

4.4. DEPARTMENT OF CHEMICAL ENGINEERING

4.4.1. Introduction

The Department of Chemical Engineering was established in 1959. The Department has 28 faculty members who carry out research in state-of-the-art areas. The focus of the research is geared towards energy, materials and the environment. The faculty work towards analysing these systems by understanding their behaviour at the molecular level as well as using a systems approach.

4.4.2. Academic Programmes

New courses introduced

Sl. No.	Course No.	Title
1	CH5012	Modelling and Simulation of Particulate Processes
2	CH5013	Principles of Fuel Cells
3	CH5014	Interfacial Science and Engineering

Students on roll

Programme	I year	II Year	III Year	IV Year	V Year and Others	Total
B.Tech.	71	69	75	57	6	278
Dual Degree	16	18	20	19	17	90
M.Tech.	32	29	1	0	0	62
M.S.	7	21	7	4	1	40
Ph.D.	13	26	16	5	12	72
Total	139	163	119	85	36	542

Names of students/scholars who attended conferences/workshops/seminars and symposia abroad or in India

Sl. No.	Name of the Student/Scholar	Roll No.	Name of the Conference/Seminar/Symposium/Workshop	Date and Venue	Financial Assistance from
Abroad					
1	M. Sudhakar	CH08D013	11th International Symposium on Process Systems Engineering	9 July 2012, Singapore	IIT Madras
2	K. Sivagami	CH08D015	International AOP Conference 2012	7–9 May 2012, Goslar, Germany	IIT Madras
			International Symposium on Advanced Control of Chemical Processes	10–13 July 2012, Singapore	–
3	Nabil M.	CH09D004	11th International Symposium on Process Systems Engineering	15–19 July 2012, Singapore	IIT Madras
4	Gokul Siva Sankar G.	CH10S012	11th International Symposium on Process Systems Engineering	5–19 July 2012, Singapore	IIT Madras
5	Dugyala Venkateswar Rao	CH11D015	16th International Congress of Rheology	5–12 August 2012, Portugal	IIT Madras
6	Anjali T.G.	CH11D018	16th International Congress of Rheology	5–12 August 2012, Portugal	IIT Madras
7	Sreenita Bhattacharya	CH11S008	International Conference CCECP 2013	25–26 December 2012, Singapore	IIT Madras
India					
1	K. Goutham	CH11M011	SERC School on Molecular Simulations	28 December 2012–2 January 2013, Kanpur	Organizers
2	M. Sudhakar	CH08D013	International Workshop on Mathematics in Chemical Kinetics and Engineering (MaCKiE 2013)	4–6 February 2013, IIT Madras	IIT Madras

3	G. Keerthiga	CH09D007	10th International Oil and Gas Conference and Exhibition (Petrotech-2012)	14–17 October 2012, New Delhi	IIT Madras
			National Symposium on Electrochemical Science and Technology (NSEST-12)	24–25 August 2012, IISc, Bangalore	–
4	K.S. Rajamohan	CH10D003	4th International Conference on Advanced Nanomaterials – ANM 2012	17–19 October 2012, IIT Madras	IIT Madras
5	C.N. Pratheeba	CH10D015	International Workshop on Mathematics in Chemical Kinetics and Engineering (MaCKiE 2013)	4–6 February 2013, IIT Madras	IIT Madras
			Symposium on International Automotive Technology (SIAT-2013)	9–12 January 2013, Pune	IIT Madras
6	Dipin S. Pillai	CH10D017	International Workshop on Mathematics in Chemical Kinetics and Engineering (MaCKiE 2013)	4–6 February 2013, IIT Madras	–
7	Harikrishna Reddy B.	CH10S013	Chemference'12	10–12 December 2012, IIT Bombay and ICT, Mumbai	IIT Madras
			International Workshop on Mathematics in Chemical Kinetics and Engineering (MaCKiE 2013)	4–6 February 2013, IIT Madras	IIT Madras
8	R. Piramuthu Raja Ashok	CH11D007	4th International Conference on Advanced Nanomaterials – ANM 2012	17–19 October 2012, IIT Madras	IIT Madras
9	Abhishankar Kumar	CH11D016	Chemference'12	10–11 December 2012, IIT Bombay and ICT, Mumbai	IIT Madras
10	Basavaraja R.J.	CH11D019	International Workshop on Mathematics in Chemical Kinetics and Engineering (MaCKiE 2013)	4–6 February 2013, IIT Madras	IIT Madras
11	Beula C.	CH11D020	International Workshop on Mathematics in Chemical Kinetics and Engineering (MaCKiE 2013)	4–6 February 2013, IIT Madras	IIT Madras
12	Fathima Fasmin	CH11D024	Fifth ISEAC Triennial International Conference on Advances and Recent Trends in Electrochemistry	16–20 January 2013, Hyderabad	IIT Madras
13	Jason Ryan Picardo	CH11D026	International Workshop on Mathematics in Chemical Kinetics and Engineering (MaCKiE 2013)	4–6 February, 2013, IIT Madras	–
14	Amala M. Mathai	CH11M002	International Workshop on Mathematics in Chemical Kinetics and Engineering (MaCKiE 2013)	4–6 February, 2013, IIT Madras	–
15	Fazil A.	CH11M007	Chemference'12	10-11 December 2012, IIT Bombay and ICT, Mumbai	IIT Madras
			Indo-US Workshop on Electrocatalytic Materials for Fuel Cells and Biofuel Cells	26–28 February 2013, BHU, Varanasi	IIT Madras
16	Abhilash J. Kottiyatil	CH11M016	Indo-US workshop on Electrocatalytic Materials for Fuel and Biofuel Cells	26–28 February 2013, BHU, Varanasi	IIT Madras
17	Danny Raj M.	CH11S013	International Workshop on Mathematics in Chemical Kinetics and Engineering (MaCKiE 2013)	4–6 February, 2013, IIT Madras	IIT Madras
18	Dhanya Ram V.	CH12D002	International Workshop on Mathematics in Chemical Kinetics and Engineering (MaCKiE 2013)	4–6 February, 2013, IIT Madras	IIT Madras

19	R. Savitha	CH12D004	4th International Conference on Advanced Nano Materials	17–19 October 2012, IIT Madras	–
20	Simi Santosh	CH12D006	International Workshop on Mathematics in Chemical Kinetics and Engineering (MaCKiE 2013)	4–6 February, 2013, IIT Madras	IIT Madras
21	M. Volga	CH12D019	Indo-US Workshop on Electrocatalytic Materials for Fuel Cells and Biofuel Cells	26–28 February 2013, BHU, Varanasi	IIT Madras
22	G. Sri Bala	CH12S012	International Workshop on Mathematics in Chemical Kinetics and Engineering (MaCKiE 2013)	4–6 February, 2013, IIT Madras	IIT Madras

Names of students/scholars who won outside prizes and awards

Sl. No.	Name of the Student/Scholar	Roll No.	Name of Prize	Prize Awarded by
1	K. Ram Satish	CH06D009	Best Ph.D. thesis and research award in chemical engineering	Dr. A.V. Rama Rao Foundation
2	M. Sudhakar	CH08D013	Best student poster award	11th International Symposium on Process Systems Engineering, Singapore
			Best paper award	IISc, Bangalore
3	G. Keerthiga	CH09D007	Best digital presentation	Ministry of Petroleum & Natural Gas, GoI, New Delhi
4	Arun Srikanth S.	CH09S001	Best thesis award	ISTE-IPCL
5	K.S. Rajamohan	CH10D003	Best poster award	IIT Madras
6	Abhishankar Kumar	CH11D016	Best poster presentation	IIT Bombay
7	Amala M. Mathai	CH11M002	poster award	IIT Madras
8	Fazil A.	CH11M007	Best poster award	BHU, Varanasi
9	S. Sriram	CH11S029	Best poster presentation	IIT Bombay

Names of students/scholars who won institute convocation prizes

Sl. No.	Name of the Student/Scholar	Roll No.	Name of Prize
1	Thimmineni Ravikeerthi	CH07B056	B. Ravichandran Memorial Prize
2	Rohit Kannan	CH08B036	Reliance Heat Transfer Pvt. Ltd. Prize
3	Sreekanth Rajagopalan	CH08B042	C.A. Sastry Endowment Prize
4	Arun Srikanth S., Arun K.	CH09S001 CH10M003	Bhagyalakshmi and Krishna Ayengar Award for the best M.Tech. thesis at the 49th convocation
5	Maharshi Maitra	CH10M017	Dr. K. Subba Raju Memorial Prize

4.4.3. Faculty and Their Activities

Faculty

Name and Qualifications	Major Areas of Specialization
Professors	
Dr. P.S.T. Sai [Head]	Chemical reactor analysis and design
Dr. Abhijit Deshpande	Rheology of complex fluids, polymers and polymeric composites, processing flow visualization
Dr. A. R. Balakrishnan	Boiling of multicomponent mixtures, flow boiling heat transfer in conventional and mini/microchannels, thermodynamics of azeotropic mixtures
Dr. M. Chidambaram	Process control
Dr. A. Kannan	Mathematical modeling, simulation and optimization of chemical processes
Dr. K. Krishnaiah	Chemical reactor analysis and design fluidization

Dr. R. Nagarajan	Particle science and technology, ultrasonic processing, statistical quality control
Dr. T. Panda	Bioprocess optimization, bioprocess technology and enzyme design
Dr. S. Pushpavanam	Modeling and simulation, nonlinear dynamics, flow visualization
Dr. Raghunathan Rengasamy	Process systems engineering, fuel cells, computational discrete microfluidics
Dr. R. Ravi	Applied statistical mechanics, foundations of thermodynamics and mechanics, process dynamics and control
Dr. Shankar Narasimhan	Process design, data mining, fault diagnosis
Dr. Sreenivas Jayanti	Fuel cells, combustion, energy systems
Dr. T. Swaminathan	Environmental management, biotechnology, membrane technology, environmental risk assessment
Dr. Tanmay Basak	Microware application, mathematical modeling and simulation
Associate Professors	
Dr. Arun K. Tangirala	Process systems engineering; control, identification and monitoring; applied signal processing
Dr. Preeti Aghalayam	Chemical reaction engineering
Dr. S. Ramanathan	Electrochemistry, chemical mechanical planarization for semiconductor processing
Dr. Susy Varughese	Physics and mechanics of polymeric materials, polymeric nano composites
Dr. Upendra Natarajan	Polymer science and engineering; molecular simulation; statistical thermodynamics of complex fluids; nanostructured hybrid composite materials
Assistant Professors	
Dr. M.G. Basavaraja	Directed assembly of colloids; microstructure and rheology of colloids, surfactants, polymers and their mixtures; interfacial rheology; ionic liquids; particulate gels
Dr. Ethayaraja Mani	Molecular simulations, self-assembly, mathematical modeling
Dr. Raghuram Chetty	Electrocatalysis, fuel cells, wastewater treatment
Dr. R. Ramnarayanan	Structural models for solids, high-resolution spectroscopy and microscopy, industrial catalysts
Dr. R. Ravikrishna	Contaminated sediment remediation, contaminant fate and transport, air pollution process and control
Dr. T. Renganathan	Multiphase reactors, computational fluid dynamics
Dr. Sridharakumar Narasimhan	Process system engineering, optimization, process control, fault diagnosis
Dr. R. Vinu	Thermo-catalytic conversion of biomass to useful intermediates, photocatalysis for environmental decontamination, microkinetic modelling of complex reactions
Adjunct Professors	
Dr. Niket S. Kaisare	Micoreactor technology, multiscale modeling, process control, fuel processing, fuel cells
Hosted Fellows	
Dr. K. Vijaya Raghavan	Environmental biotechnology, water quality and wastewater treatment
Guest Faculty	
Dr. K.S. Ravindran	Technology development and transfer to manufacturing, materials and thin-film technologies, quality management systems

Short-term courses/workshops/seminars/symposia/conferences organised by faculty members

Sl. No.	Coordinator(s)	Title	Period
Short-term courses			
1	Arun K. Tangirala	System Identification: Tutorial Overview & Emerging Trends	20–21 June 2012
2	S. Ramanathan, S. Rini Raghavan	Electrochemical kinetics and Thermodynamics — Principles with Applications	11–13 April 2013
3	T. RenganathanKannan	Applications of Process Simulators in Chemical Engineering	26–30 November 2012

Conferences

1	Ethayaraja Mani, Pijush Gosh	Applications of Molecular Simulations in Research & Industry Department of Applied Mechanics	14–18 January 2013
2	S. Pushpavanam	Mathematics in Chemical Kinetics and Engineering Indo-European Food for Health Conference	4–6 February 2013 10–12 February 2013

Workshops

1	Arun K. Tangirala	Transform Techniques for Signal & Image Processing, at PSR College, Sivakasi Linear Systems Theory & System Identification, at TUM, Munich, Germany Safety in Process Industry, sponsored by the Department of Chemicals and Petrochemicals, Ministry of Chemicals and Fertilizers, New Delhi	14–15 June 2012 15–16 May 2012 7–9 November 2012
2	Raghuram Chetty	Technology Appreciation Programme (TAP) on fuel cells, ChemClave 2013	21 December 2012 March 15–17 2013
3	Ethayaraja Mani	Application of Molecular Simulations in Research & Industry	January 14–18 2013

Short-term courses

1	T. Renganathan, Kannan A.	Applications of Process Simulators	26–30 November 2012
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Short-term courses/workshops/seminars/symposia/conferences/training programmes attended by faculty members in academic institutions and public sector undertakings

Sl. No.	Name of Faculty Member	Title	Institution	Period
Workshops				
1	Sreenivas Jayanti	Coal to Energy for Sustainable Development	NTPC and DST, New Delhi	10–11 January 2013
Symposia				
1	R. Nagarajan	8th International Symposium on Cavitations	NUS, Singapore	14–16 August 2012
2	S. Shankar Narasimhan	11th International Symposium on Process Systems Engineering PSE 2012	Singapore	15–29 July 2012
3	Arun Tangirala	Advanced Control of Chemical Processes (ADCHEM 2012)	Singapore	7–13 July 2012
4	Preeti Aghalayam	Chemical Reaction Engineering (ISCRE)	Maastricht, the Netherlands	2–5 September 2012
5	Raghuram Chetty	Severe Accident Analysis and Management (SAAM-2013) Symposium	Department of Chemical Engineering, IIT Kanpur	1–3 February 2013
Conferences				
1	Arun K. Tangirala	AICHe 2012 ADCHEM 2012	AICHe IFAC	2–7 November 2012 10–13 July 2012
2	S. Pushpavanam	Second Indo-German Workshop on Advances in Reaction and Separation Processes 2012 AICHe Annual Meeting	Bad Herrenalb, Germany Pittsburgh, PA	20–22 February 2012 28 October–2 November 2012
3	T. Swaminathan	International Conference on Sustainable Built Environment'12 Conference	Kandy, Srilanka	14–16 December 2012
4	Sreenivas Jayanti	Opportunities and Challenges in Underground Coal Gasification	Chandigarh, India	11–12 February 2012

5	S. Ramanathan	ECS Fall 2012 Conference	Electrochemical Society (ECS), USA	7–11 May 2012
6	Sridharakumar Narasimhan	IFAC Symposium on System Identification	Brussels, Belgium	11–13 July 2012

Special lectures delivered by faculty in other institutions

Sl. No.	Name of Faculty	Topic of Lecture	Institution	Date
1	Abhijit P. Deshpande	Rheology of Networked Systems: Large-Amplitude Oscillatory Shear	IISc, Bangalore	31 January 2013
		Clean Process Technologies: Reactive Distillation — An Exciting Process Intensification Tool	GMR Institute of Technology, A.P.	4 April 2012
		Concentration of Industrial Effluents Using Natural Evaporators	GMR Institute of Technology, A.P.	4 April 2012
2	Kannan A.	Faculty Development Programme (Heat Transfer): Analysis and Application of Natural Convective Systems	A.C. College of Technology, Anna University, Chennai	4 June 2012
		Aspen Plus Workshop (ALCHEMY)	National Institute of Technology, Trichy	8 March 2013
		Process Intensification	8th International Symposium on Cavitation, Singapore	13–16 August 2012
		Project presentation to GM, BHEL R&D	IITM Research Park, Chennai	13 October 2012
		Project presentation	Pan-IIT Alumni Meet, Kolkata	7–9 December 2012
3	Nagarajan R.	Project presentation	Delhi Alumni Chapter Meet, New Delhi	20 January 2013
		Erosion, Fouling and Slagging	CRRID, Chandigarh	11–12 February 2013
4	T. Panda	Recent Trends in Advanced Fermentation Technology	Department of Biotechnology, Vel Tech High Tech, Chennai	14 March 2013
		Core Annular Flow in a Gently Curved Channel	University of Houston	5 November 2012
		Applications of Nonlinear Dynamics in Chemical Engineering	IIT Madras	28 November 2012
5	Pushpavanam S.	Applications of Nonlinear Dynamics in Chemical Engineering	Gayathri Vidhya Parishad College, Vishakapatnam	13 November 2012
		Transport Processes in Microfluidics	Department of Mechanical Engineering, IIT Madras	17 January 2013
		An Overview of Fuel Cell Technology	Department of Chemical Engineering, Government Engineering College, Thrissur, Kerala	8 March 2013
6	Raghuram Chetty	An Introduction to Electrochemical Techniques	Department of Chemistry, College of Engineering, Anna University, Chennai	17 December 2012
7	Ramanathan S.	Nonlinear Electrochemical Impedance Spectroscopy	Clarkson University, USA	14 May 2012
		Effect of Abrasives in STI CMP	Hanyang University, Korea	10 October 2012
		Quantification of Interactions in Multiloop Control Systems Using Directed Spectral Decomposition	Tsinghua University, Beijing, China	19 June 2012

8	Arun K. Tangirala	Data-Driven Causality Measures for Linear Multivariate Processes	Tsinghua University, Beijing, China	18 June 2012
		On Causality Measures in Linear Multivariate Processes	Technical University of Munich, Munich, Germany	25 May 2012
9	Ravi R.	A Flowsheet for the History of Classical Thermodynamics	Sri Venkateswara University, Tirupati	10 December 2012
10	Renganathan T.	Application of Microsoft Excel for Numerical Methods in Chemical Engineering	Government Engineering College, Thrissur	10–11 September 2012
11	Sreenivas Jayanti	(1) Oxyfuel Combustion in the Context of Carbon Capture and Sequestration (2) Chemical Looping Combustion in the Context of Carbon Capture and Sequestration	NTPC & DST, New Delhi	10–11 January 2013
		Kinetic Monte Carlo to Unravel Reaction Pathways in Complex Systems, given in STTP on Applications of Molecular Simulation in Research and Industry	IIT Madras	18 January 2013
12	Vinu R.	Characterization of Polymer Degradation by Experiments and Kinetic Models, given in One-Day National Seminar on Modern Techniques for the Characterization of Polymeric Materials	Vellore Institute of Technology, Chennai	2 March 2013

Visits abroad by faculty

Sl. No.	Name of Faculty	Country Visited	Date	Purpose of Visit	Funding
1	R. Nagarajan	Singapore	6–8 April 2012	Pan-IIT APAC 2012	Project funds
		USA—Orlando, Florida	30 April to 3 May 2012	IEST 58th Annual Technical Meeting	CPDA, IIT Madras
		USA—Yale University Graduate School Alumni Association and the Department of Chemical Engineering	14–15 May 2012	Discussion regarding research collaboration	CPDA
			30–31 May 2012	Visit to other universities	Not from IIT Madras
		Japan—Kyushu University	24–27 January 2013	Programme launch	Kyushu University
		Singapore—NUS	14 August 2012	Talk, Ultrasonic Process Intensification	IIT Madras
		USA	10–21 June 2012	Alumni visit, academic collaborations, industrial relations and entrepreneurial ventures	Project funds
2	S. Pushpavanam	USA—Pittsburgh, Houston	28 October 2012	Conference, lecture	IIT Madras
		Germany	20 February 2012	Conference	Project
		USA	1 August 2012 to present	Sabbatical	University of Delaware
		China	17–24 June 2012	Special lectures, visiting fellow	Tsinghua University, China
3	Arun K. Tangirala	Munich	13–28 May 2012	Research collaborations, workshop, TUM-IAS Visiting Fellow	Institute of Advanced Studies, TUM, Germany
4	Preeti Aghalayam	The Netherlands	21–22 May 2012	Consortium progress meeting for project	Project funds

5	S. Ramanathan	South Korea	9–12 October 2012	Project discussion meeting	DST
		USA	6–11 May 2012	Conference presentation	CPDA
		USA	11 June to 5 July 2012	Sabbatical	EUFP7
6	R. Ramnarayanan	Spain	28 May to 1 June 2012	Conference, Nanoformulation 2012	EUFP7
		The Netherlands	21–22 May 2012	Consortium progress meeting for project	Project funds
7	Sreenivas Jayanti	Germany—Munich	26–27 June 2012	To attend International Flow Battery Forum 2012	IIT Madras
8	Sridharakumar Narasimhan	Belgium—Brussels,	11–17 July 2012	IFAC symposium on system identification	CPDA
		Belgium—Ghent	9 July 2012	Talk and research discussions	Not from IIT Madras
		Norway—NTNU, Trondheim	11 June to 7 July 2012	Research interaction	Partial funding from NTNU
9	Susy Varughese	USA—California	19–21 September 2012	ASME Conference on Smart Materials, Adaptive Structures & Intelligent Systems (SMASIS-2012)	IIT Madras

Honours and awards obtained by faculty

Sl. No.	Name of Faculty Member	Name of Award	Awarded by	Awarded for	Date of Award
Awards					
1	Raghuram Chetty	Bhagyalakshmi and Krishna Ayengar Award	IIT Madras	For having guided best M.Tech. project work	9 April 2013
		Top cited article certificate	Elsevier	Received for an article published during 2009-2010 in <i>Electrochimica Acta</i>	August 2012
Honours					
1	Shankar Narasimhan	Fellow of the INAE	Council of INAE	Elected for distinguished contribution to engineering	January 2013

Books authored/co-authored

Sl. No.	Name of Faculty Member	Title	Publisher	Co-author/Author
Books				
1	T. Panda	<i>Handbook of Food Process Design</i>	Wiley Blackwell	Co-author (with S. Singha)
2	S. Pushpavanam	<i>Introduction to Chemical Engineering</i>	Prentice Hall India	Author

Fellowships of academies and professional societies

Sl. No.	Name of Faculty Member	Year of Admission
AIChE		
1	A.R. Balakrishnan	1974
INAE		
1	Shankar Narasimhan	2013
2	A.R. Balakrishnan	2003
ISHMT		
1	A.R. Balakrishnan	1989
IChE		
1	A.R. Balakrishnan	1990

ISTE	1	A.R. Balakrishnan	1996
ASME	1	A.R. Balakrishnan	1992
TNAsC	1	A.R. Balakrishnan	1996
IAS Visiting Fellowship, TUM, Germany	1	Arun K. Tangirala	13–27 May 2012

Journal editorial boards

Sl. No.	Name of Faculty Member	Position (Editor/Member)	Journal
1	A.R. Balakrishnan	Editor	<i>International Journal of Heat and Mass Transfer</i> , published by Pergamon Press (Elsevier Science)
		Editor	<i>International Communications in Heat and Mass Transfer</i> , published by Pergamon Press (Elsevier Science)
		Editor	<i>Journal of Energy, Heat and Mass Transfer</i> , published by the Regional Centre for Energy, Heat and Mass Transfer
2	Shankar Narasimhan	Member	<i>ICE, Advances in Chemical Engineering</i>
3	Tanmay Basak	Associate Editor	<i>International Journal of Heat and Mass Transfer</i> and <i>International Communications in Heat and Mass Transfer</i>
4	Raghuram Chetty	Member	<i>Nano Hybrids</i>

4.4.4. Design and Development Activities

New facilities added or major equipment procured

Sl. No.	Name of Equipment	Value (lakhs of Rs.)
1	Zeta potential measurement unit	9.6
2	Aspen Plus Process Simulation university license (150 users)	3.3
3	Single shot micropyrolyzer	18.0
4	Syringe pumps (Harvard)	5.0
5	Microchannel chips and fittings(Micronit)	8.0
6	Computers (5 nos.)	4.0

Patents filed

Sl. No.	Name of Faculty Member	Title of Patent
1	Raghuram Chetty	‘A Method of Preparing Palladium Dendrites on Carbon Paper’, Indian Patent Application 5188/CHE/2012
		‘A Method of Preparing Palladium Dendrites on Carbon Nanotubes’, Indian Patent Application 4807/CHE/2012
		‘A Method of Preparing Palladium Dendrite’, Indian Patent Application 3632/CHE/2012

4.4.5. Research and Consultancy

Sponsored research projects

Sl. No.	Title	Period	Funding Agency	Amount (lakhs of Rs.)	Co-ordinators
1	Controlled drop spreading and squeeze flow analysis for improved permeability description in composite process simulation	February 2012 to January 2015	ARDB	16.96	Abhijit P. Deshpande

2	Adhesive joining technology	October 2012 to October 2014	TDB	146	G.D. Janaki Ram, Srinivasa Rao Bakshi MM, Abhijit P. Deshpande CH
3	Megasonic cleaning	October 2009 to October 2013	Crest Ultrasonics Corporation, USA	6.7	R. Nagarajan
4	Optimization of thermal shock wave damage during selective tissue cell removal using pulse shaping	February 2012 to February 2013	DST (Indo-South African)	11.01	Sarit Kumar Das, T. Panda, Franz-Josefkaglen (S. Africa)
5	Study of cell migration under thermal and chemical gradients using microfluids based BIO-MEMS	September 2010 to September 2013	DBT	65.00	Sarit Kumar Das, T. Panda, Amitava Das Gupta, Nandita Das Gupta
6	Understanding mass transfer and reactions in microchannels	2011–2013	CSIR	12	S. Pushpavanam
7	Elucidation of physio-chemical mechanisms in absorption of carbon dioxide using microchannels for optimal design of absorption systems	2012–2015	Department of Science and Technology (DST)	62	S. Pushpavanam
8	Stratification studies in the event of a core disruptive accident	2010–2013	Indira Gandhi Centre for Atomic Research	22	S. Pushpavanam, T. Sundarajan ME
9	Liquid jet instabilities	2012–2013	Department of Atomic Energy	3.8	S. Pushpavanam
10	Buckling control of cylindrical and conical shells for aerospace applications using PZT actuators	September 2010 to September 2013	ISRO	29.48	Prof. C. Lakshmana Rao, Dr. Arun K. Tangirala
11	Experiments and modeling for system-wide control of biodiesel engines and after treatment systems	2 years	DST	36.73	Preeti Aghalayam CH, Niket Kaisare
12	Characterization and modification of ceria particles for STI CMP	2011–2014	DST	31 (+ 40 million Korean Wong)	R. Ramanathan, Tanmay Basak, Jin Goo Park (Korean PI)
13	Electrochemical deposition of Se for CIGS solar cell formation	2013–2016	DST-SERI	100 (project sanctioned but exact funding not announced yet)	S. Ramanathan, Kasi Viswanathan
14	Self-assembly of patchy colloids: A route to advanced functional materials	3 years	DST	55.00	Ethayaraja Mani
15	A nanocomposite material for high-power lithium battery cathodes	2012–2015	DST, Government of India (under Indo-Australian Strategic Research Fund)	35.15	Raghuram Chetty, P. Selvam CY
16	Electrochemical and corrosion behavior of 216L stainless steel as a potential alternative to 316L SS bipolar plates in fuel cell applications	2012–2014	Renault Nissan Technology & Business Centre India Private Limited	9.75	Raghuram Chetty, N. Lakshman MM
17	Titanium compounds of interest in electrochemical titanium production	March 2009 to November 2012 (extension in progress)	Defence Research and Development Organization, India	10.39	
18	Integrating nanomaterials in formulations	July 2009 to June 2012	European Union Framework Program 7	20.7	Ramnarayanan R.

19	Proof-of-principle solar energy fuel storage cells	June 2012 to June 2014 proposed	Nissan (not supported)	8.6 (not supported)	
20	The changing risks posed by petroleum hydrocarbons in groundwater environments: Multiphase fluid dynamics coupled to multispecies biodegradation	September 2011 to August 2014	DST/DIISR (Indo-Australian Joint Research Program)	39.26	Indu Nambi CE, R. Ravikrishna CH, G. Suresh Kumar OE
21	Evaluation of strategies for the environmental restoration of Pallikaranai Marsh	January 2013 to March 2014	Department of Forestry, Government of Tamil Nadu	5.00	Indu Nambi CE, R. Ravikrishna CE, T. Swaminathan CH
22	Green roofs: An extensive study to assess the role of substrate, plants and soil microbes to improve runoff quality	5 years	DBT, Government of India	74.50	K. Vijayaraghavan
23	SANS investigation of sponge-to-lamellar transition in surfactant-protic ionic liquid mixture	1 year	UGC-DAE CSR*	0.35	Basavaraj M. Gurappa CH
24	Modelling accelerated ageing and degradation of solid oxide fuel cells (MAAD-SOFC)	3 years	DST (Indo-UK)	63.27	Ranjit Bauri MM,, Sreenivas Jayanti CH
25	Rheology and microstructure of cellulose-ionic liquid mixtures	3 years	Board of Research in Nuclear Sciences	32.75	Basavaraja M Gurappa, Abhijit P. Deshpande
26	Fundamentals of catalytic fast pyrolysis of biomass to biofuels and intermediates using a micro-pyrolysis reactor	July 2012 to June 2015	IIT Madras Seed Grant	20	R. Vinu
27	Fundamentals of co-processing of biomass residues with waste polymers via fast pyrolysis for biofuels production and resource recovery	January 2013 to December 2015	DST	52.0	R. Vinu and S. Ramanathan

Industrial consultancy projects

Sl. No.	Name of Faculty Member	Title	Industry	Amount (lakhs of Rs.)
1	Kannan A.	Performance Guarantee Testing of Induced Draught Concrete Cross Flow Cooling Tower at Rashtriya Ispat Nigam Ltd. Vishakapatnam, A.P.	Hamon Shriram Cottrell Private Ltd.	2.2
2	S. Pushpavanam	Dynamic Simulation of a Pilot Plant Fluidized Bed Gasifier	Bharat Heavy Electricals Limited (BHEL)	17
3	Sreenivas Jayanti	Prediction of the Upper and the Lower Furnace Temperature for High-Ash Coals	BHEL, Tiruchirapalli	20.0

RBIC projects

Sl. No.	Name of Faculty Member	Title	Industry	Amount (lakhs of Rs.)
1	R. Nagarajan	Spray Drying Slagging Fouling Zinc Oxide	Hindustan Unilever Ltd. BHEL, Trichy Coromandel Fertilizers	6.6 22.9 23.0
2	S. Pushpavanam	Mathematical Modeling of a Fluidized Bed Gasifier for a Mixture of Indian Coal and Petcoke	Bharat Petroleum Corporation Ltd. (BPCL) and Centre for High Technology	50
3	S. Pushpavanam, A. Kannan	Characterising Tea Extraction in a Vending Machine: An Analysis of Different Protocols	Tata Global Beverages	16

4	S. Pushpavanam, T. Renganathan	Modelling and Optimization of Plasma Enhanced Coal Gasification	Korean Institute of Science and Technology	60
5	Arun K. Tangirala (PI: Krishnan Balasubramanian)	Development of Integrated Software Package for Data Analysis and Interpretations of Inspection Data of Long-Distance Pipelines Using Instrumented and Caliper Pigs of Various Sizes	IOC	59.32
6	Arun K. Tangirala (PIs: T. Renganathan, S. Pushpavanam)	Dynamic Modelling of Fluidized Bed Gasifier	BHEL	17.21
7	Susy Varughese, Abhijit P. Deshpande	Preparation and Characterization of PVA-Based Membranes for Selective Carbon Dioxide Separation	Bloom Energy	16.2
8	T.Renganathan	Development of Simulators and Optimizer for PE-IGCC Process 3 May 2010 to 31 December 2012	Korea Institute of Science and Technology	59.1
9	S. Pushpavanam	Dynamic Modeling of a Fluidized Bed Gasifier 1 October 2011 to 31 March 2013	Bharat Heavy Electricals Limited	17.2

Research publications

Total number of papers published in refereed national journals: 3

Total number of papers published in refereed international journals: 83

Total number of papers presented at national conferences: 3

Total number of papers presented at international conferences: 34

Total number of chapters in books: 1

(a) Refereed national journals

1. M. Chidambaram (2012) Identification of five parameters of a SOPTD model by relay tuning. *Indian Chemical Engineer* 54: 79–96.
2. P.S.T. Sai (2012) Numerical studies on average solids holdup in a liquid–solid circulating fluidized bed riser. *Indian Chemical Engineer* 54(2): 97–112.
3. R. Vinu (2013) Renewable energy via photocatalysis. *Current Organic Chemistry* (in press).

(b) Refereed international journals

1. A.P. Deshpande and S. Varughese (2013) Effect of PES on the morphology and properties of proton conducting blends with sulfonated poly(ether ether ketone) *Journal of Applied Polymer Science* 127(6): 5100–5110.
2. A.P. Deshpande and S. Varughese (2013) Novel polymer electrolyte membranes based on semi-interpenetrating blends of poly(vinyl alcohol) and sulfonated poly(ether ether ketone) *Journal of Applied Polymer Science* 127(3): 2140–2151.
3. A.P. Deshpande (2012) Nonlinear viscoelastic response of asphalt binders: An experimental study of the relaxation of torque and normal force in torsion. *Material Research Communications* 43: 66–74.
4. A.P. Deshpande (2012) Nonlinear viscoelastic response of asphalt binders in transient tests. *Road Materials & Pavement Design* 13(1): 191–202.
5. A.R. Balakrishnan (2013) Effect of inorganic salts on the isobaric vapor–liquid equilibrium of the ethyl acetate–ethanol system. *Journal of Chemical and Engineering Data* 58: 560–569.
6. A.R. Balakrishnan (2012) Entropy generation during natural convection in porous cavity: Effects of thermal boundary conditions. *Numerical Heat Transfer, Part A: Applications* 62: 336–364.
7. M. Chidambaram (2012) Closed loop Identification of multivariable systems by optimization method. *Industrial & Engineering Chemistry Research* 51: 1324–1336.
8. M. Chidambaram (2012) Centralized PI controllers for interacting multivariable processes by synthesis method. *ISA Transactions* 51: 400–409.
9. M. Chidambaram (2012) Closed loop identification of SOPTD models multivariable systems by optimization method. *Industrial & Engineering Chemistry Research* 51: 9620–9633.
10. M. Chidambaram (2012) An improved relay auto tuning of PID controllers for critically damped SOPTD systems. *Chemical Engineering Communication* 199: 1437–1462.

11. M. Chidambaram (2012) Controller design for MIMO processes based on simplified decoupled ETFs and simplified decoupler. *Industrial & Engineering Chemistry Research* 51: 12398–12410.
12. A. Kannan (2013) Performance evaluation of a solar and wind aided cross-flow evaporator for RO reject management. *Desalination* 317: 1–10.
13. A. Kannan (2013) Simulation of non-Newtonian fluid–food particle heat transfer in the holding tube used in aseptic processing operations. *Food and Bioproducts Processing* 91(2): 129–148.
14. A. Kannan (2011) Effects of particle diameter and position on hydrodynamics around a confined sphere. *Industrial & Engineering Chemistry Research* dx.doi.org/10.1021/ie2000852.
15. R. Nagarajan and B.V.S.S.S. Prasad (May 2012) Acoustic enhancement of heat transfer in furnace tubes. *Chemical Engineering and Processing: Process Intensification* 59: 36–42.
16. R. Nagarajan (2013) Fouling intensity of three Indian coals. *Coal Combustion and Gasification Products (CCGP)* (ISSN 1946-0198).
17. R. Nagarajan (2013) Megasonic cleaning to remove nano-dimensional contaminants from wafer surfaces: An analytical study. *Solid State Phenomena* 195: 209–212.
18. T. Panda and T. Basak (2013) A simplified approach to derive Cleland model for enzymatic reactions. *Biotechnology Letters* 35: 785–789.
19. T. Panda (2012) Kinetics of biosynthesis of silver nanoparticles using *Fusarium oxysporum*. *Current Trends in Technology and Science Volume 1*: 47–52.
20. S. Pushpavanam (December 2012) Comparison of laminar and plug flow-fields on extraction performance in micro-channels. *Chemical Engineering Science* 83: 2–11.
21. S. Pushpavanam (2012) A nonlinear analysis of the effect of heat transfer on capillary jet instability. *Physics of Fluids* 24(12): 2012.
22. S. Pushpavanam (2013) On the conditional superiority of counter-current over co-current extraction in microchannels. *Microfluidics and Nanofluidics*. Published online.
23. R. Rengaswamy (2013) Droplet digital signal generation in microfluidic networks using model predictive control. *Journal of Process Control* 23(2): 32–139.
24. R. Rengaswamy (2013) Traffic of pairs of drops in microfluidic ladder networks with fore–aft structural asymmetry. *Microfluidics and Nanofluidics* 14(1–2): 337–344.
25. R. Rengaswamy (2013) Root cause analysis of linear closed-loop oscillatory chemical process systems. *Industrial & Engineering Chemistry Research* 51(42): 13712–13731.
26. R. Rengaswamy (2012) Automatic oscillation detection and characterization in closed-loop systems. *Control Engineering Practice* 20(8): 733–746.
27. R. Rengaswamy (2012) Control loop performance assessment using detrended fluctuation analysis (DFA). *Automatica* 48(7): 1359–1363.
28. R. Rengaswamy (2012) Design of model-based feedback controller for active sorting and synchronization of droplets in a micro fluidic loop. *AIChE Journal* 58(7): 2120–2130.
29. R. Rengaswamy (May 2012) Optimization Studies of a polymer electrolyte membrane fuel cell with multiple catalyst layers. *Journal of Power Sources* 206: 197–203.
30. R. Rengaswamy (2012) Modeling studies of a cylindrical polymer electrolyte membrane fuel cell cathode. *Industrial & Engineering Chemistry Research* 51(13): 5003–5010.
31. R. Rengaswamy (2012) Constrained unscented recursive estimator for nonlinear dynamic systems. *Journal of Process Control* 22(4): 718–728.
32. P.S.T. Sai and K. Krishnaiah (2012) Hydrodynamics and flow regimes in turbulent bed contractor with non-Newtonian liquids. *Canadian Journal of Chemical Engineering* 90(1): 87–92.
33. P.S.T. Sai and K. Krishnaiah (2012) Axial solids holdup distribution in a liquid–solid circulating fluidized bed: Effect of the liquid distributor, method of operation, and viscosity of the fluidizing media. *Industrial & Engineering Chemistry Research* 51(50): 16242–16250.
34. P.S.T. Sai (2013) Drying of solids in a rotary dryer. *Drying Technology* 31(2): 213–223.
35. S. Narasimhan (2012) Optimal operations of reverse osmosis plant driven by solar power without batteries. *Computer Aided Chemical Engineering* 31: 1442–1446.
36. S. Narasimhan (2012) Online model predictive control of municipal water distribution networks. *Computer Aided Chemical Engineering* 31: 1622–1626.
37. S. Narasimhan (2012) Constrained unscented recursive estimator for nonlinear dynamic systems. *Journal of Process Control* 22(4): 718–728.
38. S. Jayanti (2012) Thermal coupling studies of a high temperature proton exchange membrane fuel cell stack and a metal hydride hydrogen storage system. *Energy Procedia* 29: 254–264.

39. S. Jayanti (2012) Underground coal-air gasification based solid oxide fuel cell system. *Journal of Applied Energy* 94: 406-414.
40. S. Jayanti (December 2012) Thermal management strategies for a 1 kWe stack of a high temperature proton exchange membrane fuel cell. *Journal of Applied Thermal Engineering* 48: 465-475.
41. S. Jayanti (2012) Laboratory scale studies on simulated underground coal gasification of high ash coals for carbon-neutral power generation. *Energy* 46(1): 351-358.
42. S. Jayanti (2012) Integration of underground coal gasification with a solid oxide fuel cell system for clean coal utilization. *International Journal of Hydrogen Energy* 37(2): 1677-1688.
43. S. Jayanti (March 2012) Experimental studies of flame extinction in a swirl-stabilized oxy-fuel burner. *Fuel* 93: 75-81.
44. S. Jayanti (March 2012) Flame structure investigations of oxy-fuel combustion. *Fuel* 93: 52-58.
45. S. Jayanti (March 2012) CFD analysis of dense gas dispersion in door environment for risk assessment and risk mitigation. *Journal of Hazardous Materials* 209-210: 177-185.
46. S. Jayanti (2013) Effect of spacer grids on CHF in nuclear rod bundles. *Journal of Nuclear Engineering and Design* 261: 66-75.
47. S. Jayanti and T. Swaminathan (2012) Optimized enriched CO₂ recycle oxy-fuel combustion for high ash coals. *Fuel* 102: 32-40.
48. T. Swaminathan (2013) Statistical optimization for biological decolourisation and COD removal of screen-printing wastewater using *Trametes versicolor*. *International Journal of Environment and Waste Management* 11(3): 304, 314.
49. T. Basak (2012) Heatline analysis for natural convection within porous rhombic cavities with isothermal/nonisothermal hot bottom wall. *Industrial and Engineering Chemistry Research* 51(4): 2113-2132.
50. T. Basak (February 2012) Analysis of entropy generation minimization during natural convection in trapezoidal enclosures of various angles with linearly heated side wall(s). *Industrial Engineering and Chemical Research* 51: 4069-4089.
51. T. Basak (September 2012) Analysis of energy management via entropy generation approach during natural convection in porous rhombic enclosures. *Chemical Engineering Science* 79: 75-93.
52. T. Basak (2012) Analysis of entropy generation during natural convection in porous right-angled triangular cavities with various thermal boundary conditions. *International Journal of Heat and Mass Transfer* 55(17-18): 4521-4535.
53. T. Basak (2012) Role of entropy generation during convective thermal processing in right-angled triangular enclosures with various wall heatings. *Chemical Engineering Research and Design* 90(11): 1779-1799.
54. T. Basak (2013) On multiple steady states for natural convection (low Prandtl number fluid) within porous square enclosures: Effect of non uniformity of wall temperatures. *International Journal of Heat and Mass Transfer* 59(1): 230-246.
55. T. Basak (2013) Role of microwave heating strategies in enhancing the progress of a first-order endothermic reaction. *AIChE Journal* 59(2): 656-670.
56. T. Basak (2012) Heatline analysis on natural convection for nanofluids confined within square cavities with various thermal boundary conditions. *International Journal of Heat and Mass Transfer* 55(21-22): 5526-5543.
57. T. Basak (2012) Numerical study of mixed convection within porous square cavities using Bejan's heatlines: Effects of thermal aspect ratio and thermal boundary conditions. *International Journal of Heat and Mass Transfer*.
58. T. Basak. Heatlines based natural convection analysis in titled isosceles triangular enclosures with linearly heated inclined walls: Effect of various orientations. *International Communications in Heat and Mass Transfer*.
59. T. Basak (2012) Microwave material processing: A review. *AIChE Journal* 58(2): 330-363.
60. T. Basak (March 2013) Heatline based thermal management for natural convection in porous rhombic enclosures with isothermal hot side or bottom wall. *Energy Conversion and Management* 67: 287-296.
61. T. Basak (2012) Analysis of Bejan's heatlines on visualization of heat flow and thermal mixing in titled square cavities. *International Journal of Heat and Mass Transfer* 55(11-12): 2965-2983.
62. T. Basak (July 2012) A complete heatline analysis on mixed convection within a square cavity: Effects of thermal boundary conditions via thermal aspect ratio. *International Journal of Thermal Sciences* 57: 98-111.

63. T. Basak (2012) A pacelet number based analysis of mixed convection for lid-driven porous square cavities with various heating of bottom wall. *International Communications in Heat and Mass Transfer* 39(5): 657–664.
64. A.K. Tangirala (September 2012) Online data compression of MFL signals for pipeline inspection. *NDT & E International* 50: 1–9.
65. S. Ramanathan (2013) Characterization of TMAH based cleaning solution for post Cu-CMP application. *Microelectronic Engineering* 102: 74–80.
66. S. Ramanathan (2012) Electrochemical impedance spectroscopy (EIS) analysis of BTA removal by TMAH during post Cu CMP cleaning process. *Journal of the Electrochemical Society* 159: C447–C452.
67. U. Natarajan and R. Nagarajan (2012) Sono-synthesis of polystyrene/alumina nanocomposites. *Proceedings of the Institution of Mechanical Engineers Part N, Journal of Nanoengineering and Nanosystems* 226(4): 157–164.
68. U. Natarajan (2012) Molecular dynamics simulations of PAA–PMA copolymers in dilute aqueous solution: Chain conformations and hydration properties. *Industrial & Engineering Chemistry Research* 51(33): 10833–10839.
69. U. Natarajan (2012) Molecular thermodynamics of polymer chains confined between surfaces containing end-tethered flexible molecules. *Journal of Macromolecular Science B: Physics* 51(1): 164–183.
70. U. Natarajan (2012) Molecular simulations of the conformational properties of atactic poly(2-ethylbutyl methacrylate). *Journal of Applied Power Science* 25(2): 1586–1591.
71. U. Natarajan (2012) Thermodynamic free energy behavior of diblock copolymer chains confined between planar surfaces having end-tethered flexible polymer molecules. *Journal of Macromolecular Science B: Physics* 51(7): 1282–1302.
72. U. Natarajan (2012) Prediction of structure and energy of trans-1,4-polybutadiene glassy surfaces by atomistic simulations of free-standing ultrathin films. *Journal of Macromolecular Science B: Physics* 51(11): 2201–2221.
73. U. Natarajan (2012) Behavior of hydrogen bonding and structure of ionized poly(acyclic acid) PAA in water–ethanol mixture via molecular dynamics simulations. *Journal of Molecular Simulations* 39(2): 145–153.
74. U. Natarajan (2013) Generalised theoretical study of the effect of molecular bond optical tensor components on the mean-squared optical anisotropy $[\gamma_2]$ of model bead-spring linear homopolymer chains. *Journal of Macromolecular Science B: Physics* 52(1): 95–112.
75. R. Ravikrishna (2013) Evaporation from contaminated, exposed earthen cracks. *Environmental Engineering Science* 30(1): 23–29.
76. R. Ravikrishna (2012) Current atmospheric aerosol research in India. *Current Science* 102(3): 440–451.
77. R. Ravikrishna (2012) Atmospheric pollution in a semi-urban coastal region in India following festival seasons. *Atmospheric Environment* 47: 295–306.
78. T. Renganathan and S. Pushpavanam (2012) CO₂ utilization for gasification of carbonaceous feedstocks: A thermodynamic analysis. *Chemical Engineering Science* 83: 159–170.
79. R. Chetty (2012) Effect of pyrolysis temperature on cobalt phthalocyanine supported on carbon nanotubes for oxygen reduction reaction. *Journal of Applied Electrochemistry* 42: 945–951.
80. E. Mani (2012) Sheet-like assemblies of spherical particles with point-symmetrical patches. *Journal of Chemical Physics* 136: 144706.
81. S. Narasimhan (2012) Data reconciliation using uncertain models. *International Journal of Advances in Engineering Sciences and Applied Mathematics* 4: 3–9.
82. S. Narasimhan (November 2012) Modelling and simulation of unloading operations in petroleum product storage terminals. *Computers and Chemical Engineering* 46: 59–68.
83. S. Narasimhan (2012) Sensor location for optimal operation based on linear data reconciliation. *Industrial & Engineering Chemistry Research* 51: 6789–6797.

(c) Proceedings of national conferences

1. A.R. Balakrishnan (2012) Ionic liquids as entrainers for the separation of ethyl acetate–isopropanol. *National Conference on Recent Advances in Chemical and Environmental Engineering (RACEE)*, NIT Rourkela 20–21 January 2012.
2. R. Nagarajan (2013) Erosion, fouling and slagging: Mitigation strategies for Indian coals. CRRID, Chandigarh, 11–12 February.
3. R. Chetty (2012) Effect of supporting electrolyte on the electrochemical reduction of carbon dioxide at copper electrode. Electrochemical Society of India, IISc, Bangalore, 24–25 August.

(d) Proceedings of international conferences

1. A.R. Balakrishnan (2012) Prediction of salt effect on vapor–liquid equilibrium of methyl acetate–methanol system. *Proceedings of 2012 AIChE Spring Meeting*, Houston, Texas, USA, 1–5 April.
2. S. Pushpavanam and T. Renganathan (2012) Thermodynamic modeling of coal gasification: A universal approach. Pittsburgh, USA, 31 October.
3. R. Nagarajan (2012) Sono-synthesis and dispersion of nano-particles: Experiments & simulation. Singapore, 13–16 August.
4. R. Nagarajan (2013) Basics of nanotechnology. Orlando, Florida, USA, 30 April–3 May 2013.
5. S. Narasimhan (2012) Data reconciliation and its application in mineral processing industry. Delhi, India, 26–28 September 2012.
6. S. Jayanti (2012) A stand-alone coupled solar PV and RFB power generator system for domestic applications. Munich, Germany, 26–27 June 2012.
7. T. Swaminathan (2012) Development of an eco-friendly treatment method of e-waste. Kandy, Sri Lanka, 14–17 December.
8. A.K. Tangirala (2012) Reconstructing plant connectivity using directed spectral decomposition. International Federation of Automatic Control (IFAC), Singapore, 10–13 July.
9. A.K. Tangirala (2012) Analysis of high-throughput multiparametric flow cytometry data to identify cellular phenotypes underlying alcohol mediated aberrant differentiation of embryonic stem cells. AIChE, 2–7 November.
10. A.K. Tangirala (2012) Optimal arrangement of PZT actuators for the buckling control of cylindrical shells. ASME, 19–21 September.
11. P. Aghalayam (2012) CFD: A virtual platform for teaching concepts in non-ideal chemical reactions. Kottayam, India. 19–21 July 2012.
12. S. Ramanathan (2012) Multi-sine EIS-drift, nonlinearity and solution resistance effects. ECS, USA, 6–11 May.
13. S. Ramanathan (2013) Simulation of large amplitude multisine EIS with log spaced frequencies. ELAC 2013, January.
14. S. Varughese (2012) Electromechanical behavior of conductive polyaniline/poly (vinyl alcohol) blend films under uniaxial loading. California, USA, 19–21 September.
15. U. Natarajan (2012) Conformations, hydrogen-bonding structure and dynamics of hydrophobic polyelectrolyte poly (ethacrylic acid) in dilute aqueous solution investigated by molecular dynamics simulations. Varanasi, India, 4–9 November.
16. R. Chetty (2013) Electrodeposited platinum nanocatalysts for PEM fuel cell applications. Banaras Hindu University, Varanasi, India, 26–28 February.
17. R. Chetty (2013) Carbon xerogels as catalyst support for polymer electrolyte membrane fuel cells. Banaras Hindu University, Varanasi, India, 26–28 February.
18. R. Chetty (2013) Electrochemical reduction of nitrate at copper phthalocyanine supported on carbon nanotubes. Hyderabad, India, 16–20 January.
19. R. Chetty (2012) Ag/CNT electrocatalyst for oxygen reduction reactions in alkaline media. IIT Bombay & ICT Mumbai, India, 10–11 December.
20. R. Chetty (2012) Phthalocyanine supported functionalized carbon nanotubes for electrochemical reduction of nitrate. IIT Madras, 17–19 October.
21. R. Chetty (2012) Palladium dendrites on TiO₂ nano tubes as electrocatalyst for formic acid fuel cells. IIT Madras, 17–19 October.
22. R. Chetty (2012) Electrochemical conversion of carbon dioxide to useful chemicals. New Delhi, 14–17 October.
23. R. Chetty (2013) Carbon nanotubes supported silver catalyst for anion exchange membrane fuel cells. Banaras Hindu University, Varanasi, India, 26–28 February.
24. R. Chetty (2012) Development of non-platinum cathode catalysts for proton exchange membrane fuel cells. Merseburg, Germany 13–16 June.
25. S. Pushpavanam and T. Renganathan (2013) Dynamic simulation of fluidized bed gasifier. IIT Madras, 4–6 February.
26. S. Pushpavanam and T. Renganathan (2013) Thermodynamic and rate based models for simulation of gasifiers. IIT Madras, 4–6 February.
27. S. Narasimhan (2012) Online model predictive control of water distribution networks. Singapore, 15–19 July.

28. S. Narasimhan (2012) Optimal operation of reverse osmosis plant driven by solar power without batteries. Singapore, 15–19 July.
29. S. Narasimhan (2012) Approximate dynamic programming based control for water gas shift reactor. Singapore, 15–19 July.
30. S. Narasimhan (2012) Integrated sensor network design. Singapore, 15–19 July.
31. S. Narasimhan (2012) Economic back-off selection based on optimal multivariable controller. Singapore, 11–13 July.
32. S. Narasimhan (2012) Plant friendly input design for system identification in closed loop. Brussels, 11–13 July.
33. R. Vinu (2013) Kinetic modeling of co-pyrolysis of biomass and polymers: A thermogravimetric study. IIT Madras, 4–6 February.
34. R. Vinu (2013) Fundamental understanding of co-(fast)-pyrolysis of biomass and polymers for energy and resource recovery. IIP, Dehradun, India, October 2013.

(e) Chapters in books

1. M. Chidambaram (2012) PI and PID controller design for integrating and unstable systems. Chapter 3 in *PID Control in the Third Millennium*, R. Vilanova and A. Visioli (eds.) Springer-Verlag, London.

Distinguished visitors

Sl. No.	Name of the Visitor and Designation	Date of Visit	Purpose of Visit
1	B.-J. Cho and H.-M. Kim	18–22 December 2012	Project discussion
2	Dr. Nitin Kaistha Professor, Department of Chemical Engineering IIT Kanpur	5 June 2012	Seminar talk
3	Dr. Rajan Dewar Harvard Medical School, USA & Dr. Swaminthan Rajendran, Sri Ramachandra University	31 July 2012	Special seminar
4	Dr. Rahul Anantharaman SINTEF Energy Research Trondheim, Norway	3 August 2012	Seminar talk
5	Dr. Prabhu R. Nott IISc, Bangalore	4 September 2012	Special seminar
6	Vaidyanathan (Ravi) Subramanian Department of Chemical Engineering College of Engineering, University of Nevada Reno, NV 89557	4 December 2012	Seminar talk
7	Raj Mutharasan Frank A. Fletcher Professor Department of Chemical and Biological Engineering Drexel University, Philadelphia, PA 19104	13 April 2012	Seminar talk
8	Dr. Sharad Gupta IIT Gandhi Nagar	5 November 2012	Special seminar
9	Dr. Swaminathan Rajendiran, MD, Dip. R. C. Path., AB(AP&CP), AB(Cyto) Professor of Pathology, Sri Ramachandra University Porur, Chennai, India	31 July 2012	Seminar talk
10	Dr. Ganesh A. Viswanathan Assistant Professor Department of Chemical Engineering IIT Bombay	9 July 2012	Special seminar
11	Dr. Suhanya Duraiswamy NTU, Singapore	28 September 2012	Special seminar
12	Dr. Nirav Bhatt, Ph.D. EPFL, Switzerland	10 August 2012	Seminar talk
13	Prof. Anil Kumar IIT Bombay	25 October 2012	Special seminar

14	Dr. Anna Schreieck	29 November 2012	BASF scientists: Overview of Scientific Computing Unit, Chemical Engineering faculty
15	Danish Ambassador and Prof. Jan Ifversen, Vice-Dean of International Relations of Aarhus University	19 November 2012	Erasmus Mundus Project inauguration
16	Dr. Amit Rastogi and Mr. Deepak Ranjan, Coromandel Fertilizers, and Prof. Amitava Mukherjee, VIT	26 November 2012	Project review
17	Dr. Josef Wünsch BASF scientist	29 November 2012	Overview of BASF and BASF R&D, BASF scientist
18	Dr. Klaus-Juergen Schleifer, Professor from BASF SE, Ludwigshafen, Germany	29 November 2012	Introduced his topics (bioanalytics, bioinformatics and molecular modeling with a focus on life)
19	Dr. Ansgar Schäfer	29 November 2012	BASF scientist: Activities at Department of Quantum Chemistry
20	Dr. Ashok Krishna Ph.D. in chemical engineering, UMass, Amherst	12 April 2012	Seminar talk
21	Dr. Michael S. Wong Rice University, UK	12 September 2012	Special seminar
22	Prof. Norman J. Wagner University of Delaware	12 November 2012	Special seminar
23	Srinivasa R. Raghavan Patrick & Marguerite Sung Professor Department of Chemical & Biomolecular Engineering University of Maryland	18 December 2012	Seminar talk
24	Dr. Erwin K. Reichel Institute for Microelectronics and Microsensors, Austria	23 January 2013	Seminar talk
25	Prof. Jose Torero University of Queensland, Australia	14 February 2013	Seminar talk
26	Dr. Anand Veeraraghavan University of Queensland, Australia	14 February 2013	Seminar talk
27	Dr. C. Mohan IBM Almaden Research Center 650 Harry Road, K01/B1, San Jose, CA 95120, USA	22 February 2013	Seminar talk
28	Dr. rer. nat. Ravi Kumar Department of Metallurgical and Materials Engineering, IIT Madras	14 March 2013	Seminar talk
29	Prof. Jimack Dean of Engineering, University of Leeds, UK	14 March 2013	Seminar talk
30	Dr. Amit Rastogi Coromandel Fertilizers Ltd.	15 March 2013	Seminar talk
31	Dr. Laxmi Narasimhan, GM Novel Catalytic Materials, Bengaluru	6 February 2013	Seminar talk
32	Dr. Sabyasachi (Shobo) Bhattacharya, Former Director of TIFR	7 February 2013	Seminar talk
33	Prof. Farrokh Mistree University of Oklahoma	8 January 2013 9 January 2013	Seminar talk
34	Dr. R. Narayanan University of Florida, Gainesville	9 January 2013	Seminar talk

4.4.6. Other Activities of the Department/Centre

(a) Faculty and staff

Sl. No.	Item
1.	Sri R. Selva Ganapathy, Technical Superintendent, Chemical Engineering Department won a gold medal each in the Intuitive Bow (Seniors category—age 29 and above) and the TAAT Recurve (Seniors category) in the 5th Tamilnadu State Archery Championship.
2.	Prof. T. Swaminathan has been re-employed as Professor in the Department of Chemical Engineering with effect from 1 March 2013 to 30 June 2013.
3.	Prof. P. Sessa Talpa Sai has been nominated as the Head, Department of Chemical Engineering with effect from the forenoon of 22 October 2012 until further orders vice Prof. S. Pushavanam.
4.	Prof. R. Nagarajan, Department of Chemical Engineering, has been nominated as the Dean (Alumni Affairs & International Relations) for a period of two years with effect from 6 September 2012.
5.	Prof. Niket S. Kaisare, Principal Scientist, ABB Corporate Research Centre, Bangalore has been appointed to the post of Adjunct Professor in the Department of Chemical Engineering.

(b) Results obtained in research work from M.S. & Ph.D. theses

Sl. No.	Name of the Scholar/Faculty
1	Venkat Reddy Regatte and Niket S Kaisare: Analysis of Thermal Management in Catalytic Microreactors for Energy and Fuel Processing Applications
2	Prabu V. and Sreenivas Jayanti: Studies on Underground Coal Gasification in the Context of Clean Coal Utilization
3	Suresh K. and A. Kannan: Hydrodynamic and Heat Transfer Studies on Laminar Flow Over a Confined Sphere
4	V. Saravanan & Sreenivas Jayanti: Studies on the Combustion Characteristics of High Ash Indian Coals With a view to Retrofitting Power Plant Boilers for Operation in Oxy-Coal Combustion Mode
5	Abhijnan Sarkar & Raghuram Chetty: Synthesis and Characterization of Ruthenium-Based Catalysts Supported on Carbon Nanotubes for Oxygen Reduction Reaction
6	Anandhan M., K. Kannan and Preeti Aghalayam: A Kinetic Model for Vulcanization of Natural Rubber and Its Application to Curing of Tyres
7	Arun Srikanth S., Sridharkumar Narasimhan and Shankar Narasimhan: Modelling Simulation and Optimization of Unloading Operations in Petroleum Product Storage Terminals
8	Manoj Krishna K.N. & Raghuram Chetty: Development of Titania Based Catalyst Supports for Proton Exchange Membrane Fuel Cells
9	N.S. Pradeep Muramulla and K. Krishnaiah: Hydrodynamic Studies in 3-Phase Inverse Fluidized Bed: Pressure Drop Bed Expansion and Phase Holdups
10	Sangram Roy and P.S.T. Sai: Three-Dimensional Simulations of Hydrodynamics of a Liquid–Solid Circulating Fluidized Bed
11	Sarvani Kuchibhotla and P.S.T. Sai: Enhancement of Esterification Reaction Between Ethanol and Sulphuric Acid Using Ionic Liquids

(c) International collaboration achievements by the department

1. Faculty visits

Sl. No.	Name of the Faculty Member	Purpose of Visit	Date and Venue
1	S. Ramanathan	Project discussion	8–12 October 2012, Korea
2	Srini Raghavan	Chevron Chair	April 2012

2. Student visits

Sl. No.	Name of the Students	Purpose of Visit	Date and Venue
1	Byoung-Jun Cho and Hyuk-Min Kim of Hanyang University, Korea	Project discussion	18–20 December 2012, IIT Madras



This micro pilot plant equipment is designed and fabricated in Chemical engineering Department. It is used to obtain hydrodynamic information which is required for the design of large scale commercial plants.

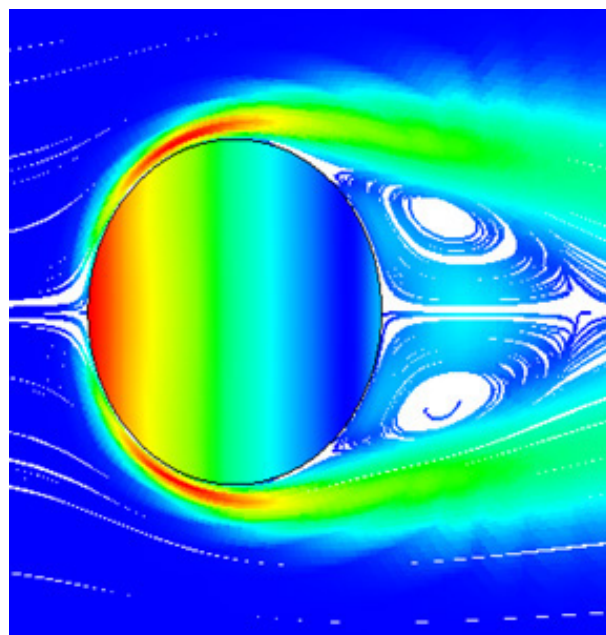
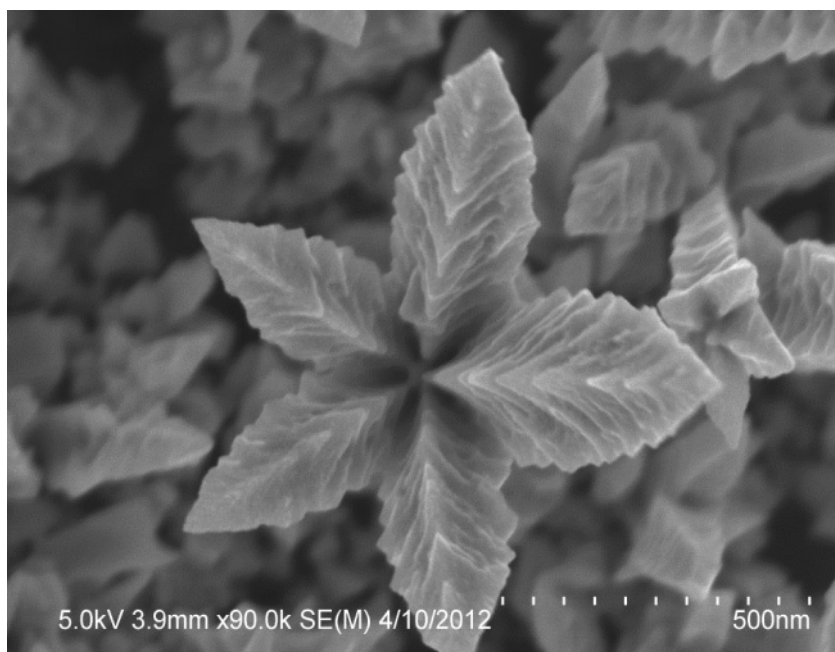


Figure shows CFD based convective fluid flow patterns and convective heat fluxes around a food particle.



Palladium Nanoflower: Palladium was electrodeposited on an electrochemically activated carbon substrate to obtain Pd Nanoflowers. A template free method was developed in our laboratory for the deposition of Pd nanoflowers on carbon substrate.