

Education

- **Ph.D. in Chemical Engineering [Fall 2019 -]** CGPA: 3.94/4
University of Cincinnati, Adviser: Dr. Aashish Priye. Expected graduation date: **May 2024**
- **Bachelor of Science in Chemical Engineering [Feb 2013 – 2017]** CGPA: 3.16/4
Bangladesh University of Engineering and Technology.

Research experience & projects

Graduate researcher: University of Cincinnati, Department of Chemical Engineering

- Developing masked stereolithography (MSLA) based 3D printed PDMS casting protocol in fabricating sub 100 μ m microfluidic devices: [Fall 2019 – Fall 2020]
 - Proposed 2 optimized microfluidic chip fabrication strategies using MSLA based 3D printing.
 - Characterized the PDMS curing behavior in conjunction with hydrophobic recovery after RF generated plasma cleaning.
- Formulating custom photopolymerizable resins of tunable elastic moduli for fabricating multi-resin microfluidic devices with integrated functional accessories: [Spring 2020 – Summer 2022]
 - Synthesized photopolymerizable resins with tunable crosslinking, tensile strength, and thermal behavior.
 - Modelled penetration depth behavior of the UV resins for optimized microfluidic channels printings.
 - Designed and built a tensile stress apparatus from scratch leveraging load cells. FDM printed parts, stepper motors, Arduino & Python.
 - Characterized the chemical properties of the tunable resins using FTIR, UV-vis spectroscopy.
- Developing fluorescence thermometry focused 3D printing for non-contact & low-cost temperature detection in a microfluidic setup: [Fall 2022 – Present]
 - Synthesized UV resin incorporating filler pigments and fluorophore molecules within the polymer matrix.
 - Validated formation dynamics of in-situ droplet generation for amphiphilic liquids using COMSOL simulation.
 - Developed a novel fluorophore infused droplet-based temperature sensing method for bioanalysis.

Graduate researcher: Procter & Gamble (via P&G Digital Accelerator at UC)

- Molecular modelling of surfactant interactions with phospholipid bilayers mimicking Corneal Epithelium: [Spring 2023 – Present]
 - Built a coarse grain system with bilayer liposomes with exogenous molecules using packmol. Parametrized the molecules with the correct forcefield parameters.
 - Simulated the system using Gromacs package, automated the workflow using python, and analyzed the results using VMD, MDanalysis.
 - Used back-mapping to convert coarse grain to all-atom system at specific timepoints to improve large scale simulation time.
- Using molecular dynamics to understand and characterize different surfactant chassis interaction in P&G personal cleansing care (PCC) products. [Summer 2022 – Fall 2022]
 - Built water-based surfactant systems in all-atom ensemble using Schrodinger wrapper.
 - Simulated the system using Desmond package, analyzed using Maestro software package.

Quality assurance (QA) officer: BEXIMCO Pharmaceuticals, US-FDA track – II

- Validating technology transfer and new product manufacturing process through technical and compliance audits maintaining cGLP, cGMP guidelines and audits. [July 2018 – June 2019]
 - Commissioned the erection process of - a) two large scale granulation systems by GLATT, b) Countec bottle filling line, c) NFA-co automated tablet filling line.
 - Performed IQ, OQ, and PQ of class B cleanroom HVAC installation.

ISTEAQUE AHMED

+1(513)-501-9751 | Cincinnati, OH | 45219

ahmedie@mail.uc.edu | [Google scholar](#) | [LinkedIn](#)

Publications

- [I. Ahmed](#), K. Sullivan, A. Priye, “*Multi-resin masked stereolithography (MSLA) 3d printing for rapid and inexpensive prototyping of microfluidic chips with integrated functional components*,” Biosensors, Aug. 2022, doi: [10.3390/bios12080652](https://doi.org/10.3390/bios12080652).
- S. Balou, [I. Ahmed](#), A. Priye “*From Waste to Filament: Development of Biomass-Derived Activated Carbon-Reinforced PETG Composites for Sustainable 3D Printing*”, ACS Sustainable Chem. Eng, Aug. 2023, doi: [10.1021/acssuschemeng.3c02685](https://doi.org/10.1021/acssuschemeng.3c02685)
- E. Ditchendorf, [I. Ahmed](#), J. Sepate, A. Priye “*A Smartphone-Enabled Continuous Flow Digital Droplet LAMP Platform for High Throughput and Inexpensive Quantitative Detection of Nucleic Acid Targets*”, Sensors, Oct. 2023, doi: <https://doi.org/10.3390/s23198310>
- D. Das, T. Singh, [I. Ahmed](#), M. Masetty, A. Priye, “*Effects of relative humidity and paper geometry on the imbibition dynamics and reactions in lateral flow assays*,” Langmuir, Aug. 2022, doi: [10.1021/acs.langmuir.2c01017](https://doi.org/10.1021/acs.langmuir.2c01017)
- Md. N. Islam, [I. Ahmed](#), M. I. Anik, Md. S. Ferdous, M. S. Khan, “*Developing paper based diagnostic technique to detect uric acid in urine*,” Frontiers in Chemistry, Oct. 2018, doi: [10.3389/fchem.2018.00496](https://doi.org/10.3389/fchem.2018.00496)
- M. I. Anik, M. K. Hossain, I. Hossain, [I. Ahmed](#), “*Recent progress of magnetic nanoparticles in biomedical applications: A review*,” Nano Select, Jan. 2021, doi: [10.1002/nano.202000162](https://doi.org/10.1002/nano.202000162)
- M. I. Anik, M. K. Hossain, [I. Ahmed](#), R. M. Doha, “*Biomedical applications of magnetic nanoparticles*”, Book: Magnetic Nanoparticle-Based Hybrid Materials – chapter 18, doi: <https://doi.org/10.1016/B978-0-12-823688-8.00002-8>

Scholarships/Awards

- **Michael and Sandra Bowman Endowment Scholarship**, August 2023, Department of Chemical Engineering, University of Cincinnati.

Conference Presentations

Talks/Oral presentations

- *Masked Stereolithography 3D Printing for Rapid Fabrication of Microfluidic Devices with Functional Components and Fluorescence Thermometry*; AIChE annual meeting 2023, Orlando, FL.
- *Cross-linking multi-UV curable resins for rapid and inexpensive fabrication of microfluidic channels with tunable mechanical properties*; ACS spring 2023, Indianapolis, IN.
- *Masked Stereolithography printing for rapid prototyping of microfluidic systems with embedded functional components*; AIChE annual meeting 2022, Phoenix, AZ.
- *3D Stereolithography (SLA) Printing-Based Micro-Fabrication Using Custom Polymer Resin Chemistry for Rapid Prototyping of Microfluidic Chips and Component*; AIChE annual meeting 2021, Boston, MA.
- *Developing custom UV curable polymer resin chemistry to enable stereolithography (SLA) based micro-fabrication for rapid prototyping of microfluidic chips and components*; ACS Fall 2021, Atlanta, GA.

Poster presentations

- *Stereolithography 3D printing for rapid fabrication of microfluidic channels with integrated quake valves*; MicroTAS 2022, Hangzhou, China.

Affiliations/memberships

- American Institute of Chemical Engineers (AIChE) (2021 – present)
- American Chemical Society (ACS) (2021 – present)

Skills

Programming language: Python, MATLAB, Octave, R.

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CAD: FreeCAD, AutoCAD, Fusion 360.

Analysis: Pandas, ImageJ, Mathematica.

Chemical analysis: FTIR, NMR, UV-vis Spectroscopy.

Simulation: Packmol, Gromacs, Schrodinger (MD), COMSOL.

Visualization: VMD, Blender, Bio-render, Adobe Illustrator.

Organizational activity

Graduate Student Government (CHEE – GSA) (Fall 2022 – Spring 2023)

- President, Chemical & Environmental Engineering graduate student association at UC.