Reviews, 464 (2022) 241541
<https://doi.org/10.1016/j.ccr.2022.241541>

Updates on CSIR-ICeNGESS, Mission, Theme and Major Projects

❖ CSIR-ICeNGESS:

- Meeting of the Committee for the Tender Opening (Financial Bid) [Apr 01]
- Meeting on Phase I Activities and Equipment Installation [Apr 05]
- Internal Meeting of Plant Layout Finalizing Committee for Phase II Activities at Chennai [Apr 20]
- ❖ Meeting of **i-Connect Theme** Nodals: Participation of Director, CSIR-CECRI as Executive Committee Member [Apr 04]
- ❖ Meeting of the Monitoring Committee for reviewing FTT/FTC Projects under the **4M Theme** of CSIR [Apr 07]
- ❖ Monthly Review Meeting for the project *Conducting polymer-based composites for the next generation of flexible electrochromic display devices* under **AMM Theme** [Apr 12]
- ❖ Mock Presentation by Scientists for the upcoming Second Review Meeting for FBR/NCP Projects under **Energy Theme** of CSIR [Apr 25]

Business Development Leads

- ❖ Meeting on review of Project Proposals to DRDO [Apr 01]
- ❖ Project Review Meeting with M/s. Titantech LLC, Bangalore (SSP 26/21) [Apr 04]
- ❖ Visit of Officials from TATA Chemicals for R&D Collaboration especially *Magnesium Extraction through Molten Salt Electrolysis* [Apr 05]
- ❖ Visit of Officials from Chemfab Alkalies on *Na-ion Battery Technology* [Apr 06]
- ❖ Visit of Officials from ARi Global Solutions on *Development of Nano Material-enhanced Sodium-Ion Battery* and other R&D Collaboration [Apr 08]
- ❖ Meeting with Calibre Chemicals, Mumbai on Electrochemical Technologies [Apr 11]
- ❖ Visit of officials from VIT Vellore for discussion on Indo-Danish joint Project Proposal titled *Hydrogen Generation via high-temperature Solid Oxide Electrolyzer Cells* [Apr 13]
- ❖ Discussion with Officials from ACME Solar Holdings Pvt. Ltd. on R&D collaboration [Apr 19]
- ❖ CECRI-DRDO-TSL collaborative discussion on *Production of Magnesium and Calcium through Molten-Salt Electrolysis* [Apr 21]
- ❖ Meeting with M/s. Zerust on collaborative project proposal [Apr 26]
- ❖ Meeting with ISRO-IPRC, Mahendragiri on Dynamic Pressure Sensors Project [Apr 27]
- ❖ Meeting with BGR Energy Systems Ltd., Chennai on *Developing Green Hydrogen Production Technologies of PEM & AEM Electrolyser and Solid Oxide Technology* [Apr 28]
- ❖ Project Review Meeting with Sri Meenatchi Industries, Sivakasi [Apr 29]

Azadi Ka Amrit Mahotsav and CSIR-CECRI@75 Lecture Series

To commemorate India's 75th year of Independence (**Azadi Ka Amrit Mahotsav**) and the coinciding CSIR-CECRI's 75th Foundation Year (**CSIR-CECRI@75**), CSIR-CECRI in association with The Society for Advancement of Electrochemical Science and Technology (**SAEST**), Karaikudi has initiated a monthly Lecture Series on '**Electrochemical Science and Technologies: A Path Forward to Sustainable Society**' by having special lectures by eminent personalities in the field of electrochemical science and technologies, and allied areas. The objective is to popularize the knowledge on electrochemical science and technology and its impact on energy, environment, healthcare, and industrial sector with a view to promote interest among students, scholars, scientists and technologists.

In this series, the first lecture was delivered by **Prof. M.V. Sangaranarayanan**, Professor Emeritus, Department of Chemistry, Indian Institute of Technology (IIT) Madras, Chennai at Abdul Kalam Auditorium, CSIR-CECRI on April 28, 2022 at 11:00

am. The lecture was on physical mode and attended by undergraduate and graduate students, PhD scholars and scientists. In his lecture on **Phase transitions at Electrochemical Interfaces**, Prof. Sangaranarayanan highlighted the fundamental issues faced by theoreticians in modeling the electrochemical double layers and in explaining underpotential deposition of metals. He also shared his recent experience of using the Ising model to understand the liquid/liquid interfaces.

Later, at 3:00 pm, **Dr. S. Srikanth**, Former Director, CSIR-National Metallurgical Laboratory, Jamshedpur delivered a lecture on **A Future Hydrogen Economy - Reality or a Pipe Dream**. In his lecture, Dr. Srikanth presented the economics of hydrogen as a future fuel in the global as well as Indian scenario. He emphasized the multiple challenges associated with the cost of hydrogen production and storage apart from indicating the large-scale supporting infrastructures that need to be overcome to realize hydrogen as the commercial fuel.



Skill Development Activities

CSIR-JIGYASA:

Connect with Scientists Webinar Series:

The following lectures were arranged as a part of on-going Webinar Series:

1. *Batteries: Concepts to Applications* by Dr. Aiswarya Bhaskar [Apr 07]
 2. *Metal Air Batteries: Futuristic Energy Storage System* by Dr. S.T. Nishanthi [Apr 18]
 3. *Food Contaminants* by Dr. K. Giribabu [Apr 21]
- ❖ Dr. C. Naveen Kumar, Senior Scientist delivered a talk at Alagappa University Community Radio Station under Science Communication Programme (*Vigyana Vindai*) [Apr 11].

Career Guidance Event:

CSIR-CECRI JIGYASA conducted a career guidance event for the student community (along with their Teachers and Parents) [Apr 12]. A large number of students, teachers and parents gained valuable insights for the future.

Skill Development:

- ❖ A One-week Skill Development Training Programme (*Online*) on *Industrial Wastewater Treatment Technologies* was organized by CSIR-CECRI during 04 to 08 April 2022. A total of 250 candidates registered and took part actively in the event.

Centre for Education and AcSIR Highlights

Honours and Awards



Ms. T. Roshni, IV B.Tech.

Financial support to pursue PhD in Chemical Engineering at Michigan State University (Annual Fellowship: \$62,485)



Ms. P. Moghitha, IV B.Tech.

Financial support to pursue PhD in Chemistry at University of Pittsburgh (Annual Fellowship: \$24,552)



Mr. R. Vaitheeswaran, III B.Tech.

Mitacs Globalink Research Internship 2022 for a period of 12 weeks at Montreal University, Canada

AcSIR:

- ❖ Synopsis Submission of Ms. P. Kanagavalli, AcSIR Scholar (Thesis Title: *Chemically interplayed graphene-based label-free sensor platform for dengue diagnosis and therapeutics*; Guide: Dr. V. Murugan) [Apr 06]
- ❖ PhD Viva Voce Examination for Mr. G.S. Ayyappan, AcSIR Scholar (Thesis Title: *Study and implementation on condition monitoring and fault diagnosis of induction machine on continuous operation*; Guide: Dr. B. Ramesh Babu) [Apr 08]
- ❖ Doctoral Advisory Committee Meeting for Mr. K. Sanjeev Kumar, AcSIR Scholar [Apr 12]
- ❖ Synopsis submission of Mr. R.K. Vishnu Prataap, University Research Scholar (Thesis Title: *Electrodeposition of Ni and Ru based materials for various electrochemical applications*; Guide: Dr. A. Palaniappan) [Apr 13]
- ❖ Synopsis Submission of Mr. Chrysanthus Andrew, CSIR TWAS Fellow (Thesis Title: *Electrodeposition of samarium from ionic liquids*; Guide: Dr. M. Jayakumar) [Apr 20]

- ❖ Doctoral Advisory Committee Meeting for Ms. Jyothy Mol, UGC-JRF [Apr 22]
- ❖ Public Viva-Voce Examination for Ms. M. Nagalakshmi, AcSIR Scholar (Thesis Title: *Next generation electrode materials for energy storage applications*; Guide: Dr. N. Kalaiselvi, Director) [Apr 29]

Centre for Education:

Placement Interview for B.Tech. Students:

- The following final year students got placement offer from Lucas TVS Ltd., Chennai, TAFE-Tractors and Farm Equipment Ltd., Chennai, BatX Energies Pvt. Ltd., Haryana, Lakshmi Machine Works Ltd., Coimbatore, Bharat Electronics Ltd., Pune and Taqanal Energy Pvt. Ltd., Karnataka:

Mr. S. Chandru, Mr. L.C. Dilip Kumar, Mr. V. Vijay, Ms. M.L. Gayathri Devi, Mr. K. Manibharathi, Mr. Soumya Raj, Ms. B. Eunice Evangeline and Ms. Selvi Mahalakshmi.

Superannuation

The following staff members of CSIR-CECRI superannuated on April 30, 2022 after a long illustrious service:



Dr. S. Radhakrishnan
Chief Scientist and
Head, Central Instrumentation Facility



Dr. K. Kulangiappan
Principal Technical Officer
Electro-Organic & Materials Electrochemistry



Mr. M.P. Gunasekar
Principal Technical Officer
Engineering and Technical Services



Mr. S. Ashokumar
Senior Technician (2)
Stores & Purchase Section

Official Events

- ❖ Briefing Ph.D. scholars about the activities under JIGYASA and UBA [Apr 01]
- ❖ CSIR collaborated Indo-Danish promotional workshop for the bilateral call on Green fuels including green hydrogen [Apr 01]
- ❖ OLIC Meeting with all HODs on Parliamentary Committee's Questionnaire on Official Language implementation [Apr 04]
- ❖ 113th Birth Anniversary Celebrations of Dr. R.M. Alagappa Chettiar [Apr 06]
- ❖ Selection Committee Meeting for engagement of Project Personnel [Apr 06, 07]
- ❖ Meeting of Peer Review Committee *Establishment of Advanced Energy Research Centre for development of Battery Technologies for Present & Futuristic requirements* organized by DRDO-RCI: Director, CSIR-CECRI chaired the meeting [Apr 07].
- ❖ Visit of Director, CSIR-IHBT, Palampur: *Discussion on Aroma Mission & Floriculture* [Apr 11]
- ❖ Visit of Dr. B. Chandrasekaran, Former Director, CSIR-CLRI & CSIR-CECRI (additional charge): *Discussion with Scientists of CSIR-CECRI* [Apr 11]
- ❖ Meeting on deliberating the Technology, Innovation and R&D movement of India with Dr. Naushad Forbes on *The Struggle and the Promise: Restoring India's Potential* organized by the Confederation of Indian Industry [Apr 12]
- ❖ Meeting organised by CSIR-TMD, New Delhi on the alignment of CSIR's Carbon Capture, Utilization and Storage activities with the suggestions of IPCC [Apr 18]
- ❖ Online Meeting of DG, CSIR with all Scientists of CSIR on CSIR Vision Document [Apr 19]
- ❖ Meeting of the Departmental Canteen Management Committee [Apr 25]
- ❖ Panel Discussion on Battery Storage and Biomass Energy organized by Confederation of Indian Industry, Chennai: Director, CSIR-CECRI delivered a talk on *Next Generation Lithium-Ion Batteries & E-Mobility* [Apr 26]
- ❖ Kick-off meeting of CSIR Mission Mode Project on *Aerospace Materials and Technologies* [Apr 26]
- ❖ Online Brainstorming on *Additive Manufacturing* organised by CSIR-HRDC, Ghaziabad [Apr 26]
- ❖ Monitoring Committee meeting for EAC approved projects with officials from CPWD [Apr 27]
- ❖ 26th Research Council Meeting of CSIR-CIMFR, Dhanbad: Participation of Director, CSIR-CECRI as a Member [Apr 28]
- ❖ National Workshop on *Electric Aircraft & Allied Technologies* jointly organised by CSIR-NAL, Bengaluru, AeSI, Bengaluru and IIST, Thiruvananthapuram [Apr 28]
- ❖ National Conference on *Energy Technologies* organised by INAE along with IIT Madras and ARCI: Director, CSIR-CECRI delivered an Invited Lecture on *Electrochemical Power Sources of Today and Tomorrow* [Apr 29]
- ❖ Online Meeting with Innovation Protection Unit, CSIR HQ [Apr 29]

Deputation Abroad:



Dr. P. Ragupathy, Principal Scientist, CSIR-CECRI has been deputed to USA to avail the **Raman Research Fellowship** at Purdue University, Indiana, USA during March 1, 2022 to July 31, 2022.

New Member in CSIR-CECRI Family:



Name: Shri. Gopal S
Designation: Security Officer
Date of Joining: 04/04/2022

Snapshots



Review Meeting on *Development of Mg based Alloy Anodes for Energy Applications*



Demonstration on *Extraction of Magnesium through Molten Salt Electrolysis* to Tata Chemicals



113th Birth Anniversary Celebrations of Dr. R.M. Alagappa Chettiar



Skill Development Training Programme on Industrial Wastewater Treatment Technologies



Discussion with Director, CSIR-IHBT



Discussion with former Director, CSIR-CLRI



JIGYASA: Career Guidance Event



Farewell and Felicitation to Retirees

TECHNOLOGY COMPENDIUM OF CSIR-CECRI

- ❖ Indigenous Li-ion battery
- ❖ Indigenous Sodium Ion Battery
- ❖ Performance Improved Lead Acid Battery
- ❖ 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 (ICSC) for Rebars
- ❖ Electrochemical Preparation of DL-Homocysteine Thiolactone Hydrochloride from DL-Homocysteine
- ❖ 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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