

Curriculum Vitae

Michelia Dam

damml@uci.edu

University of California, Irvine

Irvine, CA 92617

Professional Profile

Aerosol chemist with a strong background in mass spectrometry, instrumentation and conducting laboratory chamber studies for studying particle formation from organic oxidation chemistry. Additional experience with field measurements and computational modeling.

Education

University of California, Irvine

Ph.D. in Chemistry

Oct 2018 – August 2023

Advisor: Prof. James Smith

San Jose State University

Bachelor of Science in Chemistry, Minor in Physics, Magna Cum Laude

August 2015 – May 2018

West Valley College

Lower division credits transferred to San Jose State University

August 2013 – May 2015

Research Experience

February 2019 - present. PI: Dr. James N. Smith, University of California, Irvine.

Laboratory

- Developed an iodide (I-) reagent source and operational method for a high resolution chemical ionization mass spectrometer (CIMS, Aerodyne LTOF) with a home-built transverse ion inlet.
- Measured reaction products in the gas and particle phase with a suite of analytical techniques (high resolution mass spectrometry (NO₃- and I- CIMS), SMPS, GC-FID, FTIR).
- Elucidated the oxidation mechanisms of night time chemistry of the atmosphere by designing and implementing laboratory chamber experiments that simulate nitrate radical-induced oxidation of monoterpenes.
- Collaborated with Prof. Julianne Fry (Reed College) on kinetic modeling of the chemical system, creating a more robust understanding of the chemical mechanisms.
- Measured chemical composition of gases (NO₃- and I- CIMS) emitted from vehicle brake wear generated from a home-built brake dynamometer system.

Field

- Measured the chemical composition of urban gasses and ultrafine particles at a field site near Houston, TX from early July to late August of 2022.

- Operated and maintained instruments, including mass spectrometers that measured gas and particle composition (NO₃-CIMS, TDCIMS) and aerosol particle counters located inside a rented mobile office trailer.
- Project was part of a larger field campaign funded by the US Department of Energy, in collaboration with Prof. Don Collins (UC Riverside).
- Measurements implicated sulfuric acid and oxidized organics as major precursors to nanoparticle formation in the Houston atmosphere.

August 2017 - July 2018. PI: Dr. Carolus Boekema, San Jose State University.

- Performed computational modeling of muon-bonding sites in magnesium tetrahedron using Python in order to assess the physical feasibility of earthquake-precursor (MgO-) detection by muon bombardment.
- The muon was found to localize approximately one angstrom away from the oxygen atom in our computational model, allowing us to approximate and predict the measurable observation in an analogous physical system.

May 2016 - July 2018. PI: Dr. Annalise Van Wyngarden, San Jose State University.

- Designed experiments for the measurement of optical properties (absorbance, refractive index) of sulfuric acid/organic solutions, representative of aerosol found in the upper stratosphere/lower troposphere, using UV/vis spectroscopy and other analytical techniques to evaluate their radiative effects.
- Sulfuric acid/organic solutions were found to be significantly more absorbing than pure sulfuric acid in atmospherically relevant wavelengths, showing the importance of understanding the impact of aerosol composition on climate.

Analytical Instrumentation, Programming and Modeling Techniques

Mass spectrometry

- High-resolution chemical ionization mass spectrometry (CIMS, Aerodyne LTOF) with a custom, home-built transverse ion inlet for nitrate (NO₃-) and iodide (I-) reagent ions for measuring oxidized organics, sulfuric acid and inorganic nitrogen in the gas phase.
- Thermal desorption chemical ionization mass spectrometer (TDCIMS) for measuring size-resolved nanoparticle (sub 100 nm) composition. This is a uniquely designed and home-built instrument (one of three in existence).

Particle sizing

- Scanning mobility particle sizer (SMPS) consisting of a differential mobility analyzer (DMA) upstream of a condensation particle counter (CPC) for measuring particle concentration.

Chromatography

- Gas chromatography with a flame ionization detector (GC-FID) with a home-built inlet specifically designed for measuring monoterpene (C₁₀H₁₆) compounds.

Spectroscopy

- Fourier transform infrared spectroscopy (FTIR) for detection of oxygenated nitrogen compounds (NO₂, N₂O₅) as gas precursors in laboratory experiments.
- Ultraviolet-visible (UV-Vis) spectroscopy.
- Nuclear magnetic resonance (NMR) spectroscopy.

Programs and models

- Igor Pro for data analysis and visualization.
- LabVIEW for computer-instrument interfacing.
- Tofware (Igor Pro-based program) for analysis of high-resolution mass spectra.
- TERN (Igor Pro-based program) for analysis of gas chromatograms.
- KimSim (Igor Pro-based program) for kinetic modeling of chemical systems for laboratory chamber experiments.
- Python applied to modeling atomic interactions.
- LaTeX for producing publications.
- Microsoft Suite: Excel, Word, PowerPoint.

Teaching Experience

Teaching Assistant

University of California, Irvine

Spring 2021: Majors Quantitative Analytical Chemistry, M2C (*remote*)

- Facilitated two weekly discussion sections; developed new midterm projects and corresponding rubrics to replace traditional exams.

Spring 2019: Majors Quantitative Analytical Chemistry Lab, M3LC

- Led two four hour laboratory sections weekly; graded lab reports, exams, and weekly experiment presentations; held weekly office hours; beta-tested experiments before classes.

Winter 2019: General Chemistry Lab for Engineers, 1LE (*in person*)

Fall 2018: General Chemistry for Non-majors, 1A (*in person*)

- Taught a 1 hour lecture for a class of 400 students on introductory quantum mechanics, facilitated four discussion sections per week; held weekly office hours; drafted exam practice material; graded exams.

Professional Development and Outreach

President for the AAAR Student Chapter

Fall 2021 - Summer 2022

American Association for Aerosol Research (AAAR) Student Chapter at UCI

- Initiated and facilitated monthly officer meetings. Executed professional development, social and technical events geared for students and post-docs. Submitted annual reports to secure funding for events.

Coordinator for AirUCI Internal Seminar**Winter 2021 - Spring 2022***Atmospheric Integrated Research at UCI*

- Sole coordinator of this seminar series until Fall 2022; co-coordinator onwards. Secured funding for seminars. Solicited and hosted research seminar talks from graduate students, post-doctoral researchers and project scientists from various departments (chemistry, earth systems science, toxicology, engineering, etc.).

Mentor for Paving the Path Mentorship Program**Spring 2021***Silicon Valley American Chemical Society (ACS) Chapter*

- Advised the mentee through their transfer process from community college to a four year university. Actively guided the mentee in the development of their application documents, transfer courses and ultimate career goals.

Social Event Coordinator for the AAAR Student Chapter**Fall 2019 - Summer 2020***American Association for Aerosol Research (AAAR) Student Chapter at UCI*

- Led the development of professional events for graduate students and post-doctoral researchers. Composed professional communications (emails, letters, flyers) to the community for student chapter events.

Mentor for Peer Mentor Program**Fall 2019 – Winter 2020***UCI Department of Chemistry*

- Guided incoming first year PhD students in the Chemistry department at UCI by advising and providing resources for first year activities, such as group rotations, teaching, classes and research.

Member of Student Affiliated American Chemical Society**Fall 2016 – Spring 2018***San Jose State Department of Chemistry ACS*

- Participated in STEM outreach programs in the community (science fairs, informational gatherings, etc.), specifically working with elementary school children in public school.

Awards and Recognition

- 2019. National Science Foundation Graduate Research Fellowships Program (NSF-GRFP) Honorable Mention. University of California, Irvine.
- 2018. American Chemical Society (ACS) Undergraduate Researcher Award. San Jose State University.

Publications

1. **Dam, M.**, Draper, D. C., Marsavin, A., Fry, J. L., and Smith, J. N.: Observations of gas-phase products from the nitrate-radical-initiated oxidation of four monoterpenes, *Atmospheric Chemistry and Physics*, 22, 9017–9031, <https://doi.org/10.5194/acp-22-9017-2022>, 2022.

2. Smith, J., N.; Draper, D., C.; Chee, S.; **Dam, M.**; Glicker, H.; Myers, D.; Thomas, A., E.; Lawler, M., J.; and Myllys, N.: Atmospheric clusters to nanoparticles: Recent progress and challenges in closing the gap in chemical composition. *Journal of Aerosol Science*, 153: 105733. 2021.

Presentations

Talks:

- **May 14, 2020. Aerodyne Chemical Ionization Mass Spectrometry Users Meeting.** “Questions about NO₃- and I- reagent ion sensitivity to nitrate radical-initiated monoterpene oxidation products and TDCIMS mysteries regarding thermal desorption and decomposition.”

Posters:

- **October 4, 2022. American Association for Aerosol Research Annual Conference.** “Observations of Gas and Particle Phase Composition of α -Thujene Ozonolysis Products.”
- **October 5, 2020. American Association for Aerosol Research Annual Conference.** “Comparison of Nitrate Radical Initiated Oxidation of Four Monoterpenes in a Laboratory Chamber Study to Gain Mechanistic Insight.”
- **May 6, 2017. American Chemical Society Northern California Undergraduate Research Symposium.** “Optical Properties of Mixed Sulfuric Acid/Organic Aerosols in the Upper Troposphere and Lower Stratosphere: Implications for Climate.”
- **November 3-4, 2017. American Physical Society Far West Meeting.** “Muon-bonding site search in MgO: Possible implications for earthquake-precursor detection.”
- **December 11-15, 2017. American Geophysical Union Fall Meeting.** “Optical Properties of Organic/Sulfuric Acid Solutions at Upper Troposphere/Lower Stratosphere Aerosol Acidities: Implications for Climate.”

Conference Funding

- **Fall 2021 Associated Graduate Students Conference Stipend.** Secured \$250 for conference registration fees for the 2021 AAAR Fall Meeting.