

# MONOJIT CHAKRABORTY

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## Permanent Address

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## Educational Background

| Examinations passed                            | Year      | Institution/University  | % of marks obtained/CGPA          |
|--|-----------|---|-----------------------------------|
| Doctor of Philosophy<br>(Chemical Engineering) | 2011-2016 | Indian Institute of Technology Kharagpur, West Bengal.                | -                                 |
| M. Tech<br>(Chemical Engineering)              | 2009-2011 | Indian Institute of Technology Kharagpur, West Bengal.                | 9.73/10.0<br>(Department rank 1)  |
| B. Tech<br>(Chemical Engineering)              | 2002-2006 | Heritage Institute of Technology/West Bengal University of Technology | 9.19/10.0<br>( University rank 2) |
| 10+2   | 2002      | West Bengal Council of Higher Secondary Education                     | 72.2%                             |
| 10   | 2000      | West Bengal Board of Secondary Education                              | 80.63%                            |

## Honors and Awards

- Institute **Silver Medal** from **Indian Institute of Technology Kharagpur** for securing **1<sup>st</sup> Position** in Master of Technology, Chemical Engineering, 2011.
- University **Silver Medal** from West Bengal University of Technology, for Securing **2<sup>nd</sup> Position** in Bachelor of Technology, 2006.
- **All India Rank 65** in National level Graduate Aptitude Test in Engineering (GATE), 2009.
- Cognizant certified Professional in **COBOL, DB2 and Oracle 8i**.

## Projects/ Trainings

- **Research in Doctor of Philosophy:**  
**Department of Chemical Engineering, Indian Institute of Technology Kharagpur, India**  
**Research topic:** Self Propelled and Electrically Induced Enhanced Microflows  
**Descriptions:**
  - **Amplification in Self-Propelled Droplet Motion:** An enhancement in the instantaneous propelling speed of a droplet on a silicon surface with chemically induced hydrophilicity gradient by the application of relatively low heat flux is observed. Analytical model has been developed to capture the underlying experimental trends in a precise quantitative sense. A molecular dynamic simulation has also been performed to evaluate the effect of contact line friction on the induced droplet motion. The 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. These surfaces enable exploitation of the dissipated heat in the system as a natural advantage thereby eliminating the use of power-consuming external driving influences.

**Publications:** One paper published in *RSC Advances*, one in *Langmuir*.

- **Electrically Induced Droplet Oscillation:** Rapid oscillation of a micro-liter sized droplet on application of a periodic DC electric field in a EWOD configuration has been studied. DC pulse functions with variation in voltages and delay time are imposed on the droplet and the subsequent changes in the shape dependent parameters are measured. Oscillation augmented mixing inside the droplet results in the augmentation of microscale transport processes. The increase may be a result of oscillation induced internal circulation inside the evaporating droplet and can be used as a tool for specific micro-cooling applications; e.g., cooling of a hot-spot.

**Publications:** One paper published in *RSC Advances*.

- **Electrowetting of Partially Wetting Thin Nanofluid Films:** A study of electrowetting of partially wetting thin nanofluid films has been performed to understand the underlying physics of contact line motion in presence of an electric field. Image-analyzing interferometry is used to accurately measure the meniscus profile, including the spatial change in the meniscus curvature. The movement of the meniscus is analyzed taking into account the capillary forces and Maxwell-stress-induced flows. An analytical model based on the Young–Laplace equation is used to analyze the electric-field-induced contact line motion, and the model-predicted velocities are compared to the experiments.

**Publications:** One Paper published in *Langmuir*.

➤ **Graduate Research :**

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

**Title:** Study of Thin Film Electrowetting Dynamics

**Duration:** One Year

**Description:** Electrowetting on dielectrics experiments were designed for thin liquid films subjected to different voltages in controlled environment. The extended meniscus profile of the extracted images at different time intervals were measured using image-analyzing interferometry. Significant advancement of the contact line and reduction in the constant curvature at the thicker end of the capillary meniscus with time was observed. Detailed model of the interface velocities has been proposed for in-depth analysis of the experimental observations.

**Publication:** One paper published in *Langmuir*.

➤ **Under Graduate Research:**

**Department of Chemical Engineering, Heritage Institute of Technology, Kolkata, West Bengal, India**

**Research topic:** Modeling and Simulation of UV Photo reactor and Toxic Waste Degradation

**Duration:** One Year

**Description:** To measure degradation of industrial toxic waste (HCOOH) when different thermo physical properties (i.e. Temperature, Catalyst loading, feed concentration, intensity of the UV wavelength etc.) were varied and finding the optimum catalyst (TiO<sub>2</sub>) loading for maximum toxic waste degradation. Detailed model of the different adsorption isotherms were performed. A reasonable agreement between the experimentally observed values with theoretically predicted values was obtained.

### **Instrument proficiency and Software exposure**

|                       |   |
|-----------------------|---|
| Instruments handled   | : Confocal Microscope, Optical and fluorescence Microscope, Goniometer, Elipsometer, High Speed Camera, Spin Coater, Inferred Camera etc. |
| Software              | : Matlab, Autocad, COMSOL, Gromacs, LAMMPS,   |
| Programming Languages | : Basics of C, PL/SQL, COBOL.   |

## Work Experiences

1. **Company** : **Cognizant Technology Solutions**, (Kolkata, India)  
**Duration** : 2 year & 7 months (January 2007 – July 2009)  
**Designation** : Programmer Analyst  
**Applications & Tools used** : Toad 8.5.3, Appworx, Jira, Oracle 10
2. **Company** : **Heritage institute of Technology**, (Kolkata, India)  
**Duration** : 6 months (July 2005 – December 2005).  
**Designation** : Teaching assistance.

## Publications/Conferences

### Journals:

- **Chakraborty, M.**; Anand, R.; Rao, P. S.; Sen, S. Oscillating Nanofluid Droplet for Micro-Cooling. *Sens. Actuators, B*. 2016 *Article In Press*, doi:10.1016/j.snb.2016.06.145
- **Chakraborty, M.**; Chowdhury, A.; Bhusan, R.; DasGupta, S. Molecular Dynamics Study of Thermally Augmented Nanodroplet Motion on Chemical Energy Induced Wettability Gradient Surfaces. *Langmuir* 2015, 31(41), 11260-11268.
- **Chakraborty, M.**; Chatterjee, R.; Ghosh, U. U.; DasGupta, S. Electrowetting of Partially Wetting Thin Nanofluid Films. *Langmuir* 2015, 31(14), 4160-4168.
- **Chakraborty, M.**; Ghosh, U. U.; Chakraborty, S.; DasGupta, S. Thermally Enhanced Droplet Motion on Gradient Surfaces. *RSC Adv.* 2015, 5, 45266-45275.
- **Chakraborty, M.**; Ghosh, A.; DasGupta, S. Enhanced Microcooling by Electrically Induced Droplet Oscillation. *RSC Adv.* 2014, 4, 1074-1082.
- Ghosh, U. U.; **Chakraborty, M.**; De, S.; Chakraborty, S.; DasGupta, S. Contact line Dynamics during Evaporation of Extended Colloidal Thin Films: Influence of Liquid Polarity and Particle Size, Submitted to *Langmuir*, 2016, *Just Accepted Manuscript*, DOI: 10.1021/acs.langmuir.6b03267
- Ghosh, U. U.; **Chakraborty, M.**; Bhandari, A. B.; Chakraborty, S.; DasGupta, S. Wettability Induced Crack Dynamics and Morphology, *Langmuir*, 2015, 31 (22),6001-6010.
- Bhaumik, S. K.; **Chakraborty, M.**; Ghosh, S.; Chakraborty, S.; DasGupta, S. Electric Field Enhanced Spreading of Partially Wetting Thin Liquid Films. *Langmuir* 2011, 27(21), 12951–12959.
- Pandey, N. K.; Mitra, S.; **Chakraborty, M.**; Ghosh, S.; Sen, S.; Dasgupta, S.; DasGupta, S. Disruption of Human Serum Albumin Fibrils by a Static Electric Field. *J. Phys. D. Appl. Phys.* 2014, 47, 305401. (Selected as cover article and also published in *Nature India*, doi:10.1038/nindia.2014.102 Published online 29 July 2014)
- Ghosh, S.; Chakraborty, I.; **Chakraborty, M.**; Mukhopadhyay, A.; Mishra, R.; Sarkar, D. Evaluating the morphology of erythrocyte population: An approach based on atomic force microscopy and flow cytometry, *BBA-Biomembranes*, 2016, 1858 (4),671-681.
- Sarkar, D.; Sarkar, A.; **Chakraborty, M.**; Sen, S.; Bhattacharjee, C. Transient Solute Adsorption Incorporated Modeling and Simulation of Unstirred Dead-End Ultrafiltration of Macromolecules: An Approach Based on Self-Consistent Field Theory. *Desalination* 2011, 273, 155–167.
- Sarkar, D.; Bardhan, S.; Bandhyopadhyay, A.; **Chakraborty, M.**; Bhattacharjee, C. Simulation of continuous stirred ultrafiltration process: an approach based on surface renewal theory. *Asia-Pacific Journal of Chemical Engineering* 2012, 7, 279–294.
- Sen, S.; **Chakraborty, M.**; Goley, S.; Dasgupta, S.; DasGupta, S. Role of Alternating Electric Field Frequency in the Disintegration of Preformed Amyloid Fibrils: A Case Study with Human Serum Albumin. Submitted to *RSC Adv*.
- Tenneti, S.; Subramanian, S. G.; **Chakraborty, M.**; Soni, G.; DasGupta, S. Magnetowetting of Ferrofluidic Thin Liquid Films. Submitted to *Sci. Rep*.

### Conference proceedings:

- **Chakraborty, M.**; Ghosh, A.; Ghosh, U. U.; DasGupta, S. Enhanced Cooling By an Oscillating Droplet on DMF Platform, AICHE 2015, Salt Lake City, Utah, USA

- **Chakraborty, M.;** Anand, R.; Ghosh, U U.; DasGupta, S. Oscillating Nanofluid Droplet, Droplets 2015, University of Twente, The Netherlands
- **Chakraborty, M.;** Chowdhury, A.; DasGupta, S. Molecular Dynamic Simulation Of A Moving Nano-Droplet On Gradient Surfaces , Chemical Engineering Congress 2014, Chandigarh, India
- **Chakraborty, M.;** Bhusan, R.; DasGupta, S. Physics Of Dynamic Spreading Using Molecular Dynamics Simulation, Chemical Engineering Congress 2014, Chandigarh, India
- **Chakraborty, M.;** Garimella, G.; Bhaumik, S.; K., Ghosh, A.; DasGupta, S. Electric field induced oscillation of micro-drops on a dielectric surface, Chemical Engineering Congress 2012, Jalandar, 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, Jalandar, India
- Bhusan, R.; **Chakraborty, M.;** DasGupta, S. A Molecular Dynamic Study On The Effect Of Nano-Structures On Contact Line Dynamics, EMBL Conference Microfluidics 2016, Heidelberg, Germany
- Ghosh, U U.; **Chakraborty, M.;** Chakraborty, S.; DasGupta, S. Interferometric Investigation of Evaporating Thin Layer of Colloidal Droplets, AIChE 2015, Salt Lake City, Utah, USA
- Sen, S.; **Chakraborty, M.;** Goley, S.; DasGupta, S.; DasGupta, S. Effect of Oscillating Electric Field on Preformed Human Serum Albumin Fibrils, AIChE 2015, Salt Lake City, Utah, USA
- Sen, S.; **Chakraborty, M.;** Mitra, S.; Dasgupta, S.; DasGupta, S. Oscillating Electric Field Disintegrates Preformed Fibrils Of Human Serum Albumin, Chemical Engineering Congress 2014, Chandigarh, India
- Bhaumik, S., K.; **Chakraborty, M.;** Mitra, S.; DasGupta, S.; Surfactant Assisted Spreading of Ultrathin Films, Chemical Engineering Congress 2011, Bangalore, India
- Ghosh, U. U.; Bhandari, A. B.; **Chakraborty, M.;** DasGupta, S. Effect Of Surface Wettability On Crack Formation, Chemical Engineering Congress 2014, Chandigarh, India
- Pandey, N.; K., Mitra, S.; **Chakraborty, M.;** Sen, S.; Dasgupta, S.; DasGupta, S. Effect of electric field on aggregated protein fibrils, Chemical Engineering Congress 2012, Jalandar, India
- Datta, D.; Sarkar, D.; **Chakraborty, M.;** Bhattacharjee, C.; Surface Renewal theory based Modeling and simulation of rotating disk membrane module, Chemical Engineering Congress 2010, Annamalai Neyveli Regional Center, Annamalai Nagar, Chidambaram, India

### Extra Curricular Activities

- Team leader and ace trekker (Himalayan range).
- Research scholar representative (2013-2015) of the Department of Chemical Engineering, Indian Institute of Technology Kharagpur.
- Captain of Hall and Department cricket team in Indian Institute of Technology Kharagpur.
- Member of Cricket team at Cognizant technology solutions.

### References

**Prof. Sunando DasGupta**

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### Personal Details

**Father's Name** : Monotosh Kumar Chakraborty  
**Sex** : Male  
**Date of Birth** : 12<sup>th</sup> October, 1983  
**Nationality** : Indian  
**Language Known** : English, Bengali, Hindi, German.

### Declaration

I hereby declare that the above written particulars are true to the best of my knowledge and belief.

*Monojit Chakraborty*

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