

Brendan C. Sweeny

EDUCATION

Doctor of Philosophy in Chemistry

University of Florida, Gainesville, FL

August 2009 – August 2015

- Specialized in physical chemistry under the direction of Dr. Wei David Wei

Bachelor of Arts in Chemistry – ACS Certified Degree

Saint Anselm College, Manchester, NH

September 2005 – May 2009

PROFESSIONAL EXPERIENCE

Plasma Chemistry Group, Space Vehicles Directorate, Air Force Research Lab

Kirtland Air Force Base

Albuquerque, NM 87117

National Research Council Postdoctoral Researcher

July 2016 – Present

- Measure temperature-dependent kinetics and product branching of gas-phase reactions between metal ions or metal clusters and neutral molecules
- Devise experiments that probe the kinetics of reactions with relevance to ionospheric chemistry, fuel additives, alternative fuels, and other Air Force interests
- Incorporate DFT calculations and statistical modeling (unimolecular rate theory, RRKM, PST) to gain mechanistic insight into reactions
- Maintain a laser vaporization variable-temperature selected ion flow tube mass spectrometer that enables temperature-dependent kinetics of metal cluster and neutral molecule reactions
- Coauthored four peer-reviewed publications collaborating with six group members and two external scientists
- Mentored one summer scholar through the AFRL Scholars Program
- Write and maintain software to control certain aspects of the laser vaporization ion source

Chemistry Department, University of Florida

214 Leigh Hall

P.O. Box 117200

Gainesville, FL 32611

Research Assistant

August 2009 – July 2016

- Developed novel gold, silver, and metal-oxide nanomaterials that improve visible light photocatalysis
- Devised experiments to elucidate the mechanism through which visible light improves catalytic activity
- Utilized internal facilities (Major Analytical Instrumentation Center, Nanoscale Research Facility) using spectroscopy (UV-Vis, FTIR, XPS, EDS, Raman, PL), microscopy (SEM, TEM, AFM), and diffraction (XRD) to explore the properties of metal-semiconductor photocatalysts
- Collaborate with national labs (BNL, PNNL) to characterize catalysts with electron microscopy (HAADF-STEM) and spectroscopy (XPS, EELS)
- Coauthored two book chapters and preparing four manuscripts in collaboration with seven group members and four external scientists highlighting research results
- Designed, built and maintained a custom gas-phase reactor that enables wavelength-dependent characterization of catalysts during reaction
- Modelled individual parts using computer-aided design software and advised machinists on fabrication
- Coauthored grant proposals (NSF Career, DOE) using novel ideas

Lab Manager

August 2009 – July 2016

- Organized lab start up, operation, and development, including equipment procurement and SOPs
- Oversaw lab operation including management of chemical inventory, maintenance, hazardous waste
- Mentored three undergraduate students and one visiting student through Research Experience for Undergraduates (REU) program

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SELECTED PUBLICATIONS

- **B. C. Sweeny**, S. G. Ard, D. C. McDonald II, O. Martinez, A. A. Viggiano, N. S. Shuman. "Discrepancy Between Experimental and Theoretical Predictions of the Adiabaticity of Ti^+ + CH_3OH ". *Chem. Eur. J.*, 2017, 23 (49), pp 1521.
- J. S. DuChene, **B. C. Sweeny**, A. C. Johnston-Peck, D. Su, E. A. Stach, and W. D. Wei. "Prolonged Hot Electron Dynamics in Plasmonic-Metal/Semiconductor Heterostructures with Implications for Solar Photocatalysis" *Angew. Chem. Int. Ed.*, 2014, 53 (30), pp 7887.
- K. Qian, **B. C. Sweeny**, A. C. Johnston-Peck, W. Niu, J. O. Graham, J. S. DuChene, J. Qiu, Y.-C. Wang, M. H. Engelhard, D. Su, and W. D. Wei. Surface-Plasmon-Driven Water Reduction: Gold Nanoparticle Size Matters" *J. Am. Chem. Soc.*, 2014, 136 (28), pp 9842.
- W. D. Wei, J. S. DuChene, **B. C. Sweeny**, J. Wang, and W. Niu. "Current Development of Photocatalysts for Solar Energy Conversion". In: *New and Future Developments in Catalysis*. S. Suib ed., Elsevier. 2013, pp 279.
- **B. C. Sweeny**, K. Qian, J. S. DuChene, J. Qiu, A. C. Johnston-Peck, D. Su, E. A. Stach, and W. D. Wei. "Manipulating Interfacial Electronic Structure through Plasmon-Mediated Electron Transfer" In Preparation.
- W. D. Wei, **B. C. Sweeny**, J. Qiu, and J. S. Duchene. "Metallic Nanostructures for Catalytic Applications" In: *Metallic Nanostructures: from Controlled Synthesis to Applications*. Y. Xiong ed., Springer. 2014, pp 243.

ORAL PRESENTATIONS

- **B. C. Sweeny**, S. G. Ard, N. S. Shuman, A. A. Viggiano. "Exploring the Critical Role of Two-State Reactivity in Gas Phase Metal Chemistry" 73rd Southwest Regional Meeting of the American Chemical Society, 2017.
- **B. C. Sweeny**, K. Qian, J. S. DuChene, J. Qiu, A. C. Johnston-Peck, D. Su, E. Stach, and W. D. Wei. "Plasmon-Driven CO Oxidation in Au-SrTiO₃ Nanostructures at Room Temperature" 249th ACS National Meeting & Exposition, 2015.
- **B. C. Sweeny**, K. Qian, J. S. DuChene, J. Qiu, A. C. Johnston-Peck, D. Su, and W. D. Wei. "Plasmon-Enhanced CO Oxidation in Au-SrTiO₃ Nanostructures" Florida Inorganic and Materials Symposium, 2013.

POSTER PRESENTATIONS

- **B. C. Sweeny**, D. C. McDonald II, S. G. Ard, N. S. Shuman, A. A. Viggiano. "Exploring the Critical Features of the Potential Energy Surface for the Reaction Between Ti^+ and Methanol" GRC Gaseous Ions: Structures, Energetics and Reactions, 2017.
- **B. C. Sweeny**, K. Qian, J. S. DuChene, J. Qiu, A. C. Johnston-Peck, D. Su, and W. D. Wei. "Plasmon-Enhanced CO Oxidation in Au-SrTiO₃ Nanostructures" NanoFlorida, 2013.

SKILLS

Technical: Mass Spectrometry, Gas Chromatography, Ultraviolet-Visible Spectroscopy, Fourier Transform Infrared Spectroscopy, Electrochemical Workstation

Computer: SolidWorks 2013, Python, LabVIEW, Blender, Photoshop, HTML/CSS, JavaScript, MS Office

AWARDS & HONORS

- UF Department of Chemistry Alumni Research Fellowship (2009 – 2013)
- Outstanding Poster, NanoFlorida 2013 (1 of 5 awarded to group of 60)
- CLAS Spring Travel Award 2015 (1 of 12 awarded to entire College of Liberal Arts and Sciences)
- Graduate Student Council Travel Award Spring 2015
- Albuquerque Deep Dive Code-A-Thon 2018 "Coding for the Greater Good", 3rd Place Project