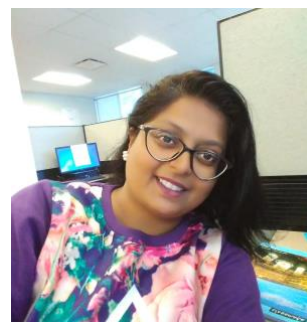


BioData of JAYATI SARKAR



I have acquired my Bachelor of Chemical Engineering degree from Jadavpur University, Kolkata in the year 2000, M.Tech in Chemical Engineering from IIT Kanpur in the year 2001 and PhD in Chemical Engineering from IIT Kanpur in the year 2005. My PhD research was about study of instabilities in thin soft elastic films and the phenomena that occur there namely adhesion, debonding, dewetting and pattern formation. Pattern formation at soft interfaces is a field of extreme importance and relevance in today's world in fabricating nano-meso scale materials. Apart from Chemical Engineering have also done several advanced level courses in Mechanical and Aerospace Engineering. My subjects of interest are: *Interfacial Science, Computational Fluid Dynamics, Nanotechnology, Complex Fluids and Solid Mechanics*.

After PhD I have worked for about two years in an MNC and an incubation centre of IIT Mumbai as lead CFD scientist and has worked in areas like dispersed phase flow, multiphase flow, electro kinetics and parallelization. I have completed my postdoctoral studies in the area of Lattice Boltzmann Modeling in complex fluid and granular materials at the Max Planck Institute for Dynamics and Self Organization, Goettingen, Germany in the year 2008, just before joining Chemical Engineering Department in IIT Delhi as Assistant Professor. Currently working as a Professor in the Department.

In IIT Delhi I have taken up both UG courses like Heat Transfer, Transport Phenomena, Introduction to Chemical Engineering, Fluid Mechanics and Heat Transfer Laboratory, Chemical Engineering Laboratory – I, Design and Laboratory Practices and PG courses like Fundamentals of Computational Fluid Dynamics and Advanced Computational Techniques in Chemical Engineering. In total I have/had 17 PhD students, 9 M.Tech, 24 Dual Degree and 32 B.Tech students under my supervision. I have taken up two project from DST and an in-house funded project on complex fluids. I have been a part of Training and placement committee in the department, member of student review committee for PhD students, member of Departmental UG committee, member of Departmental Review committee and dual degree coordinator.

I have been rewarded with several awards of national and international importance for my research output and scholastic achievements. They include University Medals for standing first at BE level in Chemical Engineering, Kusuma Trust sponsored outstanding Young Faculty Fellowship in the area of Engineering at IIT Delhi, (2008), Amar Dye-Chem award, IChE 2012 for excellence in research and development given to scientists under the age of 35 Years, Outstanding scientist Award by Venus International Foundation 2015, Marquis Who's Who in the World 2016, Bharat Vikas Award 2017 for outstanding contribution in the field of chosen research and lately have also been awarded by Indo-U.S. WISTEMM-Women Overseas Fellowship 2018. I had been appointed as technical committee member for conferences, reviewer for papers, as an external examiner for several IITK/IITG MS/PhD students. I have lately been given the honor to serve as a member of the Editorial Board for Scientific Reports, a journal from Nature publication. Am also an Associate Editor of Frontiers.

My thesis has been highly acclaimed by reviewers and the first PhD thesis guided by me has received **Shah-Schulman Award in the field of Colloids and Interfacial Science from IChE in the year 2014.**

1. Name in Full

First Name	Middle Name	Last Name
JAYATI		SARKAR

2. Address

Present	Permanent
<u>40 NORTH AVENUE, INDIAN INSTITUTE OF TECHNOLOGY, DELHI, NEW DELHI:110016</u> Phone: <u>9717701531</u> Email: <u>jayati@chemical.iitd.ac.in</u> WebPage: <u>http://web.iitd.ac.in/~jayati/</u>	Flat #B-3/7 EKTP PHASE-IV, ABHYUDOY HOUSING COMPLEX., Kolkata-700107, Phone: <u>033-24431563</u> Email <u>dr.javatisarkar@gmail.com</u>

3. Date of Birth : 09/06/77 **4. Nationality:** INDIAN **5. Sex:** FEMALE

6. Present Employment details:

Designation	Organization	From	To	Roles and responsibilities
Associate Professor	Indian Institute of Technology, Delhi	December 2016	Present	Teaching/Research/ Administrative

7. Areas of Specializations: Chemical Engineering

8. Current Areas of Research: Instabilities in thin films, Interfacial Science, Complex Fluids

9. Academic Record EDUCATION:

<i>Course</i>	<i>Year of passing</i>	<i>Institution</i>	<i>Board/ University</i>	<i>Division/ Class</i>	<i>CPI/% of Marks</i>	<i>Position</i>
Doctor of Philosophy in Chemical Engineering	2005	Indian Institute of Technology, Kanpur, India	Indian Institute of Technology, Kanpur, India	N/A	CPI 10/10	N/A
Masters of Technology in Chemical Engineering	2001	Indian Institute of Technology, Kanpur, India	Indian Institute of Technology, Kanpur, India	N/A	CPI 9.67/10	N/A
B.Che. (Chemical Engineering)	2000	Jadavpur University	Jadavpur University	1 st Class (Hons)	88.55% (Chemical Engineering as Major)	1st

12 th Standard	1996	South Point High School	W.B.C.H.S.E.	1 st Division	86.40%	43rd
10 th Standard	1994	South Point High School	W.B.B.S.E.	1 st Division	83.22%	89th

(i) W.B.C.H.S.E: West Bengal council of Higher Secondary Education

(ii) W.B.B.S.E: West Bengal Board of Secondary Education

Academic Record (in details)

2001-2005 **Indian Institute of Technology**, Kanpur, India

Degree: **Doctor of Philosophy in Chemical Engineering**

PhD Dissertation: *Instabilities of Soft Confined Interfaces: Adhesion, Debonding, Dewetting and Pattern Formation*

Specialized Coursework: Finite Element Methods for Fluid Dynamics; Theory of Plasticity; Optimization; Engineering Applications of Rheology

Advisor: Professor Ashutosh Sharma

Grade: CPI: **10/10**

2000-2001 **Indian Institute of Technology**, Kanpur, India

Degree: **Masters of Technology in Chemical Engineering**

M-Tech Thesis: *Stability and Pattern Formation in Thin Solid Films*

Specialized Coursework: Transport Phenomena; Numerical Methods in Chemical Engineering; Fundamentals of Colloid and Interface Science and Technology; Introduction to Solid Mechanics; Chemical Reaction Engineering; Reaction Engineering of Polymers

Thesis Advisors: Professor Ashutosh Sharma and Dr. Vijay Shenoy

Grade: CPI: **9.67/10**

1996-2000 **Jadavpur University**, Calcutta, India

Degree: **Bachelor of Engineering in Chemical Engineering**

Project: *Study of Design Aspects of Reactive Distillation Column*

Advisors: Dr. Abhijit Bhowal and Dr. Chiranjib Bhattacharya

Marks: **88.55% (1st Rank)**

10. Previous experience

A. Research experience (excluding research done for Ph.D. Degrees)

Designation	Organization	From	To	Roles and responsibilities
Senior Research Engineer	Transoft International, Fluidyn Software & Consultancy Pvt. Ltd., Bangalore, India.	Sept 2005	Dec 2006.	<ul style="list-style-type: none"> Upgraded the existing structure and fluid solver source codes through parallelization for both direct solution methods like Cholesky factorization and iterative methods like GMRES. Worked on dispersed phase models where particle tracking is done through a Lagrangian model. Developed new software for solving electro kinetics problem.

				<ul style="list-style-type: none"> • Worked on Testing during up-gradation of software. • Wrote Technical and User Manual and Conference paper.
Lead CFD Scientist Chemical	Zeus Numerix Pvt. Ltd, Mumbai, India	Feb 2007	Jul 2007	<ul style="list-style-type: none"> • Worked on multiphase flow applicable in industrial extractors using Eulerian model for multiphase flow. • Worked on development of pressure-based solver. • Gave invited lectures in the University of Pune on the topic of Low Speed • Flows in Computational Fluid Dynamics. • Guided a student through his PhD thesis on multiphase model
Postdoctoral Scientist	Max Planck Institute for Dynamics and Self Organization Gottingen Germany	Aug 2007	Aug 2008	Study of Lattice Boltzmann Simulation in complex fluids containing granular materials to understand equilibrium and non-equilibrium phase diagrams for particle systems with hysteretic forces.
Assistant Professor	Indian Institute of Technology Delhi	September 2008	December 2016	Teaching/Research/Administrative

B. Teaching experience

Duration	Organization	Area(s)
22nd September, 2008 onwards	Indian Institute of Technology, Delhi	Chemical Engineering UG and PG Level
2000-2005	Teaching Assistant Dept. of Chemical Engineering, IIT Kanpur, India.	Courses: Fundamentals of Colloid and Interfacial Science and Technology; Introduction to nano-materials and nano-technology;

		Fluid Mechanics and Rate Processes; and Thermodynamics Responsibility: Conducting exams and grading exam papers.
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WORK EXPERIENCE IN IIT DELHI

Planning Unit, IIT Delhi	Self Organization of complex fluids: Instabilities at soft interfaces; Wet granulates under shear	3 years (2008-2011) completed	Rs. 7 Lakhs
Department of Science & Technology (DST)	Instabilities on Patterned Substrates, Blistering, Fibrillation, Necking and Friction at Soft Thin elastic Films	3 years (2010-2013) completed	Rs. 29.16 Lakhs
Department of Science & Technology (DST)	Instabilities in wetting thin films with thickness dependant viscosity effects	3 years (2014-.2018.) completed	Rs. 30.10 Lakhs
DST and IUSSTF	Dewetting assisted self assembly/origami formation and folding of grapheme particles	3 months 2018 completed	Rs.10.1 1Lakhs

Ansys, India	CFD Applications in Bioprocessing	2016-2022 ongoing	Rs. 20.00 Lakhs
FIRP, IITD	Investigation of the interface between electrochemically-active microorganisms and self-assembled grapheme/carbon nanotubes over polymeric surfaces.	2019-2021 ongoing	Rs.10.00 Lakhs
FIRP, IITD	Fabrication of a Multifunctional polymer composite having Thermo-Piezo-Conductivity	2021-2022 ongoing	Rs.5.00 Lakhs
UQIDAR-IITD	Surface modification of biodegradable scaffolds for bone tissue engineering application.	2021-2023 ongoing	\$33292 (AUD) as student scholarship
SERB,DST, IITD	Single ventilator design modification for optimal multi-patient use-A CFD study	July2020-July2021 ongoing	Rs.10.57408 Lakhs
SERB,CRG,DST, IITD	Study of self-organization of ferrofluidic-polymer thin film in presence of an external magnetic/electric field	3 years (2021-2024) ongoing	Rs. 34.04700 Lakhs
Individualistic Consultancy through FITT	Agitator /Baffle design to understand crude mixing in tanks	2021 (4 months)	Rs. 4 Lakhs
Biopolymer based nanocomposite coating for high-barrier applications (low water vapor and oxygen transmission rates)	J. K. Paper Consultancy through FITT	2022-2025	Rs. 87.5 Lakhs

Design of Self-assembled electrodes for Enhanced Microbial electron Transfer in Bioelectrochemical Systems	Department of Biotechnology, Ministry of Sc.& Tech India	2022-2025	Rs. 33.95 Lakhs
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Details of PhD theses supervised

S No	Name/Entry Year	Status	Thesis Title
1	Hemalatha Annepu (Entry Year:2008)	Thesis Defended	Miniaturization of Patterns and Friction at Soft Interfaces
2	Dheerendra Dubey (Entry Year: 2008)	Thesis Defended	Study of wet granulates under Shear
3	Tirumalarao Kotni (Entry Year: 2010)	Thesis Defended	Instabilities in wetting thin films with thickness dependent properties.
4	Sunita Sen (Entry Year:2014)	Thesis in progress/ thesis submitted	Instabilities in non-linear thin films.
5	Surita Basu (Entry Year:2015)	Thesis Defended	Study of Miniaturization of Surface Patterns and Self-organization of carbonaceous nano-particles on soft, thin films and their applications.
6	Manga Ramya Durga (Entry Year 2016)	Thesis in progress/ Synopsis submitted	Electric field induced instabilities in non-linear thin films.
7	Garima Vishal (Entry Year 2015) co-guide	Thesis in progress/ Synopsis submitted	Flow of Non-newtonian Fluid in Confined Channels
8	Shalaka Bhargava (Entry Year 2017) co-guide	Thesis in progress/ Comprehensive Exam Completed	Dewetting over porous substrate
9	Yash Malviya (Entry Year 2019)	Thesis in progress/ Comprehensive Exam Completed	CFD design of bioreactors

10	Yedla Venkata durga Anudeep (Entry Year 2019)	Thesis in progress/ Comprehensive Exam Completed	Hydrogen Production in MECs using a conductive polymer as cathode and Adsorption of CO2 in bacteria assisted 3D Porous-CNT sponges.
11	Rahul Kumar (Entry Year 2020)	Thesis in progress/ Comprehensive Exam Completed	CFD design of heat exchangers
12	Rahul Panth (Entry Year 2020)	Thesis in progress/ Comprehensive Exam Completed	Fabrication of a Multifunctional polymer composite having ThermoPiezo-Conductivity
13	Swarnima Agarwal (Entry Year 2020) UQIDAR-IITD student co-guide	Thesis in progress/ Comprehensive Exam Completed	Surface modification of biodegradable scaffolds for bone tissue engineering application.
14	Neeraj Singh (Entry Year 2021)	Thesis in progress/ Comprehensive Exam Completed	Simulation-based study of hydrogen energy production and storage
15	Krishna Patel (Entry Year 2021)	Thesis in progress/ Comprehensive Exam Completed	Molecular Dynamics Simulation of Carbonaceous Materials
16	Kirti Kumari (Entry Year 2021)	Thesis in progress	Experimental study of cellulose based piezoelectric materials
17	Shruti Gautam (Entry Year 2023)	Thesis in progress	Simulation studies of particulate flow and confined spaces.
18	Ankita Choure (Entry Year 2023)	Thesis in progress	Experimental study of thermo-piezo conductive polymer

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SNo	Name/Entry Year	Status	Degree	Thesis Title
1	Pratap Chandra Das (Entry Year:2008)	Defended	MTech	Design of Ducts in Cyclones
2	Chandrakant Ramkrushnaji Khudsange (Entry Year: 2009)	Defended	MTech	Instabilities in elastic films on patterned surfaces under the influence of e-field
3	Naipal Singh (Entry Year:2011)	Defended	MTech	Coupled tension-shear interactions in thin ELASTIC films
4	Satish Mishra (Entry Year:2012)	Defended	MTech	FEM study of thin films on patterned substrate

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5	Ramesh Bunker (Entry Year:2012)	Defended	MTech	FEM study of hyperelastic thin Films
6	Neeru Bala (Entry Year:2013)	Defended	MTech	LBM study of multiphase systems
7	Jitendra Mandi (Entry Year:2018)	Defended	MTech	Morphological study of PS+PDMS thin film and blend
8	Praveen Kumar Yadav 2019CHE2537	Ongoing	MTech	Bacteria and CNT network development
9	Shobhit Kumar Gupta (Entry Year:2020)	Ongoing	MTech	Molecular Dynamic Simulation of blends of Thermo-responsive/Conductive/Piezoelectric polymers
10	Sanand Prakash (Entry Year:2020)	Ongoing	MTech	LBM study of hydrodynamics of non-Newtonian fluids
11	Anupam Amar (Entry Year:2005)	Defended	Dual Degree	Study of wet granulates with the help of 3D Lattice Boltzmann Model
12	Nikhil Khurana (Entry Year:2006)	Defended	Dual Degree	Study of stress-strain relationship of wet granulates under shear using lattice Boltzmann modeling
13	Gaurav Sharma (Entry Year:2007)	Defended	Dual Degree	Instability in thin films - A FEM approach
14	Swati Agrawal (Entry Year:2008)	Defended	Dual Degree	Study of oscillatory shear on wet granulates
15	Gaurav Dev Singh (Entry Year:2008)	Defended	Dual Degree	Friction at soft interfaces.
16	Harshit Agrawal (Entry Year:2009)	Defended	Dual Degree	Study of inertial effects on dewetting of thickness dependant thin liquid films.
17	Rohit Chand (Entry Year:2009)	Defended	Dual Degree	Experimental Study of soft thin films.
18	Kushal Verma (Entry Year:2009)	Defended	Dual Degree	Influence of e-field on pattern formation of adhesive elastic films cast on patterned substrates.

19	Aryanshi Kumar (Entry Year:2010)	Defended	Dual Degree	Instabilities in viscoelastic thin films
20	Himanshu Dhakar (Entry Year:2010)	Defended	Dual Degree	FEM study of necking in hyperelastic thin films
21	Devendra Kumar (Entry Year:2010)	Defended	Dual Degree	Experimental study of thin elastic films on patterned substrates
22	Dharampal Singh Meel (Entry Year:2011)	Defended	Dual Degree	Control of Self-Organized Contact Instability and Patterning in Soft Elastic Films
23	Ashutosh Yadav (Entry Year:2011)	Defended	Dual Degree	Dewetting in Thin Liquid Films of Thickness Dependent Viscosity on Heterogeneous Substrate
24	Seema Yadav (Entry Year:2012)	Defended	Dual Degree	Contact Instability and Pattern Formation due to van der Waals Forces in Bilayers
25	Yotesh (Entry Year:2012)	Defended	Dual Degree	Control of Self-Organized Instabilities and Patterning in Soft Elastic Films
26	Vasu Tekriwal (Entry Year:2013)	Defended	Dual Degree	Instability in viscosity varying thin films
27	Bhukya Vishnu Naik (Entry Year:2013)	Defended	Dual Degree	Nano-particle assisted dewetting
28	Anshu Kumar (Entry Year:2014)	Defended	Dual Degree	Coiled Configurations for Inversion of Flow and Their Effects
29	Mukul Mittal (Entry Year:2015)	Defended	Dual Degree	Electricity production by heating response of a Piezo-Thermal assembly
30	PAL PRAKHAR SINGH (Entry Year:2015)	Defended	Dual Degree	Poly(N-isopropylacrylamide): A thermo-responsive polymer
31	PARTH AGARWAL (Entry Year:2016)	Ongoing	Dual Degree	LBM Study of Viscoelastic flows
32	Kartikeya Kumar (Entry Year:2016)	Ongoing	Dual Degree	Molecular Dynamic Simulation of Graphene and poly-styrene
33	Aniket Munjal (Entry Year:2017)	Ongoing	Dual Degree	Agitator /Baffle design to understand crude mixing in tanks

34	Gaurav Singh (Entry Year:2017)	Ongoing	Dual Degree	Adhesion-debonding in graded polymers
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Details of B.Tech theses supervised

S. No.	Name	BTP Project Title
1	Aman Gupta 2017CH10195	Oscillatory Shear between parallel plates
2	Divyansh Garg 2017CH10894	LBM Study of Ferrofluids
3	Ankit Kumar 2017CH10197	LBM Study on non-Newtonian Fluids
4	Pranjal Kacholia 2016CH10098	Spin coating on coated, non-coated Magnetite Nanoparticles and CNTs on the layer of PMMA + Toluene
5	Kshitiz Agrawal 2016CH10072	Experiments on Polystyrene Dewetting
6	Siddharth Singh 2016CH10076	CFD in coiled pipe flow
7	Devandra Godara 2015CH10094	Synthesis of Ferrofluid Particles and Its Application
8	Atul Yadav 2015CH10090	Study of Polymeric blend Polystyrene and PDMS
9	Dikshant Makhija 2015CH10097	Hydrophilic Coatings on Polymer coated Glass Surface
10	Ajay Prakash 2014 Entry	Lattice Boltzmann modelling of heat transfer
11	Himanshu Kumar 2014 Entry	Modelling of flow over rough polymer surface to account for reduction in drag force.
12	Prashant Arya 2014 Entry	Electric field experiments on thin elastic films
13	Riya Meghwal 2013CH10108	contact instability in bilayer system
14	Rakesh Kumar 2013ch10101	Simulation of Turbulent Flow inside Pipe and Over Obstacle using Lattice Boltzmann Method (LBM)
15	Abhishek kumar 2013CH10064	Silanization and Contact angle measurement
16		ELASTIC CONTACT INDUCED PATTERNING OF SOFT

	Ravi Kumar Gupta (2012CH10109)	THIN FILMS
17	Rounit (2012CH10112)	Analysis of 2-D surfaces using Minkowski Functionals
18	Apoorv Jain 2011 Entry	Experiments on Thin Films
19	Anmol Sarraf 2011 Entry	Friction at Soft Interfaces
20	Deepak Meena 2010 Entry	Expt studies of thin films
21	NARENDRA MEEL 2010 Entry	Thin Liquid Films
22	Mayank Prajapat 2010 Entry	LBM study of granulates in non-Newtonian fluid
23	Sagar Singhal 2009 Entry	Study of dewetting of thin films by FEM
24	Akshay Yadav 2009 Entry	Adhesion Debonding of Soft Elastic Film from Patterned Substrate – A Finite Element Approach
25	Harshit Rungtha 2008 Entry	Instability of thin thin films on patterned substrates -A FEM approach
26	Abhishek Kumar 2008 Entry	Adhesion and pattern formation in viscoelastic films
27	Neeraj Kumar Meena 2008 Entry	Shear study of a single aggregate of wet granulates using Lattice Boltzmann Modelling
28	Piyush Taneja 2007CH10080	Study of Non-Newtonian Behaviour of Particulate Matter in Shear using Lattice Boltzmann Modeling
29	Himanshu Bathla 2006CH10068	Instabilities in Thin Non Linear Elastic Films

TEACHING IN IIT DELHI

UG courses taken (shared):

1. Transport Phenomena (CHL110).
2. Introduction to Chemical Engineering (CHN110).
3. Introduction to Engineering (NIN100)
4. Heat Transfer for Chemical Engineering (CLL 251)
5. Numerical Methods in Chemical Engineering (CLL113)

UG courses taken for self study students:

1. Mass Transfer Operations (CHL351).
2. Numerical Methods in Chemical Engineering (CHL711).

UG Labs (shared):

1. Fluid Mechanics and heat transfer lab (CHP301/CLP301).
2. Mass Transfer and fluid particle mechanics laboratory (CHP302).
3. Chemical Reaction Engineering and Process Control (CHP302).
4. Chemical Engineering Laboratory – I (CHP304)
5. Design and Laboratory Practices (CHP311)
6. Colloquium (CHC410).
7. Seminar Course (CLQ 301)

PG courses taken:

1. Modelling of Transport Process (CLL701)
2. Fundamentals of Computational Fluid Dynamics (CHL768/CLL768)
3. Advanced Computational Techniques in Chemical Engineering (CHL830)

• **Contribution to Curriculum development, Course Development**

Played active role for the process of UG Curriculum review, especially to form course templates for Core courses like

- A. Transport Phenomena
- B. Numerical Methods for Chemical Engineers
- C. Fluid Mechanics for Chemical Engineers

Elective Courses in the basket of six new courses developed for Complex Fluids

1. Introduction to Complex Fluids
2. Transport Phenomena in Complex Fluids
3. Thermodynamics of Complex Fluids
4. Simulation Techniques for Complex Fluids
5. Complex Fluids Technology
6. Granular Materials

also Nano-Engineering of Soft Materials

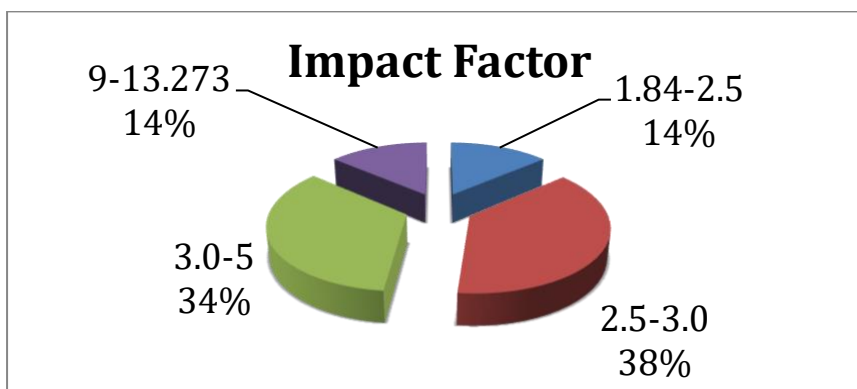
• **Contributions to continuing education programmes (short-term courses etc.)**

1. Mathematical Modeling of Complex fluids September 24 - 28,2020, Online Short Term Course On “Mathematical Modeling of Complex fluids”
2. CFD in bioprocessing, DBT Center of Excellence for Biopharmaceutical Technology, 10th December 2019
3. Case study in CFD modelling of bioreactor, DBT Center of Excellence for Biopharmaceutical Technology, 10th December 2019
4. UG Workshop, Chemical Engineering. IITD, 2017.
5. Computational Fluid Dynamics simulations for biotech processes and medical devices DBT Center of Excellence for Biopharmaceutical Technology, 13th December 2016.
6. Dynamics of Thin Films, SERB School on Rheology of Complex Fluids: Advanced Computational Methods & Symposium on Rheology of Complex Fluids-2013
7. Lattice Boltzmann Method, SERB School on Rheology of Complex Fluids: Advanced Computational Methods & Symposium on Rheology of Complex Fluids-2013
8. Low Speed Flows: University of Pune, April, 2007.

Administrative Responsibilities

1. ACL Member
2. PSL lab in charge
3. Dual Degree Coordinator of the Department.
4. MTP Coordinator of the Department
5. MSR Coordinator of the Department
4. Departmental Review Committee Member.
5. Departmental UG committee member.
6. M. Tech curriculum review committee member of the department.
7. SRC committee member of 5 PhD students excluding my own.
8. Had been a part of training and placement team of the department.
9. Internal review committee member of the department involved in writing technical details of the Governance in the Department of Chemical Engineering.
10. Institute Representative in JEE and GATE exams

11. Publications



Number of Publications in Peer Reviewed International Journals	33 +1 book chapter +1 under review +several in final draft stage	(1 CEJ, 2 in Physical Review Letters, 1 PRE Rapid Communications, 1 ACS APPL. MATER.) Average Impact Factor: 4.11	
		Times cited	695
		Average Citations per item	~21
		H-index	14
		i-10-index	16

Publications in refereed journals (international)

Sl. No	Title of Paper(s)	Name of the Author(s)	Name of the Journal	Page(s)	Volume & Year
1	Advanced multi-wall carbon nanotube-optimized surfactant-polymer flooding for enhanced oil recovery	A. Pandey et. al.	Fuel	129463	335, 2024
2	Mixing and mass transfer in production scale mammalian cell culture reactor using coupled CFD-species transport-PBM validation	S Mishra, V Kumar, J Sarkar, AS Rathore	Chemical Engineering Science	267	118323, 2023
3	Dewetting assisted self-assembly of carbon nanotube into circular nanorings	Surita BasuPrabir PatraJayati Sarkar	Chemical Engineering Science	117961	261, 2022
4	Numerical modeling and development of a dual lung simulator using partitioned fluid-structure interaction approach for ventilator testing	R Kumar, S Tokas, V Hadda, D Rakshit, J Sarkar	International Journal of Numerical Methods in Biomedical Engineering		2022
5	Dewetting assisted self-assembly of graphene nanoparticles by diverse approaches	S BASU, BV NAIK, K ANKARAO, P PATRA, J SARKAR	Bull. Mater. Sci.	246	44,2021
6	Self-assembly of graphene nano-particles on biocompatible polymer through dewetting	S Basu, BV Naik, K Ankarao, P Patra, J Sarkar	Surfaces and Interfaces, 2021	101009	23,2021
7	Miniaturized pattern formation in a soft elastically graded thin film in adhesive contact	Sunita Singh, Jayati Sarkar	Chemical Engineering Science	116516	236,2021
8	Self-assembly of amphiphilic Janus spheres using the	Gaurav Nath, Bahni Ray, Jayati	Computational Particle Mechanics	1-17	2021

	lattice Boltzmann method	Sarkar			
9	CFD based mass transfer modeling of a single use bioreactor for production of monoclonal antibody biotherapeutics	Somesh Mishra, Vikash Kumar, Jayati Sarkar, Anurag S Rathore	Chemical Engineering Journal	128592	412, 2021
10	Selective adsorption of oil on self-organized surface patterns formed over soft thin PDMS films	S. Basu, J Sarkar	Chemical Engineering Science	970-979	207, 2019
11	Miniaturization of surface patterns in soft elastic film over patterned substrates	S. Basu, J Sarkar	Chemical Engineering Science	195-203	197, 2019
12	Process development in the Quality by Design paradigm: Modeling of Protein chromatography resin fouling	Lalita Kanwar Shekhawat, Mili Pathak, Jayati Sarkar, Anurag S.Rathore	Journal of Chromatography A,	56-66	1570, 2018.
13	Application of CFD in Bioprocessing: Separation of mammalian cells using disc stack centrifuge during production of biotherapeutics	Lalita K Shekhawat; Jayati Sarkar; Rachit Gupta; Sandeep Hadpe, Anurag Singh Rathore	Journal of Biotechnology	1-11	267, 2018
14	Hierarchical micro-and nanofabrication by pattern-directed contact instabilities of thin viscoelastic films	A Ghosh, D Bandyopadhyay, J Sarkar, A Sharma	Physical Review Fluids	124004	2017
15	A Finite Element Study of Adhesion of Soft Thin Elastic Films cast on Rough Surfaces	S. Mishra, H. Annapu and J. Sarkar	International Journal of Adhesion and Adhesives	102-110	79, 2017
16	Kinetics of sub-spinodal dewetting of thin films of thickness dependent viscosity	T. Rao. Kotni, R. Khanna nad Jayati Sarkar	Journal of Physics: Condensed Matter	175001	29, 2017
17	Failure Regimes of single wet granular aggregate under Shear.	J. Sarkar, D. Dubey	Journal of Non-Newtonian Fluid Mechanics,	236-248	234, 2016

18	CFD of mixing of multi-phase flow in a bioreactor using population balance model.	Sarkar, J. Shekhawat, L. K., Loomba, V. and Rathore, A. S.	Biotechnol Progress. doi:10.1002/btpr.2242	613-628	32, 2016
19	Mechanical Strain Induced Tunable Anisotropic Wetting on Buckled PDMS Silver Nanorods Arrays.	P. Goel , S. Kumar , J. Sarkar , and J. P. Singh	ACS APPL. MATER. INTERFACES,	8419–8426	7 (16), 2015
20	Miniaturized Pattern Formation in Elastic Films Cast on Sinusoidally Patterned Substrates.	H. Annepu, J, Sarkar	LANGMUIR	12278-12286	30 (41), 2014
21	Kinetically engendered subspinodal length scales in spontaneous dewetting of thin liquid films	T. Rao Kotni, J. Sarkar and R. Khanna.	<i>PHYSICAL REVIEW E, RAPID COMMUNICATIONS,</i> Impact Factor: 2.326 Number of Citations:2 The standards for Rapid Communication are parallel those for PRL but is of interest to a more specialized readership.	020401 (R)	90, 2014
22	Pattern Formation in Soft Elastic Films Cast on Periodically Corrugated Surfaces a Linear Stability and Finite Element Analysis	H. Annepu , J. Sarkar and S. Basu.	<i>Modelling Simul. Mater. Sci. Eng.</i>	055003	22(5), 2014
23	Squeezing instabilities and delamination in elastic bilayers: A linear stability analysis.	H. Annepu, J. Sarkar	<i>PHYSICAL REVIEW E</i>	051604	86, 2012
24	Contact Instability of a Soft Elastic Film Bonded to a Patterned Substrate	J. Sarkar, H. Annepu and A. Sharma	JOURNAL OF ADHESION	214	87, 2011
25	A Unified Theory of Instabilities in Viscoelastic Thin Films: From Wetting to Confined Films, From Viscous to Elastic Films, From Short To Long Waves.	J. Sarkar, A. Sharma	LANGMUIR	8464	26, 2010
26	Electric-field induced instabilities and morphological phase transitions in soft elastic fil	J.Sarkar A. Sharma and V. Shenoy	PHYSICAL REVIEW E	031604	77, 2008

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27	Electric Field Induced Morphological Transitions in Elastic-Contact-Instability of Soft-Solid Films	N. Arun, J. Sarkar, A.Sharma, V.B.Shenoy and K.S. Narayan	JOURNAL OF ADHESION	513	83, 2007
28	Contact Instability in Adhesion and Debonding of Thin Elastic Films.	M. Gonguntla, A. Sharma, J. Sarkar, S.A. Subramanian, M. Ghosh, V.Shenoy	PHYSICAL REVIEW LETTERS,	018303	97, 2006
29	Confinement-induced instability and adhesive failure between dissimilar thin elastic films	J. Y. Chung, K. Kim, M. K. Chaudhury, J. Sarkar and A. Sharma	THE EUROPEAN PHYSICAL JOURNAL E,	47-53	20, 2006.
30	Adhesion and debonding of soft elastic films on rough and patterned surfaces	J. Sarkar ,A. Sharma and V. Shenoy	JOURNAL OF ADHESION	1-25,	81, 2005
31	Adhesion and Debonding of Soft Elastic Films: Crack Patterns, Metastable Pathways and Forces.	J. Sarkar ,A. Sharma and V. Shenoy	LANGMUIR,	1457-1469	21, 2005
32	Patterns, forces, and metastable pathways in debonding of elastic films	J. Sarkar ,V. Shenoy and A. Sharma	PHYSICAL REVIEW LETTERS, Also a selected paper in VIRTUAL JOURNAL OF NANOSCALE SCIENCE AND NANOTECHNOLOGY	018302,	93 (1), 2004. 10 (2), 2004.
33	Spontaneous surface roughening induced by surface interactions between two compressible elastic films	J. Sarkar ,V. Shenoy and A. Sharma	PHYSICAL REVIEW LETTERS	031607	2003

Book Chapter

Type	Description	Category	Publisher name	Pub. year	Author status
Book chapter	Simulating contact instability in soft thin Films through Finite	Authored	InTech	2016	1

	Element Technique				
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Manuscripts to be submitted shortly (by this semester):

1. The Dynamics of wet disperse phase granulates under shear flow by Dheerendra Dubey, Jayati Sarkar
2. Study of The Dynamics, fluid behavioral index and morphological changes of the polydisperser system by Dheerendra Dubey, Jayati Sarkar
3. Bimodal distribution of thin liquid film morphology for films on coated substrates whose viscosity decreases with film thickness by TirumalaRao Kotni, Jayati Sarkar and Rajesh Khanna
4. Kinetics of thin film dewetting for films whose viscosity inversely varies with film thickness by TirumalaRao Kotni, Jayati Sarkar and Rajesh Khanna.
5. Instabilities in Elastic films under non-isothermal conditions, Jayati Sarkar, Sunita Singh

12. Details of papers presented in webinars:

1. 7TH International Conference on Smart Materials & Nanotechnology, Webinar, 20-21 July 2020, Nano Ring Formation of MWCNT by Dewetting of Thin Film, Surita Basu, Prabir Patra, Jayati Sarkar.
2. 7th International Conference on Smart Materials and Nanotechnology, Webnair, 20-21 July 2020, Miniaturization of Patterns Formed in Non-Homogeneous Soft Thin Film, Sunita Singh, Jayati Sarkar

Details of papers in refereed conferences held abroad:

1. Surita Basu, Bhukya Vishnu Naik ,Kalluri Ankarao, Prabir Patra, Jayati Sarkar, Influence of graphene particles on morphology and patterns on dewetting of thin polystyrene film, International Conference Nano-M&D 2019, in Paestum, Italy from 4-8 June 2019.
2. Surita Basu and Jayati Sarkar, Selective adsorption of oil from oil-water mixture on the instability driven interfacial surface patterns over thin soft PDMS film, 23rd Polish Conference on Chemical and Process Engineering- 23rd PCCandPE, in Jachranka-Warszawa, Poland, from 2-5 June 2019,
3. J. Sarkar, Influence of Patterned Substrates on Miniaturization of Surface Patterns in Soft Elastic Films, NANOSMAT 2018, USA.
4. J. Sarkar Miniaturized Pattern Formation at Soft Interfaces, CCMR2017, South Korea.
5. L. Shekhawat, J. Sarkar, A.Rathore, Application of CFD: A case study for bio-separation of microbial cells using disc stack centrifuge in production of biotherapeutics, ACS Conference, USA 2017.
6. S. Mishra, J. Sarkar, Surface roughness effect on Adhesion-Debonding of soft thin elastic film, New Orleans, Louisiana, APS March Meeting, 2017
7. H. Annepu and J. Sarkar; "Ordered miniature pattern formation through elastic contact instabilities", Jülich Soft Matter Days 2015, 10-13 November 2015, Germany.
8. T. Rao Kotni, J. Sarkar, R. Khanna, "Instability and morphology of thickness dependent viscosity liquid films", Interdisciplinary Surface Science Conference, Brimingham,UK, April, 2015.
9. H. Annepu and J. Sarkar; Mesoscale Pattern Formation in Soft Polymers, Adhesion, Science of (GR S), Gordon Research, Conference, USA, 2013.
10. J. Sarkar, "Formation of miniaturized patterns at soft interfaces", 68th IUVSTA Workshop, Hong Kong, 2012.
11. J. Sarkar, Hemalatha Annepu, A. Sharma, Non-

Linear Study of Instabilities of films on Patterned Substrates, International Symposium on Non-Equilibrium Soft Matter, Nara, Japan, 2010.

12. Kai Huang, Martin Brinkmann, Jayati Sarkar, and Stephan Herminghaus, "Two dimensional wet granular matter under shear", Fachverband Dynamik und Statistische Physik (DY), 2009.
13. J. Sarkar, A. Sharma, and V. Shenoy ; Instabilities at Soft Confined Interfaces, Dynasoft08, Cargese, France, August, 2008.
14. J. Sarkar, Kai Huang, Martin Brinkmann, Jürgen Vollmer, Stephan Herminghaus, "Wet Granulates under Shear", Dynasoft08, Cargese, France, August, 2008.
15. J. Y. Chung, K. H. Kim, M. K. Chaudhury, J. Sarkar and A. Sharma; "Pattern Formation in Thin Films under Confinement", Adhesion Society Meeting, Jacksonville, Florida, February, 2006.
16. A. Sharma, J. Sarkar and V. Shenoy; Patterns, forces and metastable pathways in debonding of elastic films, 27th Adhesion Society meeting, Wilmington, North Carolina from February15-18, 2004.

Details of papers in refereed conferences held in India

1. R.D.Manga, V.Tekriwal, J.Sarkar, "Miniaturization of patterns different potentials if viscosity of film varies with the thickness" Compflu, ISER Bhopal, December 5-7, 2019 Workshop.
2. S. Basu, B. V. Naik, K. Ankarao, P. Patra and J. Sarkar , Jamia Millia Islamia, Delhi, Influence of graphene on morphology and patterns on dewetting of thin polymeric film, International Conference on Advance Materials (ICAM 2019), March 06-07, 2019
3. S. Basu, B. V. Naik, K. Ankarao, P. Patra and J. Sarkar , Effect of graphene nanoparticles embedded in thin film, 3rd International Conference on Soft Materials, Malviya National Institute of Technology, Jaipur, December 09-14,2018,
4. S. Basu and J. Sarkar, Selective adsorption of oil on interfacial surface patterns over soft thin PDMS film, Soft Matter: Young Investigators Meet 2018, Koti Resorts Shimla, May 23 – 25 , 2018.
5. S. Basu and J. Sarkar, Adsorption of oil on surface patterns on thin elastic film, International Conference on Sculptured Thin Films, Indian Institute of Technology Delhi, Delhi, March 30-31, 2018,
6. Surita Basu, Bhukya Vishnu Naik, Kalluri Ankarao, Prabir Patra, Jayati Sarkar, Graphene nanoparticles in thin films, ICSM, Jaipur, 2018
7. Sinta Singh, Jayati Sarkar, Miniaturization in thin films with graded shear modulus, ICSM, Jaipur, 2018.
8. Manga Ramya Durga, Jayati Sarkar, Miniaturization of Patterns under a top attractive surface in case of inhomogeneous thin films, Compflu, IIT Roorkee, 2018
9. J. Sarkar Miniaturized Pattern Formation at Soft Interfaces, INDOGFOE2017, Jaipur.
10. J. Sarkar and S. Sen, Surface instability and morphology in inhomogeneous incompressible elastic thin film, Soft Matter - Young Investigators Meet, SMYIM held at Goa December, 2016.
11. S. Sen and J. Sarkar, "Surface instability and morphology of incompressible elastic thin film having inhomogeneous material properties, Seventh National Level Annual Research Symposium of Chemical Engineering Research Scholar, Chemference, IITGandhinagar, 3-4 Decemder,2016.
12. S. Basu and J. Sarkar, Miniaturization of length scale over patterned substrate, Seventh National Level Annual Research Symposium of Chemical Engineering Research Scholar, Chemference, IITGandhinagar, 3-4 Decemder,2016.
13. S. Basu and J. Sarkar, Experimental observation of minuscule length scale of patterns formed over patterned substrate, ComFlu, IIIT Hyderabad, December 12-14, 2016
14. D. Dubey and J. Sarkar ."Failure regimes of a single wet granular aggregate under shear", Comp Flu, IISER, PUNE, 2016
15. T. Rao Kotni, J. Sarkar, R. Khanna, "Satellite hole formation in thin liquid films exhibiting thickness dependant viscosity: Soft Matter - Young Investigators Meet, SMYIM held at Pondicherry December, 2015
16. D. Dubey and J. Sarkar ."Single Cluster Aggregate under shear flow in Couette ", IUTAM, Symposium

- in Multiphase Flows with Phase Change Challenge and Opportunities, Hyderabad, December, 2014.
17. J. Sarkar and D. Dubey, Study of the Dynamics of Wet Granulates under Shear, International Conference of Powder, Granule and Bulk Solids: Innovations and Applications, November, 2013.
 18. D. Dubey and J. Sarkar ."Study the Dynamics and Stress Strain Behaviors of Wet Granulates under Shear", CHEMCON, Jalandhar, Punjab, December, 2012.
 19. H. Annepu, J. Sarkar," Miniaturized Pattern Formation at Soft Interfaces", CHEMCON, Jalandhar, Punjab, December, 2012.
 20. H. Annepu, J. Sarkar, "Miniaturization of Patterns in Elastic Films by Substrate Patterning and Bilayers Route", International Conference on Nanoscience and Technology ICONSAT 2012, Hyderabad, India, 2012.
 21. H. Annepu, J. Sarkar, "Varicose Instabilities in Elastic Bilayers", SERC school and symposium on Rheology of Complex Fluids, IIT Guwahati, India, 2012.
 22. T.R. Kotni, J. Sarkar and R. Khanna, 'Quantifying of slippage in thin liquid films', National conference on chemical engineering, ChemFference12, 2012.
 23. H. Annepu, J. Sarkar, Linear Analysis of Instabilities of films on Patterned Substrates, Chemcon, Annamalai University, TamilNadu, India, 2010.
 24. J. Sarkar, H. Annepu, A. Sharma, Study of Instabilities of films on Patterned Substrates, International Conference of Fundamental And Applications of Nano Science and Technology, Jadavpur University, Kolkata, India , 2010.
 25. J. Sarkar, A. Sharma and V. Shenoy. "Stability, Morphology and Forces of Debonding of a soft thin elastic film", National Workshop-cum-Symposium on Complex Fluids , Bangalore, December 3-7, 2002.

Invited talks

Invited talks given by me on my research area of interest:

1. Miniaturized pattern formation at soft interfaces at University of Connecticut, Chemistry Department
2. Cluster formation, breakage and rheology of wet granulates under shear- A LBM study, CompFlu-Decemeber-2017, IIT Madras.
3. Award Presentation in CHEMCON, IIT Guwahati, December, 2015
4. Engineering Challenges in the 21st century a Special Address at Annual Research Meet, VIFARM Chennai, December, 2015
5. Soft Matter Young Investigators Meet, SMYIM 2014, being held at Pondicherry. (Also chaired a session in the meeting).
6. Award Presentation in CHEMCON, Jalandhar, Punjab, December, 2012
7. A meet on Industrial Problems Related to Surface & Interfacial Science, Chemical Engineering Department, Indian Institute of Technology Delhi. April 2012.
8. Chemical Industry - Academia Meet, foundation For Innovation and Technology Transfer. IIT Delhi, March 2012.
9. Golden Jubilee Symposium on Fabrication At Small Scales (FASS) & Indo-US Conference on Fabronics: Science of advanced fabrication, IIT Kanpur, December, 2009
10. Scientific Advisory Board Meeting, Max Planck Institute for Dynamics and Self Organization, 28th February, 2008.
11. Max Planck Institute for Dynamics and Self Organization, 30th November, 2007
12. Tata Research Development and Design Centre, Pune, 27th November, 2006.
13. Annual Conference of Chemineer's Society, IIT Kanpur 6th April, 2003.

Invited talks in conferences where my work was portrayed:

1. A. Sharma, J. Sarkar and V. Shenoy; Adhesion, "dewetting" and debonding of soft elastic films: Patterns, forces and metastability, Workshop on Pattern formation through instabilities in thin liquid films: from fundamental aspects to applications, Max-Planck Institute for the Physics of Complex Systems, Dresden (Germany), September 21-28, 2004.
2. A. Sharma, J. Sarkar and V. Shenoy; Adhesion and debonding of elastic films: patterns, forces and metastability, STATPHYS-22 Satellite: Pattern Formation in Nonequilibrium Systems, Kolkata, July 11-13, 2004.
3. A. Sharma, J. Sarkar and V. Shenoy; Debonding of a thin soft elastic film, Nanobali 2: Nanotribology: The Li

quid-Solid Interface, Bali, 2003.

4. A. Sharma, J. Sarkar and V. Shenoy; Adhesion and debonding of elastic films: Patterns, forces and metastability, India- Japan Workshop on Surfaces and Interfaces, Saha Institute, Kolkata, 2003.

13. (a) Research Achievements/Highlights of Dr. Jayati Sarkar

My work so far can be divided in the following 4 categories:

A. Instabilities at soft interfaces:

My major research contribution in this area lied in understanding of instabilities at soft interfaces. The major innovative element in study of pattern formation: was to work out the contact mechanics of soft surface for the first time and to show that soft surfaces undergoing adhesion undergo a novel instability resulting in micro/nano patterns. New knowledge has been created in:

1. Understanding of soft adhesion: The reason behind adhesion-debonding hysteresis, requirement of much smaller debonding forces due to pattern formation, different pathways of debonding were unfolded in the study.
2. Pattern formation through self organization method of elastic thin films, which involves reorganization of surface morphology due to application of an internal or external force field to attain minimum energy state, has been found from my research to be an excellent cheaper alternative route compared to conventional lithographic techniques for meso/nano scale fabrications at such soft interfaces at large length scales. The patterns formed are found to be short-waved and independent of the nature of interactions present.
3. Properties such as optical, adhesive, wetting, antifungal and catalytic of a material can be readily varied by surface patterning. Thus, to create surfaces with enhanced functional properties it is essential to achieve smaller and smaller lengthscales. My studies have shown that it is possible to have miniaturized patterns in such soft elastic films with bilayer-configuration and even with much ease when cast over a patterned substrate. The miniaturized lengthscales were found to be about an order of magnitude smaller than formed over flatter substrates.
4. When van der Waals contact interactions were present, the patterns were uniformly formed throughout the film but were not regularly ordered whereas both uniformity and ordered patterns were found to be attained with long range electrostatic interactions with the advantage that the morphologies can now be tuned by just adjusting the applied electric field externally, bringing in the concept of tunable adhesion. My study has been able to develop a unified theory to understand general instabilities in thin films with different rheology and under different geometric confinements. For the first time my research has been able to show that viscous/shear modulus inhomogeneity can also open up avenues to obtain smaller lengthscales in wetting thin liquid films which have a thickness of 2-10 nm and in solid thin films in adhesive contact as well.

B. Nano-particle self-assembly at soft interfaces:

When a minute amount of graphene dispersed in a solvent is added on PS and spin-coated into a thin film, the concentration gradient caused by centrifugal force leads to a Marangoni flow that in conjunction with the dewetting of the underlying PS at the edges lead to a series of very interesting and self-assembled morphologies of graphene. At the particle enriched zone near the center, the graphene-particles exhibit morphologies ranging from folds, wrinkles, flakes, onion-rings to blob structures depending on the aspect ratio. The graphene-particles thrown to the periphery are found to march back

towards the central portion leading to the unique formation of very ordered nano-scale scratches on the PS substrate. The nano-particles that end up into the confined rims in the intermediate region get twisted into nano-ribbons and dendrimers. Similar graphene nano-particle distribution evenly in the PS mixture or over dewetted PS-surface also lead to polygonal network formation or graphene dot formation over the biocompatible polymer. CNT nano-particles are also found to self-assemble into nano-rings in all the above configurations. In this work we were interested to understand the forces responsible for the evolution of different origami structures formed as a result of the underlying dewetting dynamics without the aid of any high-end instrumentation or process. Since these self-assembled structures are formed over a bio-compatible polymer, the structures are anticipated to find applications in fabricating biosensor, super-capacitors, and biomedical microfluidic devices.

C. Complex Fluid Rheology :

From blood flow to food/mineral processing industry to the earth's surface, presence of wet granulate matter is ubiquitous in nature though the rheology they exhibit is highly complex. My main focus in the field of complex fluids has been to study via Lattice Boltzmann Modeling the hydrodynamics of clustering of granular particles in a shear cell due to capillary forces and their ultimate failure through ductile and brittle fracture, a study, which is fundamental to the understanding of rheology of such complex fluids.

D. Bioreactor and Ventilator Design:

In pursuit for alternate sources of energy my work has also involved cfd studies for optimization of bioreactor performance for biomass and biofuel production.

To optimize ventilator design with CFD studies, the working of a human lungs has been explored.

In future my research plan in the above fields are as follows:

A. Instabilities at soft interfaces:

Study of pattern formation in Ferrofluids: Ordered patterns of ferrofluids formed through self-organization in the nanometer scale having very high aspect ratios will have huge technological applications as actuators in MEMS/NEMS, in fabrication of thin film solar cells, in creation of optical diffraction gratings and so on. Moreover, since the magnetic field is an external field, it can be altered externally and a pulsating motion can be set in at such small scale, utilizable in creating artificial organs like heart. The convective flow generation can be utilized in microfluidic devices to generate turbulence and moreover, the planar self-organization of magnetic nano-particles when cast as a bilayer over a polymeric fluid in the presence of a perpendicular electric field, can be harnessed to create high-end sensors.

Fabrication of PS-PDMS-graphene blends: With the advancement in the field of polymer and nanoparticles and their huge application; the prospect of designing new polymers incorporated with nanoparticles has large technological importance. The aim of the research is to design an immiscible blend of an elastomer polydimethyl siloxane (PDMS) and thermoplastic polystyrene (PS) and incorporate it with graphene and carbon nanotube nanoparticles. The compatibility in case of immiscible polymer blend remains a challenge for

both scientific and technological purposes. The goal of the project is to apprehend the development in the field of immiscible blend, creating thin film and also to understand the variance when the nanoparticles are part of the blend. The dependence of the blend morphology on different factors such as blend composition, thickness of the film, temperature, substrate morphology, and application of shear rate is expected to develop interesting structures. The arrangement of the nanoparticle in the PDMS/PS blend has to be probed in the phase separated blend and also in continuous domain of the blend. The immiscible blend film created will possibly generate mesoscale patterns with varying length scale. The change in conductivity with addition of carbon nanoparticles need to be investigated. The hydrophobicity and hydrophilicity, along with the adsorption of oil over the patterns created with nanoparticles embedded in immiscible polymer blend may be an interesting scope of study for its application.

The topic of this work finds application in the field of nanotechnology; is of considerable interest to the polymer blend and carbon nanoparticles domain and mostly to the phase separation community.

B. Nano-particle self-assembly at soft interfaces:

The graphene and CNT nanoparticles self-assemble during dewetting over PS to give very nice surface patterns. These patterned surfaces are biocompatible and have high potential to be used for

1. Sensors for gas sensing
2. As bio-electrodes for fuel cells
3. As advanced surfaces for CO₂ adsorption and storage
4. As surfaces for tissue engineering
5. For cancer detection etc.

So the applicative side of the work that has already been done will be pursued. Along these lines the following will be done also:

Bacteria assisted 3D CNT/Graphene Sponge for CO₂ adsorption : So in the present project the aim will be to create a porous 3D structure of both CNT and graphene so that the surface area for adsorption made available is manifold than presently available. This can be achieved by dispersing the nanoparticles in a colony of bacteria. The growth dynamics and the diffusion of bacteria will lead to unique self-assembled 3D porous structures of colonies. The suspended nanoparticles under concern are anticipated to take the underlying structure of the colonies; also they can self-assemble on their own. Exposing the culture to CO₂ or high temperature can kill the bacterial cells and the resulting 3D porous structure of the nanoparticles can be subsequently used for the gaseous absorption. The structures can also be thermally treated or chemically modified during the course for enhancing adsorption.

Fabrication of a Multifunctional polymer composite having Thermo-Piezo-Conductivity for Energy Harvesting: The present proposal is aimed to develop a smart multi-functional polymer composite, that will respond to thermal stimuli (which is easier to control than a mechanical one) and that too around room temperature or human body temperature and can produce electricity directly and thus, can be used for energy harvesting. For this purpose, in the present project, a polymer composite will be made out of three polymers viz, a thermo-responsive, a piezoelectric and a conductive one, where each of the layer, spin coated on the top of the other will respond to the stimuli of the preceding one. How thermal response will be converted into a mechanical one will be studied numerically and experimentally with the help of AFM, and how this mechanical stimulus is converted into electric charges in the piezo-layer will be measured with the help of an oscilloscope. The conductive layer at the top will help the charges accumulated in the piezo layer to flow. The conductivity displayed by the top-polymer layer and hence the current produced will be investigated by a 4-point conductive meter and from an impedance study.

Whether introducing biocompatible nanoparticles like graphene can enhance the performance of such a composite will be studied further. It is anticipated that smaller the thicknesses of each of the layer better will be the stimuli transitivity. For this purpose not only discrete polymer layers will be tested but layer by layer deposition of the three different polymers by dip-coating as well as electro spinning of the polymer matrix into fibers will be done. The comparative efficiencies will be analyzed to obtain the optimized processing conditions. The results found here will help in fundamental understanding of the unique functionality of each of the polymer layer and their smart interactions with each other. The present project will help in fabricating future experiments in the field of energy harvesting in its quest for cleaner source of electricity and in developing new biocompatible sensors and actuators.

C. Complex Fluid Rheology :

From outer space to natural phenomena like avalanches, from raw materials of chemical industries to daily house hold items like rice, sugar, salt: presence of granular materials are ubiquitous in nature. Granular materials fall under the category of complex fluids because of the diverse and complex rheology they display depending upon the amount of moisture content in their matrix. Rheology of wet granulates are even more poorly understood. In simple static packed beds, because of lower process characteristic time compared to fluid relaxation time (high Deborah number), even fluids like water exhibit strong elastic behavior. Thus, wet granulates as found in mineral extraction via froth floatation, in waste water treatment etc. are anticipated to exhibit viscoelastic rheology, understanding of which is essential for an optimal process operation. In the present project through LBM simulations it is intended to find the viscoelastic properties of such wet granulates under oscillatory shear. Moreover for binary fluid it has been seen that oscillatory shear leads to phase separation. It will be interesting to see whether for the poly-dispersed wet granulate system; oscillatory shear can lead to such size separation.

D. Design of Equipments through CFD:

Ventilator design: A design to accommodate multiple patients on a single ventilator with minimalistic and easy design changes which can be applied universally to all makes and builds of ventilators. The design solution involves using readily available plastic tubing to split up the oxygen supply from a single ventilator among multiple patients (the number could be as high as 8 or 10) instead of being used for a single patient. Using the techniques of Computational Fluid Dynamics (CFD) the design of the split-up system needs to be optimised for it to be fit to use. Also, CFD calculations will give a precise map of insights on how much capacity amplification can be done in different scenarios without causing risk of life.

CFD based scale-up study of bioreactor design from lab to industry to maximise yeast

biomass production: Yeast-biomass is crucial for bio-ethanol generation: the most promising alternate-energy resource. Through CFD-studies the aim is to optimize different bioreactor-designs for specified reactor-volume and predict ideal operating conditions at different scales conducive in supplying necessary oxygen through mixing, to help sustain aerobic-respiration to maximize yeast growth without allowing cell-lysis.

14. Awards and Recognitions:

S. NO.	AWARDED FOR	NAME OF AWARD	AWARDING AGENCY	YEAR
1	Women Researcher Award	VDGOOD Professional Association	VDGood	2019

2	To undertake international collaborative research in premier institutions in U.S.A	Indo-US WISTEMM fellowship	DST	2018
3	For outstanding contribution	Bharat Vikas Award	Indian Institute of Self Reliance	2017
4	Biographical profile for inclusion in the new Who's Who in the World(R) 2016	Marquis Who's Who(R)	http://www.marquiswhoswho.com	2015-2016
5	Venus International Research Award	Outstanding Scientist Award	Venus International Foundation	2015
6	Best PhD thesis to Student Hemalatha Annepu in the area of Colloid and Interface Sciences under my guidance	Shah-Schulman Award	IICChE	2014
7	Excellence in research and development given to scientists under the age of 35 Years	Amar Dye-Chem award,	IICChE	2012
8	Contribution in the area of Engineering	Kusuma Trust sponsored outstanding "Young Faculty Fellowship" in the area of Engineering at IIT Delhi	IIT Delhi	2008-2013
9	Medals Received for standing first in B.ChE, Jadavpur University	<ul style="list-style-type: none"> • University Medal; • Chemical Engineering Diamond Jubilee Gold Medal; • Chitta Ranjan Khastagir Memorial Gold Medal; • Bandana Ghosh Memorial • Gold Centred Silver Medal; • Jatindra Krishna Memorial Bronze Medal. 	Jadavpur University, Kolkata	2000
10	Medals received for Chemical Engineering Viva Examination	Hiralal Roy Smriti Padak (Silver Medal)	Jadavpur University, Kolkata	2000

11	Award received for Merit and Academic Activities	R. Debnath Memorial Award (1999-2000)	Jadavpur University, Kolkata	1999-2000
12	Award received for Merit and Academic Activities	Sumona Memorial Book Prize	Jadavpur University, Kolkata	2000
13	For achieving highest marks Chemistry in Higher Secondary Exam	South Point Prize	South Point High School, Kolkata	1996
14	Good result in Higher Secondary Exam.	National Scholarship	West Bengal council of Higher Secondary Education	1996-1997
15	Good result in Madhyamik Exam.	National Scholarship	West Bengal Board of Secondary Education	1994-1995

Recipient of several other prizes at school level for general proficiency.

Award received by student:

Hemalatha Annepu: Won the 2nd prize in the department in Open House Poster Presentation for her Phd work, 2013.

15. Any Other Relevant Information_

Memberships of various governmental, professional or industrial committees including editorial boards of journal, technical conference committees, etc.

- 1. Editorial Board Member of Scientific Reports**
- 2. Associate Editor of Self-Assembly and Self-Organisation section in Frontiers in Soft Matter.**
3. Life member of IChE
4. Reviewer in Journal of Colloids and Interfacial Science, Indian Journal of Chemical Technology, Journal of Chemical Technology & Biot of Self-Organization section of Frontiersechnology, Mechanics Research Communications, International Journal of Science, Engineering and Innovative Research etc.
5. Technical Review Committee Member of International Conference of Powder, Granule and Bulk Solids, Patiala, 2013
6. Was appointed by Director, IIT Roorkee as an external eminent expert in V.N.M.M.3 and was asked to evaluate a particular nomination, 2012
7. Was appointed by FITT to evaluate 2 patents done by IIT faculties, 2012.
8. Was appointed as referee to DST projects.
9. Was appointed as external examiners of PhD students by Senate Chair of IITK.

16. Names and Addresses, including E-mail, Fax, Telephone numbers of at least three referees:

Referee-1	Referee-2	Referee-3	Referee-4
Prof. Ashutosh Sharma Department of Chemical Engineering, Indian Institute of Technology, Kanpur 208016 Email: ashutos@iitk.ac.in Contact No.: +91-512-259-7026	Prof. Vijay B. Shenoy Centre for Condensed Matter Theory Department of Physics Indian Institute of Science Bangalore 560 012, India Email: shenoy@physics.iisc.e rnet.in Contact No.: +91-80- 2293-2888	Prof. Sanjay. Mittal Department of Aerospace Engineering, Indian Institute of Technology, Kanpur 208016 Email: smittal@iitk.ac.in Contact No.: +91 (0512) 2597906, 2597626	Prof. Sumit. Basu Department of Mechanical Engineering, Indian Institute of Technology, Kanpur 208016 Email: sbasu@iitk.ac.in Contact No.: +91 512 259 7506

I hereby declare that I have carefully read and understood the instructions and particulars supplied to me, and that all entries in this form as well as in attached sheets are true to the best of my knowledge and belief.

Date: 2023-10-30

Place: New Delhi

Signature: Jayati Sarkar