

Kazi Fazle Rabbi

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EDUCATION

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

PhD, Mechanical Engineering May 2022 (expected)

Research: Micro/Nano Structured Functionalized Surface development for Enhanced Heat Transfer and Two Phase Cooling of Electronics/Battery.

BANGLADESH UNIVERSITY OF ENGINEERING & TECHNOLOGY

GPA: 3.91/4.00

BS, Mechanical Engineering, 1st /201 (*Summa Cum laude*).

March 2016

WORK EXPERIENCE

TOYOTA MOTOR NORTH AMERICA

Ann Arbor, Michigan

Engineering Co-op (Material Research Division-2)

Mar 2018- Aug 2018

- ❖ Designed and Tested Ultra-Thin Heat Pipe for Enhanced Cooling of Fuel Cell Vehicle Batteries [$t < 5\text{mm}$].
- ❖ Fabricated Superhydrophilic Micro/Nano Engineered Surfaces for Ultra-Thin Heat Pipe [$CHF \sim 400\text{ W/cm}^2$].

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Urbana-Champaign, IL

Graduate Teaching Assistant, Department of Mechanical Science and Engineering

Jan 2018- Present

- ❖ Mentored 50 students and demonstrated laboratory experiments on Fluid Dynamics (ME 310)
- ❖ Designed experiments for characterization of Fluids.

BANGLADESH UNIVERSITY OF ENGINEERING AND TECHNOLOGY

Dhaka, Bangladesh

Lecturer, Department of Mechanical Engineering

Apr 2016- Dec 2016

- ❖ Demonstrated laboratory experiments on Solid Mechanics, Heat Transfer, IC Engine, and SolidWorks.
- ❖ Mentored ~300 students, organized departmental seminars, industrial training and engineering project shows.

RESEARCH & PROJECTS

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Urbana-Champaign, IL

Graduate Research Assistant

[NSF Power Optimization of Electro-Thermal Systems Center (POETS), NSF Air-Conditioning and Refrigeration Center (ACRC), NSF Li-Battery Future Manufacturing Center]

- ❖ Developed scalable and resilient micro/nanostructured surface for Refrigerant Flow Boiling Enhancement (300%) for building/vehicle AC and Electronics Cooling Application. [[US Patent S/N 63/189,776](#)]
- ❖ Developed Ultra-Efficient Electro-Thermal Desnowing, Defrosting, and Deicing method (10X faster and 3X smaller energy consumption) for applications that suffer from frosting and icing limitations such as building/vehicle AC, solar panels, and wind turbines.
- ❖ Developed Micro/Nano Structured Superhydrophobic Next Generation Heat Exchangers with enhanced (8x) performance for energy efficient vehicle/building AC system.
- ❖ Developed structuring method for AlSi10Mg Additively Manufactured Metal Surface for thermal application and next generation heat exchanger.
- ❖ Developed Functionalized Surface Coating for Enhanced Condensation of Low Surface Tension [14mN/m] liquids for power generation, distillation, AC systems, natural gas and petroleum processing.
- ❖ Holistic Design of Low-Cost and Recyclable High Energy Density Li-ion Batteries [Ongoing Project].
- ❖ Developed anti-corrosive and anti-fouling thin film coatings for thermal application.

RELEVANT COURSE PROJECTS:

- ❖ Fabricated a micro-machined pressure sensor from silicon nitride (Si-N) wafer in Cleanroom. [Course Project]
- ❖ Fabricated a microfluidic mixing device from PDMS using Photolithography. [Course Project]
- ❖ Fabricated Integrated Circuits (Diodes, BJT, MOSFET) in Cleanroom using Photolithography. [Course Project]

SKILLS

SOFTWARE: SolidWorks | AutoCAD | LAMMPS | ANSYS Icepak / FLUENT | C / MATLAB.

LABORATORY: CVD/Sputtering/Evaporative-Deposition | Electroless/Cathodic-deposition/Anodic-etching | AFM/FIB/ESEM/Optical/Confocal Microscopy | EDS/XPS/ToF SIMS characterization | Goniometry.

CLEANROOM 100 & 1000 level: Photolithography / Maskless Lithography | Dry/ Wet Etching | RC1/RC2/BOE/KOH Etching Process | DRIE.

PUBLICATIONS [For Complete List of Publications: [Google Scholar](#)]

1. L. Li, ..., [K.F. Rabbi](#), ... , N. Miljkovic " **Fabrication Optimization of Ultra-Scalable Nanostructured Aluminum-Alloy Surfaces,**" *ACS Applied Materials & Interfaces*, 2021
2. [K.F. Rabbi](#), ... , ... , N. Miljkovic " **Wettability-defined frosting dynamics between plane fins in quiescent air,**" *International Journal of Heat and Mass Transfer*, 2021
3. N. Upot, [K.F. Rabbi](#), ... , N. Miljkovic " **Scalable and Resilient Etched Metallic Micro and Nanostructured Surfaces for Enhanced Flow Boiling,**" *ACS Applied Nano Materials*, 2021
4. J.Y. Ho, [K.F. Rabbi](#), ... , N. Miljkovic " **Dropwise condensation of low surface tension fluids on lubricant-infused surfaces: Droplet size distribution and heat transfer,**" *International Journal of Heat and Mass Transfer*, 2021
5. K. Siavash, ... [K.F. Rabbi](#), ... , N. Miljkovic " **Scalable Corrosion-Resistant Coatings for Thermal Applications,**" *ACS Applied Materials & Interfaces*, 2021
6. Jiaqi Li, ... [K.F. Rabbi](#), ... , N. Miljkovic " **Liquid film-induced critical heat flux enhancement on structured surfaces,**" *Science Advances*, 2021
7. J. Ma, ... [K.F. Rabbi](#), ... , C. Evans " **Ultra-thin self-healing vitrimer coatings for durable hydrophobicity,**" *Nature Communications*, 2021
8. Y. Suh, ... [K.F. Rabbi](#), ... , Y. Won " **A Deep Learning Perspective on Dropwise Condensation,**" *Advanced Science*, 2021
9. X. Yan, ..., [K.F. Rabbi](#), ..., N. Miljkovic " **Laplace Pressure Driven Single-Droplet Jumping on Structured Surfaces,**" *ACS Nano*, 2020
10. S. Sett, ... , [K.F. Rabbi](#), ... , N. Miljkovic " **Transient Pulse Condensation,**" *Applied Physics Letter*, 2020
11. S. Sett, ... , [K.F. Rabbi](#), ... , N. Miljkovic " **Stable Dropwise Condensation of Ethanol and Hexane on Rationally-Designed Ultra-Scalable Nanostructured Lubricant-Infused Surfaces,**" *Nano Letters*, 2019
12. S. Chavan, ... , [K.F. Rabbi](#), N. Miljkovic " **Pulse Interfacial Defrosting,**" *Applied Physics Letter*, 2019
13. J.Y.Ho*, [K.F. Rabbi](#)*, ... , N. Miljkovic " **Opportunities in Nanoengineered Surface Designs for Enhanced Condensation Heat and Mass Transfer,**" *Journal of Heat transfer*, 2021- *Invited Article*

HONORS AND AWARDS

- ❖ MechSE Distinguished Fellowship, UIUC 2017
- ❖ Outstanding Teaching Assistant, UIUC 2019
- ❖ 1st Prize, Nikon World Microscopy, 2020
- ❖ NSF Conference Award, IMECE, 2019
- ❖ Top 3, Art of Science, UIUC 2017 & 2018
- ❖ Top 10 Science as Art, MRS Conference, Boston 2018
- ❖ Prime Minister Gold Medal, Outstanding UG, BUET, 2016
- ❖ MechE Gold Medal, 1st in Dept, BUET, 2016
- ❖ Dean's List Scholarship, BUET 2011-2016
- ❖ Top 100 Youth Delegate of Bangladesh, 2015

OUTREACH & OTHER ACTIVITIES

- ❖ Young Scholar Mentor, NSF outreach Program, UIUC
- ❖ Grad Committee Member, GRaMS, UIUC 2019
- ❖ Journal Reviewer, Molecular Simulation
- ❖ Journal Reviewer, Int. Journal of Refrigeration

Featured Media

- ❖ Featured in Scientific American-Nikon World Microscopy 1st Prize. [Link](#)
- ❖ Featured in Nikon 2020, "Masters of Microscopy: The People Behind the Lens." [Link](#)
- ❖ Featured in Times of India, "New energy-efficient way to defrost ice within a second." [Link](#)
- ❖ Featured in AIP Science in highlight, "Enhancing condensation heat transfer using transient condensation." [Link](#)