CSIR-CENTRAL ELECTROCHEMICAL RESEARCH INSTITUTE, KARAIKUDI

PLACEMENT PROFILE 2022-2023

Centre For Education

B.Tech. (Chemical and Electrochemical Engineering)

Affiliated to

Anna University, Chennai

Centre for Education
CSIR-Central Electrochemical Research Institute
Karaikudi-630003, Tamil Nadu.

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OUR VISION

Central Electrochemical Research Institute (CECRI) is the major platform for various inventions and innovations in the field of Electrochemistry. It is well equipped in providing the knowledge and experience to the students in science, technology and liberal arts, and also in preparing them to handle the challenges of the modern world. In order to evolve into an academy of excellence, CECRI does its best to impart all of its expertise to the students.

OUR MISSION

- To create and sustain a community of learning in which students acquire knowledge and learn to apply it professionally with due consideration for ethical, logical and economic issues.
- To provide knowledge-based on technological services to satisfy the needs of the society and the industries.
- To help in building professional capabilities in science, technology, humanities, management, education and research.

OUR CORE VALUES

INTEGRITY
Honest, ethical and responsible behaviour will be fundamental to all our dealings and actions.

DIVERSITY OF IDEAS
We encourage plurality and diversity of ideas to create a robust and vibrant future.

ACADEMIC FREEDOM
We ensure complete academic freedom in teaching and research.

ENQUIRY
We foster the spirit of scientific enquiry.

TRANSPARENCY
We exhibit transparency in all that we do.

ENVIRONMENTAL STEWARDSHIP
We are committed to developing and participating in green technologies.

EXCELLENCE
We endeavour to excel in research, education and student activities.

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ABOUT US

The CSIR-Central Electrochemical Research Institute (CSIR-CECRI), a premier research establishment of electrochemistry in South Asia founded in 1948, has its roots in the patriotic fervour of Padma Bhushan Dr. RM. Alagappa Chettiar, Pandit Jawaharlal Nehru and Dr. Shanti Swarup Bhatnagar, who conceived the idea of a dedicated research center of electrochemistry in order to cater the demands and needs of society. On January 14, 1953 CECRI became a physical reality when Dr. S. Radhakrishnan dedicated CECRI, the twelfth national laboratory under the CSIR umbrella, to the nation.

CECRI today is a proud family of more than 300 employees, including more than 100 scientists and other staff members. Headquartered at Karaikudi, CECRI has extension centres at Chennai and Mandapam. The CECRI campus has a rich biodiversity of flora and fauna, and is ample green and serene environment making it an apt ambience for R&D work.

CECRI has blossomed into a launching pad for a multitude of technologies for the Indian electrochemical industry. Naturally, reflecting on the fact that the inimitable Dr. Alagappa Chettiar donated 300 acres of land and Rs.15 lakh as cash in 1948 to establish a national laboratory devoted solely to Electrochemistry at a time when Electrochemistry was relegated to the flip-side of Physical Chemistry syllabi in universities, one cannot miss the rare philanthropy and foresightedness of this great visionary.

In living up to its *raison d'etre,* the institute works on a gamut of problems covering all facets of electrochemical science and technology: viz., Corrosion & Materials Protection, Electrochemical Power Sources, Electroplating & Metal Finishing, Electrodics & Electrocatalysis, Electrochemical Process Engineering and Electro-organic & Materials Electrochemistry. The institute provides a single and unique canopy under which all aspects of electrochemistry and related areas are investigated upon in all their dimensions. The activities of CECRI are directed towards the development of new and improved products and processes as well as innovations in electrochemical science and technology. CECRI undertakes several R&D projects in collaboration with laboratories and private companies within and outside India. The 750 patents, 250 processes, 800 sponsored and grant-in-aid projects (in the last five years), 550 licenses and 6,500 research papers in peer-reviewed national and international journals that the institute boasts of are ample testimony to its leadership in nation building.

CECRI assists Indian industry by conducting surveys and undertaking consultancy projects. CECRI has developed and transferred several technologies to industry and strategic sectors. Lithium-ion battery electrode materials and its fabrication, Supercapacitors, Fuel Cells, Redox flow battery, CO_2 adsorption under flue gas condition, CO_2 utilization to value-added products like adipic acid, oxalic acid, polyurethane etc., Mg technology, solar powered PEM electrolyser to generate green Hydrogen, Electrowinning of Rare Earth metals and alloys, extraction of metals from secondary sources, trivalent hard chromium thermal barrier coatings and specialized anticorrosive coatings etc., are the significant recent technologies of CECRI.

The institute also conducts short-term refresher courses for the benefit of industry and academia through skill development programmes. As part of its human resource development programme, CECRI offers B.Tech. course in Chemical & Electrochemical Engineering through Anna University, Chennai as well as Ph.D. course through the Academy of Scientific and Innovative Research (AcSIR), which was established by CSIR. The institute is equipped with an excellent library as well as the state-of-the-art analytical and characterization facilities. CECRI also organizes national and international conferences for dissemination of scientific knowledge through its professional non-profit societies viz. Society for Advancement of Electrochemical Science and Technology (SAEST) and National Corrosion Council of India (NCCI) both of which are functioning in CECRI Campus. CECRI is alive to societal obligations and participates in the activities such as 'Entrepreneur Development' and CSIR's Integrated Skill Development Initiative. The institute has been bestowed with several prestigious awards and recognitions.

FROM THE DIRECTOR'S DESK

Friends,

Greetings from CSIR-CECRI!

I am delighted in inviting you to take part in the placement process of CSIR-CECRI's Centre for Education (CFE), a unique place where the B. Tech. course in Chemical and Electrochemical Engineering is being offered in India. I have immense pride in mentioning here that the CFE with its balanced curriculum comprising academic rigour and soft skills required for success in an industrial environment produces the country's elite class of chemical and electrochemical engineers. Also, we feel proud in preparing dynamic leaders, who can make a difference to the world, with the skills nurtured here for a better future.

The objective of the CFE is to provide significant opportunities for the students to learn, excel and most importantly, to develop and hone multiple skills across various aspects of chemical and electrochemical engineering. At CSIR-CECRI, we encourage our students to realize their passion, achieve and shine in all their endeavours. For more than three decades, our graduates have outclassed themselves to become world-class innovative leaders. Being passionate champions of technological advances, our students also nurture and savour the sense of achievement. They are highly ambitious and have developed dignity in themselves. Our students are our great ambassadors and future leaders of the world in electrochemical technologies.

CFE's undergraduate curriculum is of international standard and inextricably linked with creativity on one hand and effective hands-on research training on the other. In the ever-changing and challenging world, it is our objective to support research institutes and reputed manufacturing companies by combining theoretical problems with real-world problems in the curriculum.

A perfect combination of theory and practice has always been a central element of our teaching. With CSIR-CECRI being a research institute, the Scientists who are the full-time Faculty Members of CFE, continuously thrive themselves in imparting new and emerging knowledge to the students. The aim has been to contribute to the national and international research communities on one side and to provide innovative contents for teaching on the other. With this perspective, CSIR-CECRI constantly strives to upgrade its intellectual capital and the know-how, and skillsets with a problem solving basic attitude.

We dedicate ourselves in grooming our students as excellent chemical and electrochemical engineers and we encourage them to gain experiences through participation in various academic and R&D activities such as Summer Internship Programs, assisting our Scientists in live Projects, etc. These activities help them in enhancing their cognitive and risk-taking abilities in identifying opportunities.

I am privileged to invite you to our CSIR-CECRI campus for the placement process of B.Tech. in Chemical and Electrochemical Engineering for the Batch 2019-2023 and can assure you a rich and rewarding experience with our young talents. CSIR-CECRI will play its part proactively in the near future in this direction, looking forward to a strong long-standing collaboration with the industry.

Dr. K.J. Sreeram

MESSAGE FROM DEAN

Moulding students into effective engineers in a minuscule span of four years is indeed a mammoth task, which depends more on the student's commitment than on the administration. It is the intense commitment and focus of our students, which has uplifted them to such soaring heights.

The development of a nation in all dimensions depends on students, who require to possess well-established technical knowledge along with innovation and creativity. To serve this very purpose, CECRI has strived and is credited for producing immensely talented Chemical & Electrochemical Engineers. I have great faith that the present batch too will exhibit their skills to the greatest extent and play a significant role in achieving efficiency and productivity at their workplaces.

The unique four-year B.Tech. programme in Chemical and Electrochemical Engineering offered by the CSIR-CECRI under the banner of Centre for Education (CFE), fulfils the expectation of the industry since the curriculum is formulated by experts from industry and academic institutions.

The important aspects of Electrochemical Engineering such as Electrochemical Reaction Engineering. Electrochemical Process Technology, Electrochemical Energy Sources, Electrochemical Metal Finishing. Corrosion Engineering, Electrochemical Materials Science, Electrodics and Electrocatalysis, etc., are covered exhaustively. The students are exposed to real time projects funded by various agencies that inculcate to understand the problems associated with the society and they learn the techniques and methods to resolve the problems in their formative age. The students are getting opportunity to publish their work in reputed national and international journals and to participate in various conferences and seminars under the guidance of experienced scientists. I take this opportunity to invite the recruiters with assurance that our B.Tech. students will fulfil your expectations.

Dr. B. Ramesh Babu

MESSAGE FROM PLACEMENT OFFICERS

The course B. Tech (Chemical and Electrochemical Engineering) has always been acclaimed for its exhaustive coverage of all concepts in Chemical as well as Electrochemical Engineering, making it a class apart and unique ever since its induction in the year 1988 under the banner of Centre For Education (CFE). The important fact is that all courses are dealt with by specialized engineers and scientists of CECRI, whose many years of research experience in their respective fields render them fully capable of providing quality technical education. The Placement has been extremely satisfying and our students have been performing exceptionally well. On behalf of the Placement cell, I take immense pleasure in inviting you for on-campus placements 2022-2023. Our students are having very good knowledge in the area of Corrosion, Electroplating, and Batteries. They are also having exposure to these areas since they do research work during the course.

Dr. Sundar Mayavan

As a Scientist, I really wonder about the students' desire to research the various electrochemical principles used for applications like Batteries, Corrosion, Water splitting, Fuel cells, Materials protection and Electroplating. With this inquisitive attitude, there is no doubt that the B. Tech students of CECRI will become tremendous leaders of the future as it provided a platform to showcase their skills. In the past, students have been positioned in high ranks of reputed companies which reflects their professional learning in CECRI. I feel proud of my students and very honourable in inviting you to the on-campus placements for the year 2022-2023.

Dr. M. Jayakumar

CSIR-CECRI IN NEWS

Union Minister Jitendra Singh unveils indigenously developed hydrogen fuel cell bus in Pune (*Hindustan Times*, August 22, 2022)

Hon'ble Union Minister Dr. Jitendra Singh unveiling hydrogen fuel cell bus.

Dr. N. Kalaiselvi, known for her work on lithium-ion batteries, appointed first woman DG of CSIR (*The Print*, August 7, 2022)

Dr. N. Kalaiselvi assuming charge as DG-CSIR & Secretary, DSIR, GOI, New Delhi.

CSIR-CECRI, Godi India to make lithium-ion cells in Chennai (*The Financial Express*, July 19, 2022).

Ohmium to sponsor CSIR-CECRI research on advanced materials for electrolysers (*PV Magazine India*, February 23, 2022.

CSIR-CECRI signing MoU with Godi India.

Dr. K. Giribabu, Scientist, CSIR-CECRI, Karaikudi receiving the "CSIR Young Scientist Award" for the year 2021 in the field of Chemical Sciences for his outstanding contributions (*Press Information Bureau*, September 06, 2021).

Dr. K. Giribabu, Scientist, CSIR-CECRI receiving the CSIR Young Scientist Award.

ALUMNI ACHIEVEMENTS

Shri D. Balamurali, IAS assumed charge as Regional Officer, Central Board of Film Certification, Chennai (03.08.2022).
https://pib.gov.in/PressReleasePage.aspx?PRID=1847829
[CSIR-CECRI B.Tech. - 2007]

Shri Sudhan Nagarajan at Wayne State University – A recipient of the 2022 ECS Summer Fellowship Award (The F. M. Becket Fellowship). The award consists fellowship of US $5,000.00.
https://www.electrochem.org/press-room/2022-ecs-summer-fellowships/
[CSIR-CECRI B.Tech. - 2017]

WHY RECRUIT @ CECRI ?

STRINGENT STUDENT SELECTION

All of our students get selected for this Course following a highly competitive and stringent selection process (at school level; through single window counselling of Anna University/based on JEE rank) Merit is the only rewarding criteria followed.

WORLD-CLASS CURRICULUM AND FACULTY

As our faculty members are Scientists, actively involved in research and publishing research articles in high impact journals, our curriculum gets constantly updated to gain knowledge in emerging technologies. With their in-depth knowledge and vast experience in their areas of specialization, our faculty members easily make our students understand the core principles of science with real-life examples and also teach them on scaling up principles to applications in the lab/industry. With this kind of world-class mentorship and guidance, students get transformed into experts who can excel in any sort of environment.

BALANCED PERSONALITIES

Our faculty members believe wholeheartedly in helping our students to realize their fullest potential in every field of their interest. Soft skills development is made part of the classroom experience through presentations and open-minded learning components. Extracurricular activities, student-managed clubs and events make them to venture into different aspects and to express themselves and develop skills beyond academics.

BECOMING AN EXTREMELY SUCCESSFUL TECHNOLOGIST

As a student of CSIR-CECRI, one is encouraged to become a competent technologist, a renowned scientist, a successful entrepreneur and manager, and also a leader of society. Our alumni have proven this by actively engaging with the institute and the students, thereby motivating and guiding them to perform and excel in all ways.

A PREMIER RESEARCH INSTITUTION

CECRI is a renowned research institution of national importance that has a history of scientific and industrial innovations for the development of the Nation since its inception in 1953.

RESEARCH AMBIENCE

Being an institute where active research is carried out especially for practical applications, the research ambience prevailing here nurtures the students' minds with the innovative ideas to tackle the existing and emerging global problems and trains them to think critically and beyond the horizon in day-to-day life. Active participation in scientific projects and interaction with scientists in the years of undergraduate study gives them a definite edge over their peers.

HIGHLY MOTIVATED & RESPONSIBLE STUDENTS

With great freedom comes greater responsibility. Students are highly motivated to organize events like technical fests, culturals, blood camps, social events, etc. under the guidance of faculty members of CSIR-CECRI. Such learning experiences help the students develop eminent leadership and organization skills which will greatly enhance their performance in industrial scenarios.

DISTINGUISHED ALUMNI

BALSU LAKSHMANAN
Chief Technology Officer
Versogen
Wilmington, Delaware, USA

CHOCKKALINGAM KARUPPAIAH
Chief Technology Officer
Ohmium
Fremont, California, USA

GODFREY SIKHA
Principal Engineer
Tesla
Palo Alto, California, USA

JOSHY JOHN
Sr. Statistical Analyst
AbbVie
San Francisco Bay Area, USA

KARTHICK SUDHAN SHANMUGAM
General Manager - New Energy (Batteries)
Reliance Industries Ltd.
Mumbai, Maharashtra, India

KARTIK KUMAR
Deputy Director
Saint Gobain Research India Pvt. Ltd.
Chennai, Tamil Nadu, India

DISTINGUISHED ALUMNI

MOHAMED SHARIF
Manager - Application Development Engineering
Black Diamond Structures LLC
Austin, Texas, USA

MOHAN KUMAR
Sales Manager - South & East India
Teknos
Helsinki, Finland

SHANKAR. V
Professor (Higher Administrative Grade)
Department of Chemical Engineering
Indian Institute of Technology, Kanpur, India

VIGNESH SUNDARESAN
Assistant Professor of Chemistry and Biochemistry
University of Mississippi, Oxford
Mississippi, USA

VIJAYGANESH KRISHNAN
Manager - Advanced Material Group
Renault Nissan Technology & Business Centre India
Chennai, Tamil Nadu, India

YOGESH ANGUCHAMY
Cell Engineer, Apple
San Francisco, Bay Area
California, USA

B. TECH. PROGRAMME

Established in 1988, by Prof. K. I. Vasu, former Director of CSIR-CECRI, Centre For Education (CFE) was conceptualized as a part of the human resource development program of CSIR – CECRI, CFE offers a unique undergraduate technology degree (B. Tech) in Chemical and Electrochemical Engineering, which is affiliated to the Anna University, Chennai and is recognized by the All India Council for Technical Education (AICTE) and the Indian Institute of Chemical Engineers (IIChE). The course is conducted in a research atmosphere with Scientists and specialized Engineers as Faculty members with state-of-the-art laboratory facilities available in the field of Chemical and Electrochemical Engineering. Students can learn and practice the principles of Electrochemical Science and Engineering. CFE, besides committing to world-class research, ensures that B. Tech students are prepared as pioneers ready to face any challenges in the professional world by providing them with a sound conceptual understanding.

CSIR-CECRI is facilitating a unique holistic educational ecosystem that offers interactive learning, a highly flexible academic structure, cutting-edge research, and strong industrial collaboration. It is providing an environment wherein students need not think twice to translate their dreams into realities. Since theory without practice is useless and practice devoid of theory is dangerous, the incoming neophytes are being trained in all practical aspects strengthened with a sound theoretical background. The professionalism and immense experience of the faculty members of CFE help them upgrade the curriculum in accordance with the changes and developments in the fields of Chemical & Electrochemical Science and Technology. Students get exposed to the industrial atmosphere through industrial tours and in-plant training which gives them a perspective of engineering principles working in real-life industrial applications. Interaction with the scientists and working on projects under their guidance has infused a strong desire to innovate and improve in the minds of B. Tech. students.

R&D DIVISIONS

CORROSION AND MATERIALS PROTECTION

Corrosion is considered as a slow killer that destroys the stability of a material and we can see it in all walks of everyday life. The corrosion division's research focus is to understand various aspects of corrosion and come up with a number of remedies for mitigating corrosion.

RESEARCH FIELDS

Biological Corrosion, Cathodic Protection, Paints and Coatings, Concrete corrosion, Metallurgy, Failure Analysis, Cathodic Protection on Marine and Underwater, etc.

RESEARCH FACILITIES

Electrochemical Impedance Spectroscopy, Soil Resistivity Meter, Field Impedance Meter, Slow Scan Stress Corrosion Cracking Machine, Compression Testing Machine, Salt Spray Chamber, Carbonation Chamber, Instantaneous Corrosion Rate Meter, FE Fluorescent Microscope, Closed In travel potential survey, Pearson Survey, Laminar Air Flow, Polymer Chain Reaction (PCR) and Gel Documentation, Electrophoresis Techniques, Ultrasonic Pulse Velocity Meter, Surface preparation instruments - shot/grit blasting, Paint formulation facilities like homogenizers, attritors, ball mill, sonicators, etc., Paint application and Paint testing equipment.

CURRICULUM

This department provides a fundamental understanding on aspects of materials science and corrosion phenomena. It trains the students to master various practices for the prevention and mitigation of corrosion and provides hands-on experience to understand the techniques to measure the corrosion rate, through which our students would understand the causes, mechanisms of various types of corrosion, viz., uniform corrosion, galvanic corrosion, crevice corrosion, pitting corrosion, intergranular corrosion, and various modes of environmentally assisted cracking.

ELECTROCHEMICAL POWER SOURCES

The Electrochemical Power Sources Division (ECPS) distinguishes itself through excellence in basic and applied research on electrochemical energy storage devices directed towards high industry relevance, contemporary, and next-generation energy storage systems for more than seven decades.

RESEARCH FIELDS

Advanced Lead Acid Batteries, Lithium-ion Batteries, Redox-Flow & Metal-Air Batteries, Sodium-ion Battery, Lithium-Sulfur Battery, Supercapacitors, etc.

RESEARCH FACILITIES

Charge-discharge cycle life tester at different current rates, Electrochemical WorkStation, Hot press for polymeric membrane, Polymer kneading machine, Electrospinning. High-energy ball milling. Acceleration Rate Calorimetry, Vibration Tester, Humidity Chamber, Glove Boxes, Redox Flow-battery Tester, Tubular and muffle furnaces, Thermal evaporator, Hot-air, and vacuum oven, Light source, Gas Chromatography, Screen printer.

CURRICULUM

Our students gain knowledge on the principle and applications of batteries and fuel cells and their design through the state-of-the-art laboratory practices. They also learn about the construction, performance, and application of primary and secondary batteries, fuel cells, and supercapacitors relating to the recent technological advancements in development, testing of capacity, charge retention, vibration, life, efficiency, high-rate discharge, testing of separators, stack engineering, batteries for electric vehicle applications.

ELECTROPLATING AND METAL FINISHING

This unique division plays an important role in the development and growth of several industries such as Metal finishing, Electroplating and Metal refining. It focuses on activities including fundamental aspects, research possibilities, and industrial applications.

RESEARCH FIELDS

Electroplating, Electropolishing, Electroforming, Anodizing extraction of metals by Electro hydrometallurgy, Electro-pyrometallurgy from primary and secondary resources, vacuum and thermal barrier coating.

RESEARCH FACILITIES

Electroplating line for various metals, alloys, composites and characterization facilities, high-temperature molten salt reactor, Physical Vapour Deposition (PVD), Chemical Vapour Deposition (CVD), Pulsed Laser Deposition (PLD), Electron Beam Evaporation (EBE).

CURRICULUM

We train the students to understand the concepts through hands-on electroplating of metals and alloys from aqueous baths, understanding the fundamental concepts, bath preparation, pre-treatment of substrates, electroplating and characterization of deposits. We provide basic knowledge of hydrometallurgy and electrometallurgy techniques that are used in the processing of minerals, and anodising of aluminum alloys and coating of steel samples.

ELECTROCHEMICAL PROCESS ENGINEERING

The research focus of this division is mainly on the development of electrode materials for the electrosynthesis of inorganic chemicals. It has developed customized processes around electrochemical technologies and to support electrochemical reactors, different physical and chemical processes are explored as pre- and post-treatment processes.

RESEARCH FIELDS

Hydrogen production by PEM and by AEM based water electrolysis using novel non-noble metal-based electrocatalysts and anion exchange membranes, synthesis of glass ceramics, biodegradable polymers and electrospun composite fibres and engineering applications, development of functionalized carbon-based ORR catalyst for Chlor-alkali cell, development of electrochemical reactors/processes for the recovery of non-ferrous metals for e.g. copper, silver and gold.

RESEARCH FACILITIES

Multi-channel electrochemical analyser, Rotating ring disk electrode, Electrochemical quartz crystal microbalance, Solar stimulator, 3D-optical microscope, Scanning electrochemical microscope, Solid surface zeta potential analyser, Gas chromatography, Incident photon-to-current efficiency (IPCE) measurement unit, Tensile testing machine, TOC analyser, Confocal laser scanning microscope, 3D Polymer printer, Planetary ball mill, Hot pressing unit, Rotary evaporator, High-temperature furnace.

CURRICULUM

Students are made familiar with the aspects of current-voltage relationships & estimation of mass transfer coefficient, PFR & CSTR systems model. Students are also trained to analyze electrochemical design models, the thermal behavior of electrochemical reactors and to determine the kinetic constants and conversion of a given electrochemical, reaction in a batch reactor, tubular reactor, and mixed flow reactor and compare with the theoretically predicted conversions. Students will acquire knowledge of basic electrochemical concepts and principles involved in the electrochemical process and its applications.

ELECTRO-ORGANIC AND MATERIALS ELECTROCHEMISTRY

CECRI has developed many electro-organic processes over the years and technologies are transferred to the industries. To meet the current product requirements and industrial needs, some of these technologies, developed more than three decades ago, need upgradation, which is catered through efficient research methods. Fortunately, such updated technologies are now commercially available. Some of the classic processes like calcium gluconate and potassium iodate production still receive enquiries from industries and entrepreneurs. Efforts to update a few commercially viable processes of current interest are also in progress.

RESEARCH FIELDS

A gamut of materials is being developed for multifarious applications: (i) solar energy conversion into fuels by means of photocatalysis and photo-electrocatalysis, cathodes for dye-sensitized solar cells (DSSCs), (ii) electrocatalysis for oxygen and hydrogen evolution reactions (OER & HER), oxygen reduction reaction (ORR), and CO_2 reduction, (iii) electrochemical sensors for detecting biologically and environmentally significant compounds, (iv) phosphors with tunable emission colours for LED and display applications, and (v) electro-ceramics.

RESEARCH FACILITIES

Electrochemical workstation, High-performance liquid chromatography (HPLC), Gel permeation chromatography (GPC), Electrochemical reactors/pressure reactors, Physical Property Measurement System (PPMS), Solar Simulator and Photoreactors, Large area DSSC fabrication unit, Gas chromatography, BET surface area and pore size analyser, Microwave reactor, Electrophoretic deposition unit.

CURRICULUM

Students are provided an introduction to basic electrochemistry, principles of electrochemical devices, electroactive materials used in devices, and case studies of batteries and sensors after which they get acquainted with the integration of electrochemical principles and material science for innovation in the area of modern electrochemical devices.

ELECTRODICS & ELECTROCATALYSIS

Electrodics, Electrocatalysis, electroanalysis, novel electrode/electrolyte materials, sensors and devices are the thrust research areas of this division and the advancement of electrochemical science through fundamental investigations is the major goal. The research is mainly focused on studying the mechanisms and kinetics of electrode processes for developing electrochemical sensors, electrochemical biosensors, biofuel cells, electrochromic devices, and electrocatalysts. R&D on varieties of materials including nanomaterials, functionalized organic molecules, liquid crystals, graphene quantum dots, ion-selective electrodes (ISE), microelectrodes for intracellular electrochemistry and liquid-liquid interfaces, flexible printed electrodes, multi-analyte electrode arrays, chemiresistors, and electrochemical transistors are being carried out.

RESEARCH FIELDS

The research focus is on modifying the electrode surfaces with nanostructures, self-assembled monolayers, polymeric materials, and biological macromolecules to fabricate sensors and devices for various applications. We also develop functionalized materials and methods for biosensing & imaging of molecular signatures and cellular events

Studying the biological aspects of electrochemistry and electron transport properties of redox proteins is important in understanding the signal transduction and the processes of electron transfer reactions between the electrodes and biological molecules, investigating the thermodynamic and kinetic information of biological electron transfer reaction, studying protein-drug interaction, microbial fuel cells are also being researched upon.

RESEARCH FACILITIES

Characterization facilities available include UV-Vis spectrophotometer, Multiplate reader (Absorbance, Fluorescence), Cyclic voltammetry AutoLab, Parstat, EG&G instruments, Particle size analyser, Lyophilizer, Electrospinning Unit, Contact Angle Measuring system, Ellipsometer.

CURRICULUM

Fundamental knowledge is imparted to the students to understand, analyze and solve problems related to electrochemical processes. Students will acquire knowledge on the electrical double layer. electrocatalysis and different types of electrochemical techniques.

RESEARCH AND DEVELOPMENT

Indicator	2021-22	2020-21	2019-20	2018-19
Total amount ofFunding - Projects (Rs. in Lakhs)	179.6	837.08	1476.63	975.31
No. of Publications	282	264	303	297
No. of Patents granted	10	9	5	3
No. of Technologies developed / transferred	7	9	5	6

PATENTS AND PUBLICATIONS

Patents and Research Publications form the crux of any R&D institute and these numbers of CSIR-CECRI speak volumes about the quality of academics and research here. This transferable culture of research is inculcated in undergraduate students by introducing credits for their projects, where the students execute a project of their choice in small groups irrespective of their selected division and some students even publish their thesis. This vibrant research culture validates more than 750 patents, 250 processes, 800 sponsored and grant-in-aid projects (in the last five years), 550 licenses and 6,500 research papers in peer-reviewed national and international journals that the institute boasts of are ample testimony to its leadership in nation building.

RESEARCH ENDEAVOURS

Every research endeavour is a voyage to discover truth and CSIR-CECRI is committed to furthering this voyage. It constantly aims at improvising learning through practice and research and is on its way in creating the infrastructure, ambience and culture necessary for the pursuit of creative ideas.

INNOVATIVE INITIATIVES

The conventional engineering skills are no more sufficient to address the problems of today's fast-changing society. At CSIR-CECRI, students are provided with a plethora of choices in electrochemistry from which they diligently choose with the help of faculties through B.Tech undergraduate program offering courses in smaller credits, called electives designed with great care and concern, to induce the enthusiasm of the students and to keep them in pace with the current scientific, technological and industrial scenarios. These courses are distributed from the first to the eighth semester.

Symmetric cylindrical supercapacitor device fabricated using activated carbon developed at CSIR-CECRI.

0.08 Nm^3 / hr. PEM water electrolyser

INFRASTRUCTURE

INSTRUMENTATION FACILITY

CECRI, apart from the labs, has a central instrumentation facility, housing a long list of sophisticated scientific instruments, which includes SEM, TEM, HR-TEM, XRD, NMR, EPR, ICPMS, PPMS, UV-Vis & FT-IR spectrophotometers, AFM, STM, XPS, 3-D Metal Printing, Cluster computing facility, etc., for characterization. These facilities immensely help students, besides their regular curriculum, to get exposed and familiarized with characterization techniques and data analysis.

KNOWLEDGE RESOURCE CENTRE (KRC)

The Knowledge Resource Centre (KRC) of CSIR-CECRI is a treasure trove of knowledge in the area of electrochemical science & technology and its allied fields. It plays a vital role in supporting and furthering the academic and research mission of CECRI facilitating the creation and dissemination of knowledge. It has about 55,000 volumes in the form of books and back volumes of journals in various disciplines to cater the needs of scientists, research scholars, students, and employees of the institute. It also extends its services to the students and researchers of other academic institutions and industries. It has a huge collection of patents, standards and doctoral theses The e-Library, a one-stop virtual knowledge platform gives students access to international and national journals published by Nature Publishing Group, AAAS, ACS, ECS, John Wiley, OUP, RSC, Elsevier, Springer, Tailor & Francis group, etc.

INTERNSHIPS & PROJECTS

On completion of their second/third year of the course, students attend summer/winter internships in prestigious institutions in India and abroad to gain hands-on experience in the professional world. Apart from this, students also carry out research projects from the second year onward under the intellectual and expert guidance of scientists. Once completed, they publish their works in high-impact international journals.

Our students actively do research work in labs of CECRI and other institutions and publish their works in prestigious national as well as international journals. Areas of their work include:

- Corrosion and Cathodic Protection
- Solar Cells and Fuel Cells
- Nanomaterials
- Electrometallurgy
- Electroplating and Metal Finishing
- Water Electrolysis and Purification
- Paints and Smart Coatings
- Waste Remediation
- Batteries and Supercapacitors
- Organic Synthesis
- Biosensors
- Catalysis

OUR STUDENTS' PROJECTS

- Synthesis of cathode material for SIB: NASICON-based NVP through wet chemical route with ultrasound assistance
- Using spinel compounds as electrode material for Supercapacitors
- Application of various deposition methods for Li-ion battery
- Fabrication of Efficient Photoelectrodes for Enhanced Photo-electrocatalytic Water Splitting
- Synthesis of cathode material for metal ion batteries through the supercritical method
- Enzymatic sensing of Glucose on GCE, by GOx immobilized on poly-1- NEDA polymer co-functionalized with Ferrocene di carboxylic acid redox mediator.
- Modification of cathode materials for lithium-ion batteries
- Electrospun non-precious metal incorporated ZIF based fibrous material for electrocatalytic water splitting reaction
- Hydrothermally synthesized Cobalt Phosphate and Bismuth Phosphate for Asymmetric Supercapacitor device
- Electrode modification for improving the performance of zinc iron flow batteries
- Electrochemical method used to deionize the water with help of carbon based flow electrodes
- Designing of an effective electrocatalyst with optimized d-band center for water oxidation reaction: A Sabatier principle approach
- Comparison of active material(Lithium-ion battery) depletion with additive
- Fabrication of volumetric superhydrophobic coating
- Optimization of Lithium-ion batteries for fast charging
- Layered materials for energy related applications
- Performance enhancement of zinc bromine redox flow battery using metal organic framework as catalyst

PLACEMENT CELL

Over the years, the placement cell acting as an intuitive interface between the institute and hiring companies has maintained a symbiotic, vibrant and purposeful relationship across the globe. As a result, it has built up an impressive placement record both in terms of the percentage of students placed as well as the number of companies visiting the campus.

The recruiters are provided with all required facilities for the placement process such as:

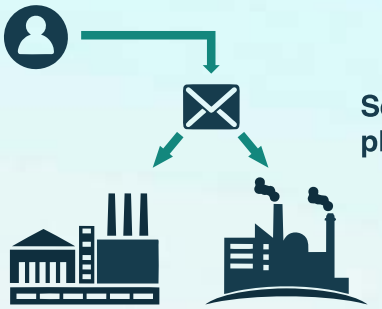
- The computer and internet facilities are available for online test
- Fully furnished, air-conditioned rooms for group discussion and personal interviews
- Telephonic and video conferencing facilities are available if necessary.

HOSPITALITY

CECRI, which has an aesthetically appealing campus spread over 300 acres of land with a large variety of flora and fauna, especially peacocks, is well known for its warm hospitality over decades. For the recruiters, great care will be taken in providing transportation facilities. Hospitality will be provided in the institute's guest house with all amenities including internet facility.

RECRUITMENT PROCESS

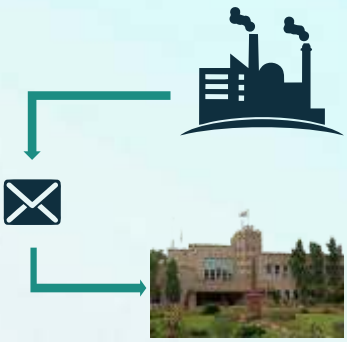
INVITATION



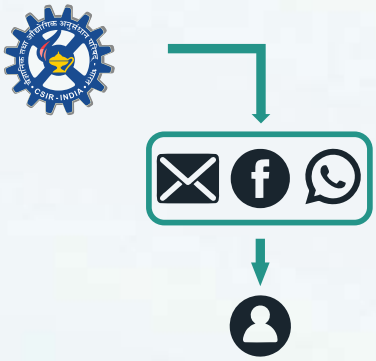
Sending invitation to companies or organizations along with placement brochure through e-mail.

REVERT WITH RESPONSE

Interested companies will revert with the job description, compensation details, selection procedure and mode of interview.



STUDENTS ARE NOTIFIED

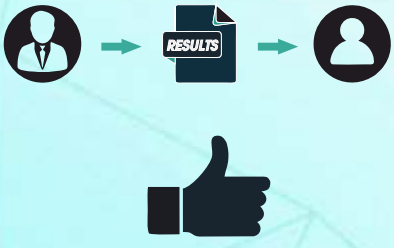


Students are notified about the companies. The list of the interested candidates will be collected, the same will be forwarded to the concerned companies. The candidates will be informed the date and selection process by the companies.

PLACEMENT PROCESS

The placement cell arranges the visiting companies to conduct written tests, group discussions and interviews. Audiovisual aids like laptops, internet facilities etc. for online tests will be arranged upon prior intimation.

RESULTS, OFFER LETTERS



After completion of the placement process, the company shall give the list of selected candidates to the placement cell and the offer letters will be sent to the candidates through courier.

OUR ESTEEMED RECRUITERS

A
Amara Raja Batteries, Tirupati
Amco Batteries, Bangalore
Anabond Sainergy Fuel Cell India(P) Ltd., Chennai
Auto Eastman, Haryana
Ashley Alteams India Ltd., Kanchipuram
Asian Paints, India
Atotech India Pvt. Ltd., Bangalore
Associated Electrochemical Pvt., Haryana

B
Base Batteries Ltd., Himachal Pradesh
Batx Energies Pvt Ltd., Gurgaon, Haryana
Berger Paints India Ltd., Kolkata
BGR Energy Systems Ltd., Chennai
Bharat Electronics Ltd., Pune
Bimetal Bearing Ltd., Hosur
Bloom Energy, Bangalore
Bloom Batteries, Mumbai
BPL PTI Chemicals India, Karnataka

C
Chemfab Alkalis Ltd., Pondicherry
Continental Device India Ltd., New Delhi
CorrTech International Pvt. Ltd., Ahmedabad
Corroseal Ltd., Chennai
Corrosion Control Services, Mumbai
Corrosion Technology Services, Dubai
Crompton Greaves Ltd., Mumbai

D
Dalmia Cement (Bharat) Ltd., Tamil Nadu
Deeya Energy, New Delhi
DuPont India Ltd., Hyderabad

E
Enarka, Bangalore
Enercon India Ltd., Daman
Eveready Industries Ltd., Kolkata
Exide Batteries, Hosur

G
Gabriel India Ltd., Pune
GFL, Gujarat
Godrej Batteries, Mumbai
Grauer and Well India Ltd., Mumbai

H
HBL Nife Power System, Hyderabad
HEMA Pvt. Ltd., Bangalore
High Energy Batteries, Trichy
Hindustan UniLever Ltd., Bangalore
HOV General Trading and Contracting Co., Kuwait
Hyderabad Electroplating Works, Hyderabad

I
IEC Fabchem, Chennai
Infosys Tech, Bangalore
International Paints, Bangalore

K
Kinetic Engineers Ltd., Pune
Kirloskar Brother Ltd., Pune
Kansai Nerolac Paints Ltd., Hosur

L
Lakshmi Machine Works, Coimbatore
Livguard Batteries, Himachal Pradesh
Lucas TVS, Chennai
Luminous Power Technology Ltd., Himachal Pradesh

M
Madras Electroplaters, Chennai
MALCO, Mettur
Max India, Bangalore
MICROPACK India Ltd., Bangalore
Minda Batteries, New Delhi

N
NED Energy Ltd., Hyderabad
NOCIL India Ltd., Bangalore & Navi Mumbai

O
Okaya Power Ltd. Jammu

P
Prestolite Tudor India Pvt. Ltd.,

R
Raychem RPG Ltd., Mumbai
Reem Batteries, Muscat

S
Shell, Bangalore
Shan Poornam Metals, Malaysia
Sree Sakthi Batteries, Bengaluru
SRI Ram Fibres India Ltd., Chennai
Su-Kam Batteries, Noida
Sundaram Fasteners, Chennai

T
TAFE Power Source, Chennai
Taqanal Energy Pvt Ltd., Bangalore
Tatva Chintan Pharma Chem, Baroda
Technip Energies, India
TechnoCorr, Kerala
Thermax Pune
TVS, Hosur

U
Umicore, Mumbai

V
Veolia Water Technologies & Solutions, Bangalore
Virya Batteries, Mumbai

W
Wipro Electroplaters, Bangalore

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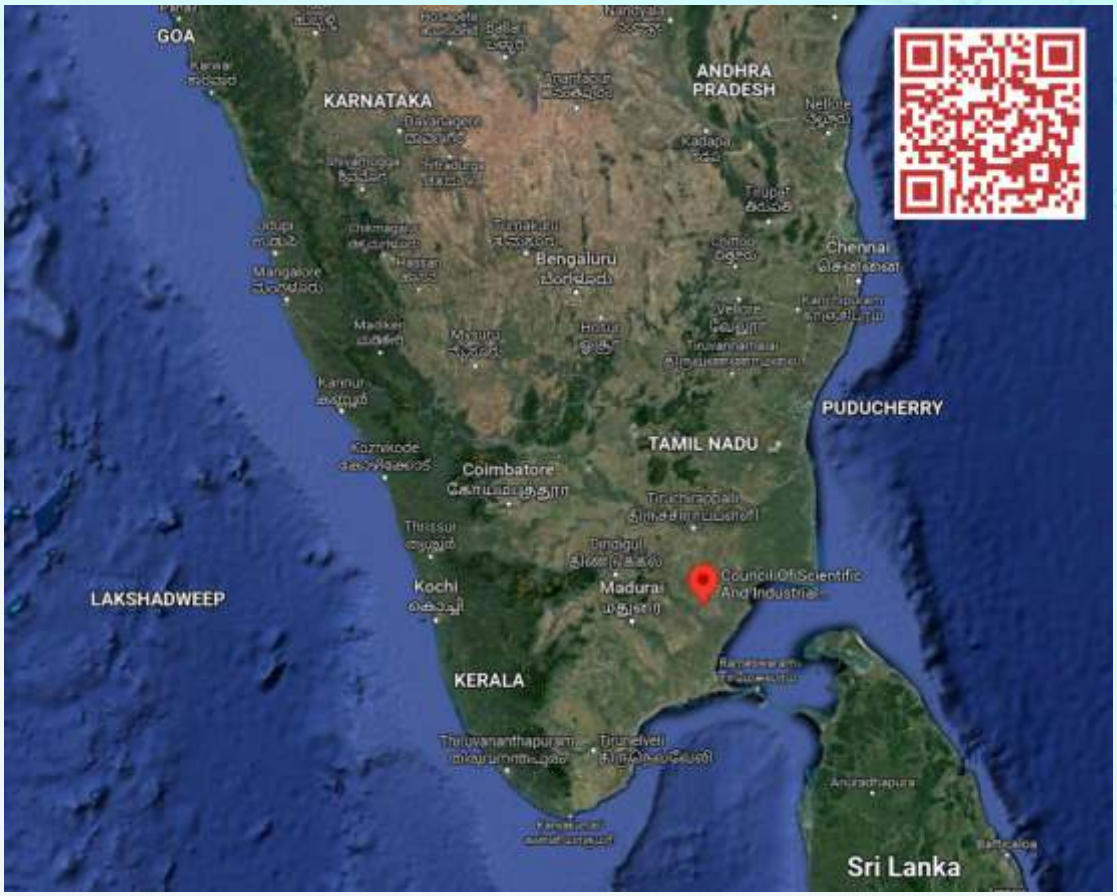
HOW TO REACH US



By Air

From Chennai, one can fly either to Tiruchirappalli or Madurai, to reach Karaikudi. Both the airports are equidistant (~100 km) from Karaikudi and both these airports are also connected by direct flights from Mumbai and New Delhi. The Airports also receives international flights from Singapore, Dubai, Sharjah, Kuwait, Colombo and Kuala Lumpur.

By Road

Karaikudi is also well-connected to Chennai and Bangalore through National Highway via Tiruchirappalli / Madurai. From Dr. M.G.R. Bus stand (Maatuthaavani) in Madurai, one can reach Karaikudi New Bus stand by bus round the clock. Similarly, frequent bus services are available from Tiruchirappalli as well. CSIR-CECRI is just 3 km away from Karaikudi New Bus stand.

By Rail

Karaikudi Junction is connected via the Chennai-Rameswaram railway line as well as by Mayiladuthurai-Karaikudi railway line. There are many direct trains from Chennai (overnight journey) to Karaikudi via Tiruchirappalli.

MEET OUR TEAM

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