

Sourim Banerjee

📍 Flex Lab 2101A, Purdue University, West Lafayette, IN-47906

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Education

Purdue University *August 2021 - Present*
Ph.D. in Mechanical Engineering
Advisor: Prof. Partha Mukherjee

Indian Institute of Technology Kharagpur *July 2016 - July 2021*
B.Tech-M.Tech Dual Degree in Chemical Engineering CGPA : 9.21/10

Research Interest

Electrochemical energy storage and conversion, Physics based modelling of batteries, Transport Phenomena

Research Experiences

Purdue University May'20 - Aug'20
Advisor: Prof. Partha Mukherjee *Energy and Transport Science Lab(ETSL), Purdue University*

Topic: Study of void dynamics and morphology inside Li metal electrode using Kinetic Monte Carlo algorithm. Found out the critical stress for mechanical failure on the Li-atom filament inside solid electrolyte during battery charging.

École polytechnique fédérale de Lausanne May'19 - July'19
Advisor: Prof. Francois Gallaire *Laboratory of Fluid Mechanics and Instabilities(LFMI), EPFL*

Topic: Understanding the dynamics of a confined bubble under both gravity and Marangoni actuations. Study of film thickness around the bubble for different surface tension gradients across the channel length using COMSOL and building a phase diagram with two dimensionless numbers associated with the fluid flow.

Jawaharlal Nehru Centre for Advanced Scientific Research May'18 - July'18
Advisor: Prof. Ganesh Subramanian *Engineering Mechanics Unit (EMU), JNCASR*

Topic: Study of the orientation dynamics of non-axisymmetric particle in various ambient planar linear flows. Found out the critical ambient flow parameter for non-chaotic to chaotic transition of the particle motion by solving the governing equations.

Academic Projects

Masters' Thesis Project:

Mesoscale Origin of Void Formation in Metal Electrode for Solid-State-Batteries Aug'20 - Apr'21
Advisor: Prof. Monojit Chakraborty *Chemical Engineering Dept, IITkgp*
CoAdvisor: Prof. Partha Mukherjee, Purdue University

Journal paper in preparation, S. Banerjee, B. Vishnugopi, M. Chakraborty, P. P. Mukherjee, "Vacancy Transport Dictates Metal/Solid-Electrolyte Interface Energetics."

B.Tech Project:

Monte Carlo modeling of the nanoparticle drying pattern Aug'19 - Apr'20
Advisor: Prof. Monojit Chakraborty
CoAdvisor: Prof. Sunando Dasgupta *Chemical Engineering Dept, IITkgp*

Topic: Executing Kinetic Monte Carlo simulation of irreversible drying of nanoparticle system by minimizing free energy in the grand canonical ensemble using Metropolis algorithm in a lattice gas model to identify the geometric pattern of phase separation.

Computer Skills

Programming Languages Matlab • C
Software Skills COMSOL Multiphysics • Matlab • ASPEN • Solidworks • L^AT_EX • Microsoft Office
Operating Systems Windows • LINUX

Courses completed during Undergraduate

Departmental courses : Fluid Mechanics, Chemical Process Calculations, Heat and Mass Transfer, Reaction Engineering, Chemical Engineering Thermodynamics, Instrumentation and Process Control, Mechanical Operations, Biochemical Engineering, Transport Phenomena, Computer methods in Process Engineering, Microscale Transport Process, Instability and Patterning in Thin Polymer Films, Process Modeling and Simulation, Microfluidics.

Advanced Courses : Advanced Fluid Mechanics, Advanced Thermodynamics, Advanced Heat and Mass Transfer, Advanced Mathematical Techniques in Chemical Engineering, Advanced Process Control

Non-Departmental courses : Programming and Data Structures, Transform Calculus, Physics, Numerical Solution of Ordinary and Partial differential equations, Science of Living System, Regression and Time Series model, Probability and Stochastic process, Mechanics

Academic Achievements and Awards

- Recipient of the **Arrasmith Fellowship** and **Lozer Assistantship** from the School of Mechanical Engineering, Purdue University for the academic year 2021-'22.
- **Department Rank 3** among 42 B.Tech-M.Tech Dual degree students in Department of Chemical Engineering.
- Successful **Department change** from Manufacturing Science and Engineering to Chemical Engineering at IIT Kharagpur at the end of 1st year among **top 10%** students in a batch of around 1400 students.
- Awarded prestigious Jagadis Bose National Science Talent Search (**JBNSTS**) Scholarship, 2016.
- Secured All India Rank **379** in prestigious **KVPY** (Kishore Vaigyanik Protsahan Yajana- translated to **Young Scientist Encourage Scheme**) scholarship in SX stream in 2016.
- All India Rank **4047** in Joint Entrance Exam (JEE)-Advanced for admission in IIT (**Top 2.02%**).
- All India Rank **328** in Joint Entrance Exam (JEE)-Main (**Top .0317%**).
- State Rank (West Bengal) **88** in WBJEE Engineering) (**Top .069%**).

Educational Camp attended

Participated in **Talent Enrichment Program(TEP)** 2017 organised by JBNSTS in Bangalore, India and attended a series of lectures from globally known leaders and researchers of Indian Institute of Science(IISc), International Centre for Theoretical Sciences(ICTS), Indian Space Research Organisation(ISRO), National Centre for Biological Sciences(NCBS) and other research and industrial centres.

Extra-Curricular Activities

- **Secretary, Electrochemical Society(ECS) Purdue University student chapter**
 - Managing communications inside and outside Purdue University about recent webinar series by ECS student chapter on Solid-State-Batteries from Fall 2021.
- **Speaker in Young Scholars' Exposure Event(YSE)**
 - Presented my master's thesis work in YSE organized by Jagadis Bose Scholars' Professional Development Forum(JBSPDF) in front of professors from internationally reputed institutes in July 2021.
- **Teaching Assistantship, IIT Kharagpur**
 - Serve as a teaching assistant of Chemical Reaction Engineering course in a class of 100 students in 2021.
- **Mentorship, Student Welfare Group, IIT Kharagpur**
 - **Mentoring 6 students** of Chemical Engineering Department regarding academics, extracurriculars and campus related matter as a part of Student Welfare Group(SWG) in academic year 2018-'20.
- **Technology event**
 - **Vice-Captain** of Chemquest team of LBS hall of residence at IIT Kharagpur in academic session 2018-'19.
- **National Service Scheme(N.S.S), IIT Kharagpur**
 - Actively participated in all NSS activities at IIT Kharagpur during first **two years** of undergraduate study and attended NSS annual camp in 2016.
- **Socio-cultural event**
 - Participated actively in 'Illumination' as a boarder of Lal Bahadur Shastri hall of residence.