

Adam P Cismesia

Department of Chemistry
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Education:

University of Florida, Gainesville, FL
Ph. D. in Analytical Chemistry, Anticipated May 2018
Area of Specialization: Mass Spectrometry/Ion Spectroscopy

Purdue University, West Lafayette, IN
B.S. in Chemistry, December 2012
Area of Specialization: Tandem Mass Spectrometry

Research Experience:

Doctoral Research: Department of Chemistry, Analytical Division, University of Florida
(research advisor: Prof. Nicolas C. Polfer)

August 2013 – present

- Performed infrared predissociation (IRPD) and infrared multiple photon dissociation (IRMPD) spectroscopy to determine dissociation mechanisms and structurally elucidate gas-phase ions
 - Determined protonation sites of small molecules and metabolites by analysis of distinct vibrational stretching modes
 - Developed a method for isomeric/isobaric separation based upon spectral shifts of vibrational modes and comparisons to computationally derived vibrational spectra
 - Performed dual infrared laser experiments to elucidate suppressed vibrational bands and enhance IRMPD yield
- Designed/Implemented/Optimized instrumentation for performing cryogenic vibrational spectroscopy
 - Utilized SolidWorks 3D CAD and AutoCAD software to design: RF ion guides; cryogenic linear ion trap; heat shield; electron multiplier detection system; custom vacuum chambers; electrical feedthroughs; DC Einzel lenses; laser optics; and gas mixing chambers
 - Simulated ion trajectories to develop and optimize instrumental geometries for ion guides, traps and optics using SIMION software
 - Engineered custom instrumentation and electronic components and collaborated with machine and electronic shop staff to ensure design specifications were met
 - Installed and optimized custom rectilinear ion trap for the pre-accumulation of ions to increase overall sensitivity and duty cycle of experiments along with cryogenic ion trap to perform infrared predissociation (IRPD) spectroscopy
- Operated, diagnosed and repaired instrumentation and electronics relevant to mass spectrometry
 - Operated, maintained and repaired custom-built electrospray ionization/quadrupole mass filter/quadrupole ion trap/time-of-flight mass spectrometer (ESI/QMF/QIT/TOF MS) using custom LabVIEW software
 - Tested and diagnosed high-voltage (200V – 12KV) RF and DC power supplies using testing equipment such as a digital multimeter and oscilloscope with high voltage probe
 - Installed and aligned an optical parametric oscillator/amplifier (OPO/A) pumped by a pulsed Nd:YAG laser and a CO₂ laser for IRMPD and IRPD spectroscopic studies
 - Utilized commercial software (Agilent, Advion, Bruker, Thermo, etc.) to operate and tune liquid chromatographs and mass spectrometers
 - Developed standard operating procedures and safety protocols for correct operation of multiple instruments and lasers

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Undergraduate Research: Department of Chemistry, Purdue University
(research advisor: Prof. Hilikka Kentammaa)

August 2011 – December 2012

- Used separation techniques and high-resolution, tandem mass spectrometry to examine heavy crude oil fractions to determine structural features
 - Used a LTQ LQIT and a LTQ-FT-ICR mass spectrometer to perform collision induced dissociation techniques to fragment asphaltene samples along with multiple mass isolation techniques to gain structural information
 - Assisted with organic synthesis of model compounds for structural comparison to field obtained samples
 - Proposed molecular structures of asphaltenes based on statistical analysis of fragmentation pathways based on mass spectra
 - Assisted in diagnostic and repair of commercial mass spectrometers using electronic diagnostic tools

Internship Research: Nalco Company, Naperville, IL
(research manager: Dr. Kevin O'Brien)

May 2011 – August 2011

May 2012 – August 2012

- Developed and performed organic and inorganic polymer synthesis to be utilized in cooling and descaling processes
 - Assisted in development of de-scaler polymers to reduce metallic buildup on heating elements during alumina manufacturing
 - Maintained and calibrated analytical instruments such as a densitometer, viscometer, auto titrator, and RSV tubes
 - Recorded data from FT-IR, torque test, settling test, and percent solids test
 - Compiled and organized detailed information in a lab notebook
 - Collaborated with team members to design experimental procedures

Research Interests:

- Designing, simulating, and constructing custom analytical instrumentation
- Vibrational and electronic ion spectroscopy
- Development and practical application of mass spectrometric techniques
- Elucidation and characterization of amino acids, peptides, and metabolites
- Operating, maintaining, and troubleshooting mass spectrometric instrumentation

Awards/Travel Grants:

Center for Chemical Physics Graduate Student Travel Award - UF Chemistry (2016 & 2017)

The center for chemical physics awards graduate students travel funding based on research results to present data at local and international conferences.

American Society for Mass Spectrometry Student Travel Award (2017)

The American society of mass spectrometry student travel award is awarded based on research abstracts to help fund students to present data at the international ASMS conference.

Purdue Undergraduate Research Symposium Award in Physical Science – 1st place (2012)

Awarded to 1 out of 120 students that competed in this symposium.

Teaching Experience:

Teaching Assistant: Department of Chemistry, University of Florida

January 2016 – May 2016

Quantitatively analyzed samples via mass spectrometry in the mass spectrometry core

Teaching Assistant: Department of Chemistry, University of Florida

August 2014 – December 2014

Led undergraduate-level general chemistry discussion

Teaching Assistant: Department of Chemistry, University of Florida

**May 2014 – August
2014**

Led undergraduate-level instrument laboratory for analytical chemistry

Teaching Assistant: Department of Chemistry, University of Florida

January 2014 – May 2014

Led undergraduate-level general chemistry discussion

Teaching Assistant: Department of Chemistry, University of Florida

August 2013 – December 2013

Led undergraduate-level general chemistry discussion

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Professional Memberships:

Member of the American Chemical Society

2013 - present

Member of the American Society of Mass Spectrometry

2013 - present

Publications:

4. Cismesia, A.P.; Tesler, L.F.; Bell, M.R.; Bailey, L.S.; Polfer, N.C. Infrared Ion Spectroscopy Inside a Mass-Selective Cryogenic 2D Linear Ion Trap. *J. Mass Spectrom.*, **2017**, 52, 720-727.
3. Cismesia, A.P.; Nicholls, G.R.; Polfer, N.C. Amine vs. Carboxylic Acid Protonation in *ortho*-, *meta*-, and *para*-Aminobenzoic Acid: An IRMPD Spectroscopy Study. *J. Molec. Spectroscopy.*, **2017**, 332, 79-85.
2. Patrick, A.L.; Cismesia, A.P.; Tesler, L.F.; Polfer, N.C. Effects of ESI Conditions on Kinetic Trapping of the Solution-phase Protonation Isomer of *p*-Aminobenzoic Acid in the Gas Phase. *Int. J. Mass. Spectrom.*, **2016**, 418, 148-155.
1. Cismesia, A.P.; Bailey, L.S.; Bell, M.R.; Tesler, L.F.; Polfer, N.C. Making Mass Spectrometry See the Light: The Promises and Challenges of Cryogenic Infrared Ion Spectroscopy as a Bioanalytical Technique. *J. Am. Soc. Mass Spectrom.*, **2016**, 27, 757-766.

Oral Presentations:

1. Cismesia, A.P.; Polfer, N.C. **Development of a Cryogenic Linear Ion Trap for the Structural Elucidation of Unknown Metabolites.** *The 93rd Florida Annual Meeting and Exposition (FAME)*. Palm Harbor, FL. May 4th – 6th, 2017.

Poster Presentations:

6. Cismesia, A.P.; Polfer, N.C. **Infrared Ion Spectroscopy as a Method to Structurally Elucidate Unknown Metabolites.** *American Society for Mass Spectrometry Annual Conference*. Indianapolis, IN. June 4th – 8th, 2017.
5. Cismesia, A.P.; Polfer, N.C. **Using Infrared Multiple Photon Dissociation Spectroscopy to Study Amine vs. Carboxylic Acid Protonation of *ortho*-, *meta*-, and *para*-Aminobenzoic Acid.** *Florida Inorganic and Material Science Conference*. Gainesville, FL. October 1st, 2016.
4. Cismesia, A.P.; Tesler, L.F.; Polfer, N.C. **Development and Performance of a Mass Selective Linear Ion trap for Infrared Predissociation Spectroscopy of Metabolites.** *American Society for Mass Spectrometry Annual Conference*. San Antonio, TX. June 5th – 10th, 2016.
3. Cismesia, A.P.; Borton, D.J.; Hurt, M.R.; Kenttamaa, H.I. **A Mass Spectrometric Comparison of the Molecular Structures of Field Deposit Asphaltene to Heptane Precipitated Asphaltene.** *Deans Leadership Council Poster Invitational*. West Lafayette, IN. October 11th – 12th, 2012.
2. Phillips, E.; Cismesia, A.P. **Synthesis of Descalers for Alumina Production.** *Nalco Company Poster Symposium*. Naperville, IL. July 19th – 20th, 2012.
1. Cismesia, A.P.; Borton, D.J.; Hurt, M.R.; Kenttamaa, H.I. **A Mass Spectrometric Comparison of the Molecular Structures of Field Deposit Asphaltene to Heptane Precipitated Asphaltene.** *Purdue Undergraduate Research Symposium*. West Lafayette, IN. April 26th – 27th, 2012.