Toulik Maitra

toulik-maitra.github.io

Education

University of California, Davis | ***GPA: 4.0*** Davis, CA

Doctor of Philosophy, Chemical Engineering *Sep. 2022 – 2027*

- Exploring the Relationship Between Vibrational Dynamics, Electrical Mobility, and Crystallinity in Organic Semiconductors.
- Awards: Achieved **second place** in CHMS symposium Outstanding Poster 2023, Selected among the **top 60 students** in North America for the 26th National School on Neutron and X-ray Scattering (Organized by ANL and ORNL).

University of Calcutta | ***GPA: 8.36/10.0*** Kolkata, India

Bachelor of Technology, Chemical Engineering *Aug. 2016 – Aug 2020*

- Awards: Best paper award in IIT Kharagpur, Most innovative idea in the field of nanoscience at IIT Bombay, Among the top 10 teams (out of 2500) in Global Entrepreneurship Event organised by IIT Kharagpur.

Experience

Graduate Student Researcher Jan 2023 - Present

University of California, Davis *Davis,USA*

- Developing a methodological framework for understanding structural disorder in organic semiconducting (OSCs) materials using Inelastic Neutron Spectra (INS) data analysis
- Addressed critical limitations in current OSC characterization techniques by developing alternative methods that overcome computational constraints of DFT and MD simulations
- The methods developed provides an analytical approach enabling precise prediction of OSC crystallinity and molecular mobility through sophisticated INS data interpretation

Undergraduate Research Assistant Feb 2018 - Dec 2021

University of Calcutta *Kolkata, India*

- Synthesis and simulation studies of hierarchical nanostructures for photovoltaics and hydro chemical water-splitting.
- Mathematical modelling of Spinning basket membrane using Ansys and Python.

Business Development Intern May 2019 – July 2019

TATA Autocomps Systems Ltd *Pune, India*

- Established a business case study of a new manufacturing plant increased the revenue by 20%
- Provided an analysis to clarify the difficulties and opportunities which are in favour of the company's future growth.

Undergraduate Summer Internship May 2018 – Dec 2018

Jadavpur University *Kolkata, India*

- Optimized geometrically different combustors, which have been designed to study the effect of multicomponent diffusion transport.
- Evaluated the effect of strain rate variation and effect of velocity variation of oxidizer inlet on methane/air counterflow diffusion flame.
- Collaborated in the construction of a neural network model for fire detection, actively participating in its optimization process.

Publications

- Farahnaz Maleki, **Toulik Maitra**, Chen-Wei Chiang, Makena Dettmann, Luke L. Daemen, John E. Anthony, and Adam J. Moulé. Extensive model validation enables quantitative prediction of complex structural and electronic properties, **(Under review)**.
- Farahnaz Maleki, Karl J. Thorley, Hamna F. Iqbal, Daniel Vong, **Toulik Maitra**, Luke L. Daemen, Oana D. Jurchescu, John E. Anthony, and Adam J. Moulé. Design Rules to Optimize Intermolecular and Long-Range Packing of Organic Semiconductor Crystals. Chemistry of Materials 2024 36 (9), 4794-4805, 2024.

- Keka Rana, **Toulik Maitra**, Indrashis Saha, Ankit Saha, Sarani Gupta, and Debasish Sarkar. Modeling, simulation, and characterization of spinning basket membrane module in recovery of proteins from synthetic wastewater. Journal of Water Process Engineering, 42:102135, 2021.
- Soumyajit Maitra, Subhan Pal, **Toulik Maitra**, Somoprova Halder, and Subhasis Roy. Solvothermal etching-assisted phase and morphology tailoring in highly porous cufe2o4 nanoflake photocathodes for solar water splitting. Energy & Fuels, 35(17):14087–14100, 2021.
- Soumyajit Maitra, Somoprova Halder, **Toulik Maitra**, and Subhasis Roy. Superior light absorbing cds/vanadium sulphide nanowalls@tio2 nanorod ternary heterojunction photoanodes for solar water splitting. New J. Chem., 45:7353–7367, 2021.
- Soumyajit Maitra, Subhan Pal, Shyamal Datta, **Toulik Maitra**, Biswadeep Dutta, and Subhasis Roy. Nickel doped molybdenum oxide thin film counter electrodes as a low-cost replacement for platinum in dye sensitized solar cells. Materials Today: Proceedings, 39:1856–1861, 2021. 3rd International Conference on Solar Energy Photovoltaics.
- Soumyajit Maitra, Arundhati Sarkar, **Toulik Maitra**, Somoprova Halder, Kajari Kargupta, and Subhasis Roy. Solvothermal phase change induced morphology transformation in cds/cofe2o4@fe2o3 hierarchical nanosphere arrays as ternary heterojunction photoanodes for solar water splitting. New J. Chem., 45:12721– 12737, 2021.
- Soumyajit Maitra, Arundhati Sarkar, **Toulik Maitra**, Somoprova Halder, Sub- hasis Roy, and Kajari Kargupta. Cadmium sulphide sensitized crystal facet tailored nanostructured nickel ferrite @ hematite core-shell ternary heterojunc- tion photoanode for photoelectrochemical water splitting. MRS Advances, 5(50):2585–2593, 2020.

Mentorship

E-Search Mentor, Summer 2024

- I extensively worked with Rachel L. Long undergrad in Department of Mechanical and Aerospace Engineering.
- We found new possible ways to quantify molecular disorder in organic materials.
- Rachel presented the work in the form of a Poster at UC Davis College of Engineering.

Teaching Assistant (TA)

- Courses covered: Properties of Materials, Introduction to Fluid Mechanics, General Chemistry (2B), General Chemistry (2C), General Chemistry (1V), and Coffee Lab.

Leadership Skills

Founder, eCell University of Calcutta

- Built a founding team of students and led them to organize different seminars and workshops.
- Conducted 50+ interviews for better entrepreneurship opportunities.

Technical Skills

Languages: Python, C/C++, SQL (Postgres), R, MATLAB, PyTorch
Developer Tools: Git, Docker, VS Code, Visual Studio, PyCharm
Libraries: pandas, NumPy, Matplotlib