

The R&D Vision

Global warming is a threat to human prosperity and has been intensively discussed worldwide. Regulations are needed to prevent problems, as well as drastic social change to create a low-carbon sustainable society that balances environmental protection with economic growth. Further technological innovation is essential for solving the issues and building a sustainable society. By analyzing societal impacts, IChE defined the following short and long-term R&D visions to be achieved by 2030:

The development of technologies for a low-carbon society

- 1) With sustainable growth – the creation of technologies for societal needs
- 2) Revolution in product development

To counter the depletion of resources and global warming, new energies and environmental conservation systems are being developed. IChE will help to build a low-carbon society through the technology innovation for environmental preservation, energy conservation and optimizing plant operation.

Focused R&D strategy

To realize our R&D vision by 2030, IChE defined core R&D domains for strategic technologies. The fusion of technological fields beyond borders and the strategic utilization of those fields are essential to create higher value-added products and solutions. We have selected the following fields: -

- Nanotechnology
- Micro-reactor
- Bio-refinery
- CO₂ capture and sequestration
- Conversion of CO₂ to useful chemicals
- Artificial intelligence in chemical processes

Any other relevant/innovative afield recommended by the R&D committee and approved by council.

The Institute is recognized by the Department of Science and Technology, Government of India as a Scientific and Industrial Research Organization (SIRO). Some of the major R&D projects sponsored by the Institute completed in recent times include:

- Supercritical fluid extraction of natural products from various plant residues.
- Studies in the Problems and Prospects of Indian Fertilizer Industry.
- Parametric optimization and control of semi batch reactor for sulpholanation process.
- Hydrodynamics of tapered bubble column.

- Green route synthesis of cadmium sulfide quantum dots.
- Treatment of coke oven waste water using hybrid technology.
- Removal of Toluene by isolated Microbes from Municipal Sewage Water using Nanoparticles Coated Membrane Reactor.
- Production of Biodiesel from Municipal Sewage Sludge By Transesterification Process.
- Modelling and Experimental Studies on Microwave and Ultrasound Assisted Extraction of Shikimic Acid from Arjuna Seeds.
- Microwave Assisted Polymerization of Lactic Acid and Poly Lactic Acid Nanocomposites.

Research and Developments

Research Project has been undertaken by IChE Headquarters jointly with Heritage Institute of Technology, Kolkata.

The project which is continuing is entitled as:

Study of Antibacterial Effects on Indian Currency

PI: Dr. Avijit Ghosh, Co-PI: Dr. Sujoy Bose, Mr. Sandip Ghosh

The on-going R&D projects Sponsored by IChE underway are as follows:

i. Extraction, Characterization and Isolation of Betulinic Acid From Jamun Leaves (Syzygium Cumini) Through Novel Techniques.

PI: Ms. Shraddha V. Admane (Shende), MIT Academy of Engineering, Pune.

ii. Mass Transfer Studies in Biofiltration of Pharmaceutical Industrial Waste Gas Using Coupled Biofilter With Membrane Bioreactor.

PI: Dr. V. Saravanan, Annamalai University, Chennai.

iii. Synthesis, Characterization of Nanosorbents and Its Application In Removal of Zn²⁺ Ions: Isotherm, Kinetic And Thermodynamic Studies.

PI: Dr. R. Rajesh Kannan, Annamalai University, Chennai.

iv. Experimental and Numerical Study of Flow Through Ventilator Splitter

PI: Dr. P. R. Naren, School of Chemical & Biotechnology (SCBT), SASTRA Deemed To Be University, Thanjavur, Tamil Nadu

v. Synthesis of Activated Carbon from Animal Manure - Goat and Sheep Dung and Its Application in Wastewater Treatment.

PI: Dr. K. Senthil Kumar, Kongu Engineering College, Tamilnadu

vi. Kinetic and Thermodynamic Analyses of Pyrolysis of Sugarcane Leaves Through Thermogravimetric Analysis.

PI: Dr. Ashish N. Sawarkar, Motilal Nehru National Institute of Technology (MNNIT) Allahabad

vii. Recovery and Enhancement of Fine Chemicals and Bio-Crude from Microalga Species Using Hydrothermal Liquefaction

PI: Mr. R. Sathish Raam, Kongu Engineering College, Tamilnadu

viii. Development of Electrocatalyst for PEM Fuel Cell

PI: Dr. Avijit Ghosh, Heritage Institute of Technology, Kolkata

ix. Synthesis and Characterization of Electrocatalyst For Proton-Exchange Membrane Fuel Cells (Pemfc) and Regenerative Fuel Cell

PI: Dr. Biswajit Mandal, Co-PI: Dr. Sunil Baran Kuila, Dr. Avijit Ghosh, Haldia Institute of Technology, Haldia, West Bengal

x. Microwave Catalytic pyrolysis of E-waste using bimetal doped char for fuel production.

PI: Dr. K. M. Meera S. Begum, National Institute of Technology Tiruchirapalli, Tamilnadu

xi. Development of Novel Photocatalyst for Treatment of Textile Effluent

PI: Dr. M. Matheswaran, National Institute of Technology Tiruchirapalli, Tamilnadu

xii. Analysis of Salt Hydrates for Thermal Energy Storage

PI: Dr. Jyoti Sahu, National Institute of Technology Tiruchirapalli, Tamilnadu

xiii. Synthesis and Characterization of Novel Nano Filled Polymeric Ion Membrane for Proton-Exchange Membrane Fuel Cells (PEMFC) and Pervaporative Separation.

PI: Dr. Sunil Baran Kuila, Co-PI: Dr. Biswajit Mandal, Dr. Avijit Ghosh, Haldia Institute of Technology, Haldia, West Bengal

xiv. Synthesis and Characterization of Cashew Nut Shell Oil (Cns) by Solvent Extraction/ Super Critical Fluid Extraction

PI: Dr. Somak Jyoti Sahu, Co-PI: Dr. Sutapa Roy, Haldia Institute of Technology, Haldia, West Bengal