

ACADEMIC BACKGROUND

Degree/Examination	Year	Institute/University	CGPA/Percentage
M. Tech. (Chemical Engineering.)	2011-2013	Indian Institute of Technology Kharagpur, West Bengal	9.89/10
B. Tech. (Chemical Engineering.)	2007-2011	Laxminarayan Institute of Technology, Nagpur, Maharashtra	77.09%
Class XII	2007	Dr. Ambedkar College, Nagpur, Maharashtra	84.3%
Class X	2005	Mount Carmel Girls' High School, Nagpur, Maharashtra	86.6%

SCHOLASTIC ACHIEVEMENTS

- **Institute Silver Medal** from **Indian Institute of Technology Kharagpur** for securing **1st Position** (in a batch of 60 students) in Master of Technology, Chemical Engineering, 2013.
- Secured **All-India Rank 311** in the **Graduate Aptitude Test in Engineering, 2011** for the Chemical Engineering specialization (total number of examinees: **12994**).
- Received a **scholarship** from the **Council of Scientific and Industrial Research** (Govt. of India's umbrella organization for R&D) for **securing above 90% in mathematics and science subjects in class XII** (2007).
- Received a **certificate of distinctive performance** in the **Fifth National Science Olympiad** (2003).

PUBLICATIONS

Journals:

- **Ghosh, U. U.**; Chakraborty, M.; Bhandari, A. B.; Chakraborty, S. DasGupta, S. Wettability Induced Crack Dynamics and Morphology, to be *Communicated to Langmuir* (arXiv:1412.1234v1).
- Chakraborty, M.; Chatterjee, R.; **Ghosh, U. U.**; DasGupta, S. Electrowetting of Partially Wetting Thin Nanofluid Films. *Communicated to Langmuir*.
- Chakraborty, M.; **Ghosh, U. U.**; Chakraborty, S.; DasGupta, S. Thermally Enhanced Droplet Motion on Gradient Surfaces. *Communicated to RSC Adv*.
- Dey, R.; **Ghosh, U. U.**; DasGupta, S. Chakraborty, S.; Dynamics of colloidal droplet transport under electrocapillary actuation. *Manuscript preparation in progress*.

Conference proceedings :

- Dey, R.; **Ghosh, U. U.**; DasGupta, S. Chakraborty, S.; Electro-mechanical Transport Characteristics of Colloidal Microdroplets ,Flow14, 2014, University of Twente - Netherlands.

-
- **Ghosh, U. U.;** Bhandari, A. B.; Chakraborty, M.; DasGupta, S. Effect of Surface Wettability On Crack Formation, Chemical Engineering Congress 2014, Chandigarh, India.
 - Chakraborty, M.; Chakraborty, D.; Jain, A.; **Ghosh, U.;** DasGupta, S.; Thermocapillary enhanced droplet motion on a surface with wettability gradient , Chemical Engineering Congress 2012, Jalandhar, India.

PROJECTS

ONGOING RESEARCH:

Department of Chemical Engineering, Indian Institute of Technology Kharagpur, India

Research topic: Investigation Of Crack Dynamics and Morphology in colloidal thin films.

- **Effect of substrate wetting state:** Colloidal nanosuspension (53nm,mean particle diameter) droplets subjected to natural drying. The effects of substrate surface energies over the dry-out characteristics have been outlined on crack dynamics, crack morphology and underlying particle arrangements. These physical phenomena have been explained based on the magnitude of stress dissipation incurred by the substrate. DLVO theory has also been invoked to evaluate the experimental investigations.

Publication: 1 Paper to be communicated to *Langmuir*

- **Effect of particle surface charge:** The role of particle characteristics in a drying colloidal film has been a topic of interest. Grafting of the colloidal particles with different surface functional groups results in varying surface charge. This may be alter particle-particle interactions and its consequential effects on crack morphology and dynamics will be investigated .
- **Electrowetting of Nanofluid meniscus:** Partially wetting thin nanofluid films under the influence of electric field show enhancement in contact line velocity. Characterization of the contact line dynamics and meniscus deformation as a function of nanofluid properties and electric field polarity has been performed.

Publication: 1 Paper under review in *Langmuir*.

POST-GRADUATE RESEARCH :

- **Amplification in Self-Propelled Droplet Motion:** Chemically induced hydrophilicity gradient surfaces were prepared on silicon wafers. Droplet motion on wettability gradient surfaces has been investigated in detail. An enhancement in the instantaneous velocity has been reported on application of low constant heat flux. An analytical model has also been developed to capture the
-

underlying experimental trends in a precise quantitative sense. Our findings are likely to be of immense importance in devising novel strategies for cooling of miniaturized electronic devices and systems, by which energy efficient surfaces can be elegantly fabricated.

Publication: 1 Paper under review in *RSC Advances*.

➤ **Electro-capillary actuated dynamics of colloidal droplets:** We experimentally delineate the transport characteristics of colloidal droplets of micro/nano-particles under electrocapillary actuation. Particle properties such as size and surface charge are found to affect the displacement, instantaneous velocity and acceleration of the droplets. We believe that the present endeavor will provide new physical insights in the operation of digital microfluidic platforms involving handling of colloidal droplets.

Publication: Manuscript preparation in progress.

UNDERGRADUATE RESEARCH

Laxminarayan Institute of Technology, Nagpur, Maharashtra, India

Research topic: Process Integration, Practical Energy Integration, Integration of Design and Control (2011-2012)

A case study for an integrated process design was completed, demonstrating the usage of principles of *pinch technology* for integrating energy.

INTERNSHIPS

NATIONAL ENVIRONMENTAL ENGINEERING RESEARCH INSTITUTE (NEERI), NAGPUR, INDIA

Topic: Solid Municipal Waste Management (April-May 2012)

- Presented an overview of the processing methods of solid waste, like incineration, pelletization, and biomethanation.
 - Carried out physical (pH, moisture, and calorific value determination) and chemical analysis (nitrogen, phosphorus, and potassium content) of solid waste samples.
-

HALDIA PETROCHEMICALS LIMITED (HPL), HALDIA, INDIA

Topic: Working of the Pyrolysis Gasoline Hydrogenation Unit (PGHU)

- Studied the process flow diagrams of PGHU sub-units – first stage hydrogenation, inter-stage distillation, and second-stage hydrogenation, studied butadiene and benzene production by extractive distillation.
 - Designed shell-and-tube heat exchangers for benzene heartcut and hydrogenated pygas cooling.
-

TEACHING ASSISTANTSHIP

Course: Fluid Flow and Transport Phenomena (Undergraduate-level course, *Instructor:* Dr. Somenath Ganguly and Dr. Sunando DasGupta).

SKILLS ACQUIRED

Experimental Skills

- Chemical gradient preparation.
- Sustainable Self-Propelled droplet motion characterization (measurement of droplet velocity using high speed camera).
- Preparation of electro wetting on dielectric (EWOD) setup.
- Fabrication of Digital Microfluidic Platforms using Photo-Lithography.
- Fabrication of Microchannels using Soft-Lithography technique.

High end Equipment handled

- Confocal Microscope.
- Optical and fluorescence Microscope.
- Goniometer.
- High Speed Camera (up to 2000 fps).
- Spin Coater for polymer film coating.

Software

- Image ProPlus
- Fluent
- COMSOL
- MATLAB
- Aspen

EXTRA-CURRICULAR ACTIVITIES

- Captain of the Badminton teams at Laxminarayan Institute of Technology (LIT), Nagpur, Gokhale Hall of Residence, IIT Kharagpur (2013) and Nivedita Hall of residence, IIT Kharagpur(2014).
- Captain and winner of inter department badminton championship at IIT Kharagpur.
- Winner of Impromptu (extempore) at the annual cultural festival *Spring Fest*, IIT Kharagpur (January 2012).