



CECRI NEWS

(A monthly newsletter of CSIR-CECRI)
compilation of significant happenings

International Day of Yoga Celebrations

CSIR-Central Electrochemical Research Institute (CSIR-CECRI), Karaikudi celebrated the 9th International Day of Yoga on June 21, 2023 with invigorating events including an informative lecture. Staff Members, Research Scholars, and B.Tech. Students took part in these events in large numbers exhibiting enormous enthusiasm. **Shri. S. Kamaraj**, from the Karaikudi Centre of the **Mahayogam Foundation** based at Kanchipuram, Tamil Nadu which specializes in Yoga, Kriya & Meditation, Zenskar-Healing Martial Arts, Energy Medicine & Research, Education & Culture, Astro Science and Traditional Seed Promotion activities graced the occasion as the Chief Guest and delivered a captivating Lecture on various aspects on the theme of the event. He also conducted the live practical yoga session on essential exercises and postures for an energetic and positive life ahead.



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*“Yoga for Vasudhaiva Kutumbakam”,
which also represents as
“One Earth, One Family, One Future”*

- The theme for the
International Day of Yoga 2023



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Earlier, **Dr. N. Lakshminarasimhan**, Senior Principal Scientist, CSIR-CECRI welcomed the participants to Lecture. He thanked the CECRI Club for organizing this much-sought after activity in our fast-paced world and expressed his gratitude to the Chief Guest for his acceptance and presence.

Dr. V. Saraswathy, Chief Scientist, CSIR-CECRI in her Presidential Address cited her own life examples and explained in detail how she could successfully overcome all with the help of yoga and meditation. She particularly stressed on the stressful life of women workforce who are struggling hard to strike a right balance between career and family life. Yoga and Meditation are a must for the mental and physical well-being of such women, she opined. She called for maximum utilization of this apt opportunity facilitated by CECRI Club by all its members and dependents.

Shri. S. Kamaraj, Yoga Guru, Mahayogam Foundation, Karaikudi began his Lecture in a subtle way by explaining the origin of **Yoga**, its significance and soon synced with the minds of the audience mesmerizing them with secrets behind many myths and the real story hidden within.

He highlighted the concept of **Panchaboothangal** - the five elements of nature viz. **Earth, Water, Fire, Air and**

Space which forms the basic composition of the Universe and basic knowledge about these five elements will helps us in understanding the laws of nature, he added. He further added that any universal process cannot evolve without involving these five elements. The event ended with a vote of thanks by **Dr. P. Murugan**, Secretary, CECRI Club.

A live practical **Yoga Session** ensued which was guided by the Guru and his students. Special emphasis was given to basic yoga poses including '**Surya Namaskar**' to get relief from daily work stress and self-defense methods to get rid of emergency threats especially for women employees and students. The Guru and his students monitored the participants engaged in the session in smaller groups and meticulously made corrections in the postures instantly which ensured active and accurate participation.

Shri. Kamaraj also elaborated in detail on the science and logic behind each act/asana which served as an eye-opener for the participants. He also delineated on the **Energy Chakras** in our body and the relevant points to be activated. All the participants profusely thanked CECRI Club for organizing this energy enriching event as they all reaped immense benefits and gained valuable insights into the traditional knowledge originated from our Nation many decades ago.



CSIR Jigyasa Activities

Council of Scientific and Industrial Research (CSIR), India and the **Royal Society of Chemistry (RSC), UK** entered into a *Memorandum of Understanding* on September 22, 2022 to support an outreach programme designed to promote the chemical sciences in schools and universities. The two organisations committed to work together on the **CSIR's Jigyasa** programme, a pan-India outreach programme, objective of which is to extend the classroom learning by focusing on well-planned research laboratory based learning for school students. Jigyasa is aimed to inculcate the culture of

curiousness and scientific nature thereby widening and deepening the *Scientific Social Responsibility (SSR)* of CSIR. It also envisages opening up the national scientific facilities to school children enabling dissemination of CSIR's scientific knowledgebase. Following are the models of engagement under **CSIR Jigyasa**: Laboratory Visits, Popular Lecture Series, Summer Vacation Programmes, Scientists as Teachers and Teachers as Scientists, Teachers' Workshop, Student Residential Programmes, Visit of Scientists to Schools, Lab-specific activities/on-site experiments and many more.

Teacher Training programme

Under the umbrella of the above MoU, CSIR-CECRI organized a two-day **Teacher Training Programme** in association with RSC during June 5-6, 2023 at CSIR-CECRI, Karaikudi. **Ms. Indira Nair** and **Ms. Karima Anjum** from **Royal Society of Chemistry India Foundation, Bangalore** were the Expert Trainers for this

exclusive training programme in which around 70 Science Teachers (TGT/PGT) from Government/Govt. aided/Private schools actively took part. All the participant teachers felt refreshed and rejuvenated as they were given training ranging from basic/fundamental methods to advanced/emerging trends.



Summer Vacation Programme

Under CSIR Jigyasa, **Summer Vacation Programme** was organized by CSIR-CECRI for school students during May 22 – June 9, 2023 in which the students were given hands-on training on R&D lab procedures and were guided to further their area of interest thereby attracting them to science. The following students participated and gained valuable insights from this program: i) R. Gopika and K. S. Kumaravel from Naahar

Public School, Villupuram, ii) G. Pradeepa and S. Mohamed-Arif from Ramanathan Chettiar Municipal High School, Karaikudi, iii) G. Kannammal and A. Pavithrakumari from Sri Meenakshi Girls Hr. Sec. School, Karaikudi, iv) M. Murukesh, Kendriya Vidyalaya No.1, JIPMER, Puducherry, v) R.P.K. Manovignesh, Kendriya Vidyalaya, Vijayanarayanam, vi) R. Lavanya, Government High School, Kalasambadi, Nagapattinam.



Business Development Leads

- ❖ Meeting with **Cochin Ship Yard Ltd.** Officials [June 1, 20]
- ❖ Meeting on **CO₂ Capture & Conversion** [June 6]
- ❖ Meeting With **AIC-NIFTTEA-Incubation Centre** Tiruppur, Tamil Nadu on R&D collaboration [June 7]
- ❖ Discussion on Electrode Fabrication Coating Machine with **Ultrasonic Systems, Inc., USA** [June 9]
- ❖ Meeting of the Project Proposal Review /

- Recommendation Committee [June 12]
- ❖ Meeting with **Ather** on R&D collaboration [June 13]
- ❖ CSIR-AMM HCP-030-Review Meeting [June 13]
- ❖ Project Review Meeting with **NALCO** [June 26]
- ❖ Meeting of Know-how Proposal Evaluation Committee [June 23, 26]
- ❖ First Meeting of Monitoring Committee of **CSIR-FIRST** Projects [June 28]

CFE and AcSIR Highlights

AcSIR:

- ❖ PhD Viva Voce Examination for Mr. R. Velmurugan, AcSIR Scholar (Guide: Dr. B. Subramanian) [June 2]
- ❖ Synopsis Submission of Mr. S. Arunkumar, AcSIR Scholar (Guide: Dr. Subbiah Alwarappan) [June 9]
- ❖ Synopsis Submission of Ms. M. Kiruba, AcSIR Scholar (Guide: Dr. C. Jeyabharathi) [June 19]
- ❖ III DAC Meeting for Ms. N. Mohanapriya, AcSIR Scholar (Guide: Dr. C. Naveen Kumar) [June 20]

- ❖ Synopsis Submission of Ms. S. Sathya, AcSIR Scholar (Guide: Dr. A. Manuel Stephan) [June 21]
- ❖ Synopsis Submission of Mr. A. Abbasriyaludeen, AcSIR Scholar (Guide: Dr. P. Murugan) [June 28]

Centre for Education:

- ❖ Admission to **B.Tech.** Course under Other State Quota [June 15]
- ❖ Management Affairs Committee Meeting [June 21]

Official Events

- ❖ Meeting of the Procurement Committee - Video on CECRI's Technologies - *One Week One Lab* [June 1]
- ❖ Meeting on *One Week One Lab* Event [June 2, 9]
- ❖ Review Meeting on Green Hydrogen Mission [June 3]
- ❖ Dissertation Works Committee Meeting [June 6]
- ❖ Interview for Engagement of Apprentices [June 7]
- ❖ Meeting of the Works Committee [June 8]
- ❖ Editorial Committee Meeting - Video on CECRI's Technologies - *One Week One Lab* [June 2, 7, 8, 9, 13]
- ❖ Governing Council Meeting and Annual General

- Body Meeting of SAEST [June 14]
- ❖ Meeting with ISTAD, CSIR HQ [June 15]
- ❖ ECS Students Chapter Meeting [June 16]
- ❖ Organising Committee Meeting for 20th National Conference on Corrosion Control [June 20]
- ❖ OLIC and TOLIC Meeting [June 20, 21]
- ❖ Interview for Project Personnel [June 22-23]
- ❖ Review Meeting on National Technical Textile Mission [June 27]
- ❖ Farewell & Felicitation for Retirees [June 30]

Cardiology Medical Camp

CSIR-CECRI in association with Apollo Hospitals, Managiri, Karaikudi organized a **Cardiology Medical Camp** on June 27, 2023 for the benefit of CSIR-CECRI Staff, Pensioners and their Family Members. **Dr. M. Ranga Manikandan, MD (Gen. Med.), DM (Cardio), DNB**

(Cardio), **Apollo Hospitals** was the Chief Consultant. Many patients consulted him and cleared their doubts on Cardiology in general and their health condition in particular. Health Care Committee of CSIR-CECRI coordinated the necessary arrangements in this regard.



Skill Development Activities

Skill Development Training Programmes:

- ❖ A Skill Development Training Programme on **Solar Energy Technologies: Fundamentals to Device Fabrication** was organized by CSIR-CECRI during June 12-16, 2023. A total of 38 participants took part in this programme.
- ❖ A Skill Development Training Programme on **Electroanalytical Techniques for Electrocatalytic and Biosensing Applications** was organized by CSIR-CECRI during June 26-30, 2023. A total of 65 participants attended this training programme.

CSIR-JIGYASA:

- ❖ **Vigyana Vindhavi Programme:** The following talks were delivered during June 2023 in the Alagappa University Community Radio:
 - i) Ms. K. Nivedha, JRF (DST-INSPIRE) on *Energy and its Applications* [June 7]
 - ii) Dr. M. Sathish, Principal Scientist on *Super-capacitors* [June 14]

- iii) Four of our B.Tech. first year Students namely, K. Subathra, R. Tejashree, C. Kavya Shree and V. Pavadharani organized a group discussion on *Waste to Wealth* [June 23]

- ❖ **Online Quiz Contest** was organized through our Website on the following National/International Days of Importance during June 2023 :

- i) World Environment Day [June 5]
- ii) World Food Safety Day [June 7]
- iii) World Oceans Day [June 8]
- iv) World Wind Day [June 15]
- v) International Yoga Day [June 21]

- ❖ **Visit of Students:**

30 students and two faculty members from Alagappa University-Learnnet Institute of Skills under Alagappa Skill Development Programme, Karaikudi visited CSIR-CECRI on June 8, 2023 and witnessed a glimpse of the ongoing R&D activities in various divisions.

Lifestyle for Awareness (LiFE) pledge

On the occasion of **World Environment Day**, *Lifestyle for Awareness (LiFE)* Pledge Ceremony was organized on June 5, 2023 at CSIR-CECRI, Karaikudi.

Dr. K. Ramesha, Director, CSIR-CECRI administered LiFE pledge to all the members of CSIR-CECRI Family at 10:30 am in the CECRI main building (near Gandhi portrait). He addressed the gathering on the importance of awareness in our routine daily life activities related to our own wellbeing and protection of environment towards a sustainable future. A large number of staff members and scholars took part enthusiastically in the event and evinced keen interest in ensuring an energetic life & effervescent environment for the next generation.



Azadi Ka Amrit Mahotsav and CSIR-CECRI@75



As a part of the ongoing Lecture Series on '**Electrochemical Science and Technologies: A Path Forward to Sustainable Society**' in marking the celebrations of India's 75th Year of Independence (**Azadi ka Amrit Mahotsav**) and CSIR-CECRI's 75th Foundation Year (**CSIR-CECRI@75**), **Dr. B. Chandrasekaran**, Distinguished Scientist, CSIR-CLRI, Chennai delivered a lecture on ***In pursuit of Sustainable Excellence: An 'events-filled' Journey*** [June 22]. He began his talk by bringing out the striking similarities between CSIR-CLRI and CSIR-CECRI in their origin, vision & mission and R&D areas. Later he shifted gears and shed light on the significant achievements of CLRI and its seminal contribution in Nation building.

Honours and Awards



Mr. M. Lakshmi Narayana, B.Tech. Student [2019-23 passed out batch] has been selected for admission to **MS+Ph.D. by Research Programme** at the **Department of Chemical Engineering, Indian Institute of Technology, Madras** under **High-Throughput Research Associate (HTRA) Scheme** for the Academic Year 2023-24.



Ms. Ardra S Darsan, DST-INSPIRE-JRF & AcSIR Scholar (Guide: Dr. P. Murugan) has won the **Best Poster Presentation Award** for the work *Structured Hematite Thin Films Grown by Pulsed Laser Deposition for Photoelectrocatalytic Water Splitting* in the **Three-day International Workshop / Summer School & Course Preparation on Solar Water Splitting and Artificial Photosynthesis (SWAP)** held during June 5-7, 2023 at Madurai Kamaraj University.



Ms. Shubhi Tripathi, AcSIR Scholar (Guide: Dr. S. Ravichandran) has won the **Best Poster Presentation Award** for the work *Economical Comparison of Capillary Mode Electrolysis with Existing Water Electrolyzers to Generate Green Hydrogen* in the **International Conference on Energy Conversion and Storage (IC-ECS-2023)** held during June 21-23, 2023 at Amrita Vishwa Vidyapeetham, Coimbatore.

Recent Research Publications

- ❖ An ultrathin 2D NiCo-LDH nanosheet decorated NH₂-UiO-66 MOF-nanocomposite with exceptional chemical stability for electrocatalytic water splitting
S.K. Saddam, M. Ragunath, Deepak S. Gavali, Vidha Bhasin, Ranjit Thapa, S.N. Jha, D. Bhattacharyya, Subrata Kundu and Ujjwal Pal
Journal of Materials Chemistry A 11 (2023) 10309; <https://dx.doi.org/10.1039/d3ta00836c>
- ❖ Structural modulation of low-valent iron in LDH-derived Ni₃Se₄ nanosheets: a breakthrough electrocatalyst for the overall water splitting reaction
Arun Karmakar, V.K. Abhirami, Rahul Jayan, Ragunath Madhu, Md Mahbubul Islam and Subrata Kundu
Journal of Materials Chemistry A 11 (2023) 10684; <https://doi.org/10.1039/D3TA00868A>
- ❖ Enhancing the surface-active sites of bimetallic 2D hydroxide materials by Introducing Fe²⁺ Ions toward effective hydroxide adsorption for the water oxidation reaction
Aditi De, Arun Karmakar and Subrata Kundu
ACS Applied Energy Materials 6 (2023) 5761; <https://doi.org/10.1021/acsaem.3c00139>
- ❖ Regulating surface charge by embedding Ru nanoparticles over 2D hydroxides toward water oxidation
Arun Karmakar, Rahul Jayan, Ankit Das, Althaf Kalloorkal, Md Mahbubul Islam and Subrata Kundu
ACS Applied Materials and Interfaces 15 (2023) 26928; <https://doi.org/10.1021/acsami.3c05512>
- ❖ Exploring the linear relationship between potential dynamics and interfacial capacitance: implications for enhancing the turnover frequency in electrochemical water splitting
Arun Karmakar, N. Sreenivasan, Ankit Das, Althaf Kalloorkal and Subrata Kundu
Journal of Materials Chemistry A 11 (2023) 15635; <https://doi.org/10.1039/D3TA02540C>
- ❖ A review on consequences of flexible layered double hydroxide-based electrodes: fabrication and water splitting application
N. Sreenivasan, Seungmin Yang, Arindam Adhikari, Rajkumar Patel and Subrata Kundu
Sustainable Energy Fuels 7 (2023) 3741; <https://doi.org/10.1039/D3SE00573A>
- ❖ Bypassing the scaling relationship with spin selectivity: construction of Lewis base-functionalized heterostructural 2D nanosheets for enhanced oxygen evolution reaction
Arun Karmakar, Durairaj Mahendiran, Ragunath Madhu, P. Murugan and Subrata Kundu
Journal of Materials Chemistry A 11 (2023) 16349; <https://doi.org/10.1039/D3TA02815A>
- ❖ Tuning the surface electronic structure of amorphous NiWO₄ by doping Fe as an electrocatalyst for OER
N.D. Hariharan, M. Ragunath, Aditi De, Mohamed A. Salem, B. Ramesh Babu and Subrata Kundu
Inorganic Chemistry 62 (2023) 11817; <https://doi.org/10.1021/acs.inorgchem.3c01095>

Snapshots



SDTP on Solar Energy Technologies: Fundamentals to Device Fabrication



SDTP on Electroanalytical Techniques for Electrocatalytic and Biosensing Applications



Participants of CSIR Jigyasa Teachers Training Programme



Vigyana Vindhai Programme - Alagappa University Community Radio



Governing Council Meeting and Annual General Body Meeting of SAEST



Director's Maiden Address to the Research Scholars Forum



Felicitations to B.Tech. Sports Achievers

- ❖ Indigenous Li-ion battery
- ❖ Indigenous Sodium Ion Battery
- ❖ Performance Improved Lead Acid Battery
- ❖ CO₂ 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 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 for Rebars
- ❖ Electrochemical Preparation of DL-Homocysteine Thiolactone Hydrochloride from DL- Homocystine
- ❖ 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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