

## 4.4. DEPARTMENT OF CHEMICAL ENGINEERING

### 4.4.1. Introduction

The Department of Chemical Engineering was established in 1959. The Department has 30 faculty members who carry out research in state-of-the-art areas. The focus of the research is on 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	CH5013	Principles of Fuel Cells
2	CH5015	Process Safety
3	CH6999	Special Topics in Chemical Engineering
4	CH7999	Special Topics in Chemical Engineering
5	CH5021	Molecular Simulation of Soft Matter

#### Students on roll as of September 2014 including research scholars admitted in January 2015

Programme	I Year	II Year	III Year	IV Year	V Year and Others	Total
B.Tech.	63	68	72	64	10	277
Dual Degree	20	14	16	22	22	94
M.Tech.	39	39	—	—	—	78
M.S.	19	06	06	14	04	49
Ph.D.	23	23	13	25	28	112
<b>Total</b>	<b>164</b>	<b>150</b>	<b>107</b>	<b>125</b>	<b>64</b>	<b>610</b>

#### Names of students/scholars/post-doctoral fellows who attended conferences/workshops/seminars/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
<b>Abroad</b>					
1	K. Nagarajan	CH10D011	2014 AIChE Annual Meeting	16–21 November 2014, Atlanta, Georgia	IIT Madras
2	C.N. Pratheeba	CH10D015	12th International Conference on Combustion and Energy Utilization	29 September to 3 October 2014, Lancaster, UK	IIT Madras
3	Seelam Narasimha Reddy	CH11D005	2014 AIChE Annual Meeting	16–21 November 2014, Atlanta, Georgia	IIT Madras
4	S. Sam David	CH11D009	2014 AIChE Annual Meeting	16–21 November 2014, Atlanta, Georgia	IIT Madras
5	G. Saranya	CH11D010	International Aerosol Conference (IAC 2014)	28 August to 2 September 2014, Busan, Korea	IIT Madras
6	Vaishak Nair	CH11D012	249th ACS National Meeting & Exposition	22–26 March 2015, USA	IIT Madras

Sl. No.	Name of the Student/ Scholar	Roll No.	Name of the Conference/Seminar/ Symposium/Workshop	Date and Venue	Financial Assistance from
7	Venkata Sesha Praveen Bulusu	CH11D032	Electrochemical Society Annual Conference	11–15 May 2014, Orlando, USA	IIT Madras
8	Pratibha Biswal	CH11D037	15th International Heat Transfer Conference (IHTC–15)	10–15 August 2014, Kyoto, Japan	IIT Madras
9	Simi Santosh	CH12D006	5th International Conference Symposium on Advanced Control of Industrial Processes (ADCONIP 2014)	28–30 May 2014, Hiroshima, Japan	IIT Madras
10	Venkata Reddy Palleti	CH12D009	24th European Symposium on Computer Aided Process Engineering	15–18 June 2014, Budapest, Hungary	IIT Madras
11	Vir Anil Babasaheb	CH12D010	12th International Conference on nanochannels, Microchannels and Minichannels (ICNMM 2014)	3–7 August 2014, Illinois, USA	IIT Madras
12	Debayan Das	CH12D014	10th International Conference on Heat Transfer Fluid Mechanics and Thermodynamics	14–16 July 2014, Orlando, USA	IIT Madras
13	Volga	CH12D019	65th Annual International Society of Electrochemistry Meeting (ISE–65)	31 August to 5 September 2014, Switzerland	IIT Madras
14	Bontapalle Sujitkumar Anteshwarrao	CH14D001	International Fall School on Organic Electronics-(IFSOE, 2014)	21–26 September 2014, Moscow, Russia	IIT Madras
<i>M.S.</i>					
15	Daware Santosh Vasant	CH11S014	The Physics of OFT and Biological Matter	14–16 April 2014, Cambridge, UK	IIT Madras
16	Debashish Panda	CH11S015	International Conference on Chemical and Process Engineering (ICCPE 2014)	5–6 October 2014, Brussels, Belgium	IIT Madras
17	Gorugantu Sri Bala	CH12S012	AIChE Annual Meeting 2014	16–21 November 2014, Atlanta, USA	IIT Madras
<b>India</b>					
18	Mohamed Shahid U.N.	CH11S034	International Conference on Polymers and Allied Materials	28 May to 1 June 2014, IIT Patna	IIT Madras
19	Akankshya Majhi	CH12S007	International Conference on Polymer Processing and Characterization (ICPPC 2014)	10–15 October 2014, MG University, Kottayam	IIT Madras
20	Dadi V. Suriapparao	CH13S001	International Workshop on Sustainable Energy, Power and Propulsion	5–7 January 2015, Jadavpur University, Kolkata	IIT Madras
<i>Ph.D.</i>					
21	S. Sam David	CH10D009	International Conference on New Frontiers in Chemical Energy and Environmental Engg. (INCEE 2015)	20–21 March, 2015, NIT Warangal	IIT Madras
22	K. Nagarajan	CH10D011	International Conference on New Frontiers in Chemical Energy and Environmental Engg. (INCEE 2015)	20–21 March, 2015, NIT Warangal	IIT Madras
23	Rahul Trivedi	CH10D016	International Conference on New Frontiers in Chemical Energy and Environmental Engineering (INCEE 2015)	20–21 March 2015, NIT Warangal	IIT Madras
24	Seelam Narasimha Reddy	CH11D005	National Conference on Novel Process Developments for Sustainable Industrial Practice	12–13 December 2014, SV University, Tirupati	IIT Madras
25	Seelam Narasimha Reddy	CH11D005	CHEMCON 2014	24 December 2014 to 4 January 2015	IIT Madras

Sl. No.	Name of the Student/ Scholar	Roll No.	Name of the Conference/Seminar/ Symposium/Workshop	Date and Venue	Financial Assistance from
26	Seelam Narasimha Reddy	CH11D005	International Conference on Mineral Processing Technology 2014	12–14 March 2015	IIT Madras
27	Vaishakh Nair	CH11D012	International Workshop on Sustainable Energy, Power and Propulsion	5–9 January 2015, Jadhavpur University, Kolkata	IIT Madras
28	Vaishakh Nair	CH11D012	National Conference on Application of the Derivatives of Chitin and Chitosan (ADCC)–2014	22–23 August 2014, Gandhigram Rural Institute, Gandhigram, Tamil Nadu	IIT Madras
29	Abhishankar	CH11D016	CHEMCON–2014	27–30 December 2014, Chandigarh	IIT Madras
30	Abhishankar	CH11D016	Indian Control Conference 2015	6–7 January 2015, IIT Madras	IIT Madras
31	Chinta Sankar Rao	CH11D022	International Conference on Mathematical Modeling and Computer Simulation	8–10 December 2014, IIT Madras	IIT Madras
32	R. Savitha	CH12D004	International Conference on Advanced Oxidation Process 2014	25–28 September, 2014, Munnar	IIT Madras
33	Anil B. Vir	CH12D010	INUP Familiarization Workshop/ Hands on Training on Nanofabrication Technologies	9–18 December 2014, IISc, Bangalore	–
34	S. Manigandan	CH12D016	International Conference on Soft Materials	6–10 October 2014, MNIT, Jaipur	IIT Madras
35	Neethu Thomas	CH12D020	International Conference on Soft Materials	6–10 October 2014, MNIT, Jaipur	IIT Madras
36	Deepak Kumar Ojha	CH13D001	International Workshop on Sustainable Energy, Power and Propulsion	5–9 January 2015, Jadhavpur University, Kolkata	IIT Madras
37	Abhishek Kumar Gupta	CH13D016	3rd International Conference on Polymer–Processing and Characterization (ICPPC–2014)	10–14 October 2014, Kottayam	IIT Madras
38	R. Ashna	CH13D019	International Conference on Soft Materials	6–10 October 2014, MNIT, Jaipur	IIT Madras
39	B. Bala Shyamala	CH13D020	Indian Control Conference	5–7 January 2015, IIT Madras	IIT Madras
40	Bincy George Abraham	CH13D021	ICONTEST–2014	7–9 August 2014, IISc, Bangalore	IIT Madras
41	Chandra Shekar Besta	CH14D002	International Conference on Mathematical Modeling and Computer Simulation	8–10 December 2014, IIT Madras	IIT Madras
42	Chandra Shekar Besta	CH14D002	International Conference on Industrial and Information System (ICIIS-14)	15–17 December 2014, IIITM, Gwalior	IIT Madras
43	Indu Chanchal Polpaya	CH14D011	International Conference on Polymers and Allied Materials	30–31 May 2014, IIT Patna	IIT Madras
44	Dheeraj Kumar	CH14D401	Indian Control Conference 2015	5–7 January 2015, IIT Madras	IIT Madras
<i>PDF</i>					
45	Dhriti Chatterjee Majumdar	CH14IPF01	83rd Annual Meeting of Society of Biological Sciences	17–21 December 2014, Bhubaneswar	IIT Madras
46	Krishna Etika	CH14IPF02	2nd Young Investigator Meet on Soft Matter 2014	18–20 December 2014, Pondicherry	IIT Madras

### Name 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	Dipin S. Pillai	CH10D017	Best Poster Award	IIT Madras-IMSc, Chennai
2	S. Narasimha Reddy	CH11D005	Best Paper Award	Taipei, Taiwan
3	Vaishakh Nair	CH11D012	Best Oral Presentation	The Gandhigram Rural Institute, Gandhigram, Tamil Nadu
4	Vaishakh Nair	CH11D012	Best Poster Presentation	Jadavpur University
5	Jason R. Picardo	CH11D026	Fulbright-Nehru Doctoral Exchange Fellowship	Fulbright-Nehru Doctoral Exchange Fellowship
6	Manigandan S.	CH12D016	Best Poster Presentation Award	Mallavia National Institute of Technology, Jaipur
7	Mohammed Samdani Shaik (Interdisciplinary)	CH13D024	Prime Minister's Fellowship for Doctoral Research	Science & Engineering Research Board (SERB)-Department of Science and Technology (DST)
8	Indu Chanchal Polpaya	CH14D011	Third Prize for Paper Presentation, ICPAM 2014	IIT Patna

### Names of students/scholars who won institute convocation/Institute Day prizes

Sl. No.	Name of the Student/Scholar	Roll No.	Name of Prize
<b>Convocation Prize 2014</b>			
1	Merin Thomas	CH09B070	B. Ravichandran Memorial Prize
2	Krishna Shrinivas	CH10B026	Reliance Heat Transfer Private Limited Prize
3	Swaroop I.R.	CH10B068	C.A. Sastry Endowment Prize
4	Rahul R.	CH12M021	Dr. K. Subba Raju Memorial Prize
5	Jyothi Latha Tamalapakula	CH09D008	Bhagyalakshmi and Krishna Ayengar Award
<b>Institute Day Prizes 2014</b>			
1	Nirmal L.	CH11B093	Dr. Anita Mehta-Damani Prize
2	Sahithi Gorthy	CH11B089	Prof. Ramanujam Memorial Award
3	Krishna Shrinivas	CH10B026	Dr. R.K. Viswanath Memorial Prize
4	Iyer Shachit Shankaran	CH09B067	Dr. Anita Mehta-Damani Prize
5	Resmi Suresh M.P.	CH12M024	Chevron Products Company Prize
6	Varun Govindarajan	CH10B072	K. Srinivasan and Indira Srivasan Prize
7	Shivani Patel	CH10B101	Mr. S. Viswanathan Prize
8	Swetha Pendyala	CH12M017	48th Indian Pharmaceutical Congress Prize for the best project in biotechnology, 2014
<b>Alumni Day Prizes 2014</b>			
1	Vulavala Midhun Reddy	CH09B076	Prof. M. Ramanujam Memorial Award
2	R. Subramanian	CH09B074	Ms D.L. Saraswati Memorial Prize

### 4.4.3. Faculty Members and Their Activities

#### Faculty members

Name and Qualifications	Major Areas of Specialisation
<b>Professors</b>	
P.S.T. Sai [Head]	Chemical reactor analysis and design
Abhijit Deshpande	Rheology of complex fluids; polymers and polymeric composites; processing flow visualization
A.R. Balakrishnan	Thermodynamics of azeotropic mixtures; two-phase flows and boiling in narrow tubes

Name and Qualifications	Major Areas of Specialisation
M. Chidambaram	Process control
A. Kannan	Mathematical modeling; simulation and optimisation of chemical processes
R. Nagarajan	Fine particle science & technology; chemical vapour deposition; process intensification using acoustic fields
T. Panda	Bioprocess optimisation; bioprocess technology; enzyme design
Preeti Aghalayam	Chemical reaction engineering
S. Pushpavanam	Modeling and simulation; nonlinear dynamics; flow visualisation
Raghunathan Rengasamy	Process systems engineering; fuel cells; computational discrete microfluidics
S. Ramanathan	Electrochemistry; chemical mechanical planarisation for semiconductor processing
R. Ravi	Applied statistical mechanics; foundations of thermodynamics and mechanics; process dynamics and control
Shankar Narasimhan	Process design; data mining; fault diagnosis
Sreenivas Jayanti	Fuel cells; combustion; energy systems
Susy Varughese	Physics and mechanics of polymeric materials; polymeric nano composites
Tanmay Basak	Microware application; mathematical modeling and simulation
Upendra Natarajan	Polymer science and engineering; molecular simulation; statistical thermodynamics of complex fluids; nanostructured hybrid composite materials
<b>Associate Professors</b>	
Arun K. Tangirala	Process systems engineering; process control, identification and monitoring; applied signal processing
Niket S. Kaisare	Catalytic combustion; micro-reactors; advanced process control; energy and fuel processing
Raghuram Chetty	Electrocatalysis; fuel cells; wastewater treatment
R. Ravikrishna	Contaminated sediment remediation; contaminant fate and transport; air pollution process and control
Sridharakumar Narasimhan	Process system engineering; optimisation; process control; fault diagnosis
<b>Assistant Professors</b>	
M.G. Basavaraja	Directed assembly of colloids; microstructure and rheology of colloids, surfactants, polymers and their mixtures; interfacial rheology; ionic liquids; particulate gels
Ethayaraja Mani	Molecular simulations; self-assembly; mathematical modeling
R. Ramnarayanan	High-resolution microscopy and spectroscopy; ideating original concepts in the life sciences; revisiting old ideas of value in the physical and chemical sciences
T. Renganathan	Multiphase systems; gasification; capture of CO <sub>2</sub>
R. Vinu	Thermo-catalytic conversion of biomass to useful intermediates; photocatalysis for environmental decontamination; microkinetic modeling of complex reactions
<b>Professors Emeriti</b>	
K. Krishnaiah	Chemical reactor analysis and design fluidization
<b>Hosted Fellows</b>	
K. Vijaya Raghavan	Environmental biotechnology; water quality and waste water treatment
<b>INSPIRE Fellows</b>	
Nirav P. Bhatt	Data analysis; process systems engineering; kinetic modeling
<b>Chevron Chair Professor</b>	
Srini Raghavan	Wet processing in semiconductor manufacturing including cmp, corrosion and electrochemistry; surface and colloidal phenomena
<b>Guest Faculty</b>	
K.S. Ravindran	Technology development and transfer to manufacturing; materials and thin film technologies quality management systems
G. Vaidyanathan	Nuclear thermal hydraulics and safety

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

Sl. No.	Co-ordinator(s)	Title	Period
<b>Workshops</b>			
1	Arun K. Tangirala	System Identification and Network Modelling	12–15 May 2014
2	Arun K. Tangirala	Data-driven Analysis of Non-linear Signals and Systems	6–7 September 2014
3	Arun K. Tangirala	Data-driven Multiscale Analysis (pre-conference tutorial), First Indian Control Conference (ICC)	4 January 2015
4	Arun K. Tangirala	ChemClave 2015	13–15 March 2015
<b>Short-term courses</b>			
1	S. Ramanathan and R. Ramnarayanan	DST SERB School on Fundamental Electrochemical Principles Applied to Problems in Science and Engineering	10–14 August 2014
2	M. Chidambaram	Process Control	15–19 December 2014
3	A. Kannan and T. Renganathan	Thermodynamic Analysis of Modern Separation Processes	24–28 November 2014

### 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
<b>Workshops</b>				
1	Arun K. Tangirala	A Tutorial Overview of Time-Frequency Analysis and Wavelet Transforms	IISc, Bangalore	14 February 2015
2	R. Nagarajan	Annual Workshop of Deans of Alumni Relations	IIT Kanpur	19–21 September 2014
3	R. Ramnarayanan	ESTEEM2 Electron Crystallography Workshop	University of Cambridge, UK	22–25 July 2014
<b>Seminars</b>				
1	Basavaraha Madivala Gurappa	CMET Seminar	University of Delaware	30 June 2014
<b>Symposia</b>				
1	Basavaraha Madivala Gurappa	88th Colloids and Surface Symposium	Philadelphia, USA	22–25 June 2014
<b>Conferences</b>				
1	A.R. Balakrishnan	15th International Heat Transfer Conference	Kyoto, Japan	10–15 August 2014
2	Raghuram Chetty	Gordon Research Seminar and Gordon Research Conference on Fuel Cells	Bryant University in Smithfield, Rhode Island, USA	2–8 August 2014
3	P.S.T. Sai	Fifth International Conference on Chemical Engineering and Applications (CCEA 2014)	Taipei, Taiwan, Hong Kong	26–27 August 2014
4	P.S.T. Sai	Third International Conference on Chemical and Biological Processes (ICCBP 2014)	Dubai, UAE	19–21 December, 2014
5	Sreenivas Jayanti	International Flow Battery Forum 2014	Hamburg, Germany	1–2 July 2014
6	Tanmay Basak	10th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics	Florida, USA	14–16 July 2014
7	Tanmay Basak	10th Mississippi State Conference on Differential Equations and Computational Simulations	Mississippi State University, USA	23–25 October 2014

Sl. No.	Name of Faculty Member	Title	Institution	Period
<b>Others</b>				
1	S. Pushpavanam	Faculty selection meeting	Calcutta University	20 November 2014
2	S. Pushpavanam		BIT Messra, Ranchi	23–24 November 2014
3	R. Nagarajan	Investiture ceremony (chief guest)	Bala Vidya Mandir School, Adyar	20 June 2014

### Special lectures delivered by faculty members at other institutions

Sl. No.	Name of Faculty Member	Title of Lecture	Institution	Date
1	Arun K. Tangirala	On system identification under the TEQIP programme	NIT Tiruchirappalli	28 March 2015
2	R. Nagarajan	Inaugural address at TECHENOSIS 2015, inter-collegiate symposium	Tagore Engineering College, Chennai	18 March 2015
3	R. Nagarajan	Dispersion in nano-suspensions	VIT, Vellore	November 2014
4	R. Vinu	Energy and resource recovery via catalytic fast pyrolysis of polymers, biomass and algae	Institute of Chemical Technology (ICT), Mumbai	28 July 2014
5	R. Vinu	Deriving energy from biomass: From characterization to combustion, gasification and pyrolysis (invited talk at India Expo 2014)	Noida, India	4 September 2014
6	R. Vinu	Characterisation and applications of lignin-based composites	Mahathma Gandhi University, Kottayam, India	11 October 2014
7	R. Vinu	Thermochemical conversion of biomass, coal, algae and MSW to fuels and useful intermediates (invited)	IIT Madras	4 December 2014
8	R. Vinu	Fast pyrolysis of biomass for liquid fuels (invited)	BPCL—Corporate R&D Centre, Greater Noida	18 December 2014
9	Raghuram Chetty	Shape controlled palladium electrocatalysts for polymer electrolyte membrane fuel cells	IIT Guwahati	1 December 2014
10	Raghuram Chetty	Shape controlled palladium electrocatalysts for low-temperature fuel cells	Michigan State University, USA	24 July 2014

### Visits abroad by faculty members

Sl. No.	Name of Faculty Member	Place Visited	Date	Purpose of Visit	Funding from
1	A.R. Balakrishnan	Kyoto, Japan	10–15 August 2014	International conference	CPDA
2	Basavaraha Madivala Gurappa	Philadelphia, USA	22–25 July 2014	Symposium	CPDA
3	Basavaraha Madivala Gurappa	Delaware	30 June 2014	CMET Seminar	CPDA
4	Ethayaraja Mani	Philadelphia, USA	22–25 June 2014	International conference	CPDA
5	R. Nagarajan	Middle East countries and Abu Dhabi University	25 April–3 May 2014	Official visit	IIT Madras
6	R. Nagarajan	UAE	May 2014	Alumni meetings, university visits	IIT Madras
7	R. Nagarajan	USA	July 2014	Alumni meetings, university visits	IIT Madras
8	R. Nagarajan	USA	14–18 May 2014	Mehta Family Foundation and Houston Methodist Research Institute, brief visit	IIT Madras

Sl. No.	Name of Faculty Member	Place Visited	Date	Purpose of Visit	Funding from
9	Raghuram Chetty	Florida, USA	11–16 May 2014	Electrochemical Society meeting	UGC and IIT Madras
10	R. Ramnarayanan	UK	22–25 July 2014	Workshop on Electron Microscopy	CPDA
11	R. Ramnarayanan	Department of Metallurgy and Materials Science, University of Cambridge, UK	24 July 2014	Invited talk	–
12	R. Ravikrishna	San Francisco, USA	10–14 August 2014	Oral presentation at the 248th National Exposition and Meeting	CPDA
13	P.S.T. Sai	Taipei, Taiwan, Hong Kong	26–27 August 2014	International conference	CPDA
14	P.S.T. Sai	Dubai, UAE	19–21 December 2014	International conference	CPDA
15	Sreenivas Jayanti	Hamburg, Germany	1–2 July 2014	International conference	CPDA
16	Tanmay Basak	Florida, USA	14–16 July 2014	International conference	CPDA

### Honours and awards obtained by faculty members

Sl. No.	Name of Faculty Member	Name of Award	Awarded by	Awarded for	Date of Award
<b>Awards</b>					
1	Arun K. Tangirala	Junior-Level Research & Development Award	IIT Madras	Junior-level research and development	2014
2	Ethayaraja Mani	Young Faculty Recognition Award (YFRA) 2014	IIT Madras	Outstanding achievements in teaching, scholarship and creative research work	5 September 2014
3	S. Pushpavanam	Best Poster Award	IIT Madras–IMSc, Chennai	Jetting-to-dripping transition of bi-fluid flows in circular channels	21–24 July 2014
4	P. Sessa Talpa Sai	Best Paper Award	Taipei, Taiwan	Experimental investigation on segregation of binary mixture of solids by continuous liquid fluidisation	26–27 August 2014

### Books, monographs authored/co-authored

Sl. No.	Name of Faculty Member	Title	Publisher	Author/Co-author
<b>Books</b>				
1	M. Chidambaram	<i>Relay Auto Turning for Identification and Control</i>	Cambridge University Press	Co-author (Vivek Sathe and Babasaheb Ambedkar)
2	Arun K. Tangirala	<i>Principles of System Identification: Theory and Practice</i>	CRC Press, Taylor & Francis Group	Author
3	C. Lakshmana Rao	<i>Modelling of Engineering Materials</i>	John Wiley & Sons	Co-author (Abhijit P. Deshpande)

### Articles

- 1 K. Vijayaraghavan and Frankin. D. Raja. (2014). Design and development of green roof substrate to improve runoff water quality: Plant growth experiments and adsorption. *Water Research* 63: 94–101.

### Fellowships of academies and professional societies

Sl. No.	Name of Faculty Member	Year of Admission
<b>INAE</b>		
1	Shankar Narasimhan	2013
2	A.R. Balakrishnan	2003
<b>TNAsc</b>		
1	A.R. Balakrishnan	1996



Sl. No.	Name of Faculty Member	Year of Admission
<b>Institute of Engineers</b>		
1	A.R. Balakrishnan	2013
<b>CSIR—Central Institute of Mining &amp; Fuel Research, Dhanbad</b>		
1	Sreenivas Jayanti	2013–2016
<b>Raman Fellowship for Post Doctoral Research</b>		
1	Raghuram Chetty	Michigan State University, USA 2013–2014

#### Editorial boards of journals

Sl. No.	Name of Faculty Member	Position	Journal
1	A.R. Balakrishnan	Editor	<i>International Journal of Heat and Mass Transfer</i>
2	A.R. Balakrishnan		<i>International Communications in Heat and Mass Transfer</i>
3	A.R. Balakrishnan		<i>Journal of Energy, Heat and Mass Transfer</i>
4	A.R. Balakrishnan	Editor-in-Chief	<i>Journal of The Institution of Engineers (India): Series E (Chemical and Textile Engineering)</i>
5	Raghuram Chetty	Member	<i>Nano Hybrids</i>
6	Shankar Narasimhan	Member	<i>ICE, Advances in Chemical Engineering</i>
7	Tanmay Basak	Associate Editor	<i>International Journal of Heat and Mass Transfer</i>
8			<i>International Communications in Heat and Mass Transfer</i>

#### 4.4.4. Design and Development Activities

##### New facilities added or major equipment procured

Sl. No.	Name of Equipment	Value (lakhs of ₹)
1	High pressure interchangeable SS and glass reactor (Amar Equipments)	8.75
2	UV–visible diode array spectrophotometer (Agilent Technologies)	5.17
3	Gas chromatograph with flame ionisation and thermal conductivity detectors (GC-FID/TCD) (Agilent Technologies)	8.37

##### Patents filed

Sl. No.	Name of Faculty Member	Title of Patent
1	S. Ramanathan	Lanthanum doping of ceria abrasive to obtain robust CMP polish rates
2	Sreenivas Jayanti	Auto thermal, dual reformer concept for efficient generation of hydrogen for high-temperature PEM fuel cells

#### 4.4.5. Research and Consultancy

##### Sponsored research projects

Sl. No.	Title	Period	Funding Agency	Amount (lakhs of ₹)	Co-ordinators
1	Large-amplitude oscillatory shear of physically aggregating complex fluids	2014–2017	DST	54.26	Abhijit P. Deshpande, Basavaraja M. Gurrappa
2	Institute research and development junior-level award	2014–2017	Research Fund	20	Arun K. Tangirala
3	Nanoparticle films for water evaporation retardation-film elasticity, rupture and re-formation	2013–2016	CSIR	27.4	Basavaraja M. Gurappa
4	Rheology and microstructure of cellulose–ionic liquid mixtures	2013–2016	BRNS	32.75	Basavaraj M. Gurappa (PI), Abhijit P. Deshpande (Co-PI)

Sl. No.	Title	Period	Funding Agency	Amount (lakhs of ₹)	Co-ordinators
5	Center for research on confined soft matter	2014–2016	Team Research Project	200	Basavaraja M. Gurappa, Abhijit P. Deshpande, Ethayaraja Mani, Sunil Kumar P.B., Dilip Kumar Sathapathy, Aditi Simha, Nandita Madhavan, Edamana Prasad
6	Self-assembly of Janus colloids	2012–2015	DST	55.00	Ethayaraja Mani
7	Process intensification	2014–2016	Alumni Association	3.05	Nagarajan R.
8	Model order reduction for convection diffusion process with applications to reformer	2015–2017	Nissan Research Support Program	10.73	Niket S. Kaisare, Sridharakumar Narasimhan
9	Multi-scale modeling analysis and control of reacting systems for energy applications	2014–2016	New Faculty Initiation Grant	5.00	Niket S. Kaisare
10	Identification of heterogeneous reaction systems based in multi-sensor data—INSPIRE Faculty Award	2013–2018	DST	86.27	Nirav Pravinbhai Bhat
11	DAE—Graduate Gellowship Scheme (DGFS)	—	Board of Research in Nuclear Sciences	3.80	S. Pushpavanam
12	Elucidation of physio-chemical mechanisms in absorption of carbon dioxide using microchannels for optimal design of absorption systems	2012–2015	DST	62.00	S. Pushpavanam, Abhijit P. Deshpande
13	Svagata.eu—Experience Europe as an Indian	2013–2017	European Commission	4.00	S. Pushpavanam
14	Understanding dynamic drop formation in 2-D channels and development of a rational design framework	2014–2017	DST	39.62	Raghunathan Rengaswamy
15	Next-generation green energy conversion devices	2015–2016	Exploratory Research Project	10.00	Raghunathan Rengasamy
16	Titania nanotubes as an alternative catalyst support for direct methanol fuel cells	2013–2016	Ministry of New and Renewable Energy	52.12	Raghuram Chetty (PI), S. Ramaprabhu, PH (Co-PI)
17	High-resolution scanning electron microscope (HR-SEM)	2015–2016	Maintenance of Capital Equipment	5.16	Raghuram Chetty
18	Characterisation and modification of ceria particles for STI CMP	2011–2014	DST+NRF	31 (+40 million KW)	R. Ramanathan, Tanmay Basak, Jin Goo Park (Korean PI)
19	PVD—electrochemical hybrid method to eliminate toxic H <sub>2</sub> Se in CIGS solar cell fabrication process	2013–2016	DST—SERI	93.90	S. Ramanathan, Kasi Viswanathan
20	Water purification facility (MilliQ Integral)	2014–2015	Maintenance of Capital Equipment	1.3	Ramanathan S.
21	Gas Chromatography—Mass Spectrometry (GC—MS)	2015–2016	Maintenance of Capital Equipment	1.15	Ravikrishna R.
22	Unsteady state phase holdup characteristics of three-phase inverse fluidised bed	2012–2016	New Faculty Scheme	5.00	Renganathan T.
23	GTWG proposal on advance coal technology	2014–2017	DST	63.63	Sreenivas Jayanti, Preeti Aghalayam
24	Control and operation of urban water distribution networks	2014–2017	DST	32.91	Sridharakumar Narasimhan, Shankar Narasimhan, Murty B.S.

Sl. No.	Title	Period	Funding Agency	Amount (lakhs of ₹)	Co-ordinators
25	Experiment design using convex optimisation	2013–2016	Board of Research in Nuclear Sciences	19.16	Sridharkumar Narasimhan
26	Improving targeting community health through a women's cancer screening programme	2014–2015	Socially Relevant Projects	3.00	Sridharakumar Narasimhan, Basavaraja M. Gurappa
27	Development of value-added recycled product based on polymeric composites used in aerospace application	2012–2015	Aeronautics Research & Development Board	34.7	Susy Varughese
28	Molecular interaction between water soluble polymers and ionic surfactants: Insights from atomistic molecular dynamics simulation	2013–2017	DST	17.00	Upendra Natarajan
29	Fundamentals of fast pyrolysis of algal biomass	2014–2015	Chevron Products Corporation	15.00	Vinu R., Preeti Aghalayam
30	Fundamentals of co-processing of biomass residues with waste polymers via fast pyrolysis for biofuels production and resource recovery	2013–2015	DST	52.00	R. Vinu, S. Ramanathan
31	D-Gas Chromatograph–Mass Spectrometer (2D-GC-MS)	2015–2016	Maintenance of Capital Equipment	1.7	Vinu R.
32	Fundamentals of catalytic fast pyrolysis of biomass to biofuels and intermediates using a micropyrolysis reactor	2012–2015	New Faculty Scheme	20	
33	2D-Gas Chromatograph–Mass Spectrometre (2D-GC-MS)	2015–2016	Maintenance of Capital Equipment	1.7	
34	Design and development of hybrid biofilter to treat polluted urban runoff: Role of soil, plants microbes and sorbent materials	2013–2016	DST	13.75	K. Vijayaraghavan
35	Green roofs: An extensive study to assess the role of substrate, plants and soil microbes to improve runoff quality	5 years	DBT, GoI	74.50	

#### Industrial consultancy projects (ongoing and new)

Sl. No.	Title	Period	Funding Agency	Amount (lakhs of ₹)	Co-ordinators
1	Performance evaluation studies of heat and mass transfer equipment	2013–2016	Common Code	0	Kannan A.
2	Feasibility study of UCG in India	2014–2015	Bharat Heavy Electricals Ltd.	4.69	Preethi Aghalayam
3	Assessment of flow regimes in horizontal boiling tube	2014–2017	Common Code	0	Sreenivas Jayanti

#### RBIC projects (ongoing and new)

Sl. No.	Title	Period	Funding Agency	Amount (lakhs of ₹)	Co-ordinators
1	Microstructure characterisation of emulsion using interfacial rheology	2014–2015	Unilever Industries Private Limited	16.1	Basavaraja M. Gurappa, Abhijit P. Deshpande
2	Design of self-foaming liquid hand wash: Effect of surfactant type and concentration on interfacial properties and stability	2014–2015	Hindustan Unilever Limited	16.1	Basavaraja M. Gurappa, Pushpavanam S.

Sl. No.	Title	Period	Funding Agency	Amount (lakhs of ₹)	Co-ordinators
3	RBIC project on rapid diagnostics of batteries for efficient power management	2014–2015	U.S. Army International Technology Center Pacific (ITC–PAC)	51	Raghunathan Rengasamy
4	Performance guarantee testing of induced draught concrete cross-flow towers	2015–2015	Va Tech Wabag Limited	6.4	Kannan A.
5	Megasonic cleaning: Phase II	2014–2015	Crest Ultrasonics Corporation	2.1	Nagarajan R.
6	Sensor network audit for cooling subsystems	2014–2015	IIT Bombay	12	Sridharakumar Narasimhan
7	Improving the selectivity of ethylbenzene hydroperoxide during the oxidation of ethylbenzene in the SMPO process	2014–2015	Shell India Markets Private Limited	25.0	Vinu R.

#### Retainer consultancy (ongoing and new)

Sl. No.	Title	Period	Funding Agency	Amount (lakhs of ₹)	Co-ordinators
1	Design of chlorine-di-oxide generator	2015–2015	Vasu Chemical Industries	5.62	T. Renganathan, K. Krishnaiah

#### Exchange programmes with other institutions under MoUs

Sl. No.	Name of Faculty Member	Name of University/Institution Which Has MoU
1	R. Nagarajan	University of New South Wales, Australia
2	R. Nagarajan	University of Southampton, UK
3	R. Nagarajan	Seoul National University, Korea
4	R. Nagarajan	University of New South Wales, Australia
5	R. Nagarajan	ENSAM, France
6	R. Nagarajan	NTU, Singapore
7	R. Nagarajan	Curtin University, Australia
8	R. Nagarajan	Purdue University
9	R. Nagarajan	University of Arizona, USA
10	R. Nagarajan	University of Technology, Sydney, JDP
11	R. Nagarajan	Cold Spring Harbour Laboratory, USA
12	Sridharakumar Narasimhan	Claude Bernard Lyon 1 University, France
13	Sreenivas Jayanti	Loughborough University, UK
14	R. Ravikrishna	Louisiana State University, USA
15	S. Pushpavanam	Caledonian College of Engineering, Oman

#### Research publications

Papers published in refereed national journals:	6
Papers published in refereed international journals:	84
Papers presented at national conferences:	7
Papers presented at international conferences:	39

#### Papers published in refereed national journals

1. J. Kodavaty and A.P. Deshpande. 2014. Mechanical and swelling properties of poly (vinyl alcohol) and hyaluronic acid gels used in biomaterial systems: A comparative study. *Defence Science Journal* 64(3): 222–229.
2. S. Hazarika and M. Chidambaram. 2015. Static decouplers with p-pi dual loop controllers for unstable system. *Indian Chemical Engineer* 14 pp.

3. S. Santosh and M. Chidambaram. 2015. Tuning of proportional integral derivative controllers for critically damped second-order plus time delay systems. *Indian Chemical Engineer* 57(1): 32–51.
4. V.D. Ram, A. Karlmarx and M. Chidambaram. 2014. Identification of unstable second-order transfer function model with a zero by optimization method. *Indian Chemical Engineer* 11p.
5. R. Ramnarayanan. 2014. Culture, science and music in education. *Journal of Current Science* 107.
6. C. Beula and P.S.T. Sai. 2014. Kinetics of esterification of acetic acid and ethanol with a homogeneous acid catalyst. *Indian Chemical Engineer* 20 pp.

#### Papers published in refereed international journals

1. A. Majhi, T.K. Pardhi and A.P. Deshpande. 2015. Analysis of squeeze flow experiments with different model fluids between solid surfaces and fabrics. *International Journal of Multiphase Flow* 68: 93–99.
2. J. Kodavaty and A.P. Deshpande. 2014. Regimes of microstructural evolution as observed from rheology and surface morphology of crosslinked poly(vinyl alcohol) and hyaluronic acid blends during gelation. *Journal of Applied Polymer Science* doi:10.1002/APP.41081
3. A.J. Jacob, A.P. Deshpande and L. Bouteiller. 2014. Large-amplitude oscillatory shear of supramolecular materials. *Journal of Non-Newtonian Fluid Mechanics* 206: 40–56.
4. M. Gupta, A.P. Deshpande and P.B.S. Kumar. 2014. Rheology of concentrated sulfonated poly (ether ether ketone) solutions. *Journal of Applied Polymer Science* 137(7): 40044-1–40044-10.
5. K.A.N. Iyer, R. Pantina and A.P. Deshpande. 2014. Modelling and simulation of drop spreading on fibrous porous media. *Journal of the Textile Institute* 105(3): 294–303.
6. S. Kaw, A.K. Tangirala and A. Karimi. 2014. Detection of model-plant mismatch in model-based control schemes using plant-model ratio *Journal of Process Control* 24: 1720–1732.
7. R. Kannan and A.K. Tangirala. 2014. Correntropy-based partial directed coherence for testing multivariate Granger causality in nonlinear processes. *Physical Review E: Statistical, Nonlinear, and Soft Matter Physics* 89(6): 062144.
8. S. Kaw, A.K. Tangirala and A. Karimi. 2014. Improved methodology and set-point design for diagnosis of model-plant mismatch in control loops using plant-model ratio. *Journal of Process Control* 24(11): 1720–1732.
9. M. Aravinthan, M. Venkatesan, S.K. Das and A.R. Balakrishnan. 2014. Experimental investigation of subcooled flow boiling in a minichannel. *Heat Transfer Engineering* 36: 408–417.
10. Venkateshwar Rao Dugyala and Madivala G. Basavaraj. 2014. Control over coffee-ring formation in evaporating liquid drops containing ellipsoids. *Langmuir* 30(29): 8680–8686.
11. Trivikram Reddy Nallamilli, Ethayaraja Mani and Madivala G. Basavaraj. 2014. A model for the prediction of droplet size in pickering emulsions stabilized by oppositely charged particles. *Langmuir* 30(31): 9336–9345.
12. Venkateshwar Rao Dugyala and Madivala G. Basavaraj. 2015. Evaporation of sessile drops containing colloidal rods: Coffee-ring and order-disorder transition. *The Journal of Physical Chemistry B* 119(9): 3860–3867.
13. M.G. Basavaraj, E. Mani, M. Sabapathy and S.D.C. Pushpam. 2015. Synthesis of single and multipatch particles by dip-coating method and self-assembly thereof. *Langmuir* 31(4): 1255–1261.
14. Madivala G. Basavaraj, Naa Larteokor McFarlane, Matthew L. Lynch and Norman J. Wagner. 2014. Nanovesicle formation and microstructure in aqueous ditallowethylesterdimethylammonium chloride (DEEDMAC) solutions. *Journal of Colloid and Interface Science* 429(1): 17–24.
15. V. Dhanya Ram and M. Chidambaram. 2014. Simple method of designing centralized PI controllers for multivariable systems based on SSGM. *ISA Transactions* doi:10.1016/J.ISATRA.2014.11.019
16. V.D. Ram, C. Rajapandiyam and M. Chidambaram. 2015. Steady-state gain identification and control of multivariable unstable systems. *Chemical Engineering Communications* 202(2): 151–162.
17. N. Thanga Mani and M. Chidambaram. 2014. Discrimination of three different power-law kinetic models for hydrocracking of asphaltenes by periodic operation. *Petroleum Science and Technology* 32(19): 2345–2354.
18. K. Aravamudan, V. Harikumar, B. Kumar, L. Philip, S.M. Bhallamudi and K.S. Reddy. 2014. Simulation of a cross flow wind aided evaporator. *Desalination* 340(1): 18–29.
19. S. Balakrishnan, R. Nagarajan and K. Karthick. 2015. Mechanistic modeling, numerical simulation and validation of slag-layer growth in a coal-fired boiler. *Energy* 81: 462–470.
20. Jyoti Kumari, Deepak Kumar, Ankita Mathur, Arif Naseer, Ravi Ranjan Kumar, Prathna, Thanjavur Chandrasekaran, Gouri Chaudhuri, Mrudula Pulimi, Ashok M. Raichur, S. Babu, Natarajan Chandrasekaran, R. Nagarajan and Amitava Mukherjee. 2014. Cytotoxicity of TiO<sub>2</sub> nanoparticles towards freshwater sediment microorganisms at low exposure concentrations. *Environmental Research* 135: 333–345.
21. Jay Karen Maria William, Swaminathan Ponmani, Robello Samuel, R. Nagarajan and Jitendra S. Sangwai. 2014. Effect of CuO and ZnO nanofluids in xanthan gum on thermal, electrical and high pressure rheology of water-based drilling fluids. *Journal of Petroleum Science and Engineering* 117: 15–27.

22. R. Nagarajan. 2014. Cleaning performance of high-frequency, high-intensity 360 kHz system on removal of nano-dimensional contaminants from various surfaces. *International Journal of Mechanical, Aerospace, Industrial and Mechatronics Engineering* 9(3): 355–359.
23. S. Balakrishnan and R. Nagarajan. 2014. Role of bouncing potential in molten ash implication. *Chemical Engineering Communications* doi:10.1080/00986445.2014.927358
24. S. Balakrishnan and R. Nagarajan. 2014. Effect of surface roughness and surface energy on molten fly ash deposition. *International Journal of Advances in Engineering and Sciences & Applied Mathematics* 6(1): 41–48.
25. Kannan Deepa and Tapobrata Panda. 2014. Synthesis of gold nanoparticles from different cellular fractions of *Fusarium oxysporum*. *Journal of Nanoscience and Nanotechnology* 14(5): 3455–3463.
26. A. Seenivasan, Sathyanarayana N. Gummadi, Tapobrata Panda and Thomas Théodore. 2015. Quantification of lovastatin produced by *Monascus purpureus*. *Open Biotechnology Journal* 9(1): 6–13.
27. Dipin S. Pillai, J.R. Picardo and S. Pushpavanam. 2014. Shifting and breakup instabilities of squeezed elliptic jets. *International Journal of Multiphase Flow* 67: 189–199.
28. M.V.S.R. Ravi Kanth, S. Pushpavanam, Shankar Narasimhan and B. Narasimha Murty. 2014. A robust and efficient algorithm for computing reactive equilibria in single and multi phase systems. *Industrial and Engineering Chemistry Research* 53(39): 15278–15286.
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31. A.B. Vir, S.R. Kulkarni, J.R. Picardo, A. Sahu and S. Pushpavanam. 2014. Holdup characteristics of two-phase parallel microflows. *Microfluidics and Nanofluidics* 16(6): 1057–1067.
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33. S. Pushpavanam and Guy B. Marin. 2014. Preface. *Chemical Engineering Science* 110: 1.
34. A. Manokaran, S. Pushpavanam and P. Sridhar. 2015. Dynamics of anode–cathode interaction in a polymer electrolyte fuel cell revealed by simultaneous current and potential distribution measurements under local reactant-starvation conditions. *Journal of Applied Electrochemistry* 45(4): 353–363.
35. R. Chetty, K.K. Maniam, W. Schuhmann and M. Muhler. 2015. Oxygen–plasma-functionalized carbon nanotubes as supports for platinum–ruthenium catalysts applied in electrochemical methanol oxidation. *ChemPlusChem* 80(1): 130–135.
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38. K.K. Maniam, V. Muthukumar and R. Chetty. 2014. Approaches towards improving the dispersion of electrodeposited palladium on carbon supports. *Energy Procedia* 54: 281–291.
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41. Ramachandran Manivannan, Byoung-Jun Cho, Xiong Hailin, Srinivasan Ramanathan, Jin-Goo Park. 2014. Characterization of non-amine-based post-copper chemical mechanical planarization cleaning solution. *Microelectronic Engineering* 122: 33–39.
42. B.V.S. Praveen, J.G. Park and S. Ramanathan. 2014. Effect of La doping of ceria abrasives for STI CMP. *ECS Transactions* 61(17): 27–35.
43. Shachit S. Iyer, T. Renganathan, S. Pushpavanam, Mantravadi Vasudeva Kumar and Niket Kaisare. 2015. Generalized thermodynamic analysis of methanol synthesis: Effect of feed composition. *Journal of CO2 Utilization* doi:10.1016/J.JCOU.2015.01.006
44. R. Guruprasad, T. Renganathan and S. Pushpavanam. 2014. Generalized thermodynamic analysis of high-pressure air-blown gasifier. *Industrial and Engineering Chemistry Research* 53(49): 18750–18760.
45. J. Dhanalakshmi, P.S.T. Sai and A.R. Balakrishnan. 2014. Effect of bivalent cation inorganic salts on isobaric vapour–liquid equilibrium of methyl acetate–methanol system. *Fluid Phase Equilibria* 379: 112–119.
46. A. Srikanth, S. Narasimhan, S. Narasimhan and S. Murty Bhallamudi. 2014. Optimization of unloading operations in petroleum product storage terminals. *Industrial and Engineering Chemistry Research* 53(35): 13728–13735.
47. V.R. Palleti, S. Narasimhan and R. Rengaswamy. 2014. Optimal sensor placement for contamination detection and identification in water distribution networks. *Computer Aided Chemical Engineering* 33: 1447–1452.

48. E. Harikishan Reddy, Sreenivas Jayanti and Dayadeep S. Monder. 2014. Thermal management of high-temperature polymer electrolyte membrane fuel cell stacks in the power range of 1–10 kWe. *International Journal of Hydrogen Energy* 39(35): 20127–20138.
49. K. Srinivasan and S. Jayanti. 2015. An automated procedure for the optimal positioning of guide plates in a flow manifold using Box complex method. *Applied Thermal Engineering* 76: 292–300.
50. R.J. Basavaraja and S. Jayanti. 2015. Comparative analysis of four gas-fired, carbon capture-enabled power plant layouts. *Clean Technologies and Environmental Policy* doi:10.1007/s10098-015-0936-7
51. S. Anupriya and S. Jayanti. 2014. Experimental and modelling studies of gas-liquid vertical annular flow through a diverging section. *International Journal of Multiphase Flow* 67: 180–190.
52. R.J. Basavaraja and S. Jayanti. 2015. Viability of fuel switching of a gas-fired power plant operating in chemical looping combustion mode. *Energy* 81: 213–221.
53. R.J. Basavaraj and S. Jayanti. 2014. Syngas-fueled, chemical-looping combustion-based power plant lay-out for clean energy generation *Clean Technologies and Environmental Policy* doi:10.1007/s10098-014-0781-0
54. V. Prabu and S. Jayanti. 2014. Heat-affected zone analysis of high ash coals during ex situ experimental simulation of underground coal gasification. *Fuel* 123(1): 167–174.
55. T. Jyothi Latha and S. Jayanti. 2014. Hydrodynamic analysis of flow fields for redox flow battery applications batteries. *Journal of Applied Electrochemistry* 44(9): 995–1006.
56. T. Jyothi Latha and S. Jayanti. 2014. Ex situ experimental studies on serpentine flow field design for redox flow battery systems. *Journal of Power Sources* 248: 140–146.
57. T. Abburi and S. Narasimhan. 2014. Optimal sensor scheduling in batch processes using convex relaxations and Tchebycheff systems theory. *IEEE Transactions on Automatic Control* 59(11) 6882823: 2978–2983.
58. S. Munusamy, S. Narasimhan and N.S. Kaisare. 2014. Order reduction and control of hyperbolic, counter-current distributed parameter systems using method of characteristics. *Chemical Engineering Science* 110: 153–163.
59. M. Nabil, S. Narasimhan and S. Skogestad. 2014. Profitable and dynamically feasible operating point selection for constrained processes. *Journal of Process Control* 24(5): 531–541.
60. S. Akhilesan, C. Lakshmana Rao and S. Varughese. 2014. Electromechanical behavior of polyaniline/poly(vinyl alcohol) blend films under static, dynamic and time-dependent strains. *Smart Materials and Structures* 23(7): 075016.
61. D. Ramakrishna, Tanmay Basak, S. Roy and E. Momoniat. 2014. Analysis of thermal efficiency via analysis of heat flow and entropy generation during natural convection within porous trapezoidal cavities. *International Journal of Heat and Mass Transfer* 77: 98–113.
62. Monisha Roy, Tanmay Basak, S. Roy and I. Pop. 2015. Analysis of entropy generation for mixed convection in a square cavity for various thermal boundary conditions. *Numerical Heat Transfer, Part A: Applications* 68(1): 44–74.
63. Pratibha Biswal and Tanmay Basak. 2015. Entropy generation based approach on natural convection in enclosures with concave/convex side walls. *International Journal of Heat and Mass Transfer* 82: 213–235.
64. Monisha Roy, S. Roy and Tanmay Basak. 2015. Role of various moving walls on energy transfer rates via heat flow visualisation during mixed convection in square cavities. *Energy* 82: 1–22.
65. Abhishek Kumar Singh, Tanmay Basak, Avijit Nag and S. Roy. 2015. Role of entropy generation on thermal management during natural convection in tilted porous square cavities. *Journal of the Taiwan Institute of Chemical Engineers* doi:10.1016/j.jtice.2014.12.026
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67. Madhuchhanda Bhattacharya, Tanmay Basak and Subramanian Sriram. 2014. Generalized characterization of microwave power absorption for processing of circular shaped materials. *Chemical Engineering Science* 118: 257–279.
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74. A.K. Tripathi and R. Vinu. 2015. Characterization of thermal stability of synthetic and semi-synthetic engine oils. *Lubricants* 3: 54–79.
75. D.K. Ojha and R. Vinu. 2015. Resource recovery via catalytic fast pyrolysis of polystyrene using zeolites. *Journal of Analytical and Applied Pyrolysis* DOI:10.1016/j.jaap.02.024.
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77. K. Vijayaraghavan, Y. Premkumar and J. Jegan. 2015. Malachite green and crystal violet biosorption onto coco-peat: Characterization and removal studies. *Desalination and Water Treatment* 9 pp.
78. K. Vijayaraghavan and F.D. Raja. 2015. Pilot-scale evaluation of green roofs with sargassum biomass as an additive to improve runoff quality. *Ecological Engineering* 75: 70–78.
79. K. Vijayaraghavan and F.D. Raja. 2014. Design and development of green roof substrate to improve runoff water quality: Plant growth experiments and adsorption. *Water Research* 63: 94–101.
80. K. Vijayaraghavan, U.M. Joshi, H. Ping, S. Reuben and D.F. Burger. 2014. In situ removal of dissolved and suspended contaminants from a eutrophic pond using hybrid sand-filter. *Journal of Environmental Science and Health–Part A: Toxic/Hazardous Substances and Environmental Engineering* 49(10): 1176–1186.
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#### Papers presented at national conferences

1. P. Satheesh Kumar and Arun K. Tangirala. 2015. Identification of ARX models from small samples using compressed sensing techniques. *Indian Control Conference, IIT Madras, 5–7 January 2015.*
2. T.G. Anjali and M.G. Basavaraj. 2014. Three phase contact angle measure of shape anisotropic hematite particles using gel trapping technique. *CHEMCON 2014, Chandigarh, 27–30 December 2014.*
3. S. Ramanathan. 2014. Detection of nonlinearities in electrochemical impedance spectra using Kramers Kronig Transforms. *ICONEST Conference, IISc, Bangalore, 6–8 August 2014.*
4. S. Narasimha Reddy, Harshendruhela Indraganti and P.S.T. Sai. 2014. Liquid fluidized binary mixtures in which coarser component may be flotsam. *CHEMCON 2014, Chandigarh, 27–30 December 2014.*
5. S. Narasimha Reddy and P.S.T. Sai. 2014. Segregation of binary mixtures of solids in continuous liquid fluidized beds. *Novel Process Developments for Sustainable Industrial Practice (NDSIP-14), Tirupathi, 12–13 December 2014.*
6. C. Beula, P.S.T. Sai. 2014. Enhancement of esterification of acetic acid with ethanol catalysed by Bronsted acidic ionic liquids. *CHEMCON 2014, Chandigarh, India, 27–30 December 2014.*
7. Vaishakh Nair and R. Vinu. 2014. Novel chitosan–alkali lignin composites for adsorption of industrial effluents from wastewater. *National Conference on Application of the Derivatives of Chitin and Chitosan 22–23 August 2014, Gandhigram Rural Institute, Tamilnadu.*

#### Papers presented at international conferences

1. Santosh V. Daware and M.G. Basavaraja. 2014. Pickering emulsion by arresting phase separation using anisotropic particles. *The Physics of Soft Matter, IOP Biological Physics Group, Homerton College, Cambridge, UK, April 2014.*
2. Trivikram Reddy and M.G. Basavaraja. 2014. Limited coalescence model for emulsions stabilized by oppositely charged particles. *ACS Colloid and Surface Science Symposium, University of Pennsylvania, Philadelphia, USA, 22–25 June 2014.*



3. Trivikram Reddy and M.G. Basavaraja. 2014. Control of droplet size in Pickering emulsions using oppositely charged particles. *International Conference on Soft Matter (ICSM 2014)*, NIT Jaipur, 6–10 October 2014.
4. R. Ashna and M.G. Basavaraja. 2014. Synthesis of polystyrene nanoparticles by nano precipitation from expended polystyrene wastes. *International Conference on Soft Materials*, MNIT, Jaipur, 6–10 October 2014.
5. T.G. Anjali and M.G. Basavaraj. 2014. Influence of particle change in Pickering emulsions stabilized by shape anisotropic particles. *ICSM, 2014 International Conference on Soft Materials 2014*, MNIT, Jaipur, 6–10 October.
6. C.S. Besta and M. Chidambaram. 2014. Centralized P/PI control system design based on equivalent transfer functions for unstable TITO process. *Ninth International Conference on Industrial and Information Systems, ICIIS 2014* (article no. 7036613), Gwalior, India, 15–17 December 2014 and 9 February 2015.
7. C. Sankar Rao and M. Chidambaram. 2014. Experimental application of sub-space model identification of an unstable system. *International Conference on Mathematical Modeling and Computer Simulation*, IIT Madras, 8–10 December 2014.
8. Ethayaraja Mani and S. Manigandan. 2014. Synthesis and self-assembly of patchy colloids: Experiments and simulations. *ACS Colloid and Surface Science Symposium*, University of Pennsylvania, Philadelphia, USA, 22–25 June 2014.
9. Neethu Thomas and Ethayaraja Mani. 2014. Kinetic modeling of growth of gold nanorods. *International Conference on Soft Materials (ICSM 2014)*, MNIT, Jaipur, Rajasthan, 6–10 October 2014.
10. R. Nagarajan. 2014. Use of ultrasonis for treatment of leather-dyeing effluent. *Second European Conference on Sustainability, Energy and the Environment 2014*, Brighton, UK, 3–6 July 2014.
11. Anil B. Vir, J.R. Picardo and S. Pushpavanam. 2014. Influence of Marangoni flow on extraction and reaction in microchannels. *ASME International Conference on Nanochannels, Microchannels and Minichannels (ICNMM-2014)*, Chicago, Illinois, USA, 3–7 August.
12. Niveda Lakshmanan, C.N. Pratheeba and P. Aghalayam. 2014. Transient modeling and NO<sub>x</sub> reduction in automobile exhaust. *12th International Conference on Combustion and Energy Utilization (ICCEU)*, Lancaster, UK, 29 September to 3 October 2014.
13. R. Vishnu, R.I. Sujith and P. Aghalayam. 2014. Investigation of flame dynamics in a v - Flame combustor during combustion instability. *ASME 2014 Gas Turbine India Conference, GTINDIA 2014*, New Delhi, India, 15–17 December 2014.
14. Ashutosh Singh and S. Pushpavanam. 2014. Interface dynamics approach for predicting stability of two immiscible superposed fluid flows in a rectangular channel. *International Conference on Mathematical Modelling and Computer Simulation with Applications*, IIT Kanpur, 31 December to 2 January 2014.
15. D.S. Pillai and S. Pushpavanam. 2014. Jetting-to-dripping transition of bi-fluid flows in circular channels. *Dynamics Days Asia Pacific-08 (DDAP 08)*, IIT Madras-IMSc, Chennai, India, 21–24 July 2014.
16. P. Garg, J.R. Picardo and S. Pushpavanam. 2014. Chaotic mixing in a curved channel with slip surfaces. *Dynamics Days Asia Pacific-08 (DDAP 08)*, IIT Madras-IMSc, Chennai, India, 21–24 July 2014.
17. B. Dinesh and S. Pushpavanam. 2014. Stability of axisymmetric core-annular flow. *Dynamics Days Asia Pacific-08 (DDAP 08)*, IIT Madras-IMSc, Chennai, India, 21–24 July 2014.
18. Raghuram Chetty, M. Kranthi Kumar and M. Volga. 2014. Palladium nanodendrites for electrocatalytic applications. *Electrochemical Society (ECS)-225th Meeting* (in the Characterization of Interfaces and Interphases session), Orlando, Florida, USA, 11–16 May 2014.
19. Raghuram Chetty and Lawrence Drzal. 2014. Oxygen plasma-functionalised graphene nanoplatelets as support for PT catalyst (*ECS*) 225th Meeting (in the Carbon Nanostructures for Energy Conversion session), Orlando, Florida, USA, 11–16 May 2014.
20. G. Keerthiga, B. Viswanathan and R. Chetty. 2014. Electrochemical reduction of CO<sub>2</sub> on modified Zn/Cu electrodes. *International Conference on Electrochemical Science and Technology (ICONTEST-14)*, IISc, Bangalore, India, August 2014.
21. Bincy George Abraham, S.H. Gopinath and Raghuram Chetty. 2014. Pt electro-deposited on titania nanotubes for the electr-chemical oxidation of methanol. *International Conference on Electrochemical Science and Technology*, IISc, Bangalore, 7–9 August 2014.
22. Fathima Fasmin and S. Ramanathan. 2014. Detection of nonlinearities in electrochemical impedance spectra using Kramers Kronig transforms. *ICONEST 2014*, Bangaluru, India, 6–8 August 2014.
23. B.V.S. Praveen, Jin Goo Park and S. Ramanathan. 2014. Effect of La doping of ceria abrasives. *STI CMP Selectivity*, 61(17): 27–35, Orlando, FL, USA, May 2014.
24. S. Noyel Victoria, Roberto Garrappa, Vimala Ramani and S. Ramanathan. 2014. Analytical and numerical solutions of some fractional differential equations occurring in electrochemical analysis. *10th Differential Equations & Computational Simulations (DECS)*, Mississippi State University, USA, 23–25 October 2014.
25. G. Saranya, Arun K. Devassikutty, T. Swaminathan and R. Ravikrishna. 2014. Emission of fungal spores from simulated solid waste on different surfaces. *International Aerosol Conference 2014*, South Korea, 28 August to 2 September 2014.

26. K. Nagarajan, K. Krishniah and T. Renganathan. 2015. Holdup characteristics in continuous counter current liquid–solid system operating in free mode. *International Conference on New Frontiers in Chemical Energy and Environmental Energy INCEE 2014*, NIT Warangal, 20–21 March 2014.
27. S. Narasimha Reddy and P.S.T. Sai. 2014. Segregation of binary mixture of solids in flotsam-rich continuous liquid fluidised beds. *14 AICHE Annual Meeting*, Atlanta, USA, 16–21 November 2014.
28. K. Srinivasan, V. Balamurugan and S. Jayanti. 2014. Flow control in T-junction using CFD-based optimization. *Fifth International Conference and 41st National conference on Fluid Mechanics and Fluid Power FMFP–2014*, Kanpur, India, 12–14 December 2014.
29. S. Jayanti and T. Jyothi Latha. 2014. Designing flow fields for all- liquid redox flow battery systems. *International Flow Battery Forum*, Hamburg, Germany, July 2014.
30. A. Kumar, M. Nabil and S. Narasimhan. 2014. Economical and plant friendly input design for system identification. *13th European Control Conference, ECC 2014; Strasbourg Convention and Exhibition Center, Place de Bordeaux, Strasbourg, France*, 24–27 June 2014.
31. R. Piramuthu Raja Ashok and Susy Varughese. 2014. Rheological behavior of PEDOT: PSS dispersion with secondary additives. *International Conference on Polymers and Allied Materials*, IIT Patna, May 2014.
32. T. Basak, S. Panda, S. Srirama and M. Bhattacharya. 2014. Analysis on effect of shapes for microwave-assisted food processing of 2D samples. *10th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics*, Florida, 14–16 July 2014.
33. P. Biswal and T. Basak. 2014. Numerical simulations on heat flow visualization and entropy generation during natural convection in enclosures with curved side walls. *10th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics*, Florida, 14–16 July 2014.
34. P. Biswal and T. Basak. 2014. Analysis of heat function boundary conditions on invariance of heat flow in square enclosures with various thermal boundary conditions. *15th International Heat Transfer Conference (IHTC-15)*, Kyoto, Japan, 10–15 August 2014.
35. D. Das and T. Basak. 2014. Analysis of thermal mixing via Bejan’s heatline during natural convection within square cavities with discrete heat sources. *10th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics*, Florida, 14–16 July 2014.
36. R. Chockalingam and U. Natarajan. 2015. Structure and thermodynamic investigations on symmetric poly(styrene-*block*-acrylicacid) (PS-*b*-PAA) micelle in salt-free aqueous solutions. *International Symposium on Polymer Science and Technology Macro-2015*, Indian Association for the Cultivation of Science, Kolkata, 23–26 January 2015.
37. G. SriBala and R. Vinu. 2014. Kinetic modeling of acid hydrolysis of biomass via conventional and non-conventional techniques. *AICHE Annual Meeting 2014*, Atlanta, GA, USA, 18 November 2014.
38. D.K. Ojha and R. Vinu. 2014. Production of high-quality bio-oil via fast copyrolysis of cellulose and polypropylene. *International Workshop on Sustainable Energy, Power and Propulsion*, Jadavpur University, Kolkata, 5–7 January 2014.
39. Vaishakh Nair and R. Vinu. 2015. In situ catalytic fast pyrolysis of lignin for the production of phenols using oxide catalysts. *249th ACS National Meeting*, Denver, Colorado, USA, 22–26 March 2015.

### Distinguished visitors to the department

Sl. No.	Name of the Visitor and Designation	Date of Visit	Purpose of Visit/Name of Seminar
1	Dr Suresh K. Bhatia, Professor, University of Queensland, Australia and presently Chevron Chair Professor	15 April 2014	Quantum Molecular Sieves of Light Isotopes
2		17 April 2014	How water Adsorbs in Hydrophobic Nanospaces?
3	K.A. Natarajan, Emeritus Professor and NASI Senior Scientist Platinum Jubilee Fellow, IISc, Bangalore	22 April 2014	Biology–Materials Interface
4	Prof. Srini Raghvan, University of Arizona	August 2014	Chevron Chair Professor
5	Mr. Sanjay Venugopal, Yokogawa IA Technologies Limited, Bangalore	1 May 2014	Emerging Opportunities for Chemical Engineers
6	Vijay A. Sethuraman, School of Engineering, Brown University	2 May 2014	Methods for Discovering Chemical and Mechanical Degradation Mechanisms in Lithium-Ion Batteries
7	Ranganathan Gopalakrishnan, Postdoc, California Institute of Technology, USA	5 June 2014	Diffusion-Limited Transport in Aerosol Systems: Effect of Shape and Potential Interactions

Sl. No.	Name of the Visitor and Designation	Date of Visit	Purpose of Visit/Name of Seminar
8	Dr. D.V. Satya Gupta, Business Development Director, Baker Hughes Pressure Pumping, USA	2 September 2014	Stimulation of Unconventional Shales
9	Dr. Srivatsan Kidambi, Faculty Member, Department of Chemical and Biomolecular Engineering, University of Nebraska, Lincoln, USA	10 September 2014	Engineering Novel Polyelectrolyte Multilayer Films for Tissue Engineering and Drug Delivery Applications
10	Rajnish Kumar, National Chemical Laboratory	26 September 2014	Natural Gas Hydrates: Opportunities for Innovative Energy Solutions
11	Dr. Peter B. Lillehoj, Assistant Professor, Institute of International Health at Michigan State University, USA	10 October 2014	Interaction with head and faculty members
12	Dr. Robert Burford, School of Chemical Engineering, Cooperative Research Center for Polymers, Australia	15 October 2014	Presenting their value proposition and discussing specific areas of interest
13	Hari Prasad Dasari, DST-INSPIRE Faculty, Department of Chemical Engineering, NIT, Warangal	20 October 2014	Ceria-Based Materials and Their Applications
14	Dr. Sarath Guttikumda, Director, Urban Emissions.info, Adjunct Associate Professor, IIT Bombay, Technical Advisor, India Program of Clean Air Asia	1 December 2014	Air Quality Modeling and Management in India
15	Dr. Sumesh P. Thampi, Postdoctoral Research Assistant at the Department of Physics, University of Oxford	27 January 2015	Active Turbulence
16	Gene Bunin, independent researcher in China	20 January 2015	Experimental Optimisation: State of the Art and Research Challenges
17	Dr Siva Rama Krishna Perala, Postdoctoral Associate at MIT, Cambridge	16 February 2015	Arrested Wet Chemical Precipitation of Metal Nanoparticles
18	Satyavrata Samavedi, Postdoctoral Research Associate, Rensselaer Polytechnic Institute, Troy, New York	29 March 2015	Gradient Biomaterials for the Potential Regeneration of Tissue Transitions

#### 4.4.6. Other Activities of the Department/Centre

##### Faculty and staff members

Sl. No.	Description
1	A delegation from the University of Manchester visited the department on 8 September 2014. The objectives were exploration of joint research projects, co-supervision of Ph.D. students, research workshops and two-way staff exchanges, including Dr. James Winterburn, of the Chemical Engineering Department.
2	Delegates from Louisiana State University, USA visited the department on 27 January 2015 to meet the faculty and the Head of the Department.
3	The term of Dr. R. Nagarajan as Dean (I&AR) was extended for a further period of 1 year with effect from 6 September 2014.
4	Dr. S. Niket Kaisare was appointed an Associate Professor in the Department of Chemical Engineering with effect from the forenoon of 3 November 2014.
5	Dr. Preethi Aghalayam and Dr. S. Ramanathan were appointed Professors with effect from the afternoon of 18 July 2014.

##### Results obtained in research work (from M.S. and Ph.D theses) of scholars/faculty members

Sl. No.	Item
<b>Ph.D.</b>	
1	Dr M. Kranthi Kumar, former doctoral student of the Department of Chemical Engineering was chosen for the 2014 doctoral-level Innovative Student Project Award by INAE for his Ph.D. thesis titled <i>Development of Shape Controlled Palladium Structures as Electrocatalysts for Fuel Cell Applications</i> . He was guided by Dr. Raghuram Chetty.

Sl. No.	Item
2	M. Kranthi Kumar (former student of Dr. Raguram Chetty) was awarded the Gandhian Young Technological Innovation 2015 Award for his Ph.D. thesis titled <i>Development of Shape Controlled Palladium Structures as Electrocatalysts for Fuel Cell Applications</i> . The award was presented by Dr. R.A. Mashelkar at Rashtrapati Bhavan, New Delhi on 8 March 2015.
3	A new product for the IC fabrication process, i.e. a slurry with a high oxide-to-nitride polish rate selectivity, was developed, and the mechanism of high selectivity was identified in B.V.S. Praveen's Ph.D. thesis, <i>Characterisation and Modification of Ceria Abrasives for Shallow Trench Isolation Chemical Mechanical Polishing</i> .
4	Chandrasekaran S, Ramanathan S. and Tanmay Basak: Experimental Studies on Microwave Heating of Metals and Graphite Based Powder Mixtures.
5	Dhanalakshmi J., Balakrishnan A.R. and Sai P.S.T.: Effect of Entrainers on Isobaric Vapour Liquid Equilibrium of Non-Aqueous Azeotropic Mixtures.
6	Jyothi Latha Tamalapakular and Sreenivas Jayanthi: Experimental and Numerical Investigations on Flow Field Designs for Redox Flow Battery Systems.
7	Seenivasan A. and Panda T.: Studies on Biosynthesis of Lovastatin and its analogues
8	Sudhakar M., Sridharkumar Narasimhan and Niket S. Kaisare: Model Order Reduction and Model Based Control of First Order Hyperbolic Distributed Parameter Systems.

#### M.S.

- 1 Abhinav Garg and Arun K. Tangirala: Causality Analysis for Topology Reconstruction and Interaction Assessment.
- 2 Gokul Siva Sankar G., Sridharakumar Narasimhan and Shankar Narasimhan: Model Predictive Control of Water Supply Networks.
- 3 Harikrishna Reddy B. and Nagarajan R.: Modeling and CFD Simulation of Enhanced Spray Drying Process.
- 4 Vishnu R. and Preethi Aghalayam: Experimental Study on Combustion Dynamics of a Ducted Lean Premixed V-Flame.
- 5 Kishore S., Sai P.S.T. and Selvaraju P.: Study on Reaction of Hydrogen Bubble With Flowing Sodium
- 6 Sriram S. and Tanmay Basak: Material Invariant Characterization of Microwave Power Within Circular Cross-Section

#### Socially relevant activities carried out by the department

- 1 Mr R. Selva Ganapathy, Junior Technical Superintendent, Department of Chemical Engineering, was declared the Winner of the Volunteer Hero 2013 Award by iVolunteer for his volunteer work for AID India, with whom he has been volunteering for more than 10 years. The award comprises a certificate and a sponsored trip to attend the world's biggest conference on volunteering, 'The Points of Light', held at Atlanta, USA, during 16–18 June 2014.
- 2 Mr R. Selva Ganapathy, Junior Technical Superintendent, was selected to represent Tamilnadu in the Senior Archery Nationals at New Delhi, during 15–19 October 2014.
- 3 Ms Saraswathi M., Senior Assistant, was selected by the Institute to participate (badminton) in the 22nd Inter IIT Staff Sports Meet–2014 held at IIT Bombay during 22–26 December 2014.
- 4 Dr. Abhijit P. Deshpande and Dr. Susy Varughese: Prakriti is the Wildlife Club of IIT Madras. It was founded in April 2002 by a group of wildlife enthusiasts comprising students, faculty members, staff, members residents and alumni of IIT Madras. The formation of the club was spurred by a growing recognition of the need to protect the unique biodiversity of the IIT Madras campus. This club organises an annual bird watching training programme for campus children, students of KV, IIT Madras and Vanavani in the age group of 6 and above within the campus for one week during the summer vacation from 6:30 to 8:00 am.

#### International collaboration

##### Faculty visits

Sl. No	Name of the Faculty Member	Purpose of Visit	Date and Place
1	Arun K. Tangirala	DAAD research stay	6 May to 16 July 2014, Munich, Germany
2	R. Nagarajan	CERN Supercollider facility and EPFL	4–6 September 2014, Switzerland
3	Sridharakumar Narasimhan	DAAD–IIT exchange	30 May–16 July 2014, Aachen, Germany
4.	Sridharakumar Narasimhan	Faculty exchange scheme	1 June to 15 July 2014, RWTH, Aachen, IIT-TU

## Student visits

Sl. No.	Name of the Scholar/Roll No.	Purpose of Visit	Date and Place
1	Bulusu Venkata Sesa Praveen, CH11D032	DST-NRF project	9–9 June 2014, Hanyang University, Korea
2	M.P. Reshmi Suresh, CH12D024	Internship	1 June to 6 July 2014, Concordia University, Montreal, Canada
3	Tanneru Hemanth Kumar, CH11D031	Internship	1 June to 31 July 2014, Concordia University, Montreal, Canada
4	Bhagavatula N.V.S.S.R. Dinesh, CH12D025	Project work	1 August to 31 October 2014, University of Luxembourg
5	R. Savitha, CH12D004	Visiting scholar	20 October–20 April 2014, Dublin City University, Ireland
6	M. Danny Raj, CH11D038	Visiting scholar	1 February to 4 July 2015, West Virginia University, USA
7	G. Swaminathan Bharadwaj, CH11D036	Co-Tutorial Programme	1 December 2014 to 31 May 2015, Tokyo Metropolitan University, Japan

## Activities initiated

As an initiative of Swatch Bharath, cleaning of the laboratories and workshop was carried out.