



May & June 2021
Volume 2 Issue 5&6

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

Knowhow Transfer to Tata Chemicals

CSIR-Central Electrochemical Research Institute's Knowhow on Lithium Ion Battery Technology was transferred to M/s. Tata Chemicals Ltd., Mumbai recently. After the lifting of lockdown restrictions, work under this Agreement commenced with an Online Inaugural Meeting on June 21, 2021, in the presence of DG-CSIR. A comprehensive Workmap with timeframe was arrived at and the Knowhow transfer got completed successfully within a week. This event was prominently highlighted in the Homepage of CSIR's Website and flashed in the Social Media Handles of CSIR and CSIR-CECRI.



EDITORIAL BOARD

Dr. S. Sathiyarayanan
Chairman

MEMBERS:

Mr. KR. Karuppiah
Mr. S. Gunasekaran
Mr. M. Jayakkannan
Mr. T. Ashok Balamurugan

“ **Big industries could help
the Central laboratories
to develop technology
for renewable energy**

Dr. Harsh Vardhan
Union Science and Technology Minister
(while laying the Foundation Stone of
CSIR-ICeNGESS, December 29, 2019) ”

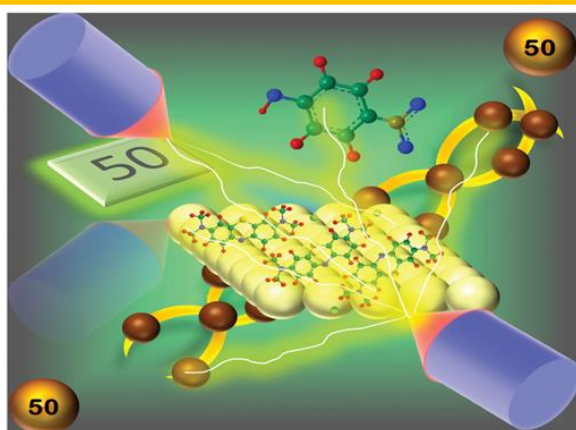
INSIDE THIS ISSUE

- Newly Sanctioned Projects
- Renewal of NABL Accreditation
- 2nd Industry Meet under ICeNGESS
- Online Workshop on *Electro-organic & Materials Electrochemistry*

Research Work of CSIR-CECRI decorated the Cover Page of Dalton Transactions

A recent research work of CSIR-CECRI from the research group of **Dr. Subrata Kundu**, Principal Scientist, Electrochemical Process Engineering Division got selected to appear in the Inner Cover Page of **Dalton Transactions** [2021,50], an esteemed journal of the Royal Society of Chemistry.

Subsequently, the Article caught immediate attention of the researchers worldwide and gained immense popularity to get elevated to the quarterly **HOT** article collection on the Website of the Journal.



Showcasing research from Dr. Subrata Kundu's laboratory, Electrochemical Process Engineering (EPE) Division, CSIR-Central Electrochemical Research Institute (CECRI), Karaikudi, Tamilnadu-630003, India.

Fabrication of highly stable platinum organosols over DNA-scaffolds for enriched catalytic and SERS applications

Synthesis of metal organosol is important from a scientific research view-point and for long-term industrial applications. Organosol provides high control towards particle size and shape with good monodispersity due to its 'low dielectric' constant. Moreover, it can be readily re-dispersed in many organic solvents for better catalytic and surface enhanced Raman scattering (SERS) applications. Herein, highly stable Pt@DNA organosol was prepared for the first time and effectively utilized as a catalyst for the reduction of aromatic nitro compounds and as a substrate for SERS studies.



As featured in:



See Subrata Kundu et al., Dalton Trans., 2021, 50, 7198.

rsc.li/dalton

Registered charity number: 2071603



Dear Dr Kundu,

I am delighted to let you know that we have added your article (**D1DT00653C : Fabricating Highly Stable Platinum Organosol over DNA-Scaffolds for Enriched Catalytic and SERS applications**) to our quarterly HOT article collection on our website.

A 'HOT' article contains research, which has been highlighted by reviewers as being interesting and significant research for the inorganic chemistry community.

Dalton Transactions HOT articles

Your article will be free to access for 6 weeks.

You can access these articles using your institutional login or by creating an individual user account which is free to setup - [get an account now](#)

I would like to take this opportunity to thank you for publishing your article with us. I look forward to considering future submissions for publication in *Dalton Transactions*.

Kind regards,

Dr Andrew Shore
Editor, *Dalton Transactions*
Royal Society of Chemistry

www.rsc.org

List of Newly Sanctioned Projects

Projects Sanctioned	Principal Investigator(s)	Budget (Rs.)	Start Date	End Date
Testing of Liquid Paint for Shalikote BT Plant - STP Ltd., Chennai	Dr. D. Sherwood	1,77,000	17.05.2021	30.06.2021
Cause of Corrosion and Prevention of natural gas carrying pipelines at Ramanathapuram - Thoothukudi pipeline	Dr. Rakesh Barik	7,62,574	08.06.2021	08.08.2021

Technology Transferred /Agreements/MoUs Signed

Non Disclosure Agreement

Greenko Energies Pvt. Ltd., Hyderabad [June 30]

(to explore the potential collaboration in the area of Sea Water Electrolysis)

NABL Accreditation

NABL Accreditation: CSIR-Battery Performance Testing and Evaluation Centre (CSIR-BPTEC) has been awarded renewal of its accreditation for next two years (till June 21, 2023) based on NABL Assessment which was held during April 24-25, 2021. **Two additional standards** with respect to **e-Rickshaw Batteries** and **Solar PV Batteries** have also been included under NABL scope of accreditation.

Business Development Leads

- ❖ Meeting with **Greenko Group**, Hyderabad on *Electrolyser Technology for Hydrogen Generation using Sea Water & related technologies* [May 06]
- ❖ Meeting with **L&T Power**, Gujarat on Project Proposal entitled *Carbon Capture Utilization and Storage Initiative* & on LFP Technology [May 07]
- ❖ Discussion with **NALCO**, Bhubaneswar on Indigenous Al-Air battery development [May 20]
- ❖ Discussion with **Nagarjuna Fertilizers** on Electrochemical production of Ammonia from Nitric oxide [May 21]
- ❖ Meeting between **CSIR and Colgate Palmolive** on the possibilities of technology transfer or collaborations in identified R&D areas [May 26]
- ❖ Meeting with **Tunga** on Lithium-ion Batteries for Submarines of **Indian Navy** [May 29]
- ❖ Meeting with **NTPC** on Battery technologies, Hydrogen Generation and CO₂ Value Addition [June 01]
- ❖ Meeting between Team CSIR (IMD & II) and Team CSIR-CECRI on LIB Technology from the **PLIS** perspective, as advised by DG, CSIR [June 04]
- ❖ Meeting with **High Energy Batteries** on *Development of Mg-based alloy electrode materials for seawater batteries* [June 09]
- ❖ **DST-HFC2021** Call: Meeting with **L&T Power**, Gujarat on the Project Proposal *Development of cost-effective carbon capture use and storage for reforming processes* [June 16]
- ❖ Meeting with **Raasi Group of Companies**, Bengaluru on **PLIS** and related MoUs [June 16]
- ❖ **DST-HFC2021** Call: Meeting with **Eastern Electrolyser Ltd.**, Noida on *Development of improved electrolyzers at MW scale* [June 17]
- ❖ Meeting with **Rennergizr Industries**, Delhi on *Green Hydrogen Production for Fuel Cell* [June 18]
- ❖ Internal Discussion on *Electrochemical Production of Ammonia (NH₃) and CO₂ to Value Added Products* [June 23]
- ❖ Meeting with **Tata Consulting Engineers**, Mumbai on *Hydrogen Generation & Storage* [June 24]
- ❖ Meeting with **NALCO**, Bhubaneswar on *Aluminium Air Battery Technology* [June 25]
- ❖ Research Collaboration Meeting with **Jubliant Chemicals** [June 25]
- ❖ Meeting on **PLIS** - Indigenous LIB technology under **AatmaNirbhar Bharat** in the presence of DG, CSIR [June 28]
- ❖ Meeting with **Indian Navy** Officials on harnessing Nuclear Energy [June 29]

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

ICeNGESS:

- ❖ Discussions with Epsilon, Qmax, Carborundum, Neogen, CK Motors, India Energy Storage Alliance, Octillion, TUNGA Systems, Labkarts, Hindalco & Gujarat Fluorochemicals [May 13-15]

Theme Projects:

- ❖ Review Meeting [Online] of ongoing FBR/NCP projects under 'Energy and Energy Devices' (E2D) Theme of CSIR [May 03]

- ❖ **Industry Meet on Hydrogen Generation & Storage** under Energy Theme Sub-vertical III: Hydrogen Energy including Hydrogen Economy [May 27]
- ❖ DG's Meeting with TMDs and Directors on **CSIR Thematic Road Maps for AatmaNirbhar Bharat and Budget Announcement Initiatives to boost S&T** - Director, CSIR-CECRI made a presentation on E2D Theme [June 29]

Official Events

- ❖ Internal Meeting on Oxygen production [May 04]
- ❖ Meeting with **Indian Air Force**, Sulur [May 19]
- ❖ Discussion with CSIR HQ and CSIR-NCL on upcoming **Industry Meet on Hydrogen Generation and Storage** [May 27]
- ❖ DG, CSIR's Meeting with all Directors of CSIR Labs [June 02 and June 29]
- ❖ Meeting with Director, CSIR-CFTRI on futuristic collaborative projects on Energy [June 09]
- ❖ National Webinar on **R&D services through I-STEM Portal** [June 10]
- ❖ Meeting between **ISTAD & CECRI** on **CSIR-Fraunhofer FIP program** [June 10]
- ❖ Internal meeting on **SOEC / SOFC & Metal Air Batteries** [June 24]
- ❖ Webinar on *Energy storage solutions beyond Li-Ion Technology* organized by WRI, India [June 24]
- ❖ Round Table on Global and India R&D Initiatives organized as a part of the Advanced Chemistry Cell (ACC) Manufacturing Masterclass by India Energy Storage Alliance (IESA), Pune [June 26]

2nd Industry Meet on Indigenous Supply Chain for ICeNGESS

The Meet commenced with welcome address by **Dr. (Mrs) N. Kalaiselvi**, Director, CSIR-CECRI in which she updated the participants on the present status of Phase I and Phase II of the Project.

She informed that **3 technologies** viz., (i) NMC material making technology, (ii) Cell making technology using NMC and (iii) Performance improved LFP cathode developed by CSIR-CECRI are ready to be offered through hand-holding ToT practices to any number of companies.

In his initial remarks, **Hon'ble Member of NITI Aayog, Dr. V.K. Saraswat** congratulated Director, CECRI for the successful efforts of her CECRI team. He stressed on the critical timeline to be adhered and wished acceleration of Phase I and II work with the support of indigenous supply chain.

Dr. Rahul Walawalker, Customized Energy Solutions and IESA, assured extended support in identifying and forming a consortium of potential partners to meet out the OPEX costs of CECRI's upcoming plant. **Mr. Sumit Garg**, Epsilon expressed their desire to supply both synthetic & natural graphite based anode materials required by CECRI. **Mr. Sivakumaran**, CUMI informed that they are working closely with global partners to meet with the international standards in anode materials. **Dr. Harin Kanani**, Neogen Chemicals Ltd. expressed their capability to supply electrolytes and sought CECRI's help in getting ToT on value added LFP.

Mr. Sagar Dhamorikar, Hindalco identified themselves as suppliers of aluminium foil reels as per customized requirements. **Mr. Piragalathan Perumalsamy**, Glowers Green Technologies introduced themselves as cell case manufacturers and evinced interest in buying CECRI-made cells for

their battery packs for 2/3 wheeler applications. **Mr. M.C. Thomas**, Tata Steel Mining presented their association with CECRI on anode materials. **Dr. Saraswat suggested to tie up with Lithium mines in other countries such as Burundi.**

Mr. V. Vijaykumar, Qmax shared details on developing and testing BMS for battery packs and expressed desire on NMC technology and cells to pack arrangement. **Mr. Yashodhan Gokhale**, Octillion showcased their capability in supplying in-house developed BMS and battery packs. **Mr. Shiraj Modi**, Gujarat Fluorochemicals declared that they are looking forward to supply PVDF binders and electrolyte components. **Dr. C. Gunasekaran** of CK Motors introduced themselves as start-up EV Company involved in establishing a manufacturing plant for Lithium-ion battery stacks in Coimbatore.

In his **concluding remarks**, Dr. Saraswat wholeheartedly appreciated CSIR-CECRI for the recent developments on indigenized electrode materials, patent protection and readiness towards ToT. He also expressed his delight on the strenuous efforts of CSIR-CECRI in establishing indigenous supply chain. He thanked all the participant industries and solicited their complete support in realizing **AatmaNirbhar Bharat**. He assured of continued support to this ambitious project through all possible means.

Dr. A.S. Prakash, PI of ICeNGESS proposed vote of thanks in which he profusely thanked Dr. Saraswat for guiding and supporting ICeNGESS from its inception and being a constant pillar of support. He also thanked **Dr. R.P. Singh** and **Dr. Hari Om Yadav** of CSIR HQ for their continued assistance. He thanked all the industry representatives for making the Meet a grand success.



Skill Development Activities

The Skill Development Group of CSIR-CECRI organized the following Training Programmes of 1 week duration (Online) [Total Participants~1500]:

- ❖ *Surface Coatings for Value Added Products: Decorative & Functional Applications* [May 03-07]
- ❖ *Photolithography based Microfabrication of Sensors* [May 17-21]
- ❖ *Energy Materials: Fundamentals to Device Fabrication* [June 21-26]
- ❖ *Corrosion Protection Technologies for Construction of Buildings and Structures* [June 28-July 2]
- ❖ *Operation and Maintenance of Analytical Instruments* [June 28-July 02]

JIGYASA:

The following lectures were arranged under Jigyasa: **Connect with Scientists (Webinar series):**

- ❖ *Food toxicants sensors: challenges driven opportunities* by Dr. K. Giribabu [June 10]
- ❖ *Electrochemical water treatment methods* by Dr. R. Malini [June 17]
- ❖ *Recent advances in polymer electrolyte fuel cells and material challenges* by Dr. Santhoshkumar Bhat [June 24]

Task Force Committee (TFC) Meeting: Jigyasa 2.0 Proposal was presented (Online) to TFC, CSIR HQ [June 18]

Centre for Education and AcSIR Highlights

- ❖ Screening of the Ph.D. Admission Applications for August 2021 Session
- ❖ Template for selection of scholars sent to AcSIR for uploading in AcSIR Website
- ❖ Doctoral Advisory Committee Meeting for Ms. Thamarai Selvi (Guide Dr. S.K. Jha) [May 19]

Recent Research Publications

- ❖ *Electrochemical mineralization of iron-tannate stain on HAp and bovine enamel - A non-peroxide approach*
V. Suryanarayanan, Deepak Kumar Pattanayak, R. Senthil Kumar, LaTonya Kilpatrick, Suman Chopra, GuoFeng Xu, Lin Fei, Cajetan Dogo-Isonagie, Patrik Johansson
Heliyon, 7, e07296 (2021)
<https://doi.org/10.1016/j.heliyon.2021.e07296>
- ❖ *Interfacial charge dynamics in type-II heterostructured sulfur doped-graphitic carbon nitride/bismuth tungstate as competent photoelectrocatalytic water splitting photoanode*
C. Murugan, K. Ranjithkumar and A. Pandikumar
Journal of Colloid and Interface Science, 602, 437 (2021)
<https://doi.org/10.1016/j.jcis.2021.05.179>
- ❖ *In-situ decorated Ni metallic layer with CoS₂ layered thin films via layer by layer strategy using pulsed laser deposition (PLD) for enhanced electrocatalytic OER*
M. Mathankumar, K. Karthick, A.K. Nanda Kumar, Subrata Kundu and B. Subramanian
Inorganic Chemistry, 60, 8946 (2021)
<https://doi.org/10.1021/acs.inorgchem.1c00839>
- ❖ *TiO₂/Carbon allotrope nanohybrids for supercapacitor application with theoretical insights from density functional theory*
A. Seetharaman, M. Kandasamy, B. Chakraborty, S. Manivannan, J. Kandasamy, S. Kaipannan, A. Pandikumar, M. Sathish, V.R. Soma, D. Sivasubramanian and B. Chakraborty
Applied Surface Sciences, 563, 150259 (2021)
<https://doi.org/10.1016/j.apsusc.2021.150259>
- ❖ *Electrospun cobalt-incorporated MOF-5 microfibers as a promising electrocatalyst for OER in alkaline media*
M. Ragunath, S. Sam Sankar, K. Karthick, Arun Karmakar, K. Sangeetha and Subrata Kundu
Inorganic Chemistry, 60, 9899 (2021)
<https://doi.org/10.1021/acs.inorgchem.1c01151>
- ❖ *Hierarchical porous CeO₂ micro rice supported Ni foam binder free electrode and its enhanced pseudocapacitor performance by redox additive electrolyte*
S. Arunpandiyan, A. Raja, S. Vinoth, A. Pandikumar and A. Arivarasan
New Journal of Chemistry, d1nj01877a (2021)
<https://doi.org/10.1039/D1NJ01877A>

Online Workshop on “Electro-organic & Materials Electrochemistry”

Society for Advancement of Electrochemical Science and Technology (SAEST) in association with CSIR-CECRI organized a Online Workshop on *Electro-Organic and Materials Electrochemistry* on June 29, 2021. Dr. S. Vasudevan, Secretary, SAEST during his welcome address briefed on the genesis of the conference. Dr. (Mrs) N. Kalaiselvi, Director, CSIR-CECRI, in her presidential address explained the significance of both organic and materials electrochemistry and highlighted on relevant technologies recently developed at CSIR-CECRI.

During the Workshop, 3 lectures were delivered by eminent scientists. Prof. Katsuhiko Ariga from Japan delivered a talk on Mechanical control of molecular machines and stem cells on liquids. In his talk, he emphasized the challenges and breakthroughs in molecular machines and stem cells with new materials coatings which can be prepared through layer by layer technology. Prof. Frank Marken from University of Bath, UK explained on the electrochemistry of Polymers of Intrinsic Microporosity (PIMs) and its usage in water

purification and diode array. Dr. Raja Thirumalaiswamy from CSIR-NCL, Pune narrated their recent technology on Heterogenous Catalysts development and their uses in a) Activation of lower hydrocarbons and dehydration study of Methanol. He also delineated the importance of the product from methanol (Dimethyl ether (DME)) as a hydrogen energy carrier.

During this Workshop, a **Felicitation Function** was arranged to Dr. D. Velayutham, Chief Scientist and Head, Electro-Organic & Materials Electrochemistry Division, CSIR-CECRI superannuating on 30/06/2021.

Dr. (Mrs) N. Kalaiselvi, Director, CSIR-CECRI, Prof. Vijayamohan K Pillai, Professor & Chair, Chemistry, IISER-Tirupati and former Director, CSIR-CECRI, Prof. P. Manisankar, Former Vice-Chancellor, Bharathidasan University, Dr. M. Noel, former Chief Scientist, CSIR-CECRI and Prof. M.V. Sangaranarayanan, IIT Madras offered felicitations and recalled the valuable contributions of Dr. Velayutham to the Institute.



Assessment Promotions

From Sr. Principal Scientist to Chief Scientist

1) Dr. (Mrs) N. Kalaiselvi, 2) Dr. G. Subramanian, 3) Mr. R. Rajasekar, 4) Dr. M. Ganesan

Superannuation

The following Staff Members superannuated on June 30, 2021 after a long illustrious service:



Dr. D. Velayutham
Chief Scientist



Dr. S. Udaya Bhanu
Pri. Scientist



Shri. R. Rajindiran
Sr. Technician (2)



Shri. T. Chockalingam
Sr. Technician (2)

Snapshots



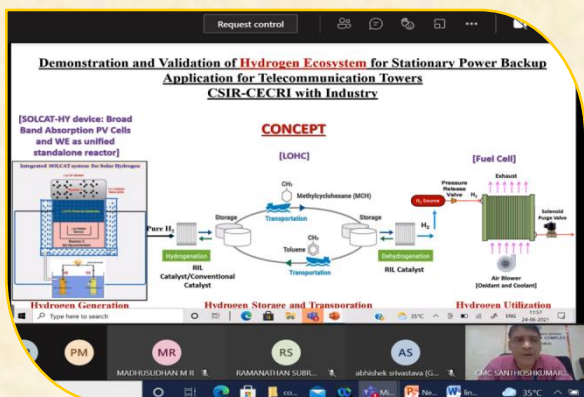
Skill Development Training Programme: i. Energy Materials: Fundamentals to Device Fabrication



ii. Corrosion Protection Technologies for Construction of Buildings and Structures



iii. Operation and Maintenance of Analytical Instruments



JIGYASA - Connect with Scientists Webinar Series



Webinar on Energy storage solutions beyond Li-Ion Technology



Farewell and Felicitation on Superannuation

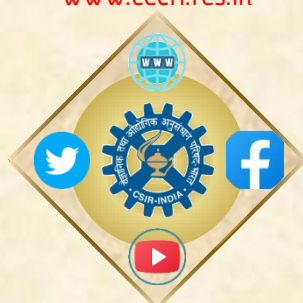


TECHNOLOGY COMPENDIUM OF CSIR-CECRI

- ❖ 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

www.cecni.res.in

https://www.twitter.com/CSIR_CECRI



<https://www.facebook.com/1CSIR.CECRI>

<https://www.youtube.com/c/CSIR-CECRI-KKDI>