

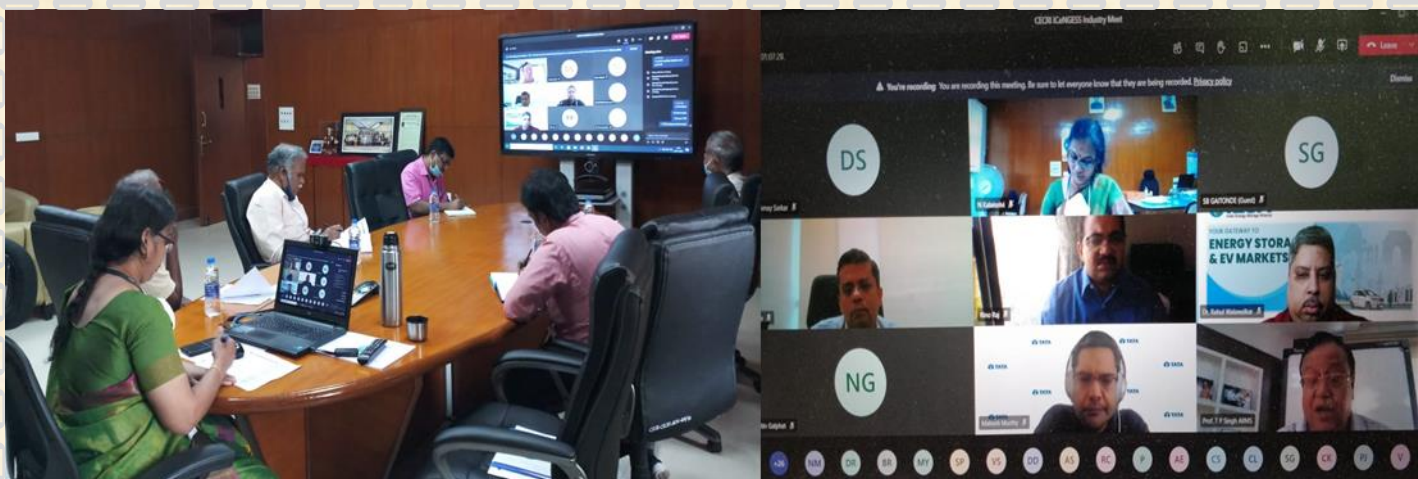


January 2021
Volume 2 Issue 1

A monthly newsletter of CSIR-CECRI
—compilation of significant happenings—

Online Industry Meet on ICeNGESS

CSIR-CECRI organized an Online Industry Meet on January 27, 2021 with Indigenous Supply Chain Supporters for 100 MW Lithium-Ion Battery (LIB) producing Plant operated at CSIR Madras Complex, Chennai under the CSIR Mission Project - “*Innovation Centre for Next Generation Energy Storage Solutions*” (ICeNGESS). In her welcome address, Dr. (Mrs) N. Kalaiselvi, Director, CSIR-CECRI briefed on the genesis, current status of the project and the objective of realizing indigenous energy storage solutions under sustainable development goals of the Nation where storage of energy is of utmost importance.



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“ ... becoming self-reliant
& realizing an invincible
Atmanirbhar Bharat... ”

INSIDE THIS ISSUE

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- New Year Speeches of DG-CSIR & D-CECRI
- Technology Transfer & MoUs Signed
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Dr. V.K. Saraswat, Hon'ble Member of NITI Aayog, Chaired the meet and in his address he discussed with intrinsic details on the key aspects in LIB production. He laid stress on the fact that all the essential elements related to LIB production should be sourced indigenously to avoid over dependence on other countries for Lithium supply. He also suggested exploring resources in **South America (Lithium) and Congo (Cobalt)** as alternates in order to avert dominance and create a level playing field.

Dr. R.P. Singh, Head, Innovation Management Directorate, CSIR briefed about CSIR's efforts in the creation of a cordial ecosystem for the supply chain in manufacturing Lithium-ion cells. **Dr. A.S. Prakash**, Principal Scientist, CSIR-CECRI and PI of the Project, presented the Budget, Objectives and Capability of this ambitious plant. He highlighted the everlasting demand for LIBs and outlined the plan for establishment of this key venture with the Annual requirements in Phase-II. **Dr. Rahul Walawalker**, MD, Customized Energy Solutions India Pvt. Ltd., being a member of Indian Energy Storage Alliance assured all possible support by bringing together all the industries involved in this area.

Dr. Bala Raghupathy, Sr. GM - Technology-EMD-EDA, Carborundum Universal Ltd., mentioned that their organization is approved by DSIR and specializes in supplying fine powdered Graphite and Graphene as Anode materials. With a present production capacity of 50 TPA of battery grade anode materials, expansion of operations to multiply the production many fold is in the pipeline. **Dr. Rino Raj**, VP-Strategic Projects, Tata Chemicals Ltd., presented their production capabilities of Cathode Active Material (CAM 532,622). TCL has plan to expand their NMC 532 production upto 10000 TPA by 2025. **Dr. Harin Kanani**, MD, Neogen Chemicals Ltd., expressed their capability of supplying Electrolyte salts required for LIB and with their 25 years of experience and 3 plants [Mahape (1200 MT), Vadodra (2000MT) and Dahej (3000MT)], it will certainly boost the LIB production process.

Mr. V. Vijaykumar, GM - Sales & Marketing, Qmax Test Equipments Pvt. Ltd., Chennai offered LIB testing solutions and agreed to provide extended support for Sodium-ion battery testing also. He showed interest in supplying Battery Management System (BMS) for post-production activities. Dr. Saraswat opined that BMS integration is essential to evaluate and enhance the performance.

Dr. J. Pushparajan, DM - QM&RD, Travancore Titanium Products Ltd. projected Lithium Titanate (LTO) as a possible battery anode material which could be utilized in the future. To Dr. Saraswat's query, Neogen and Tata Chemicals evinced interest

in production of Lithium Ferrophosphate (LFP) material.

Mr. Vikram Handa, MD, Epsilon Advanced Materials Pvt. Ltd., presented themselves as largest coal chemical processing unit and they have expertise to convert coal tar (by-product of steel plant) to graphite anode. The company is planning to increase its production capacity of synthetic graphite to 25000-50000 TPA by 2025. He also clarified that Epsilon is catering to the entire global market including China and are utilizing naturally occurring graphite as well. **Mr. Mandar Ruikar** represented Pur Energy Pvt. Ltd., a start-up in collaboration with IIT Hyderabad, involved in developing battery thermal management system & cell level testing and are already in collaboration with CSIR-CECRI and ARCI. They committed to test and validate CSIR-CECRI's LIB cells.

Mr. Sagar Dhamorikar (Jt. President - New Business & Product Development) of Hindalco Industries Ltd., proposed to supply Aluminium foil material (validated by ISRO) for cathode. R&D on Copper foil is also under progress, he said. **Lucas TVS** presented their perspectives from a battery user point of view. **Dr. T. Thangasagar** of Manali Petrochemicals Ltd., Chennai offered to supply solvents such as Di-methyl Carbonate (DMC) and Di-ethyl Carbonate (DEC). **Mr. Kapil Malhotra** (Sr. VP - Marketing) of Gujarat Fluoro-chemicals Ltd. presented themselves as global leader in fluorine chemistry and their plant in Dahej, can meet all the chemical requirements for LIB production by 2022. **Tata Steel** summed up their work on mining of Anode and Cathode materials complementing the R&D of Tata Chemicals. **Mr. P. Dineshkumar**, CEO, Labkarts, Chennai projected the stellar role played by them in this area in the procurement of equipment of all ranges required in establishing a LIB producing plant and they have already supplied state-of-the-art equipment to Amararaja Group and BHEL. They offered to set up the 100 MW LIB producing plant on turn-key basis.

In his **concluding remarks**, Dr. Saraswat was optimistic that CSIR-CECRI will be able to set up the 100 MW Lithium-Ion Battery (LIB) producing Plant successfully in the near future through indigenous collaboration with all the participants of the Industry Meet. Strong bonds need to be established and new links need to be created to tackle the gray areas like separators, copper current collectors, etc. He assured the support of the Govt. of India by all possible means in order to become self-reliant and globally competent. The Meeting concluded with a vote of thanks by **Dr. Jonas Davidson**, Head, TTBD, CSIR-CECRI and Coordinator for this Industry Meet

Highlights from DG-CSIR's New Year Speech



- ❖ **New Year** - Time to introspect the year gone by; Celebrate the Achievements and Learn from the Shortcomings.
- ❖ **2020** - Huge challenge posed by a small Virus; Yet, it was proved yet again that Science only could provide solutions to any problem.
- ❖ Unfazed by critical conditions that prevailed during the Pandemic, Team CSIR showed tremendous spirit converting crisis into opportunities and emerged victorious in many fronts ranging from diagnostics like **FELUDA** to ventilators like **SwasthVayu** to drugs like **Favipiravir**.
- ❖ One of our New Year resolve must therefore be to harness the power of multi-disciplinary nature of CSIR, to forge collaborations across laboratories and external stakeholders.
- ❖ And to bring even more impactful solutions to the society in the post-Covid era especially realizing our Hon'ble Prime Minister of India and President of CSIR Society's clarion call for **Atmanirbhar Bharat**.
- ❖ CSIR HQ and the Major Theme Projects have been reorganized with a vision to focus on innovation, technology development and strong stakeholder connect with industry and ministries for rapid and effective dissemination of the activities to society at large.
- ❖ Beyond self-reliance, it is time to contemplate about our future programs, and how we can remain at the forefront of S&T Globally.
- ❖ A record generation of Lab Reserve Fund, successful conduct of India International Science Festival 2020, implementation of cadre review process in CSIR, implementation of ERP, etc. bear ample testimony to our strenuous efforts towards achieving ambitious targets.
- ❖ Finally, the pandemic has caused uncertainty and loss but also provided CSIR an opportunity to show its strength and tremendous resilience in dealing with the crisis.
- ❖ We must continue on the same path of delivery in the coming year and bring high value to society through our interventions.

Highlights from Director, CSIR-CECRI's New Year Speech

- ❖ The Year of uncertainty, 2020, has brought out the best from us. The entire **CSIR-CECRI Family** stood united in the hour of crisis and fought the pandemic with all its might protecting the entire society in all possible ways.
- ❖ All the members of the Scientific Team and the Volunteers worked round the clock outside their comfort zone in taking care of the Nation's needs and they all deserve great appreciation.
- ❖ We once again proved that we can serve the society through **Science and Technology** in spite of the severe restrictions imposed due to the pandemic.
- ❖ We should all continue to strive hard towards making our country self-reliant. **Atmanirbhar Bharat** should be the mantra for all our researchers as it paves way to realize our true potential and creates a pathway to connect with the Society.
- ❖ Many developmental activities have been carried
- in our Institute in the recent past and an ambient environment for all to join in the mainstream of research.
- ❖ All the **Theme projects** have been further divided into specialized **sub-verticals** and we should grab this opportunity and showcase our scientific and technological prowess.
- ❖ Looking forward to more active participation, support, success, significant milestones, etc. in the years to come as well.



Business Development Leads

- ❖ Online Discussion on Research Contract Agreement with Ohmium Inc. USA [Jan 11, 12]
- ❖ Online Discussion with MTU India Pvt. Ltd., Rolls-Royce Power Systems, Pune on collaborative R&D [Jan 12]
- ❖ Online Discussion with L&T Hydro Carbon on Water Electrolyser Technology [Jan 13]
- ❖ Online Interaction with CSIR-NEERI to identify pan CSIR activities on CO₂ Capture Usage & Storage to include in Calendar of Events [Jan 15]
- ❖ Online Meeting with Technip India Ltd. on business opportunities in the areas of Green Hydrogen, Fuel Cells and Electrolysers [Jan 19]
- ❖ Online Meeting with Aravind Envisol Ltd on Lithium Battery Technology [Jan 21]
- ❖ Meeting with Q Max, Chennai on R&D Collaboration [Jan 22]
- ❖ Discussion with Gujarat Fluorochemicals Ltd. on Creation of Indigenous Supply Chain for LIB production [Jan 29]

Technology Transferred /Agreements/MoUs Signed

Technology Transfer

1) M/s. Krishna Conchem Products Pvt. Ltd., Mumbai

Title: *Coating for underwater / wet surfaces on concrete/steel substrates*

2) M/s. TATA Chemicals Ltd., Mumbai

Title: *Fabrication of 18650 type Li-ion MNC cathode material*

3) M/s. Advance Paints, Mumbai

Title: *Manufacture of four coat paint schemes consisting of epoxy & polyurethane paint systems for concrete structures*

MoU

1) Global Automotive Research Centre, Oragadam, Chennai

Title: *Collaborative R&D Projects*

2) CK Motors, Coimbatore

Title: *Lithium-ion Battery Technology*

Non Disclosure Agreement

L&T Hydrocarbon Engineering Ltd., Mumbai

Title: *Collaborations in the area of CO₂ to Value Added Products*

Updates on CSIR-ICeNGESS, Mission and Theme Projects

- ❖ Review Meeting of On-going CSIR-Advanced Materials Mission Project [Jan 01]
- ❖ CSIR-ICeNGESS: First Joint Technical Meeting [Online] among CSIR-CECRI, CSIR-IMD and TATA Chemicals [Jan 22]
- ❖ ENERGY Theme of CSIR : Industrial Meet on Sub-Vertical Coal Energy [Jan 05]
- ❖ Review Meeting on CSIR-ICeNGESS [Jan 28]
- ❖ Core Committee Meeting [Online] of CSIR-Innovation Center for Next Generation Energy Storage Solutions (ICeNGESS) [Jan 06]
- ❖ Technical discussions with TATA Chemicals Ltd. for the CSIR-ICeNGESS program [Jan 29]
- ❖ Monitoring Committee Meeting [Online] of the Mission Mode Project on Advanced Materials [Jan 11]

Skill Development Activities

The Skill Development Group of CSIR-CECRI organized the following training programmes [Online] during January 2021 under the CSIR Integrated Skill Initiative :

18-22 January 2021:

- ❖ Operation and Maintenance of Analytical Instruments (82 participants)
- ❖ Biosensor Design & Application (59 participants)
- ❖ Lithium-ion Battery: Science and Technology (194 participants)

25-29 January 2021:

- ❖ Electro-analytical Techniques for (Electro) Catalytic and (Bio) Sensing Applications (59 participants)

JIGYASA: To commemorate our 72nd Republic Day, an Essay Competition was organized [Online] for School Students in 2 categories (VI-VIII on *Biodiversity-What we can do?* and IX-XII on *Atmanirbhar Bharat-Challenges in Energy Sector*). More than 2500 students took part enthusiastically.



Centre for Education and AcSIR Highlights

- ❖ Meeting of the Committee for Management of Affairs of CFE [Jan 05]
- ❖ Meeting of the Committee for Management of Affairs of CFE with the Final Year Faculty [Jan 06]
- ❖ AcSIR: Presentation on Societal Program [Jan 07]
- ❖ 1st DAC Meeting for Mr. A. Bebin, UGC JRF (Guide: Dr. M. Kathiresan) [Jan 18]
- ❖ 1st Review Meeting on B.Tech. Final Year Projects [Jan 20]
- ❖ Final Examination for AcSIR-IDDP Students [Jan 25]
- ❖ Viva Voce examination for Mr. S. Karuppusamy, AcSIR Scholar (Supervisor: Dr. M. Anbu Kulandainathan, Sr. Principal Scientist) [Jan 28]
- ❖ Student Academic Council Meeting [Jan 28]
- ❖ 1st DAC Meeting for Ms. N. Mohanapriya, AcSIR Scholar (Guide: Dr. C. Naveen Kumar) [Jan 29]
- ❖ Upgradation/Extension meeting of CSIR-JRF [Jan 29]

New Members in CSIR-CECRI Family

❖



Mr. Krushna Chandra Nayak has joined CSIR-CECRI Family on 13.01.2021 as Technical Assistant in CIF Division

❖



Mr. T. Mathan Kumar has joined CSIR-CECRI Family on 18.01.2021 as Technical Assistant in PPMG Section

Official Events

- ❖ Online Meeting of DG-CSIR with all Lab Directors and Lab Nodals on CSIR's Success Stories [Jan 06]
- ❖ Training Programme Organized by Bureau of Indian Standards for its Technical Committee Members [Jan 07]
- ❖ Online Discussion on Operation Management of LIB Unit at Chennai through ERP [Jan 20]
- ❖ Meeting of DG, CSIR with CSIR Lab Directors [Online] [Jan 20]
- ❖ Meeting of the Technology Evaluation Committee [Jan 20]
- ❖ Bhoomi Pooja for new Over Head Tanks [Jan 25]
- ❖ Webinar on "*Two Decades of TKDL - Connecting to the Future*" - Commemoration of 20 years of India's Traditional Knowledge Digital Library (TKDL) [Jan 25]
- ❖ JIGYASA - Meeting on CSIR Virtual Lab Project [Jan 25]
- ❖ Discussion with CSIR-NEERI, Nagpur on setting up of Raw Material Characterization (RACE) facility for Firecrackers [Jan 29]
- ❖ DST-sponsored Training Program on "*General Management Programme for Scientists*" organized by Administrative Staff College of India [Jan 18-29]

Recent Research Publications

- ❖ *Sulphur Doped Graphitic Carbon Nitride as a Dual Biosensing Platform for the Detection of Cancer Biomarker CA15-3*
S. Arunkumar, C. Anita, M. Sadasivam, P. Manickam and S. Alwarappan
Journal of Electrochemical Society, 168, 017507 (2021)
<https://doi.org/10.1149/1945-7111/abd927>
- ❖ *Self-Assembly of Precision Noble Metal Nanoclusters: Hierarchical Structural Complexity, Colloidal Superstructures, and Applications*
V.J. Rival, P. Mymoona, K.M. Lakshmi, Nonappa, T. Pradeep and E.S. Shibu
Small, 2005718 (2021)
<https://doi.org/10.1002/sml.202005718>
- ❖ *Decoration of CeO₂ Nanoparticles on Hierarchically Porous MnO₂ Nanorods and Enhancement of Supercapacitor Performance by Redox Additive Electrolyte*
S. Arunpandiyam, S. Vinoth, A. Pandikumar, A. Raja and A. Arivarasan
Journal of Alloys and Compounds, 861, 158456 (2021)
<https://doi.org/10.1016/j.jallcom.2020.158456>
- ❖ *Modulating Photoelectrochemical Water Splitting Performance via Construction of Type-II Heterojunction between g-C₃N₄ and BiOI*
S. Vinoth, P. Mary Rajithaa and A. Pandikumar
New Journal of Chemistry, 45, 2010 (2021)
<https://doi.org/10.1039/D0NJ05384H>
- ❖ *Assembly of Mixed Bi₄V_{1.4}Nb_{0.6}O₁₁ Phase and g-C₃N₄ Photoactive Material over rGO: Enhanced Organic Model Pollutants Removal under Sun Light Irradiation*
J. Venkatesan, C. Murugan, A. Pandikumar and M. Alagiri
Materials Science in Semiconductor Processing, 124, 105611 (2021)
<https://doi.org/10.1016/j.mssp.2020.105611>
- ❖ *Electrospinning as a Tool in Fabricating Hydrated Porous Cobalt Phosphate Fibrous Network as High Rate OER Electrocatalysts in Alkaline and Neutral Media*
S. Sam Sankar, A. Rathish Kumar, K. Geetha and Subrata Kundu
International Journal of Hydrogen Energy, 2021 (in press)
<https://doi.org/10.1016/j.ijhydene.2020.12.131>
- ❖ *Surface Decoration of DNA-Aided Amorphous Cobalt Hydroxide via Ag⁺ Ions as Binder-Free Electrodes toward Electrochemical Oxygen Evolution Reaction*
A. Karmakar, K. Karthick, S. Sam Sankar, K. Sangeetha, M. Raghunath and Subrata Kundu
Inorganic Chemistry, 2021 (in press)
<https://doi.org/10.1021/acs.inorgchem.0c03569>

Snapshots



MoU with CK Motors, Coimbatore on LIB Technology



Release of CECRI Club Calendars & Work Planner



Bhoomi Pooja for new Over Head Tanks



Republic Day Celebration



Farewell and Felicitation Function



Skill Development Training Programme



Skill Development Training Programmes

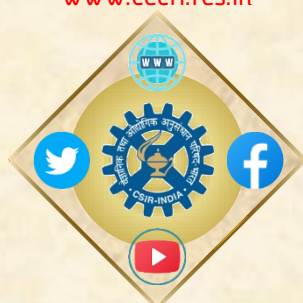


TECHNOLOGY COMPENDIUM OF CSIR-CECRI

- ❖ 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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