

## HIGHLIGHT

- Ph.D. candidate in Chemistry (USM, **expected Fall 2025**, available to join a new position in Jan 2026), specializing in **synthesizing low-molecular-weight organic probes for sensor development, including detecting nerve agent mimics**.
- Over 5 years of experience in the design and synthesis of organic probes, with comprehensive characterization using **NMR** ( $^1\text{H}$  NMR,  $^{13}\text{C}$  NMR, DEPT 135, DEPT 90, HSQC, HMBC, COSY, APT), **FTIR**, melting point, **HRMS**, X-ray **crystallography**, and **elemental analysis**.
- Extensive experience in performing optical studies, including **UV-Vis, steady-state fluorescence, and lifetime analysis**. Proficient in conducting **electrochemical** investigations (**CV, DPV, and ECL**).
- Detail-oriented and organized problem solver with strong analytical skills, leadership abilities, and collaboration skills, driven by a positive mindset.

## EDUCATION

**Ph.D. Candidate, Chemistry and Biochemistry** Aug 2019-present

The University of Southern Mississippi, Hattiesburg, MS, USA

**B.S., Chemistry and M.S., Chemistry** Sep 2008 - Jul 2014 and Sep 2014 - Apr 2015

Shahjalal University of Science and Technology, Sylhet, Bangladesh

## RESEARCH EXPERIENCES

**Graduate Research**, USM, Hattiesburg, MS Aug 2019-present

- Designed, synthesized, characterized, and performed photophysical studies of multiple coumarin derivatives.
- Studied aggregation-induced fluorescence and ECL emission of coumarin derivatives for sensor development.
- Investigated an ECL-generated coumarin-enamine chemodosimeter for diisopropylfluorophosphate, a nerve agent mimic.
- Synthesized a cyclometalated Ir (III) Complex as an alternative luminophore to enhance ECL signals.

**Undergraduate Research**, SUST, Sylhet, BD Dec 2008- Feb 2015

- Comparative kinetic studies of the hydrolysis of methyl acetate.
- Quality Control of Water Treatment and Prevailing Management Practices in the Combined Cycle Power Station.

## SKILLS

- **Synthesis:** Schlenk line, purification, crystal growth, and characterization.
- **Spectroscopy techniques:** UV-Vis, steady-state fluorescence, and lifetime analysis
- **Electrochemical techniques:** CV, DPV, and Electrogenerated chemiluminescence.

## PUBLICATIONS

- Synthesis and photophysical properties of coumarin-imine and quinoline derivatives for sensor development (*Manuscript in preparation, Funded by the DoD*)
- Dual-Emissive Coumarin–Quinoline–Oxime Molecule Exhibiting AIE and ECL: Synthesis, Characterization, and Fluorescence Imaging (*Manuscript in preparation*)
- An ECL-chemodosimeter for the detection of DFP- a sarin mimic (*Manuscript in preparation, Funded by the DoD*)
- Pyridine/pyridyl Based Chemosensor Design for the Metals and Anions (*Manuscript in preparation*)
- Optimization of Electrocatalytic Chlorazol Yellow Degradation Using PbO<sub>2</sub> Nanostructure Immobilized on Stainless Steel Substrate. *Catalysts* **2025**, 15 (1), 34.

- Influence of Different Dissolved Gases on Electrocatalytic Nitrate Sensing Performance at Cu-Modified Au Electrode. *ChemistrySelect* **2024**, 9 (36), e202402986.
- Kinetics of Electrocatalytic Oxygen Reduction Reaction over an Activated Glassy Carbon Electrode in an Alkaline Medium. *Catalysts* **2024**, 14 (3), 164.

#### CONFERENCE PRESENTATION

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- **Exploring the Photophysical and Electrochemical Properties of a Family of Coumarin-Quinoline Derivatives for Sensor Development**, the 3<sup>rd</sup> Edition of NASC, New Orleans, Louisiana, 16 December 2024, won a travel grant
- **Design and synthesis of low molecular weight electrogenerated chemiluminescence probes (LMEPs) for the detection of organophosphates** [poster], ACS Spring 2024, won a travel grant
- **Low molecular weight electrogenerated chemiluminescence probes (LMEPs) for the detection of nerve agent mimic**, 88th Annual Mississippi Academy of Sciences Meeting, 2024, won top 10% abstract
- **The Synthesis of a Coumarin-enamine Chemodosimeter for the Detection of Diisopropylfluorophosphate a Nerve Agent Mimic**, Mississippi IDEA/EPSCoR Conference, Thad Cochran Center, USM, 2023
- **An ECL Generated Coumarin-enamine Chemodosimeter for Diisopropylfluorophosphate a Nerve Agent Mimic** [poster], North American Supramolecular Chemistry (NASC) meeting, Tulane and Loyola University in New Orleans, Louisiana, 2022; won a travel grant
- **Remote detection of Chemical Warfare Agents**, 3M thesis, USM, 2020

#### ASSISTED in PRESENTATION

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- **Aggregation-Induced Emission of Coumarin Derivatives for Sensor Development**, presented by Riley Patterson, REU student, summer 2024, won top abstract, top poster, and runner-up oral presenter.
- **Synthesis, Photophysical, and Electrochemical Studies of Oxime-Functionalized Coumarin-Quinoline Molecular Probe**, presented by Nishrenika Pokhrel, undergraduate student, Chemistry and Biochemistry, USM, 26 April 2025

#### LEADERSHIP and SERVICES

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- **Reviewer for *Surface Innovations***, Emerald Publishing, UK, 2025
- **Success Coach of undergraduate students**, USM. Fall 2023
- **Vice-President**; Graduate Student Organization, Chemistry and Biochemistry, USM, USA, Aug 2022 – July 2023
- **Founding President**; Bangladesh Student Association, USM, Hattiesburg, MS, 2021-2022
- **Communication secretary**; Education, Science & Innovation Alliance (ESIA), 2023-present

#### WORKSHOPS AND PROFESSIONAL DEVELOPMENT

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- **Binding Constants Workshop**, NASC meeting, New Orleans, Louisiana; December 15, 2024,
- **Grant Writing Workshop**, The University of Southern Mississippi; October 2024
- **Professionals in Preparation (PiP)**, The University of Southern Mississippi; Aug 2020 - Apr 2021

#### TEACHING EXPERIENCE

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**Graduate Student Assistant**, USM, Hattiesburg, MS, USA (**Aug 2019 to present**)

**Lecturer**, Chemistry, JCESC, Sylhet, Bangladesh (Mar 2017- Jun 2019)

**Teacher, Chemistry**, NKM High School and Homes, Narsingdi, Bangladesh (Nov 2016- Feb 2017)

#### OTHER EMPLOYMENT

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**Executive, Quality Assurance** (Feb 2016- Oct 2016)

Shun Shing Packaging Ind. Ltd, Kaligonj, Gazipur, Bangladesh

**Quality Control Officer, Production** (Dec 2014-Jan 2016)

Rhymer Chemicals Ltd, Valuka, Mymensingh, Bangladesh