Ubaidullah S. Hassan

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EDUCATION

The Cooper Union for the Advancement of Science and Art New York, NY
B.E., Chemical Engineering, Minors in Mathematics and Chemistry, GPA: 3.94 2021 – 2025

AWARDS

Goldwater Scholar, The Barry Goldwater Scholarship and Excellence in Education Foundation 2024

Half Tuition Scholarship, The Cooper Union 2021-2025

Daniel E. Kowler ChE '65 Memorial Prize Fund Recipient, The Cooper Union 2023

RESEARCH EXPERIENCE

Stony Brook Institute of Advanced Computational Sciences Stony Brook, NY
Undergraduate Researcher (NSF REU), Advisors: Benjamin G. Levine May 2024 - Present

- Static quantum mechanical calculations and non-adiabatic *ab initio* molecular dynamics of 2-hydroxyazobenzene for applications in photochemistry

The Cooper Union Department of Chemistry New York, NY
Undergraduate Researcher, Advisor: Robert Q. Topper 2022 - Present

- Studied decomposition and growth pathways of ammonium nitrate clusters using our groups code for simulated annealing Monte Carlo geometry optimizations, quantum chemistry methods, and comparison to experimental literature

Penn State University Department of Material Science State College, PA
Undergraduate Researcher (NSF REU), Advisor: Stephanie Law May – August 2023

- Used Fourier transform infrared spectroscopy and analyzed spectra to examine Dirac semimetals' potential in infrared photodetection

Purdue Energetics Research Center West Lafayette, IN
Undergraduate Researcher (DEVCOM funded), Advisor: Stephen Beaudoin May – August 2022

- Studied particle adhesion of mock polymer-bonded explosives by quantifying Van der Waals forces
- Independently operated an atomic force microscope for more than 50 hours to calculate Hamaker constants

TEACHING EXPERIENCE

The Cooper Union Department of Mathematics New York, NY
Math Tutor 2022 - Present

- Helped undergraduate students with calculus, linear algebra, differential equations, probability, and discrete math
- Instructed and explained topics in front of groups of students in a "Help Room" weekly

PUBLICATIONS

[2] **Hassan, U. S.**; Mehmood A.; and Levine B. G. Static Quantum Mechanical Calculations and Non-Adiabatic Dynamics of 2-Hydroxyazobenzene. *(In preparation)*

[1] **Hassan, U. S.**; Amat, M. A.; and Topper, R. Q. Decomposition and Growth Pathways of Ammonium Nitrate Clusters and Nanoparticles. *Journal of Physical Chemistry A*, 2024. *(Submitted)*

TALKS

[3] **Hassan, U. S.**; Trice, R.; and Law, S. *The Potential of Dirac Semimetals for Infrared Photodetection*. Penn State Materials Research Institute 2D Materials REU Talks, State College, PA, 2023.

[2] **Hassan, U. S.** and Topper, R. Q. *Computational Analysis of Mass Spectra and Growth Patterns of Ammonium Nitrate Nanoparticles.* New York Chapter of ACS Undergraduate Symposium, Queens, NY, 2023.

[1] **Hassan, U. S.**; Vazquez J. M.; and Beaudoin S. *Adhesion of Mock Polymer-Bonded Explosives.* Purdue Energetics Research Symposium, West Lafayette, IN, 2022.

POSTER PRESENTATIONS

[5] **Hassan, U. S.**; Amat, M. A.; and Topper, R. Q. *Decomposition and Growth Pathways of Aerosolized Ammonium Nitrate Particles.* American Conference on Theoretical Chemistry, Chapel Hill, NC, 2024.

[4] **Hassan, U. S.** and Topper, R. Q. *Patterns in Growth of Ammonium Nitrate Clusters.* Virtual Winter School on Computational Chemistry, 2024.

[3] **Hassan, U. S.**; Amat, M. A.; and Topper, R. Q. *Growth and Decomposition Pathways for Ammonium Nitrate Clusters.* AIChE Annual Conference, Orlando, FL, 2023.

[2] **Hassan, U. S.**; Trice, R.; and Law, S. *Dirac Semimetals Potential in Infrared Photodetection.* Penn State REU Symposium, State College, PA, 2023.

[1] **Hassan, U. S.**; Vazquez J. M.; and Beaudoin S. *Quantifying Van der Waals Adhesion of Energetic Particles.* Purdue Energetics Research Symposium, West Lafayette, IN, 2022.

SKILLS

Computational: Python, Bash, Linux, Excel, Word, LaTeX
Chemistry Codes: ORCA, TeraChem, Spartan, OpenMolcas, Psi4
Lab: AFM, FTIR, UV-VIS Spectroscopy, MS, SEM, XRD

RELEVANT COURSEWORK

Chemistry: Computational Chemistry & Statistical Mechanics (Grad level), Organic Chemistry I & II, Physical Chemistry I & II, Organometallic Chemistry, Biochemistry
Mathematics: Linear Algebra, Real Analysis I & II, Ordinary and Partial Differential Equations, Discrete Math, Probability, Vector Calculus
Physics: Quantum Mechanics, Electricity and Magnetism, Optics and Modern Physics, Mechanics