

Department of Chemical Engineering, IIT Bombay





Indian Institute of Technology Bombay

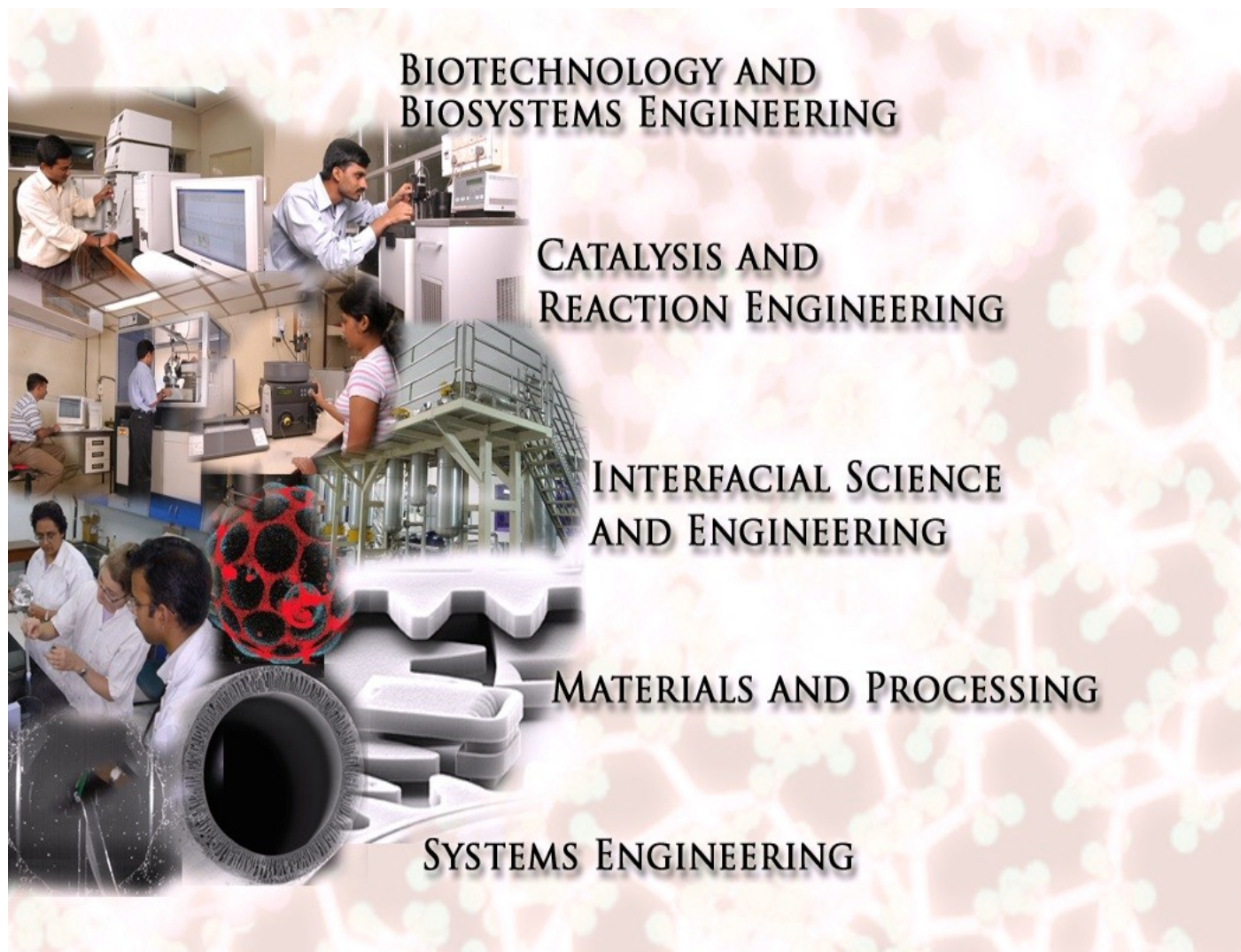
- Established in 1958
- Campus Area: 530 Acres (2.14 sq km.)
- 15 departments, 9 centres, 2 schools and 3 interdisciplinary programmes,
- Around 487 faculty members
- Around 6500 students
- Over 34,000 students graduated over 50 years
- IIT-Bombay consistently ranks amongst the best in World
(Rank:30, <http://www.usnews.com>)



Department of Chemical Engineering

Faculty members	32
Adjunct Faculty	05
Supporting staff members	34
PhD students	149
M Tech students	83
Dual degree students	143
B Tech students	253
Total students	628

Chemical Engineering Research Areas





Biotechnology & Biosystems Engineering

*J Bellare, S Noronha, KV Venkatesh, P Wangikar,
S Jadhav, S Mehra, HS Shankar, AK Suresh, RD Gudi, S
Bhartiya, M Mukhopadhyay, S Roy, A Ganesh*

- Metabolic pathway quantification
- Genetic networks and switches
- Recombinant biology
- Stem cells
- Optimal design and operation of bioreactors
- Combinatorial chemistry
- Bioinformatics: Proteomics, transcriptomics
- Drug design, controlled release
- Enzymology
- Supercritical extraction
- Vermiculture

Applications in

- *Pharmaceuticals*
- *Medical biotech*
- *Foods*
- *Fermentation products*
- *Waste treatment*
- *Natural extracts*
- *Genetic engineering*



Transport, Colloids and Interfaces Group

J Bellare, VA Juvekar, DV Khakhar, A Mehra, S Roy, AK Suresh, T Mahesh, R Thaokar, M Vinjamur, R Bandyopadhyaya, VM Naik

- Mesoporous materials and composites
- Nanoparticle synthesis, Modeling,
- Polymer adsorption
- Electrohydrodynamics
- Cryo-microscopy
- Interfacial reactions and micro-encapsulation
- Coatings, thin films, instabilities
- Aerosols

Applications in

Controlled/sustained drug delivery

- *Catalysts/catalysis*
- *Detergents, foods*
- *Reactor designs*
- *Enhanced oil recovery*
- *Paints & Coatings*

Catalysis & Reaction Engineering



*SM Mahajani, P. Aghalayam, A Mehra, VA Juvekar
AK Suresh*

- Multiphase reactions
- Reaction/separation combinations
- Novel strategies for intensification
- Automotive catalysis
- Detailed combustion modelling
- Reactions at interfaces
- CFD for better designs

• **Applications in**

- *Petroleum/petrochemicals sector*
- *Oxidations, hydrogenations*
- *Reactive distillation*
- *Underground coal gasification*
- *Interfacial polymers*



Materials and Processing

*A Mehra, J Bellare, DV Khakhar, S Mahajani,
H Nanavati, J Adhikari, AK Suresh*

- Soft solids
- Nanomaterials
- Polyurethane foams, Elastomers, Optical materials
- Intensification, combo processes
- Solid state reactions
- Interpenetrating polymer networks
- Molecular modelling
- CFD for reactions and mixing
- Granular materials

Applications in

- *Detergents, ice cream*
- *Endoscopes*
- *Ultra strong fibres*
- *Coatings and paints*
- *Reactor and mixer designs*
- *Buoyancy foams*



Systems Engineering

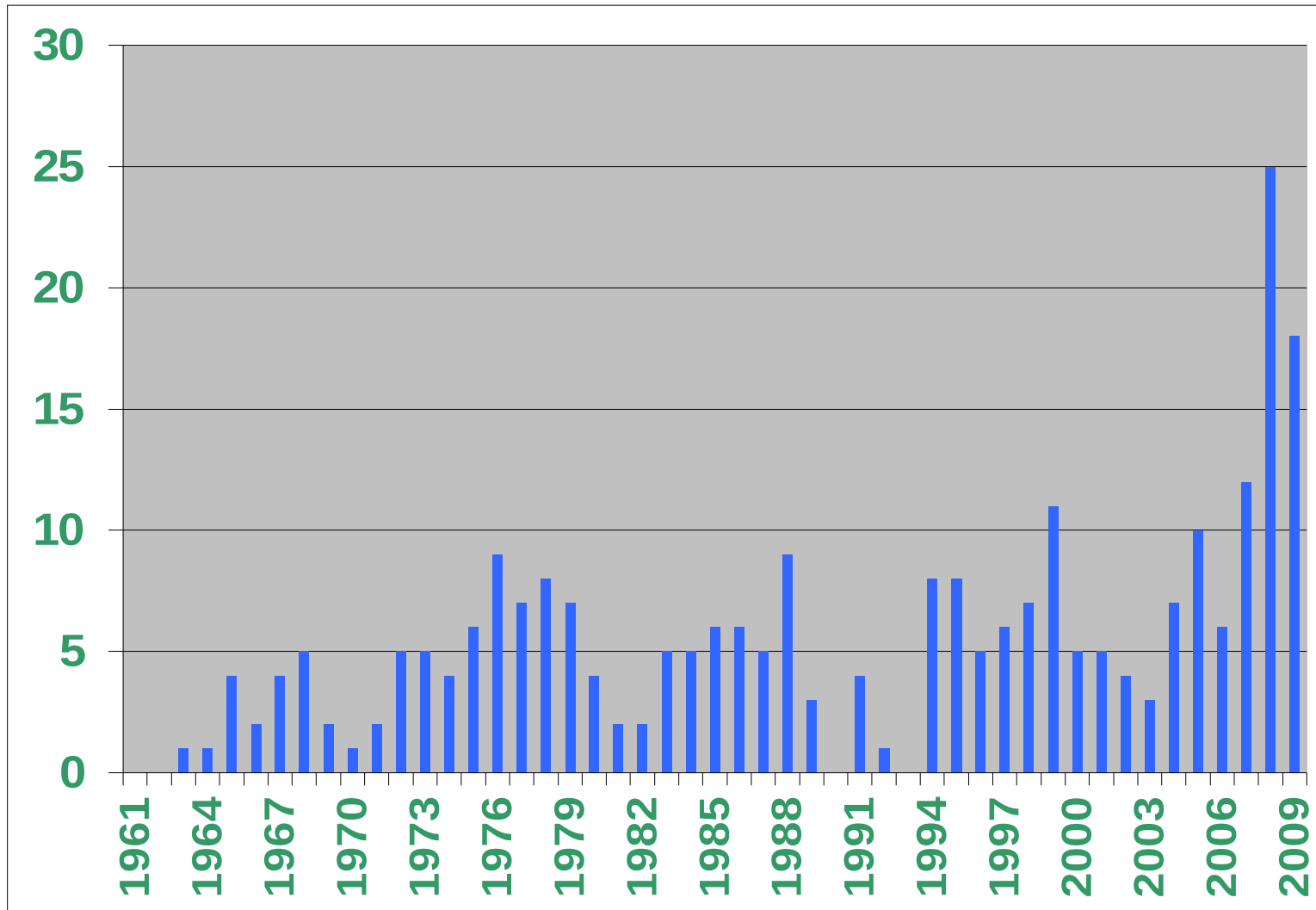
*SC Patwardhan, KM Moudgalya, AS Moharir,
S Bhartiya, RD Gudi, RK Malik, Mani Bhushan*

- Modeling & simulation
- Process synthesis and optimization
- Energy integration
- Fault diagnosis
- Sensor networks
- Advanced process control
- AI tools in controls
- Biomimetic control strategies

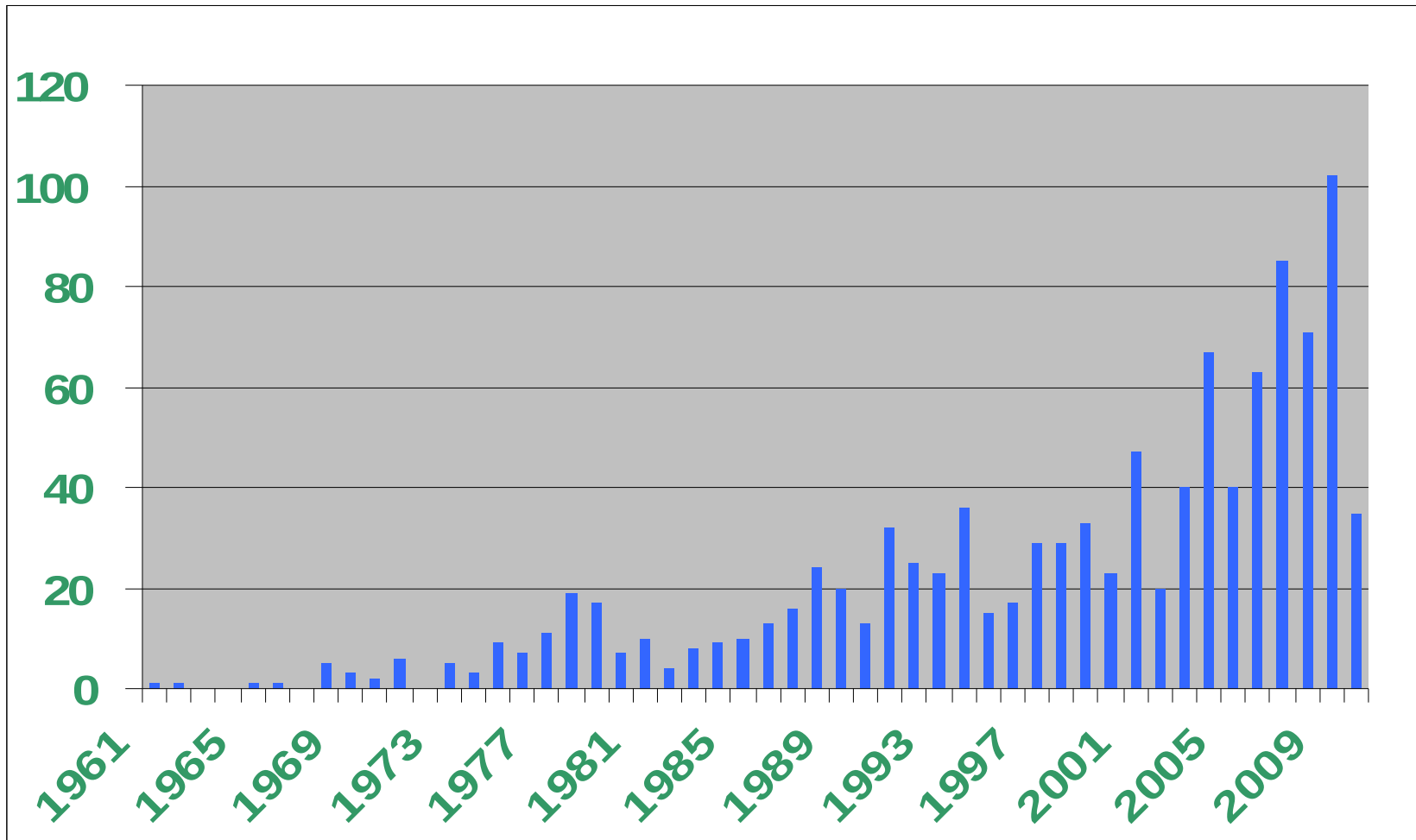
Applications in

- *Petrochemical industry*
- *Refineries*
- *Chemical process industry*
- *Biochemical processes*
- *Polymerization*

PhDs Graduated



Journal Publications



Projects

Sponsored Research

Year	Number	Amount (crores)
2004	16	2.60
2005	20	3.01
2006	10	10.23
2007	24	12.62
2008	19	3.87
2009-10	24	7.86

Consultancy

Year	Number	Amount (crores)
2004	80	0.59
2005	78	0.45
2006	57	1.05
2007	35	1.57
2008	30	2.10
2009-10	31	1.8



Achievements

- **Technologies to Industry**
 - Vermiculture
 - Supercritical fluid extraction
 - Endoscope design using fiber optics
 - Nanotechnology product for cancer therapy
 - Light guide fiber optic
 - Filter Membrane Press
- **Patents:** Total no. of patents-27
 - Several Indian and US patents
- **Awards**
 - SS Bhatnagar (2), Swaranjayanti (2), Fellows of National Academies (9), International awards (3), Other national awards (10)
- **Industry consultancy**
 - DUPONT, ONGC, Tata Steel, P & G, Unilever, McDonnell Academy (USA), AkzoNobel, Embio Ltd., Pidilite, Dow Chemicals, TCE Mumbai, BARC, BRNS



PhD Placements/Publications

- Publications, Patents:
 - Top level international journals
 - International conferences: institute funding to attend
 - Institutional support for filing patents
- Post-Docs: Top universities in US, EU, Australia, Singapore, Japan
- Corporate R&D: GE, Honeywell, Unilever, Crompton Greaves, 3M, Battelle India, RIL, P&G, GM, Shell, UBE Thailand, Samsung India, Mitsubishi Japan, Tridigonal solutions, Dow Chemicals, NTPC etc.
- Faculty Positions: No separate data, but
 - “In one of the IITs, of the 73 faculty members who joined (since Oct 2005), 40 obtained PhD from an IIT or IISc”
(IIT-Directors-Pay-Proposal, 2008)

Famous Alumni



Dr. S. Rama Iyer

M.Tech., IIT Bombay, 1962,
Chemical Engineering Ph.D., IIT
Bombay 1964, Chemical
Engineering. Chairman &
Managing Director, Davy
Powergas India Ltd., Mumbai



Dr. Uday G. Karmarkar

B.Tech., 1968, Chemical
Engineering, IIT Bombay Times
Mirror Professor of Business
Strategy, Anderson Graduate
School of Management, UCLA



Parag Rele

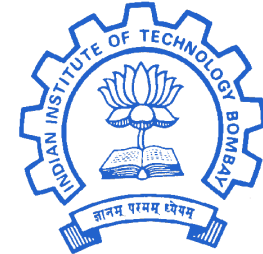
B.Tech. (Hons) 1969,
Chemical Engineering
Managing Director & CEO
Aplab Limited



Mr. Venkatesh Kasturirangan

B.Tech., 1969, Chemical
Engineering, IIT Bombay
Chairman & CEO, Unilever
Philippines.





Contd.....

Dr. Ramani Ayer

B.Tech., 1969, Chemical
Engineering, IIT Bombay
Chairman & CEO, The
Hartford Financial Services
Group. Inc.



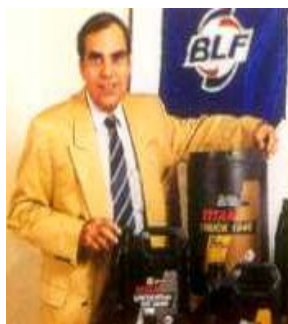
Mr. Shiv Narain Mathur

B.Tech., 1967, Chemical
Engg. IIT Bombay
Chairman and MD, IBP Co.
Ltd.



Dr. Jitendra Bhatia

B.Tech., 67, M.Tech. 69, Ph.D.
73, Chemical Engineering, IIT
Bombay, Managing Director,
Balmer Lawrie-Fuchs Ltd.



Avinash Manudhane

B.Tech., 1975, Chemical Engg,
IIT Bombay
Managing Director & Partner,
Goldman, Sachs & Co.





CEP Courses

- Piping Engineering
- Advance Pipeline Technology
- Elements of Chemical Engineering
- Optimization Techniques for Chemical Engineering Applications
- Advances in Distillation Systems: Principles and Practices
- CFD Analysis in Chemical Engineering

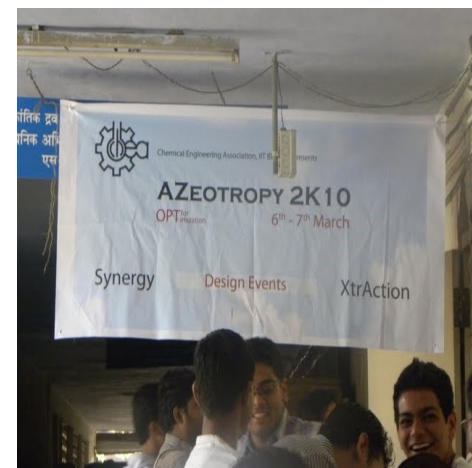
Department Activities

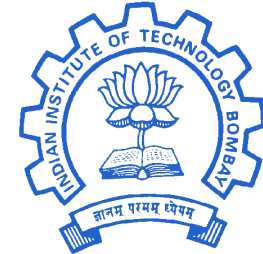
- RESEARCH SCHOLARS SYMPOSIUM
- CHEA
- AZEOTROPY



RESEARCH SCHOLARS' SYMPOSIUM 2010

Department of Chemical Engineering IIT-Bombay





Instruments And Computational Facilities

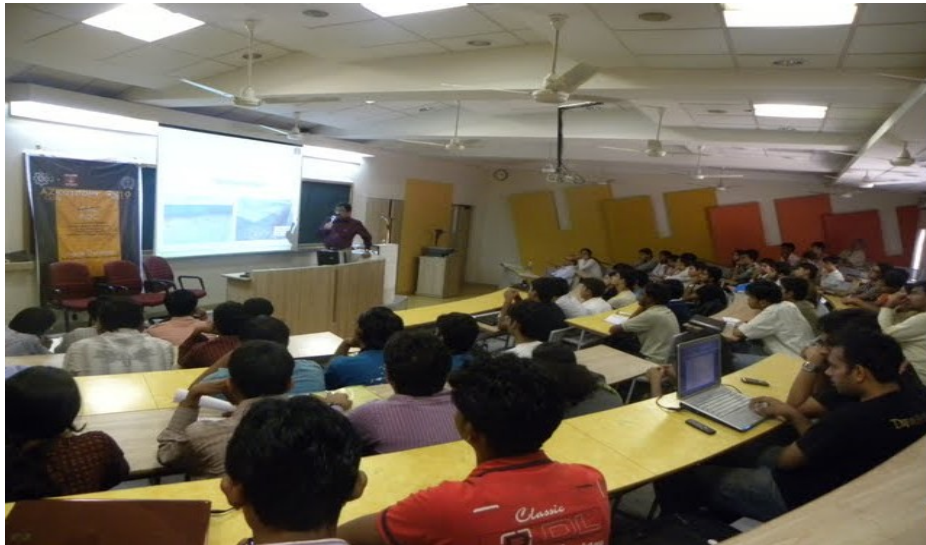
INSTRUMENTS

- HRTEM, Elipsometer, Microarray Scanner
- Dynamic Vapor Sorption, Small Volume Fiber Extruder (100gms)
- Plasma Cleaner, Real Time PCR
- Spin coater, Nanophotometer (1-5 micro liter)
- Stopped Flow Reactor, SALS, DLS
- CO₂ Incubator, Biosafety Cabinet

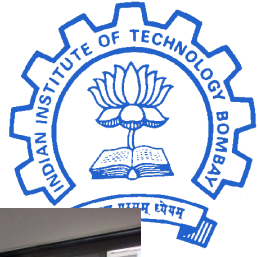
SOFTWARES

- COMSOL, ASPEN ONE (2006) Suite, Sci Lab, Accelrys Mol. Modeling, fluent

Class Rooms



Labs





Thank you