

# WASIM NAWAJ

## Analytical Chemist

+1(267)-213-9533 | [wnawaj@temple.edu](mailto:wnawaj@temple.edu) | [Wasim Nawaj LinkedIn](#) | Philadelphia, PA, 19122

### Technical skills

---

- Gas chromatography-mass spectrometry (GC-MS)
- FTIR (Transmission, ATR)
- Atomic force microscopy (AFM)
- UV-Vis spectrometers
- Material synthesis: SiO<sub>x</sub>-supported Platinum heterostructure (Pt/SiO<sub>x</sub>), Copper nanoclusters (Cu NCs), Paracetamol, etc.
- High-performance liquid chromatography (HPLC)
- Spectrofluorometer
- Transmission electron microscopy (TEM)
- Dicing SAW, Apogee Spinner
- Pymol, ChemDraw, Origin, Igor Pro, MS Office, Endnote

### Leadership

---

- Successfully mentored and trained three undergraduate students in the fundamental operation of analytical instruments including Fourier-Transform Infrared Spectroscopy (FTIR), Ultraviolet-Visible Spectroscopy (UV-Vis), and Spectrofluorometry.
- Developed and conducted hands-on experiments focusing on surface modification techniques, providing undergrad students with laboratory skills.
- Offered comprehensive guidance in data analysis, interpretation, and presentation, fostering undergrad students' abilities in scientific discussion and critical thinking.
- Successfully led the initiative for Environmental Health and Radiation Safety (EHRS) inspection preparedness in the laboratory, resulting in a commendable inspection outcome with zero safety violations, demonstrating exceptional standards in safety and operational excellence.

### Research experience

---

#### **Project 6: Developed cost-effective alternative for contact angle measurements**

*Research Assistant, Mentor: Prof. Eric Borguet, Temple University, USA (Aug 2022 - May 2024)*

- Developed a cost-effective, simplified needle-in-drop contact angle measurement setup, serving as an efficient alternative to commercial goniometers.
- Utilized this novel arrangement to analyze surface properties including structure, cleanliness, hysteresis, and interfacial kinetics.
- Contributed valuable insights applicable to diverse fields such as materials science, biomedical engineering, and chemistry.

### **Project 5: Quantification of surface functional groups in mixed self-assembled monolayers (SAMs) by fluorescence spectroscopy**

*Research Assistant, Mentor: Prof. Eric Borguet, Temple University, USA (Aug 2022 - May 2024)*

- Utilized fluorescence spectroscopy to precisely measure the quantity of molecules deposited on mixed Self-Assembled Monolayers (SAMs).
- Focused on assessing the density of linker molecules (Lipoamide-PEG3-maleimide) in conjunction with Lipoamide-PEG3-alcohol (blocker) on gold surfaces.

### **Project 4: Synthesis and characterization of alkanethiol self-assembled monolayer on oxide surfaces**

*Research Assistant, Mentor: Prof. Eric Borguet, Temple University, USA (Aug 2022 - May 2024)*

- Achieved successful deposition of well-ordered alkanethiol monolayers on oxide surfaces, defying prior beliefs regarding the impossibility of such self-assembly.
- This breakthrough paves the way for innovative methods in modifying oxide surfaces and significantly expands the application scope of self-assembled monolayers.

### **Project 3: Visible light-driven CO<sub>2</sub> reduction with water enabled by photoexcited hot carriers in platinum nanoparticles**

*Project Assistant, Mentor: Dr. Yugang Sun, Temple University, USA (Jan 2021 - May 2022)*

- Conducted a comprehensive study on the feasibility of photocatalytic CO<sub>2</sub> reduction in water, achieving 100% selectivity to CH<sub>4</sub> using Pt/SiO<sub>x</sub> heterostructure photocatalysts.
- Demonstrated the effective use of photoexcited hot electrons for activating and reducing surface-adsorbed CO<sub>2</sub> to CH<sub>4</sub>, alongside utilizing photoexcited holes for driving the water oxidation reaction, under visible light irradiation

### **Project 2: Green synthesis of a super-oleophobic membrane for water purification**

*Project Assistant, Mentor: Dr. Uttam Manna, IIT Guwahati, India (Jul 2019 - Dec 2019)*

- Synthesized a super-oleophobic membrane, specifically engineered for efficient purification of water contaminated with oil.
- Extended the functionality of the membrane to also address dye-contaminated water, demonstrating its versatility in diverse water purification applications.

### **Project 1: Photo induced chemical modification of surface ligands for aggregation and luminescence modulation of copper nanoclusters**

*Master Thesis, Mentor: Prof. Anumita Paul, IIT Guwahati, India (Jan 2019 - May 2019)*

- Demonstrated the ability to tune the luminescence of atomic clusters through strategic engineering of surface ligands.
- Employed photo-oxidation techniques to effectively modulate the luminescence properties of these clusters, showcasing a novel approach in cluster luminescence control.

## Teaching experience

---

### Graduate Teaching Assistant

2021 Spring – 2024 Spring

Temple University, Philadelphia, Pennsylvania, USA

- Chem 1034: General Chemistry Laboratory II (Spring 2021)
- Chem 1033: General Chemistry Laboratory I (Spring 2022)
- Chem 1034: General Chemistry Laboratory II (Fall 2023)
- Chem 1033: General Chemistry Laboratory I (Fall 2021)
- Chem 1033: General Chemistry Laboratory I (Spring 2023)
- Chem 1033: General Chemistry Laboratory I (Spring 2024)

## Education

---

### Master of Science (Analytical Chemistry)

2021 Spring – 2024 Spring

Temple University, Philadelphia, Pennsylvania, USA

#### Courses taken:

- Nanomaterial Chemistry and Physics
- Analytical Separation
- Special Topics (Mass Spectrometry) in Analytical Chemistry
- Literature seminar
- Chemical Kinetics
- Quantum Chemistry
- Bioinorganic Chemistry
- *Original Research Proposal*

### Master of Science (Chemistry)

2017 – 2019

Indian Institute of Technology Guwahati (IIT Guwahati), India

#### Courses taken:

- Transition and non-transition metal chemistry
- Quantum chemistry
- Inorganic reaction mechanism and organometallics
- Chemical dynamics and electrochemistry
- Principle of Bio-inorganic chemistry
- Modern technique and scope of chemical biology
- Advance Quantum Chemistry (elective)
- Inorganic chemistry laboratory
- Physical chemistry laboratory
- Principle of organic chemistry
- Group theory and spectroscopy
- Organic reaction mechanism
- Application of spectroscopy
- Concept in organic synthesis
- Classical and statistical thermodynamics
- Application of luminescence spectroscopy (elective)
- Organic chemistry laboratory
- 

### Bachelor of Science (Chemistry)

2013 – 2016

Calcutta University, Kolkata, India

**Courses taken:** Organic chemistry, Inorganic chemistry, Physical chemistry, Analytical chemistry, Physics, Math

## Publications and presentations

---

1. S. Basu, **M. W. Nawaj**, C. Gayen, A. Paul, *Phys. Chem. Chem. Phys.*, 2019,**21**, 21776-21781 [Link](#)
2. **Wasim Nawaj**, Ayan Bhattacharyya, Somaiyeh Dadashi, Belinta Naomi Simiyu, and Eric Borguet\* "Alkanethiol self-assembly on hydroxylated SiO<sub>2</sub> surfaces" (*in preparation*)
3. Yunqian Zou, Naomi Ross, **Wasim Nawaj**, and Eric Borguet\* "A Simplified Approach for Dynamic Contact Angle Measurements" (*Submitted to J. Chem. Ed*)
4. **Wasim Nawaj**, Ayan Bhattacharyya, Somaiyeh Dadashi, Belinta Naomi Simiyu, and Eric Borguet: "Self-Assembled Monolayers of Alkanethiols on SiO<sub>2</sub>" Philadelphia Inorganic Colloquium, The College of New Jersey, New Jersey, NJ, USA. April 22, 2023 (Poster presentation)
5. **Wasim Nawaj**, Ayan Bhattacharyya, Somaiyeh Dadashi, Belinta Naomi Simiyu, and Eric Borguet: "Alkanethiol self-assembled monolayer on hydroxylated oxide surfaces" Philadelphia ACS YCC, Temple University, Philadelphia, PA, USA. August 23, 2023 (Poster presentation: Best poster award)

## Reference

---

Dr. Eric Borguet (Research advisor)  
Hazel Tomlinson Professor of Chemistry  
Temple University  
Email: [eborguet@temple.edu](mailto:eborguet@temple.edu)