



CHEMISTRY

DEPARTMENT OF
CHEMISTRY



Message From HOD

The Department of Chemistry at IIT Madras has been dedicated, since its inception in 1959, to a three-pronged objective: ensuring the sound chemical education of our undergraduate Engineering students and postgraduate Chemistry students, while also undertaking first-rate fundamental and applied research in contemporary areas of the Chemical Sciences and interdisciplinary areas. Recognized in India and internationally, many of our distinguished alumni have gone on to win international acclaim in diverse fields. We continue to attract bright students to our programs, holding our own and remaining competitive as one of the foremost Chemistry Departments in the country.

It may be emphasized that our M.Sc. program is both about course work, as well as research, the latter by way of a one year project. While the former component ensures sound exposure to the basics of all contemporary aspects of Chemistry without specialization to a narrow area, the latter gives our youngsters a flavour of chemical research in an area of their choice. Currently the department is home to 34 research groups and 250 Ph.D. students, apart from a hundred plus M.Sc. students, project staff, and postdoctoral fellows.

Our faculty colleagues have had their publications in the topmost international chemistry journals. The impact of this research has led to the conferment of Bhatnagar Prizes, learned Society medals including those of CRSI and MRSI, besides election to Academy Fellowships, Editorship/membership of Editorial Boards of international and national Journals, etc., as also national Best Teacher awards on our colleagues. Our research has included a significant component that has resulted in patents and technology transfer to international manufacturers, as well as industrial applications in India.

Marching into the future, we continuing to excel and scale ever greater heights, thanks to the untiring efforts and contributions of every section of our Department: Students, Staff and Faculty.

Indrapal Singh Aiden
Head of the Department
Department of Chemistry

COURSES OFFERED FOR

[Bachelor of Technology \(B. Tech.\)](#)

[Master of Science \(M. Sc.\)](#)

[Doctor of Philosophy \(Ph. D.\)](#)

ASSOCIATED CENTERS

[MRI - MRS Centre](#)

[DST Unit of Nanoscience](#)

[National Centre for Catalysis Research](#)



RESEARCH AREAS

Organic Synthesis
Bio-Organic & Medicinal Chemistry
Bio-Inorganic
Supramolecular Chemistry
Polymer
Physical Organic
Organic Materials
Solid State
Nanochemistry & Nano Technology
Theoretical Chemistry
Photochemistry & Photophysics
NMR
Thermodynamics and Statistical Mechanics
Organometallic
Main Group
Electrochemistry
Gas Phase Kinetics, Combustion &
Atmospheric Chemistry
Surface Chemistry
Molecular Materials
Computational Chemistry
Optical Spectroscopy
Catalysis
Colloids and Interfaces
Ionic Liquids

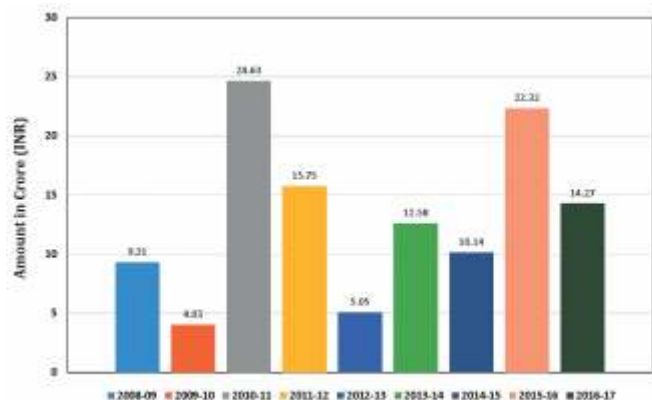


Cutting Edge Research

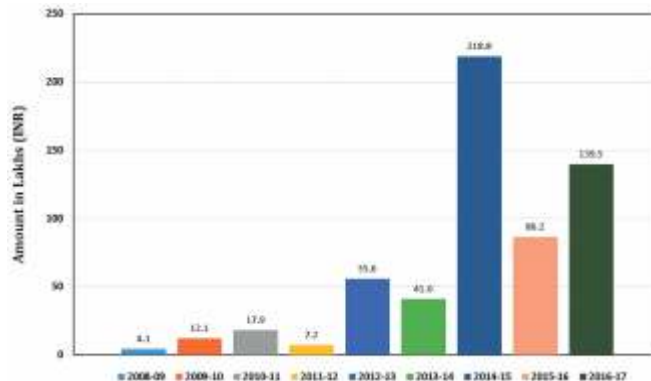
Grants Publications & Patents

Sponsored Projects

(DST, CSIR, BRNS, MNRE etc.)



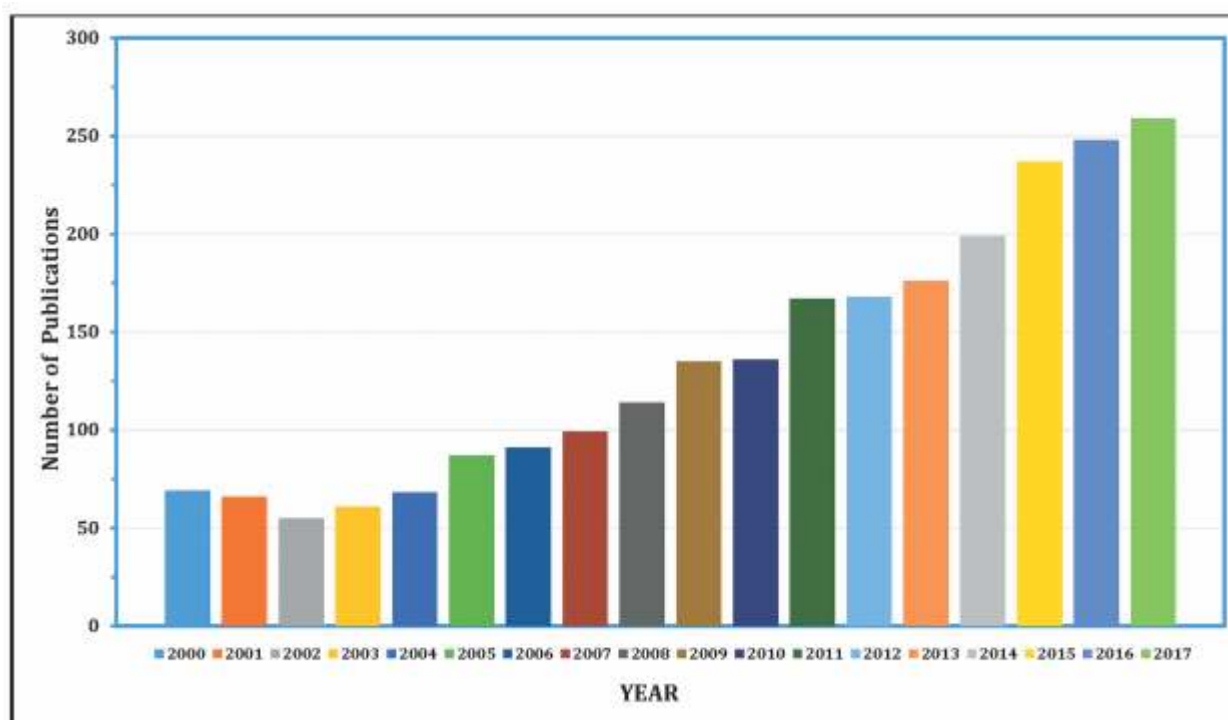
Consulting for Industry



Patents (2008-2017)	Filed & Under Process	Granted	Total
National	81	10	91
International	24	2	26

Course	Completed (1967-2017)	Ongoing
Ph. D.	927	241
No. of Faculty	34	

List of Publications (2000 - 2017)



Faculties & Research

Indrapal Singh Aidhen

isingh@iitm.ac.in

Development of synthetic equivalents based on N-methoxy-N-methylamide popularly known as "Weinreb amide" (WA) functionality and their applications in synthesis of important molecules. Synthesis of important and challenging targets from the realm of carbohydrate chemistry, particularly the C-glycosides. Development of new synthetic strategies for biologically/medicinally important molecules with inspiration from natural products of high medicinal value.

Anbarasan P

anbarasansp@iitm.ac.in

Design and development of new synthetic methodologies, Synthesis of therapeutically important natural products, Trifluoromethylation and trifluoromethylthiolation, Organometallic and organocatalysis, Valorization of biomass and carbon dioxide.

Sundarababu Baskaran

sbhaskar@iitm.ac.in

Development of new strategies in Organic Synthesis, Enantioselective Synthesis, Nano- and Supra-molecular Chemistry, Synthesis of Biologically active Molecules/ Natural Products, Drug Design of Pharmaceutical Importance.

Bhyrappa P

byra@iitm.ac.in

Bioinorganic, Supramolecular and Materials Chemistry of Porphyrinoids.

Beeraiah Baire

beeru@iitm.ac.in

Development of new synthetic methodologies, by exploring the unconventional reactivity of alkynes and propargylic alcohols. Total synthesis of natural products and drugs, Ca-Catalysis of propargylic alcohols.

Debashis Chakraborty

dchakraborty@iitm.ac.in

Organometallics for catalysis and biodegradable polymer synthesis, CO₂ sequestration, Energy storage, Chemical processes.

Dillip Kumar Chand

dillip@iitm.ac.in

Supramolecular Chemistry: Fabrication of self-assembled discrete coordination cages using Pd(II)/Pt(II) and organic ligands. Design, structural, reactivity, dynamic and functional aspects of the cages. Exploring the role of self-assembled coordination complexes as tectons in the field of crystal engineering. Catalysis: Exploration of Molybdenum(VI)-based compounds as mild and selective catalysts for organic transformations.

Raghavachari Dhamodharan

damo@iitm.ac.in

Mechanochemistry, Super Absorbing Polymers, Nanoparticles and Nanocomposites, Nanocellulose and Nanochitin, Organic Materials: π -conjugated Monomer and Polymers, Tailored Dyes for Dye Sensitized Solar Cell, Biopolymers in Building Technology.

Arti Dua

arti@iitm.ac.in

Understanding complex physicochemical processes using the methods of statistical mechanics and stochastic processes. Modeling reaction dynamics at mesoscale; Developing minimal models for biopolymer dynamics; Extracting mechanistic information from single-molecule chemical kinetics; Using coarse-grained theories to understand static and dynamics of neutral and charged polymers.

Ramesh Gardas

gardas@iitm.ac.in

Ionic Liquids, Chemical Thermodynamics, Fluid Phase Equilibria, Thermophysical properties, Group Contribution Methods, QSPR.

Sundargopal Ghosh

sghosh@iitm.ac.in

Metallaboranes of early transition metals and rare earth metals and their application in catalysis, Metalboride thin film from Metallaborane, Boron based solid state emitting materials.

Masilamani Jeganmohan

mjeganmohan@iitm.ac.in

Transition- metal- catalyzed organic transformation, Asymmetric synthesis by using chiral metal complexes as catalysts, Natural products and biologically active molecules synthesis.

Sanjay Kumar

sanjay@iitm.ac.in

Theoretical Chemistry, Quantum Dynamics and High Level ab initio Bound-State Studies of Fundamental Elementary Chemical Reactions, Nonadiabatic Quantum Dynamics (Beyond Born-Oppenheimer Approximation), Ion-Molecule and Low-Energy Electron-Molecule Collisions, Formation of Metastable Molecular Species (Resonances) and their Quantal Characterization and Decay Pathways.

Mangala Sunder Krishnan

mangal@iitm.ac.in

Theoretical Rotational-Vibrational Spectroscopy of Semi-Rigid and Non-Rigid Molecules (van der Waals Complexes), Analytic Perturbation Theory Techniques and Operator Methods for Theoretical Magnetic Resonance of the Solid State, Quantum Teleportation and Multi-Qubit Entanglement, Computational Thermochemistry of Polycyclic Aromatic Hydrocarbons, Pedagogy and Technology Innovation for Online Teaching of Chemistry.

Md. Mahiuddin Baidya**mbaidya@iitm.ac.in**

Asymmetric synthesis, organocatalysis, photoredox catalysis and transition metal catalysis. Development of new methodology, oxidation reactions, cascade reactions. C-H activation, carbon-carbon and carbon-hetero atom bonds formation. Synthesis of natural products and bioactive compounds.

Ashok Kumar Mishra**mishra@iitm.ac.in**

Physical Photochemistry and Fluorescence Spectroscopy. Photophysics of unimolecular and bimolecular processes. Developing novel paradigms for understanding the fluorescence of complex multifluorophoric systems. Developing Fluorescence probes for micro- and nano- scale organized media and soft matter.

Mondal K C**csdkartik@iitm.ac.in**

Synthesis and characterization of radical containing or radical bridged 3d-4f ion based molecular magnets. Stabilization and isolation unusual exotic chemical species of main group elements stabilized by π -accepting carbene.

Muraleedharan K M**mkm@iitm.ac.in**

Design of new peptidic/nonpeptidic oligomers with specific conformational preferences in solution, and their development into signal transduction modulators and antimicrobial agents. Development of short synthetic routes to biologically active compounds, and their iterative structure optimization. Studies to understand the mechanisms of drug action, uptake and localization using molecular probes. Design of chemical sensors for gasotransmitters like CO and H₂S.

Narasimha Murthy N**nnmurthy@iitm.ac.in**

Bioinorganic Chemistry: Design, synthesis, structure, spectroscopy and functional synthetic models for the active-sites dioxygen activating metalloproteins containing binuclear copper, iron, nickel and cobalt centers. Spectroscopy: Applications of Uv-Vis, NMR and EPR methods for characterization of paramagnetic metal complexes.

Archita Patnaik**archita@iitm.ac.in**

Colloids & Structured Interfaces, Designed Amphiphiles, Electronic Structure Calculation & Dynamics, Real time Polarized FT-IRRAS Spectroscopy, Surface Manometry, Charge Transport & Interfacial micro-Voltammetry.

T Pradeep**pradeep@iitm.ac.in**

Molecular and Nanoscale Materials, Surfaces, Physical Chemistry.

Edamana Prasad**pre@iitm.ac.in**

Soft Matter Chemistry (Gels, Liquid Crystals), Stimuli-Responsive Systems, Mechanistic Study of Self-Assembly, Photoinduced Electron and Energy transfer, Light Emitting Quantum Dots, Sensing, Dye Sensitized Solar Cell. Educational Research.

Kothandaraman Ramanujam**rkraman@iitm.ac.in**

Materials Electrochemistry (Fuel Cells, Lithium and Sodium Ion Batteries, Vanadium Redox Flow Battery and Dye Sensitized Solar Cells).

Ranga Rao G**grrao@iitm.ac.in**

Materials chemistry, Heterogeneous catalysis, Energy conversion and storage, Solid state electrochemistry, Nanostructured hybrid and layered materials.

Rajakumar Balla**rajakumar@iitm.ac.in**

Atmospheric Chemistry, Combustion Chemistry, Cavity Ring Down Spectroscopy, Gas Phase Chemical Kinetics, Computational Chemistry.

Arnab Rit**arnabrit@iitm.ac.in**

Synthesis, structure and catalytic application of multifunctional organometallic compounds. Development of new ligand systems for Poly-nuclear compounds-cooperativity between metal center. Novel Main Group compounds for small molecule activation.

Sanganarayanan M V**sangara@iitm.ac.in**

Statistical mechanics, Electrochemical Interfaces, Ultramicroelectrodes, Applications of Conducting polymers, Non-Equilibrium Thermodynamics.

Sankararaman S**sanka@iitm.ac.in**

Synthetic organic chemistry, Synthesis of unnatural compounds and studying their properties for weak interactions. Synthetic acetylene chemistry towards the synthesis of novel fluorophores, cyclophynes etc. Organometallic chemistry of N-heterocyclic carbene complexes and their catalytic properties for various reactions. C-H activation/functionalization using metal catalysis. Synthesis of electroactive molecules for their utilization in organic redox flow batteries.

Sekar G

Asymmetric Synthesis, Synthetic Methodology, Metal Nanocatalysts, Halogen Bonding Catalysts.

gsekar@iitm.ac.in

Parasuraman Selvam

Nano- & Nanoporous Materials, Heterogenous Catalysis Zeolites and Zeo-type Molecular Sieves, Photo- and Electro-Catalysis, Environmental Catalysis, Biomass Conversion, Fuel Cells, Solar Fuels, Batteries, Hydrogen Energy.

selvam@iitm.ac.in

Varadaraju U V

Solid State Chemistry, Electronic, Magnetic and Optical properties.

Varada@iitm.ac.in

Vidyasagar K

Solid State Chemistry of metal oxides, metal sulfides and metal organophosphonates.

kvsagar@iitm.ac.in

Venkatakrishnan P

Synthesis of novel functional organic molecules of interest. Luminescent and electroactive organic molecular materials for lighting, lasers, field-effect transistors and photovoltaics. Engineering efficient organic dyes for sensors/bio-imaging. Construction of organic nanoarchitectures for functional devices.

pvenkat@iitm.ac.in

Amrendra Vijay

Classical and Quantum Optics: Vector Field Equations (Maxwell) and Quantum Electrodynamics, with applications in near-field optics, nano-optics, photonics, meta-materials and other optical devices. Quantum Magnetism, Quantum Many-Body/Field Theory, Quantum Statistical Mechanics and Quantum Phase Transitions.

avijay@iitm.ac.in

Emeritus Professor

Chandrakumar N

Magnetic Resonance Spectroscopy and Imaging, MR Methodology development and applications to molecules, materials, electrochemical and biological systems.

nckumar@iitm.ac.in

Adjunct Faculty

Arumugam Manthiram

Electrochemical Energy Technologies focusing on rechargeable batteries, fuel cells, solar cells and supercapacitors.

manth@austin.utexas.edu

Rajan Ravichandran

Internal Medicine and Nephrology.

ravidoc55@yahoo.co.in

Subramanian S

EPR & NMR (Spectroscopy & Imaging), Instrumentation, Image Processing, tissue oximetry & Theoretical Chemistry.

subukannan@gmail.com

Vijayamohanan K Pillai

Electrochemistry, Materials Chemistry, Energy Storage Devices, Sensors, Nanoclusters, Self-assembled Monolayers, Carbon Nanotubes, Hybrid Materials for Fuel cells, Batteries and Ultracapacitors.

vijay@cecri.res.in

INSA Senior Scientist

Manoharan P T

Spectroscopy of Materials and Biological Molecules; Nanoclusters specially of Noble Metals; Plasmonics and Magnetism of both substrate-free and semiconductor-supported clusters; Antimicrobial and Cytotoxicity, Hydrogen Evolution Reaction with nanomaterials.

ptm@iitm.ac.in

Chemistry In-House Symposium CiHS 2017



DEPARTMENT OF CHEMISTRY

Indian Institute of Technology Madras,
Chennai 600 036

Ph.: 91-44-2257-4200 | Fax: 91-44-2257-4202

Email: cyoffice@iitm.ac.in