

MD. FARHATUL ABRAR

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EDUCATION

Master of Science (M.Sc.) in Chemical Engineering

July 2023 - Jan 2025

Bangladesh University of Engineering and Technology (BUET)

CGPA: **3.83/4.00**

Bachelor of Science (B.Sc.) in Chemical Engineering

Mar 2018 - May 2023

Bangladesh University of Engineering and Technology (BUET)

CGPA: **3.89/4.00**, Class Rank: **4/60 (Top 7%)**

RESEARCH EXPERIENCES

Research Assistant

July 2023 - Dec 2024

[Sustainability in Energy, and Environment Research \(SEER\) Group, BUET](#)

Project: Valorization of Bio-Slurry from Anaerobic Digestion via Hydrothermal Carbonization

- Developed a Life Cycle Assessment model to compare the environmental impacts of bio-slurry hydrothermal carbonization (HTC) with conventional disposal method (open dumping)
- Performed characterization of bio-slurry and HTC products (solid and liquid) to assess changes in physical and chemical properties
- Designed and conducted experimental optimization of the HTC process by investigating the effects of operating parameters (temperature and residence time) on product yield and calorific value using Response Surface Methodology

MSc Thesis

July 2023 - Jan 2025

Title: Life Cycle Assessment of Anaerobic Digestate Valorization through Hydrothermal Carbonization

- Compared the environmental impacts of anaerobic digestate's HTC against current management practice
- Conducted Monte Carlo simulations to address the assumptions and uncertainties in data
- Identified the critical hotspot in the HTC process

Undergraduate Thesis

May 2022 - May 2023

Title: CFD Simulation of a Natural Convection mixed-mode Solar Dryer using OpenFOAM

- Developed a Computational Fluid Dynamics (CFD) model of a natural convection solar dryer using OpenFOAM to analyze the thermal performance of the system
- Analyzed temperature, pressure, and velocity distributions along the airflow pathway to understand the drying process
- Validated the developed CFD model with experimental data to ensure accuracy and reliability

PUBLICATIONS

Journal Articles

- Kaniz Fatema Rahman, Md Farhatul Abrar, Sanjida Safa Tithi, Kazi Bayzid Kabir, Kawnish Kirtania, [“Life cycle assessment of hydrothermal carbonization of municipal solid waste for waste-to-energy generation”](#), Journal of Environmental Management (**Q1, IF: 8.0**), Volume 370, 2024, 122850, doi: 10.1016/j.jenvman.2024.122850.

Conferences

- **Md Farhatul Abrar**, Sohel Rana, Sumaiya Fardouse Mimmi, Chayan Kumer Saha, Kawnish Kirtania, “**CFD Simulation of a Natural Convection Mixed-mode Solar Dryer using OpenFOAM**” Presented at the 7th International Conference on Chemical Engineering (ICChE 2023)

PUBLICATIONS UNDER PREPARATIONS

Journal Articles

- **Md Farhatul Abrar**, Sakibul Ahsan, Chayan Kumer Saha, Kazi Bayzid Kabir, and Kawnish Kirtania, “**Life Cycle Assessment of Anaerobic Digestate Valorization through Hydrothermal Carbonization**” [*To be submitted in Bioresource Technology*]
- Cadianne Chambers, **Md Farhatul Abrar**, Savannah Grimes, Kawnish Kirtania and, M. Toufiq Reza, “**Techno-economic assessment and Life-cycle assessment of pyrolyzed hydrochar production by hydrothermal carbonization and pyrolysis**” [*To be submitted in Science of the Total Environment*]
- Sakibul Ahsan, **Md Farhatul Abrar**, Kazi Bayzid Kabir, and Kawnish Kirtania, “**Optimization of Hydrothermal Carbonization Reaction Conditions for Nutrient Recovery from Bio-Slurry**” [*To be submitted in a Clarivate Indexed journal*]

PROFESSIONAL EXPERIENCE

In-Plant Trainee

April 2022

Karnaphuli Fertilizer Company Limited, Chattogram, Bangladesh

- Completed a 10-day training program focused on the ammonia and urea production processes
- Gained detailed knowledge of industrial operations and learned how a chemical processing plant is managed
- Acquired insights into the utilities and infrastructure of the production facility, enhancing understanding of operational efficiencies

ACADEMIC PROJECTS

Design of a 2400 BPD Reformate and 5 MTPD iso-Butane Plant

Performed material and energy balance, equipment sizing, detailed design of major equipment, process safety, and environmental sustainability assessment. Developed a plot plan and conducted an economic analysis to assess feasibility and profitability.

Chemical Process Analysis of Pulp and Paper Manufacturing Industries

Conducted a detailed process description, performed material and energy balance calculations, and analyzed the market dynamics to evaluate the efficiency and sustainability of pulp and paper production.

Simulation and Optimization of a Natural Gas Sweetening Plant using Aspen HYSYS

Simulated a natural gas sweetening process in Aspen HYSYS to remove acid gases (CO_2 and H_2S) and improve gas quality. Optimized process parameters to enhance efficiency, reduce energy consumption, and ensure compliance with industry standards.

LEADERSHIP & VOLUNTARY EXPERIENCES

Regional Liaison

July 2021 - July 2022

Southern Asia Region ESC, AIChE

- Served as the liaison for 4 AIChE student chapters, assisting in their growth, problem-solving, and coordination with the Regional Chair.
- Organized and hosted monthly meetings with student chapter presidents and ESC liaisons to discuss progress and challenges.
- Assisted student chapters in improving operations, leadership development, and networking opportunities within AIChE.

Student Secretary

Oct 2021 - Jan 2023

BUET AIChE Student Chapter

- Maintained meeting records and chapter documents. Presided over meetings in the absence of chapter president.
- Organized competitions, workshops, and K-12 outreach programs.
- Facilitated online meetings with international student chapters.

Treasurer

Aug 2020 - Sept 2021

BUET AIChE Student Chapter

- Managed financial records, dues collection, and budget reports.
- Ensured financial transparency and submitted end-of-term reports.

ACHIEVEMENTS AND AWARDS

Donald F. & Mildred Topp Othmer Scholarship Award, AIChE 2021-2022

The Donald F. & Mildred Topp Othmer Scholarship Award is a prestigious scholarship administered by the American Institute of Chemical Engineers (AIChE) on the basis of academic achievement and involvement in student chapter activities

BUET Dean's List

2019 - 2023

Awarded for four consecutive years. The Dean's List recognizes the top academic performers and is an honour that is bestowed on students with GPA 3.75 or above in each session.

University Merit Scholarship

2019 - 2023

Awarded for four consecutive years. The University Merit Scholarship is bestowed on students with academic averages within the top 10-15% of their class in each semester.

1st Runner Up, National Laminaire Competition

2018

Developed a device to convert turbulent flow into laminar flow, applying principles of fluid dynamics and engineering design. Optimized flow stability through innovative structural modifications, securing 2nd place in the competition.

TECHNICAL SKILLS

LCA: *openLCA*

Programming Languages: *MATLAB, Python*

Experimental Design and Statistical Analysis: *DesignExpert, Minitab*

Data Analysis and Visualization: *Origin, Pandas, NumPy, Matplotlib*

Process Simulation: *Aspen Plus, Aspen HYSYS, Simulink*

CFD: *OpenFOAM, ParaView*