Department of Chemical Engineering

Indian Institute of Technology Bombay

Preface

The Chemical Engineering Department at IIT Bombay has active research programmes in wide-ranging areas, including the fundamental and the eminently practical. An extremely dynamic faculty with a well-supported staff gives the department a breadth of research focus and wide range of expertise. In addition to the core areas of Chemical Engg, the department has consolidated in recent years its strength in Computer Aided Design and Controls, Polymer Science and Material Technology, Interface Science and Colloids, Biochemical and Food Engineering, and Nanotechnology.

Supercritical Fluid Extraction Plant Designed at IIT Bombay

Reaction Injection Mould Facility for Polymerization

The faculty in the Department is actively conducting research in a wide range of topical areas of Chemical Engineering and its allied fields. Drawing upon mathematics, physics, chemistry and biology, research is being carried out in particle dynamics of granular flows, microstructures of micelles and liposomes, 3D structure analysis of proteins, complex network analysis in cellular organization, flow of pollutants in atmosphere, fuel cells, micro electronics process and flow through micro-channels. Applied and developmental projects form a major component of research in the Department, which includes supercritical extraction of natural products, application of vermiculture to waste processing, production of pharmaceuticals through genetic engineering and process development for biodegradable plastics. Most of the research is multidisciplinary and involves active collaboration with Departments of science and engineering in the country and active alliances with institutions and industries worldwide.

Exciting research in the following areas of Chemical Engineering is available at IIT Bombay:-

Computer Aided Design and Control : Process Simulation & control, Optimization, Process Integration and Scheduling, Energy Conservation and Optimal Resource Management, Artificial Intelligence and Mathematical Modeling, multi-scale modelling.

Biochemical Engineering and Biotechnology : Metabolic & Genetic Engineering, Bioseparations, Bioinformatics, Systems Biology, Drug Discovery, Enzymology, Bioprocess Development, Vermiculture for Waste Management

Food Process Engineering : Dehydration of Food Systems, Controlled Atmosphere Storage and Process Development of Food Systems.

Interface Engineering & Science : Colloids; Sol-gels; Emulsions & Foams; Nanoparticles, Microstructural Engineering, Aerosols, and Microscopy, Microfludics.

Polymer Science & Material Technology : Polymer materias, Polymer Reaction Engineering, Polyurethane, Rubber, Polymer Rheology, Ceramics, and Molecular simulation of Polymers; polymer, films, PVDF, Molecular simulation of semi-conductor Solids.

Separation Technology : Membrane Separations,Pressure Swing Adsorption, Supercritical Extraction, Bioseparations, Polymer Adsorption, Extractive Distillation, and Thermodynamics.

Reaction Engineering : Catalysis, Multiphase Reactions, Bioreaction Engineering, Reactive distillation.

Multiphase Systems : Fluidization, Granular flows, and Powder Mixing.

Petroleum Processing : Refining, Petrochemicals, Oil Field Processes & Operations, and Process Developments.

Environmental Engineering : Waste Management, Pollution Control, Air Pollution Prediction & Control and Vermiculture.

The Department encourages students interested in research towards graduate studies through our M. Tech and Ph. D programs. Currently more than 40 students per year are pursuing Mtech degree and over 80 research scholars are working towards their doctoral degrees in various areas of Chemical Engineering.

Major Recent and Ongoing Projects :

- Supercritical Fluid Extraction Pilot Plant
- Polymer Adsorption on Solid Surfaces
- Waste Water Purification in Vermicultured Biofilters
- Mixing and Segregation of Granular Materials
- Control of Molecular Weight in Emulsion Polymerization
- Development of Portable and versatile Bioinformatics Software
- Polymerization of aramid polymers under flow conditions
- Nanoparticle preparation
- Particulate aspects in Detergency
- Development of a Multipurpose Chemical Process Simulator.
- Production and purification of therapeutics in microbial systems
- Microstructure of specialty structured surfactant formulations

Facilities : Besides the standard facilities such as GC, HPLC and spectrophotometers, the department houses sophisticated instruments such as Cryo-Scanning Electron Microscope, Image analyzer and optical microscope, Reaction injection mould, Roto-viscometer, Gel permeation chromatography, fermentors with online measurements

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