Michael F. Vansco, Ph.D.

Assistant Professor of Chemistry

Coastal Carolina University,
Swain Hall Room 215, Conway, SC 29528
Office Phone: (843) 349-6502; Email: mvansco@coastal.edu

PROFESSIONAL EXPERIENCE

2023-Present **Coastal Carolina University,** Gupta College of Science
Assistant Professor of Chemistry

Current Courses:
General Chemistry I and General Chemistry I Lab

- Developing a state-of-the-art laser laboratory to study the chemical reactivity of atmospheric intermediates.

2020 – 2023 **Argonne National Laboratory,** Chemical Sciences and Engineering
Postdoctoral Appointee
Advisor: Rebecca L. Caravan

- Developed a broadband UV-Vis time-resolved absorption experiment with multiplexed product detection to study the kinetics and product branching of reactive intermediates
- Led the theoretical component of multiple projects involving Criegee intermediates, including by the first direct kinetics measurements of methacrolein oxide
- Led a multi-organizational effort to study the reactivity of hydroxy-functionalized peroxy radicals using multiplexed photoionization mass spectrometry at the Advanced Light Source user facility
- Participated in experiments at the Advanced Light Source of Lawrence Berkeley National Laboratory to explore the effects of resonance stabilization on the reactivity of Criegee intermediates

EDUCATION

2020 **Ph.D. Physical Chemistry**
University of Pennsylvania, Department of Chemistry, Philadelphia, PA
Advisor: Marsha I. Lester
Thesis: Electronic Spectroscopy, Photochemistry, and Reactivity of Atmospherically Important Intermediates

2015 **B.S. Chemistry**
University of Rhode Island, Department of Chemistry, Kingston, RI
Summa Cum Laude, ACS Certification

GRADUATE AND UNDERGRADUATE RESEARCH EXPERIENCE

2020 **University of Pennsylvania**, Department of Chemistry
Graduate Research Assistant
Advisor: Marsha I. Lester

- Directly observed the unimolecular decay dynamics of an elusive hydroperoxyalkyl radical using IR action spectroscopy
- Measured the electronic spectra of elusive atmospheric intermediates, including the first direct detection of methacrolein oxide, an isoprene-derived Criegee intermediate
- Participated in a multi-organizational collaboration to study the reaction mechanisms, kinetics, and product branching of isoprene-derived Criegee intermediates, including the first direct kinetics measurements of methyl vinyl ketone oxide
- Explored the photodissociation dynamics of Criegee intermediates using velocity map imaging to detect oxygen atom products following electronic excitation
- Developed, built, and tested an upgraded velocity map imaging apparatus to incorporate differential pumping for enhanced image resolution

2015 **University of Rhode Island**, Department of Chemistry
Undergraduate Research Assistant

- Investigated the concentrations of contaminants in Barnegat Bay, NJ, and developed a technique to measure temperature dependent diffusion coefficients of contaminants in polyethylene

TEACHING EXPERIENCE

Graduate Teaching Assistant
University of Pennsylvania, Department of Chemistry

General Chemistry Laboratory I Head Teaching Assistant (Spring 2017)
General Chemistry Laboratory II Teaching Assistant (Spring 2016)
General Chemistry Laboratory I Teaching Assistant (Fall 2015 & 2016)

Supplemental Instruction Leader
University of Rhode Island, Academic Enhancement Center

General Chemistry II (Spring 2014 & 2015)
General Chemistry I (Fall 2013 & 2014)

FACILITY PROPOSALS

2020 Co-wrote a general user proposal as the experimental lead for beam time at the Advanced Light Source of Lawrence Berkeley National Laboratories that was granted for the 2021-2022 cycles with high merits

PUBLICATIONS

Journal Articles

1. T. Liu, M. Zou, **M. F. Vansco**, S. N. Elliott, C. A. Soidak, C. R. Markus, R. Almeida, K. Au, L. Sheps, D. L. Osborn, C. J. Percival, C. A. Taatjes, S. J. Klippenstein, R. L. Caravan, and M. I. Lester, Novel OH Roaming Pathway in the Unimolecular Decay of Alkyl-Substituted Criegee Intermediates. *In Review* **2023**.

2. **Journal of Physical Chemistry A Cover Article**

M. F. Vansco, M. Zou, I. O. Antonov, K. Ramasesha, B. Rotavera, D. L. Osborn, Y. Georgievskii, C. J. Percival, S. J. Klippenstein, C. A. Taatjes, M. I. Lester, and R. L. Caravan, Dramatic Conformer-Dependent Reactivity of the Acetaldehyde Oxide Criegee Intermediate with Dimethylamine *Via* a 1,2-Insertion Mechanism. *J. Phys. Chem. A* **2022,** *126*, 710-719.

3. J. C. McCoy, S. J. Léger, C. F. Frey, **M. F. Vansco**, B. Marchetti, and T. N. V. Karsili, Modeling the Conformer-Dependent Electronic Absorption Spectra and Photolysis Rates of Methyl Vinyl Ketone Oxide and Methacrolein Oxide. *The Journal of Physical Chemistry A* **2022,** *126*, 485-496.

4. **M. F. Vansco**, K. Zuraski, F. A. F. Winiberg, K. Au, N. Trongsiriwat, P. J. Walsh, D. L. Osborn, C. J. Percival, S. J. Klippenstein, C. A. Taatjes, M. I. Lester, and R. L. Caravan, Functionalized Hydroperoxide Formation from the Reaction of Methacrolein-Oxide, an Isoprene-Derived Criegee Intermediate, with Formic Acid: Experiment and Theory. *Molecules* **2021,** *26* (10), 3058.

5. A. S. Hansen, T. Bhagde, K. B. Moore, D. R. Moberg, A. W. Jasper, Y. Georgievskii, **M. F. Vansco**, S. J. Klippenstein, and M. I. Lester, Watching a hydroperoxyalkyl radical (•QOOH) dissociate. *Science* **2021,** *373*, 679.

6. A. S. Hansen, R. M. Huchmala, E. Vogt, M. A. Boyer, T. Bhagde, **M. F. Vansco**, C. V. Jensen, A. Kjærsgaard, H. G. Kjaergaard, A. B. McCoy, and M. I. Lester, Coupling of torsion and OH-stretching in tert-butyl hydroperoxide. I. The cold and warm first OH-stretching overtone spectrum. *J. Chem. Phys.* **2021,** *154*, 164306.

7. V. J. Esposito, T. Liu, G. Wang, A. Caracciolo, **M. F. Vansco**, B. Marchetti, T. N. V. Karsili, and M. I. Lester, Photodissociation Dynamics of CH_2OO on Multiple Potential Energy Surfaces: Experiment and Theory. *J. Phys. Chem A* **2021,** *125*, 6571.

8. G. Wang, T. Liu, A. Caracciolo, **M. F. Vansco**, N. Trongsiriwat, P. J. Walsh, B. Marchetti, T. N. V. Karsili, and M. I. Lester, Photodissociation dynamics of methyl vinyl ketone oxide: A four-carbon unsaturated Criegee intermediate from isoprene ozonolysis. *J. Chem. Phys.* **2021,** *155*, 174305.

9. **Physical Chemistry Chemical Physics Hot Article**
M. F. Vansco, R. L. Caravan, S. Pandit, K. Zuraski, F. A. F. Winiberg, K. Au, T. Bhagde, N. Trongsiriwat, P. J. Walsh, D. L. Osborn, C. J. Percival, S. J. Klippenstein, C. A. Taatjes, and M. I. Lester, Formic acid catalyzed isomerization and adduct formation of an isoprene-derived Criegee intermediate: experiment and theory. *Phys. Chem. Chem. Phys.* **2020,** *22*, 26796.

10. **M. F. Vansco**, R. L. Caravan, K. Zuraski, F. A. F. Winiberg, K. Au, N. Trongsiriwat, P. J. Walsh, D. L. Osborn, C. J. Percival, M. A. H. Khan, D. E. Shallcross, C. A. Taatjes, and M. I. Lester, Experimental Evidence of Dioxole Unimolecular Decay Pathway for Isoprene-Derived Criegee Intermediates. *J. Phys. Chem. A* **2020,** *124*, 3542.

11. R. L. Caravan, M**. F. Vansco**, K. Au, M. A. H. Khan, Y.-L. Li, F. A. F. Winiberg, K. Zuraski, Y.-H. Lin, W. Chao, N. Trongsiriwat, P. J. Walsh, D. L. Osborn, C. J. Percival, J. J.-M. Lin, D. E. Shallcross, L. Sheps, S. J. Klippenstein, C. A. Taatjes, and M. I. Lester, Direct kinetic measurements and theoretical predictions of an isoprene-derived Criegee intermediate. *Proc. Natl. Acad. Sci.* **2020,** *117*, 9733.

12. **M. F. Vansco**, B. Marchetti, N. Trongsiriwat, G. Wang, T. Bhagde, P. J. Walsh, S. J. Klippenstein, and M. I. Lester, Synthesis, electronic spectroscopy and photochemistry of methacrolein oxide: A four carbon unsaturated Criegee intermediate from isoprene ozonolysis. *J. Am. Chem. Soc.* **2019,** *141*, 15058.

13. **M. F. Vansco**, B. Marchetti, and M. I. Lester, Electronic spectroscopy of methyl vinyl ketone oxide: A four-carbon unsaturated Criegee intermediate from isoprene ozonolysis. *J. Chem. Phys.* **2018,** *149*, 244309.

14. **M. F. Vansco**, H. Li, and M. I. Lester, Prompt release of O ^{1}D products upon UV excitation of CH_2OO Criegee intermediates. *J. Chem. Phys.* **2017,** *147*, 013907.

Commentaries

15. R. L. Caravan, **M. F. Vansco**, and M. I. Lester, Open questions on the reactivity of Criegee intermediates. *Comm. Chem.* **2021,** *4*, 1.

RESEARCH PRESENTATIONS

Invited Presentations

1. Massachusetts Institute of Technology Department of Civil and Environmental Engineering Seminar
   Cambridge, MA, July 8, 2022
   Understanding the Conformer- and Substituent-Dependent Reactivity of Carbonyl Oxide Intermediates (Oral Presentation)

Conference Presentations

2. **2022 Molecular Interactions and Dynamics Gordon Research Seminar**
   Stonehill College, Easton, MA, July 9th, 2022
   Dramatic Conformer-Dependent Reactivity of Acetaldehyde Oxide Criegee Intermediate with Dimethylamine (Oral Presentation)

3. **2022 Molecular Interactions and Dynamics Gordon Research Conference**
   Stonehill College, Easton, MA, July 9-15, 2022
   Exploring the Influence of Structure and Conjugation on the Reactivity of Four-Carbon Criegee Intermediates (Poster Presentation)

4. **2021 American Geophysical Union Fall Meeting Insights into Atmospheric and Planetary Chemistry Session**
   New Orleans, LA, December 17th, 2021
   Functionalized Hydroperoxide Formation from the Reaction of Isoprene-Derived Criegee Intermediates with Formic Acid: Experiment and Theory (Oral Presentation)

5. **2021 Argonne National Laboratory Postdoctoral Research and Career Symposium**
   Argonne National Laboratory, Lemont, IL, November 15th, 2021

Dramatic Conformer-Dependent Reactivity of Acetaldehyde Oxide Criegee Intermediate with Dimethylamine (Oral Presentation)

6. **2020 Atmospheric Chemical Mechanisms Conference**
   University of California Davis, Davis, CA, November 9th, 2020
   Formic Acid Catalyzed Isomerization and Adduct Formation of an Isoprene-Derived Criegee Intermediate: Experiment and Theory (Oral Presentation)

7. **2020 American Geophysical Union Fall Meeting Insights into Atmospheric and Planetary Chemistry Session**
   Online, December 1-17, 2020
   Formic Acid Catalyzed Isomerization and Adduct Formation of an Isoprene-Derived Criegee Intermediate: Experiment and Theory (Poster Presentation)

8. **2020 Argonne National Laboratory Postdoctoral Research and Career Symposium**
   Argonne National Laboratory, Lemont, IL, November 4th, 2020
   Formic Acid Catalyzed Isomerization and Adduct Formation of an Isoprene-Derived Criegee Intermediate: Experiment and Theory (Oral Presentation)

9. **Dynamics of Molecular Collisions Conference XXVII**
   Big Sky, MT, July 7-12, 2019
   Electronic spectroscopy of Criegee Intermediates from Isoprene Ozonolysis (Poster Presentation)
   Outstanding Poster Presentation Award

10. **2018 Molecular Interactions and Dynamics Gordon Research Conference**
    Stonehill College, Easton, MA, July 8-13, 2018
    Ultraviolet spectroscopy and photochemistry of Criegee Intermediates (Poster Presentation)

11. **Dynamics of Molecular Collisions Conference XXVI**
    Tahoe City, CA, June 9-14, 2017
    Prompt release of O ^{1}D products upon UV excitation of CH_2OO Criegee Intermediates (Poster Presentation)

12. T**he University of Rhode Island Graduate School of Oceanography REU Seminar**
    Narraganset, RI, July 31, 2014
    Measuring the Diffusion Coefficients of Emerging Contaminants in Low-Density Polyethylene

13. **Rhode Island Chapter of the American Chemical Society Convention**
    Providence College, Providence, RI, April 25, **2014**
    Polyethylene Passive Sampling of Emerging and Legacy Contaminants in Barnegat Bay, New Jersey (Poster Presentation)

HONORS AND AWARDS

University of Pennsylvania

2019 Outstanding Poster Presentation Award, Dynamics of Molecular Collisions Conference XXVII
2017 Distinguished Service to the Chemistry Department
2016 Graduate Teaching Award
2015 Graduate Teaching Award

University of Rhode Island

2015 American Chemical Society Division of Inorganic Chemistry Award
2014 Harold D. Riemenschneider Radiation Award and Scholarship
2014 Rhode Island Section of the American Chemical Society Outstanding Chemistry Student
2014 American Chemical Society Division of Environmental Chemistry Award
2013 Undergraduate Research Initiative Project Grant
2013 Mona Zakaria-Hamer Memorial Scholarship
2013 American Chemical Society Division of Analytical Chemistry Award

DEPARTMENTAL AND PROFESSIONAL SERVICE

AGU Atmospheric Section Outstanding Student Presentation Awards Program Judge (Fall 2020 & 2021)

Chemistry Department Open House Organizer, University of Pennsylvania (2017)

COMMUNITY OUTREACH

2016 **Philadelphia Science Festival Volunteer**
Developed and demonstrated interactive activities related to chemistry and physics at a free, public science fair for local families

2015 **iPraxis "Scienteer" Science Fair Judge at Cook Wissahickon School**, Philadelphia PA

Mentored middle school aged students in underserved communities on science fair projects

MEDIA COVERAGE

1. Brockmeier, E. K. "Identifying an elusive molecule key to combustion chemistry". *Penn Today*, 5 August 2021.
2. DOE/Argonne National Laboratory. "Tracking an elusive molecule key to climate and combustion chemistry." *ScienceDaily*, 12 October 2021.