

## **Curriculum Vitae**

### **Gary E. Douberly**

Department of Chemistry  
Department of Physics  
University of Georgia  
Athens, GA 30602  
706-542-2726

Email: [douberly@uga.edu](mailto:douberly@uga.edu)

<https://orcid.org/0000-0001-6530-7466>



## **Education**

B.S. Chemistry, 2000, University of Central Florida.  
Research Advisor – Hiroshi Matsui

Ph.D. Physical Chemistry, 2006, University of North Carolina at Chapel Hill.  
Research Advisors - Roger E. Miller and Tomas Baer  
Dissertation title: "Infrared Laser Spectroscopy of Dopants In and On Helium Nanodroplets: Rotational and Vibrational Dynamics"

## **Professional Appointments**

2022 Associate Dean, Franklin College of Arts and Sciences, University of Georgia  
2020 Courtesy Faculty, Department of Physics and Astronomy, University of Georgia  
2019 Head, Department of Chemistry, University of Georgia.  
2018 Professor, Department of Chemistry, University of Georgia.  
2016 Visiting Fellow, JILA, University of Colorado.  
2014 Associate Professor, Department of Chemistry, University of Georgia.  
2008 Assistant Professor, Department of Chemistry, University of Georgia.  
2006 Postdoctoral Fellow, University of Georgia. Advisor – Michael A. Duncan

## **Professional Affiliations**

American Chemical Society (Physical Division); American Physical Society (Chemical Physics Division); Coblenz Society; Royal Society of Chemistry (FRSC)

## **Awards and Honors**

Fellow of the Royal Society of Chemistry, 2019.  
Molecular and Ionic Clusters Gordon Research Conference, co-Chair, 2018.  
Conference on Cold and Controlled Molecules and Ions, Chair, 2018.  
Northeast Georgia Section ACS, Chemist of the Year for Service, 2017.  
JILA Visiting Fellow, 2016.

UGA Center for Teaching and Learning, Fellows for Innovative Teaching, 2016.  
Coblentz Memorial Award (Coblentz Society), 2015.  
*Journal of Physical Chemistry A* Lectureship (American Chemical Society), 2014.  
Northeast Georgia Section ACS, Chemist of the Year for Research, 2014.  
Frontiers of Spectroscopy Lecturer, Ohio State University, Columbus, OH, 2014.  
Presidential Early Career Award for Scientists and Engineers (PECASE), 2013.  
Department of Energy, Office of Science, Early Career Award, 2012.  
National Science Foundation, Faculty Early Career Development Award, 2011.  
Rao Prize, International Symposium on Molecular Spectroscopy, 2006.  
Ernest L. Eliel Fellowship, University of North Carolina at Chapel Hill, 2004.  
Frances P. Venable Fellowship, University of North Carolina at Chapel Hill, 2001.  
Office of Undergraduate Research Award, University of Central Florida, 2000.  
Analytical Chemistry Award, University of Central Florida, 2000.  
Physical Chemistry Award, University of Central Florida, 2000.

## Other Professional Activities

- Guest Editor: *Journal of Physical Chemistry* Virtual Special Issue on the 75<sup>th</sup> International Symposium on Molecular Spectroscopy, 2020.
- Chair: International Advisory Committee to the *International Symposium on Molecular Spectroscopy*, 2019-2020
- Chair: Coblentz Award Committee, *Coblentz Society*, 2017.
- Member: Committee to review the *Journal of Chemical Physics*. November 27-28, 2017.
- Member: Committee of Visitors for the Division of Chemical Sciences, Biosciences and Geosciences. Basic Energy Sciences, US-DOE. March 27-30, 2017
- Member: Independent Review of the HPIR Venture, Savannah River National Laboratory. June 29, 2017.
- Chair: *Northeast Georgia Section of the American Chemical Society*, 2016.
- Chair: Rao Prize Committee, *International Symposium on Molecular Spectroscopy*, 2014-2019.
- Member: Education Committee, *Coblentz Society*, 2012-2013.
- Rao Prize Judge: *International Symposium on Molecular Spectroscopy*, 2007-present

### International Advisory Boards:

1. *Cold and Controlled Molecules and Ions Symposium*, 2012-2022.
2. *International Conference on Quantum Fluid Clusters*, 2013-present
3. *International Symposium on Molecular Spectroscopy*, 2014-2022.

### Editorial Boards:

1. Editorial Board of the *Journal of Molecular Spectroscopy*, 2014-2017.
2. Editorial Advisory Board, *Journal of Physical Chemistry Letters*, 2015-2017.
3. Editorial Advisory Board, *Journal of Physical Chemistry*, 2020-present

Symposium/Meeting Organizer:

1. 67<sup>th</sup> International Symposium on Molecular Spectroscopy, Columbus, OH. June 17-22, 2012. Co-organizer (David T. Anderson, University of Wyoming) of the mini symposium: *Cold Quantum Systems*.
2. 2016 Molecular and Ionic Cluster Gordon Research Conference, Vice co-Chair.
3. 2018 Molecular and Ionic Cluster Gordon Research Conference, co-Chair.
4. 2018 Conference on Cold and Controlled Molecules and Ions, Chair.
5. 2022 International Conference on Quantum Fluid Clusters, co-Chair.
6. 2024 37<sup>th</sup> International Symposium on Free Radicals, Chair.

Session Chair:

1. "Cold Collisions." XXI Dynamics of Molecular Collisions Meeting, Snowbird, UT. July 5-10, 2009.
2. "Matrix and Condensed Phase" 65<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy, Columbus, OH. June 21-25, 2010.
3. "Radicals and Ions" 66<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy, Columbus, OH. June 20-24, 2011.
4. "Cold Quantum Systems" 67<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy, Columbus, OH. June 17-22, 2012.
5. "Cold/Ultracold/Matrices/Droplets" 70<sup>th</sup> International Symposium on Molecular Spectroscopy, Urbana-Champaign, IL. June 22-26, 2015.
6. "Vibrational structure/frequencies" 71<sup>st</sup> International Symposium on Molecular Spectroscopy, Urbana-Champaign, IL. June 20-24, 2016.
7. "Ions" 74<sup>th</sup> International Symposium on Molecular Spectroscopy, Urbana-Champaign, IL. June 17-21, 2019.
8. "Condensed Phase and Poster Session A" 35<sup>th</sup> International Symposium on Free Radicals, Hangzhou, China. September 16-20, 2019.

Collaborations:

Dr. C. Michael Lindsay, Air Force Research Laboratories, Eglin AFB, FL., 2008-2014  
"Laser Spectroscopy of Energetic Materials Synthesized in Helium Nanodroplets"

Dr. Andrey Vilesov, University of Southern California, 2010, "Infrared spectroscopy of HCl-H<sub>2</sub>O clusters in helium nanodroplets"; 2013, "Infrared Spectra in the 3  $\mu\text{m}$  region of ethane and ethane clusters in He droplets"

Dr. Sotiris S. Xantheus, PNNL, 2011-2016. "Non-Equilibrium growth of non-cyclic water clusters in helium nanodroplets"

Dr. Henry F. Schaefer III, University of Georgia, 2012-present. "Spectroscopy of hydrocarbon radicals in helium nanodroplets"

Dr. Mark D. Marshall, Amherst College, 2012-2014. "Spectroscopic implications of unquenched electronic angular momentum in open shell complexes solvated in liquid helium"

Dr. Stephen J. Klippenstein, Argonne National Lab, 2013, “The Propargyl + O<sub>2</sub> reaction in helium droplets: entrance channel barrier or not?”

Dr. Jerry A. Boatz and Dr. Steven D. Chambreau, Air Force Research Laboratories, Edwards AFB, CA., 2013, “Helium Nanodroplet Isolation and Infrared Spectroscopy of the Isolated Ion- Pair 1-ethyl-3-methylimidazolium bis(trifluoromethylsulfonyl)imide”

Dr. Wesley D. Allen, University of Georgia, 2013-2014. “Dipole Moment of the HOOO Radical: Resolution of a Structural Enigma”

Dr. John F. Stanton, University of Florida, 2013-2015. “Capture of Hydroxymethylene in Helium Droplets: High-Resolution Rovibrational Laser Spectroscopy”

Dr. Anne McCoy, University of Washington, 2014-2016. “Stark and Zeeman Spectroscopy of the OH-CO radical”

Dr. Edwin Sibert, University of Wisconsin, 2016 “Anharmonic interactions in the Propyl Radical”

Dr. Hua Guo, University of New Mexico, 2016 “Three-centered two-electron bonding in halogen containing molecular complexes”

Dr. Heather Lewandowski, JILA CU-Boulder, 2016-present “Laser Spectroscopy of Clusters produced in Cryogenic Buffer Gas Beams”

Dr. Yuan-Pern Lee, Academia Sinica, Taiwan, 2017-present “Spectroscopy of Alkyl Radicals in Helium Droplets and Solid *para*-Hydrogen”

Dr. Michael A. Duncan, University of Georgia, 2008-present “Spectroscopy of Molecular Ions in the Gas-Phase and in Helium Droplets”

Dr. Paul L. Raston, James Madison University, 2020-present “Synchrotron-based FIR Spectroscopy of Complex Organic Molecules”

Journal Referee:

*Journal of Physical Chemistry, Journal of Chemical Physics, Chemical Physics, Physical Chemistry Chemical Physics (PCCP), Chemical Physics Letters, European Physical Journal D, Reviews of Scientific Instruments, Journal of Molecular Spectroscopy, Journal of the American Chemical Society, Frontiers in Chemistry, Advanced Materials, RSC Advances, ChemPhysChem, Astrophysical Journal*

Proposal Review:

National Science Foundation, Department of Energy: Office of Science, American Chemical Society: Petroleum Research Fund, Louisiana Board of Regents, Austrian Science Fund (FWF),

## Biography

Gary E. Douberly received a B.S. degree in chemistry from the University of Central Florida in 2000. He received a Ph.D. in physical chemistry from the University of North Carolina at Chapel Hill in 2006 under the direction of Roger E. Miller and Tomas Baer. Following postdoctoral work with Michael A. Duncan at the University of Georgia, he began his faculty appointment at the University of Georgia in 2008. He was promoted to full Professor in 2018. Professor Douberly has received the CAREER award from the National Science Foundation, the Early Career Award from the Department of Energy Office of Science, the Presidential Early Career Award for Scientists and Engineers (PECASE) from the White House Office of Science and Technology Policy, a JILA Visiting Fellowship, and the Journal of Physical Chemistry Lectureship Award. Most recently, Gary received the Coblenz Memorial Award from the Coblenz Society recognizing advancements in the field of Molecular Spectroscopy by a scientist under the age of 40. In 2019, Douberly was appointed the Head of the Department of Chemistry at the University of Georgia. Following three and a half years serving in this role, he was appointed as Associate Dean of the UGA Franklin College of Arts and Sciences, wherein his assignments are focused on Industry Engagement, Research and Instructional Facilities, and leadership within the Division of Biological Sciences.

## Research Focus

The Douberly research group has made significant contributions to the development of spectroscopic techniques designed for the helium nanodroplet isolation method. They have employed this methodology to address a diverse set of fundamental problems in chemical physics. The low temperature (0.4 K) and rapid cooling associated with helium droplets provides a perfectly suited medium to isolate and spectroscopically probe transient species, such as molecular radicals and carbenes. Reactants sequentially added to helium droplets are often stabilized in high-energy, metastable configurations on the potential energy surface. Single and double resonance infrared (IR) laser spectroscopic techniques are used to probe the structural and dynamical properties of these systems, often with sufficiently high resolution to resolve rotational fine structure.

Continuous, effusive pyrolysis sources of molecular radicals and carbenes have been optimized for doping helium nanodroplets, and several spectroscopic studies have been reported which describe the fundamental chemical physics of helium-solvated small radicals and carbenes. The methyl,<sup>1</sup> ethyl,<sup>2</sup> vinyl,<sup>3</sup> propargyl,<sup>4</sup> allyl<sup>5</sup> and hydroxyl<sup>6</sup> radicals have been probed, as have the hydroxycarbene<sup>7</sup> and dihydroxycarbene<sup>8</sup> systems. These reports provided fundamental insights into the spectroscopy of these species and the interactions of these systems with the helium environment. Rotational and vibrational state-dependent line broadening,<sup>1-3</sup> dynamically-induced anomalous lambda doubling,<sup>6,9</sup> and the solvent effect on tunneling dynamics<sup>3</sup> are examples of the fundamental chemical physics that have been probed in these studies. Moreover, recent Stark spectroscopy measurements of hydrogen bonded complexes involving the hydroxyl radical (OH-C<sub>2</sub>H<sub>2</sub>, OH-C<sub>2</sub>H<sub>4</sub>, and OH-H<sub>2</sub>O) have been interpreted via spectroscopic models developed by

Douberly, which employ the spherical tensor operator formalism to account for the Stark effect in molecules possessing partially quenched electronic angular momentum.<sup>10,11</sup>

The Douberly group has leveraged the sequential pick-up technique developed by Scoles to investigate the mechanisms associated with several key elementary atmospheric and combustion reactions carried out inside low temperature helium droplets. The rationale for these studies is that spectroscopic measurements carried out downstream from the pick-up zones are capable of identifying the structural configuration of key intermediates along the reaction path, along with the associated product branching ratios. The outcome of low temperature reactions involving hydrocarbon radicals and O<sub>2</sub>,<sup>4,5,12</sup> or the hydroxyl radical (OH) and O<sub>2</sub>,<sup>13</sup> have been probed with this methodology. For example, a series of studies on the OH + O<sub>2</sub> helium-mediated reaction revealed the barrierless formation of *trans*-HOOO,<sup>13-15</sup> which was inconsistent with theoretical studies that had predicted a large entrance channel barrier above the reactant asymptote. Higher level multireference configuration interaction computations of this system carried out by others confirmed the barrierless reaction path implied by Douberly's experiments. IR laser Stark spectroscopy of *trans*-HOOO revealed inertial components of the permanent electric dipole moment that were inconsistent with computations at the equilibrium geometry, consistent with a floppy species undergoing large-amplitude torsional motion.<sup>15</sup> These experimental dipole components provided a stringent benchmark for theoretical computations of the ground state wavefunction, which eventually resulted in definitive computations of the dissociation energy and atmospheric abundance of this species.<sup>15</sup>

Measurements have been reported in which dipeptides,<sup>16</sup> ionic liquids<sup>17</sup> or mixed acid-water clusters<sup>17,18</sup> are assembled within helium droplets. A two-stage oven source was developed which allowed for high-precision measurements of the gas-phase interconversion thermodynamics of the model di-peptide N-acetylglycine methylamide.<sup>16</sup> Polarization spectroscopy of the ionic liquid 1-Ethyl-3-methylimidazolium bis(trifluoromethylsulfonyl)imide revealed a dipole moment of ~12 Debye, confirming definitively that these types of systems evaporate as intact ion-pairs.<sup>17</sup> IR laser spectroscopy was used to probe the evolution of the spectral signatures associated with the formation and trapping of non-equilibrium (HCl)<sub>n</sub>-(H<sub>2</sub>O)<sub>m</sub> cluster geometries.<sup>18,19</sup> This study was reported in collaboration with Andrey Vilesov and provided critical insights into controversial previous measurements of the onset of acid ionization in small acid-water clusters. More recently, a paper on the formation of exotic hydrogen-bonded water networks in helium droplets was published in the *Journal of the American Chemical Society*.<sup>20</sup> The range of systems studied during Douberly's independent career is both a testament to the versatility of the helium droplet method and the creativity of his research group.

1. Morrison, A.M.; Raston, P.L.; Douberly, G.E., "Rotational relaxation dynamics of the methyl radical in helium nanodroplets" *Journal of Physical Chemistry A*, (2013), 117, 11640-11647.

2. Raston, P.L.; Agarwal, J.; Turney, J.M.; Schaefer, III H.F.; Douberly, G.E., "The Ethyl radical in superfluid helium nanodroplets: Rovibrational spectroscopy and ab initio computations" *Journal of Chemical Physics*, (2013), 138, 194303.
3. Raston, P.L.; Liang, T.; Douberly, G.E., "Infrared spectroscopy and tunneling dynamics of the vinyl radical in  $^4\text{He}$  Nanodroplets" *Journal of Chemical Physics*, (2013), 138, 174302.
4. Moradi, C.P.; Morrison, A.M.; Klippenstein, S.J.; Goldsmith, C.F.; Douberly, G.E., "The propargyl +  $\text{O}_2$  reaction in helium droplets: entrance channel barrier or not?" *Journal of Physical Chemistry A*, (2013), 117, 13626-13635.
5. Leavitt, C.M.; Moradi, C.P.; Acrey, B.W.; Douberly, G.E., "Infrared laser spectroscopy of the helium-solvated allyl and allyl peroxy radicals" *Journal of Chemical Physics*, (2013), 139, 234301.
6. Raston, P.L.; Liang, T.; Douberly, G.E., "Anomalous  $\Lambda$ -doubling in the infrared spectrum of the hydroxyl radical in helium nanodroplets" *Journal of Physical Chemistry A*, (2013), 117, 8103-8110.
7. Leavitt, C.M.; Moradi, C.P.; Stanton, J.F.; Douberly, G.E., "Communication: Helium Nanodroplet Isolation and Rovibrational Spectroscopy of Hydroxymethylene" *Journal of Chemical Physics*, (2014), 140, 171102.
8. Broderick, B.M.; McCaslin, L.; Moradi, C.P.; Stanton, J.F.; Douberly, G.E. "Reactive Intermediates in  $^4\text{He}$  Nanodroplets: Infrared Laser Stark Spectroscopy of Dihydroxycarbene" *Journal of Chemical Physics*, (2015), 142, 144309.
9. Raston, P.L.; Liang, T.; Douberly, G.E., "Observation of the  $Q(3/2)$   $\Lambda$ -doublet transitions for  $X^2\Pi_{3/2}$  OD in Helium Nanodroplets" *Molecular Physics*, (2014), 112, 301-303.
10. Moradi, C.P.; Douberly, G.E.; "On the Stark effect in open shell complexes exhibiting partially quenched electronic angular momentum: Infrared laser Stark spectroscopy of OH- $\text{C}_2\text{H}_2$ , OH- $\text{C}_2\text{H}_4$ , and OH- $\text{H}_2\text{O}$ " *Journal of Molecular Spectroscopy*, (2015), 314, 54-62.
11. Hernandez, F.J.; Brice, J.T.; Leavitt, C.M.; Liang, T.; Raston, P.L.; Pino, G.A.; Douberly, G.E. "Mid-Infrared Signatures of Hydroxyl Containing Water Clusters: Infrared Laser Stark Spectroscopy of OH- $\text{H}_2\text{O}$  and OH( $\text{D}_2\text{O}$ ) $_n$  ( $n=1-3$ )" *Journal of Chemical Physics*, (2015), 143, 164304.
12. Morrison, A.M.; Agarwal, J.; Schaefer, III H.F.; Douberly, G.E., "Infrared laser spectroscopy of the  $\text{CH}_3\text{OO}$  radical formed from the reaction of  $\text{CH}_3$  and  $\text{O}_2$  within a helium nanodroplet" *Journal of Physical Chemistry A*, (2012), 116, 5299-5304.
13. Raston, P.L.; Liang, T.; Douberly, G.E., "Infrared spectroscopy of HOOO and DOOO in  $^4\text{He}$  nanodroplets" *Journal of Chemical Physics*, (2012), 137, 184302.

14. Liang, T.; Raston, P.L.; Douberly, G.E., "Helium nanodroplet isolation spectroscopy and ab initio calculations of HO<sub>3</sub>-(O<sub>2</sub>)<sub>n</sub> clusters" *ChemPhysChem*, (2013), 14, 764-770.
15. Liang, T.; Magers, D.B.; Raston, P.L.; Allen, W.D.; Douberly, G.E., "Dipole moment of the HOOO radical: Resolution of a structural enigma" *Journal of Physical Chemistry Letters*, (2013), 4, 3584-3589.
16. Leavitt, C.M.; Moore, K.B.; Raston, P.L.; Agarwal, J.; Moody, G.H.; Shirley, C.C.; Schaefer, H.F.; Douberly, G.E. "Liquid Hot NAGMA Cooled to 0.4 Kelvin: Benchmark Thermochemistry of a Gas-Phase Peptide" *Journal of Physical Chemistry A*, (2014), 118, 9692-9700.
17. Obi, E.I.; Leavitt, C.M.; Raston, P.L.; Moradi, C.P.; Flynn, S.D.; Vaghjiani, G.L.; Boatz, J.A.; Chambreau, S.D.; Douberly, G.E., "Helium Nanodroplet Isolation and Infrared Spectroscopy of the Isolated Ion- Pair 1-ethyl-3-methylimidazolium bis(trifluoromethylsulfonyl)imide" *Journal of Physical Chemistry A*, (2013), 117, 9047-9056.
18. Flynn, S.D.; Skvortsov D.; Morrison, A.M.; Liang, T.; Choi, M.Y.; Douberly, G.E.; Vilesov, A.F., "Infrared spectra of HCl-H<sub>2</sub>O clusters in helium nanodroplets" *Journal of Physical Chemistry Letters*, (2010), 1, 2233-2238.
19. Morrison, A.M.; Flynn, S.D.; Liang, T.; Douberly, G.E., "Infrared spectroscopy of (HCl)<sub>m</sub>(H<sub>2</sub>O)<sub>n</sub> clusters in helium nanodroplets: Definitive assignments in the HCl stretch region" *Journal of Physical Chemistry A*, (2010), 114, 8090-8098.
20. Douberly, G.E.; Miller, R.E.; Xantheas, S.S. "Formation of Exotic Networks of Water Clusters in Helium Droplets Facilitated by the Presence of Neon Atoms" *Journal of the American Chemical Society*, (2017), 139, 4152-4156.

## Research Funding

### Completed

University of Georgia Research Foundation, \$8,925 "Vibrational Spectroscopy of Transient Combustion Intermediates Trapped in Helium Nanodroplets," 1/1/10 to 12/31/10. (1164)  
PI: Douberly

Air Force Research Laboratory, Munitions Directorate (AFRL/RWME), \$65,000  
"Automation of an Optical Parametric Oscillator for the Characterization of Energetic Materials Synthesized in Helium Nanodroplets," 8/1/10 to 7/31/11. (FA8651-10-C-0272)  
PI: Douberly

American Chemical Society Petroleum Research Fund, \$100,000 "Vibrational Spectroscopy of Transient Combustion Intermediates Trapped in Helium Nanodroplets," 9/1/10 to 8/31/12. (PRF No. 50223-DNI6)  
PI: Douberly



National Science Foundation, (CSDM), \$618,505 “CAREER: Using Helium Nanodroplets to Probe the Structure and Thermochemistry of Biomolecular Building Blocks” 1/15/11 to 12/31/15. (CHE-1054742)

PI: Douberly

Department of Energy, Office of Science, Early Career Research Program, \$750,000 "Vibrational Spectroscopy of Transient Combustion Intermediates Trapped in Helium Nanodroplets," 7/1/12 to 6/30/17. (DE-FG02-12ER16298)

PI: Douberly

United States Air Force, Education Partnership Agreement, \$443,500 “Infrared Optical Parametric Oscillator for Infrared-Infrared Double Resonance Experiments using Beams of Helium Nanodroplets,” 5/1/2018. (USAF EPA Number 18-136-RW-01)

PI: Douberly

National Science Foundation, (CSDM-A), \$436,406 “Helium Droplet Spectroscopy of Atmospherically Significant Reaction Intermediates” 5/1/17 to 4/30/20. (CHE-1664637)

PI: Douberly

Department of Energy, Office of Science, Basic Energy Sciences, Gas-Phase Chemical Physics Program (GPCP), \$799,100 “Theoretical and Experimental Studies of Elementary Hydrocarbon Species and Their Reactions,” 12/1/17 to 11/30/20. (DE-SC0018412)

PI: Douberly; co-PI: Henry F. Schaefer (UGA)

American Chemical Society Petroleum Research Fund, \$110,000 “High Resolution Spectroscopy of Metal Oxide Clusters,” 9/1/19 to 8/31/21. (PRF No. 60510-ND6)

PI: Heather Lewandowski (CU-Boulder); co-PI: Douberly

### Active

Department of Energy, Office of Science, Basic Energy Sciences, Gas-Phase Chemical Physics Program (GPCP), \$827,074 “Theoretical and Experimental Studies of Elementary Hydrocarbon Species and Their Reactions,” 12/1/20 to 5/31/24. (DE-SC0018412)

PI: Douberly; co-PI: Henry F. Schaefer (UGA)

### Pending

Department of Energy, Office of Science, Basic Energy Sciences, Gas-Phase Chemical Physics Program (GPCP), \$924,000 “Theoretical and Experimental Studies of Elementary Hydrocarbon Species and Their Reactions,” 6/1/24 to 5/31/27. (DE-SC0018412)

PI: Douberly; co-PI: Henry F. Schaefer (UGA) **Recommended for Funding on 5/15/24.**

## Invited Lectures

1. “Infrared laser spectroscopy of metal atom adsorbate systems solvated and attached to helium nanodroplets” Roger E. Miller Memorial Symposium. Chapel Hill, NC. October 6-8, 2006.
2. “Synthesis of metastable/energetic metal nanoparticles within liquid helium droplets,” Eglin Air Force Base, Munitions Research Laboratory, December 12, 2006.
3. “Helium nanodroplet isolation spectroscopy (HENDI): The marriage between molecular beam and matrix isolation spectroscopy” University of Georgia, Physical Chemistry Seminar. Athens, GA. January 12, 2007.
4. “Infrared and computational studies of small carbocations” American Chemical Society National Meeting. New Orleans, LA. April 6, 2008.
5. “Infrared spectroscopy of size-selected gas phase carbocations” University of Alberta. Edmonton, Alberta. August 6, 2008.
6. “Liquid helium droplet nanoreactors: Chemistry near absolute zero” Centre College, Danielsville, KY. April 7, 2009.
7. “Liquid helium droplet nanoreactors: Chemistry near absolute zero” Georgetown College, Georgetown, KY. April 8, 2009.
8. “Liquid helium droplet nanoreactors: Chemistry near absolute zero” Berea College, Berea, KY. April 9, 2009.
9. “Spectroscopy of molecular clusters in 0.4 kelvin helium nanodroplets” Kyoto Workshop on Cold Atoms and Molecules, Kyoto, Japan. June 23-26, 2009.
10. “Thermochemistry of cytosine tautomers with  $\pm 0.1$  kcal/mol accuracy” University of Georgia, Physical Chemistry Seminar. Athens, GA. September 11, 2009.
11. “Liquid helium droplet nanoreactors: Chemistry near absolute zero” East Tennessee State University, Johnson City, TN. October 16, 2009.
12. “Spectroscopy of molecular clusters in 0.4 Kelvin helium nanodroplets” University of Georgia, Department of Physics Colloquium. Athens, GA. November 12, 2009.
13. “Liquid helium droplet nanoreactors: Chemistry near absolute zero” Armstrong Atlantic State University, Savannah, GA. March 5, 2010.

14. "Spectroscopy of molecular clusters in 0.4 Kelvin helium nanodroplets" American Chemical Society National Meeting. San Francisco, CA. March 24, 2010.
15. "Infrared spectroscopic studies of protonated polycyclic aromatic hydrocarbons (H<sup>+</sup>PAHs) and their relevance for the unidentified infrared bands" A Workshop of the Southeast Laboratory Astrophysics Community: Dust and Ice: Their Roles in Astrophysical Environments. University of Georgia, Athens, GA. March 30-April 1, 2010.
16. "Spectroscopy and reactions of hydrocarbon radicals in 0.4 Kelvin helium nanodroplets" 41<sup>st</sup> Annual Meeting of the American Physical Society Division of Atomic, Molecular, and Optical Physics (DAMOP). May 29, 2010.
17. "Biophysical chemistry in helium nanodroplets: exploring fundamental interactions at play in biochemistry" Albany State University, Atlanta, GA. August 31, 2010.
18. "Spectroscopy of molecular clusters in 0.4 Kelvin helium nanodroplets" University of Florida, Gainesville, FL. September 14, 2010.
19. "Spectroscopy of molecular clusters in 0.4 Kelvin helium nanodroplets" James Madison University, Harrisonburg, VA. January 14, 2011.
20. "Rovibrational spectroscopy of aluminum carbonyl clusters in helium nanodroplets" University of North Carolina at Chapel Hill, Chapel Hill, NC. April 21, 2011.
21. "Rovibrational spectroscopy of aluminum carbonyl clusters in helium nanodroplets" Emory University, Atlanta, GA. April 25, 2011.
22. "An introduction to optical parametric oscillators," Eglin Air Force Base, Munitions Research Laboratory, May 5, 2011.
23. Hot Topic Talk. "Rovibrational spectroscopy of aluminum carbonyl clusters in helium nanodroplets" 482<sup>nd</sup> Heraeus Seminar: *Helium Nanodroplets – Confinement for Cold Molecules and Cold Chemistry*. Bad Honnef, Germany. May 29 to June 1, 2011.
24. "Spectroscopy and Dynamics of Molecular Clusters in 0.4 Kelvin Helium Nanodroplets" XXII *Dynamics of Molecular Collisions* Meeting, Snowbird, UT. July 10-15, 2011.
25. Hot Topic Talk. "Spectroscopy and Dynamics of Open Shell Molecular Clusters in 0.4 K Helium Nanodroplets" 31<sup>st</sup> *International Symposium on Free Radicals*. Port Douglas, Australia. July 24 to July 29, 2011.

26. "Spectroscopy of Transient Species in Helium Droplets" University of Southern California, Los Angeles, CA. September 12, 2011.
27. "Hydrocarbon Radical Reactions in Helium Nanodroplets" 2012 Gordon Research Conference on *Molecular and Ionic Clusters*. Ventura, CA. January 29 to February 2, 2012.
28. "Spectroscopy of Molecular Clusters in 0.4 Kelvin Helium Nanodroplets" University of North Carolina at Greensboro, Greensboro, NC. February 10, 2012.
29. "Radical Containing Complexes and Radical-Radical Reactions in Helium Nanodroplets" Purdue University, West Lafayette, IN. April 4, 2012.
30. "Radical Containing Complexes and Radical-Radical Reactions in Helium Nanodroplets" Marquette University, Milwaukee, WI. April 6, 2012.
31. "Radical Containing Complexes and Radical-Radical Reactions in Helium Nanodroplets" University of Wisconsin, Madison, WI. April 9, 2012.
32. "Radical Containing Complexes and Radical-Radical Reactions in Helium Nanodroplets" Rowland Institute at Harvard, Cambridge, MA. May 11, 2012.
33. "The Formation of Clusters Containing the Hydroxyl Radical and (O<sub>2</sub>)<sub>n</sub> in Helium Nanodroplets: Experiment and Theory" *Southeast Theoretical Chemistry Association (SETCA) Annual Meeting*. Center for Computational Chemistry, University of Georgia, Athens, GA. May 17-19, 2012.
34. "Radical Containing Clusters in Helium Nanodroplets" *Aggregation of Small Molecules - from Dimers to Crystals*. Ruhr Universität, Bochum, Germany. May 29-31, 2012.
35. "The Formation and Spectroscopy of OH and HO<sub>n</sub> in Helium Nanodroplets" Telluride Workshop on *Spectroscopy and Dynamics on Multiple Potential Energy Surfaces*. Telluride, CO. July 9-13, 2012.
36. "Metastable Clusters in Helium Nanodroplets" 2012 Gordon Research Conference on *Atomic and Molecular Interactions*. Stonehill College, Easton, MA. July 15-20, 2012.
37. "Radical Containing Complexes and Radical-Radical Reactions in Helium Nanodroplets" The Ohio State University, Columbus, OH. September 17, 2012.
38. "Radical Containing Complexes and Radical-Radical Reactions in Helium Nanodroplets" University of Kentucky, Lexington, KY. September 21, 2012.
39. "High Resolution Laser Spectroscopy of Radical Containing Complexes and Radical-Radical Reaction Products in Helium Nanodroplets" 14<sup>th</sup> Edition of the

- Conference on the Stereodynamics of Chemical Reactions*. Paris, France. October 22-26, 2012.
40. “Radical Containing Complexes and Radical-Radical Reactions in Helium Nanodroplets” University of Wyoming, Laramie, WY. February 7, 2013.
  41. “Radical Containing Complexes and Radical-Radical Reactions in Helium Nanodroplets” University of Colorado, Boulder, CO. February 8, 2013.
  42. “Radical Containing Complexes and Radical-Radical Reactions in Helium Nanodroplets” University of Texas at Austin, Austin, TX. February 28, 2013.
  43. “Radical Containing Complexes and Radical-Radical Reactions in Helium Nanodroplets” University of West Florida, Pensacola, FL. March 29, 2013.
  44. “Radical Containing Complexes and Radical-Radical Reactions in Helium Nanodroplets” Lehigh University, Bethlehem, PA. April 17, 2013.
  45. “High-Resolution Stark Spectroscopy of OH Containing Complexes in Helium Nanodroplets” Center for Free-Electron Laser Science (CFEL) Deutsches Elektronen-Synchrotron (DESY), Hamburg, Germany. June 14, 2013.
  46. “High-Resolution Stark Spectroscopy of OH Containing Complexes in Helium Nanodroplets” *Quantum Fluid Clusters* 2013, Regensburg, Germany. June 16-19, 2013.
  47. “High-Resolution Stark Spectroscopy of OH Containing Complexes in Helium Nanodroplets” Fritz Haber Institute, Berlin, Germany. June 21, 2013.
  48. “Chemistry Near Absolute Zero: Spectroscopy of Reactive Molecules in Helium Nanodroplets” University of Mississippi, Oxford, MS. July 1, 2013.
  49. “Stark Spectroscopy and the Vibrational Dynamics of Hydridotrioxigen (HOOO)” Telluride Workshop on *Vibrational Dynamics*. Telluride, CO. July 21-26, 2013.
  50. “Helium Nanodroplet Isolation of Hydrocarbon Radicals” Telluride Workshop on *Radicals in the Rockies*. Telluride, CO. July 21-26, 2013.
  51. “High-Resolution Stark Spectroscopy of OH Containing Complexes in Helium Nanodroplets” The 23<sup>rd</sup> *Colloquium on High-Resolution Molecular Spectroscopy*, Budapest, Hungary. August 25-30, 2013.
  52. “High-Resolution Stark Spectroscopy of OH Containing Complexes in Helium Nanodroplets” *SASP XIX* 2014, Obergurgl, Austria. February 9-14, 2014.
  53. *Frontiers of Spectroscopy* Lecture Series, Ohio State University, Columbus, OH. March 26-28, 2014.

54. “Helium Nanodroplet Isolation of Hydroxymethylene: The Formose Reaction at 0.4 K” Hot Topic talk: 2014 Gordon Research Conference on *Molecular and Ionic Clusters*. Lucca (Barga), Italy. April 27 to May 2, 2014.
55. “Molecular Radical Reactions and Carbene Chemistry at 0.4 Kelvin: High-Resolution Rovibrational Spectroscopy of Pre-Reactive Complexes and Transient Intermediates” *Reaction Mechanisms 2014*, UC-Davis, CA. June 22-25, 2014.
56. “Infrared Rovibrational Spectroscopy of OH-C<sub>2</sub>H<sub>2</sub> in <sup>4</sup>He Nanodroplets: Parity Splittings due to Partially Quenched Electronic Angular Momentum” Telluride Workshop on *Spectroscopy and Dynamics on Multiple Potential Energy Surfaces*. Telluride, CO. July 7-11, 2014.
57. “Dipole Moment of the HOOO Radical: Resolution of a Structural Enigma” *Journal of Physical Chemistry A. Lecture*. American Chemical Society National Meeting. San Francisco, CA. August 12, 2014.
58. “Molecular Radical Reactions and Carbene Chemistry at 0.4 Kelvin: High-Resolution Rovibrational Spectroscopy of Pre-Reactive Complexes and Transient Intermediates” Texas A&M University, College Station, TX. November 4, 2014.
59. “Laser Spectroscopy of Reactive Intermediates in Superfluid Helium Droplets” University of Auburn, Auburn, AL. January 29, 2015.
60. “Vibrational Spectroscopy of Transient Combustion Intermediates in Helium Nanodroplets” 35<sup>th</sup> Annual Combustion Research Meeting, U.S. Department of Energy Office of Basic Energy Sciences, Potomac, MD. May 29, 2015
61. “Chemical Reactions in Helium Droplets: Past Successes and Future Prospects” X<sup>th</sup> international conference on *Quantum Fluid Clusters*. Toulouse, France. June 7-11, 2015.
62. Laser Spectroscopy of Radicals, Carbenes, and Ions in Superfluid Helium Droplets, *Coblentz Award Lecture. 70<sup>th</sup> International Symposium on Molecular Spectroscopy*. Champaign-Urbana, IL. June 21-26, 2015.
63. “Stark and Zeeman Spectroscopy of Open Shell Molecular Complexes in Helium Nanodroplets” *Defining New Directions in Cold Chemical Physics Workshop*. JILA, Boulder, CO. July 8-10, 2015.
64. “Bimolecular Reactions in Helium Droplets” 25<sup>th</sup> *Dynamics of Molecular Collisions* Meeting. Asilomar, CA. July 12-17, 2015.
65. “Stark and Zeeman Spectroscopy of Open Shell Molecular Complexes in Helium Nanodroplets” 33<sup>rd</sup> *International Symposium on Free Radicals*. Olympic Valley, CA. August 2-7, 2015.

66. “Laser Spectroscopy of Reactive Intermediates in Superfluid Helium Droplets” University of Louisville, Louisville, KY. September 4, 2015.
67. “Helium Nanodroplet Isolation: Past, Present, and Future” Roger E. Miller Symposium. Chapel Hill, NC. October 22-23, 2015.
68. “Laser Spectroscopy of Reactive Intermediates in Superfluid Helium Droplets” University of California at Berkeley, Berkeley, CA. November 3, 2015.
69. “Laser Spectroscopy of Reactive Intermediates in Superfluid Helium Droplets” 2015 *Symposium on Chemical Physics* at the University of Waterloo. Waterloo, Ontario. November 6-8, 2015.
70. “Laser Spectroscopy of Radicals, Carbenes, and Ions in Superfluid Helium Droplets” *Recent Progress in Matrix Isolated Species*, 2015 Pacificchem. Honolulu, Hawaii. December 17-18, 2015.
71. “Laser Spectroscopy of Radicals, Carbenes, and Ions in Superfluid Helium Droplets” 2016 *Cold and Controlled Molecules and Ions* Symposium. Rehovot, Israel. March 13-17, 2016.
72. “Laser Spectroscopy of Reactive Intermediates in Superfluid Helium Droplets” University of California at San Diego, San Diego, CA. April 5, 2016.
73. “Stark and Zeeman Spectroscopy of Open Shell Molecular Complexes in Helium Nanodroplets” JILA, University of Colorado at Boulder, Boulder, CO. June 30, 2016.
74. “Infrared Spectroscopy of Reactive Intermediates in Helium Droplets” 2016 Gordon Research Conference on *Vibrational Spectroscopy*. University of New England, Biddeford, ME. July 17-22, 2016.
75. “Infrared Laser Spectroscopy of Propyl Radicals in Helium Droplets: the Quest for QOOH” Telluride Workshop on *Radicals in the Rockies*. Telluride, CO. August 1-5, 2016.
76. “Stark and Zeeman Spectroscopy of Open Shell Molecular Complexes in Helium Nanodroplets” *Department of Physics Colloquium*, University of Georgia. Athens, GA. September 1, 2016.
77. “Infrared Laser Spectroscopy of Peroxy Radicals in Helium Droplets” 2017 *Pacific Conference on Spectroscopy and Dynamics*. Asilomar, CA. January 19-22, 2017.
78. “Laser Spectroscopy of Reactive Intermediates in Superfluid Helium Droplets” University of California at Davis, Davis, CA. February 21, 2017.

79. “Formation of Exotic Networks of Water Clusters in Helium Droplets Facilitated by the Presence of Neon Atoms” 253<sup>rd</sup> ACS National Meeting. San Francisco, CA. April 2-6, 2017.
80. “New Insights into the Dynamics of Radical-Radical Reactions in Helium Droplets” XI<sup>th</sup> International Conference on *Quantum Fluid Clusters*. Obergurgl, Austria. June 7-9, 2017.
81. “New Insights into the Dynamics of Radical-Radical Reactions in Helium Droplets” *Controllable Quantum Impurities in Physics and Chemistry (CoQIPC)*, Vienna, Austria. August 16-18, 2017.
82. Invited Tutorial Talk. *Spectroscopy of Radicals and Carbenes in Helium Droplets*. Spectroscopy and Dynamics Group Meeting. Durham, UK. January 8-9, 2018.
83. “Bimolecular Oxygen Atom Reactions in Helium Nanodroplets” SASP 2018, Obergurgl, Austria. February 11-16, 2018.
84. “O(<sup>3</sup>P) + Alkene Chemistry in Helium Nanodroplets” ACS National Meeting, New Orleans, LA. March 18-22, 2018.
85. “Spectroscopy of Water Clusters in Helium Droplets” Gordon Research Conference on *Molecular Interactions and Dynamics*, Stonehill College, Easton, MA. July 8-13, 2018.
86. “Sequential Capture of O(<sup>3</sup>P) and Alkenes by Helium Nanodroplets: Infrared Spectroscopy and Ab Initio Computations of the Triplet Biradical Intermediates” *International Symposium on Reactive Intermediates and Unusual Molecules*, ISRIUM, Ascona Switzerland. July 15-20, 2018.
87. Plenary Lecture “Spectroscopy of Molecular Radicals in Helium Droplets” 25<sup>th</sup> *International Conference on High Resolution Molecular Spectroscopy*, Bilbao, Spain. September 3-7, 2018.
88. “Sequential Capture of O(<sup>3</sup>P) and Alkenes by Helium Nanodroplets: Infrared Spectroscopy and Ab Initio Computations of the Triplet Biradical Intermediates” *Southeastern Regional Meeting of the American Chemical Society*, Augusta, GA. November 2, 2018.
89. “Spectroscopy of Molecular Radicals in Helium Droplets” Kennesaw University, Atlanta, GA November 6, 2018.
90. “Spectroscopy of Molecular Radicals in Helium Droplets” Aarhus University, Aarhus, Denmark. November 23, 2018.
91. “Spectroscopy of Molecular Radicals in Helium Droplets” James Madison University, Harrisonburg, VA January 11, 2019.



92. Invited Introductory Lecture “Infrared Spectroscopy of Alkyl Radicals in Helium Droplets and Solid para-Hydrogen” Conference on *Quantum Fluid Clusters*, QFC-2019, Bad Honnef, Germany, May 19-22, 2019.
93. “Theoretical and Experimental Studies of Elementary Hydrocarbon Species and their Reactions” DOE Contractor’s Meeting, Washington, DC. May 30-June 1, 2019.
94. “Infrared Spectroscopy of Alkyl Radicals in Helium Droplets and Solid para-Hydrogen” Telluride Workshop on *Radicals in the Rockies*. Telluride, CO. July 8-12, 2019.
95. “Aggregation in Helium Droplets” 4<sup>th</sup> IRTG CoCo Summer School *Cold Molecules and their Interactions: Theoretical and Experimental Methods*. Kelowna, Canada. July 29 – August 3, 2019.
96. “Infrared Spectroscopy of Alkyl Radicals in Helium Droplets and Solid para-Hydrogen” Allinger Lecture, Department of Chemistry, University of Georgia. August 20, 2019.
97. “Infrared Spectroscopy of Alkyl Radicals in Helium Droplets and Solid para-Hydrogen” Hot Topic talk: *35<sup>th</sup> International Symposium on Free Radicals*. Hangzhou, China. September 15-21, 2019.
98. “Spectroscopy of Molecular Radicals and Ions in Helium Droplets” Gordon Research Conference: *Molecular and Ionic Clusters*. Ventura, CA. January 26-31, 2020.
99. Cancelled or Rescheduled due to Covid-19: “Aggregation in Helium Droplets” Chemistry Department Seminar, College of William and Mary. Williamsburg, VA. March 27, 2020.
100. Cancelled or Rescheduled due to Covid-19: 2020 Conference on *Chemistry and Physics at Low Temperatures*. Visegrad, Hungary. July 5-10, 2020.
101. Cancelled or Rescheduled due to Covid-19: “Zeeman Spectroscopy of OH and OH-C<sub>2</sub>H<sub>2</sub> in Helium Droplets” Telluride Workshop on *Spectroscopy and Dynamics on Multiple Potential Surfaces*. Telluride, CO. July 14-18, 2020.
102. Cancelled or Rescheduled due to Covid-19: Pacifichem 2020, *Structure and function of complex molecular clusters – challenges in theory and experiment*. Honolulu, Hawaii, December 17-18, 2020.
103. “Aggregation in Helium Droplets” University of Central Florida, Orlando, FL November 05, 2021.

104. “Helium Droplet Isolation Infrared Spectroscopy of the Butyl Radicals” *36<sup>th</sup> International Symposium on Free Radicals*. Stockholm, Sweden. July 3-8, 2022.
105. “Aggregation in Helium Droplets” University of Innsbruck, Austria, August 5, 2022.
106. “Aggregation in Helium Droplets” University of Florida, Gainesville, FL November 1, 2022.
107. “Helium Droplet Isolation Infrared Spectroscopy of the Butyl Radicals” *Spring 2023 American Chemical Society National Meeting*. Indianapolis, Indiana. March 27, 2023.
108. “A diatomic molecule in a superfluid helium droplet: Is the anomalous Zeeman splitting a signature of a microscopic Einstein - de Hass effect? *Department of Physics Colloquium*. University of Colorado, Boulder, CO, USA. April 26, 2023.
109. “Helium Droplet Isolation Infrared Spectroscopy of the Butyl Radicals” *New Directions in Cold and Ultracold Chemistry*. Leiden, Netherlands. May 8-12, 2023.

### **Other Lectures and Contributed Papers**

1. Douberly, G.E.; and Matsui, H. “Fabrication of protein tubules using a peptide tubule template” *Particles 2001*. Orlando, FL. February 24-27, 2001.
2. Douberly, G.E.; and Miller, R.E. “Isomers of hydrogen fluoride clusters (HF)<sub>N</sub> (N=4-6) formed in helium nanodroplets” *57<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy*. Columbus, OH. June 17-21, 2002.
3. Douberly, G.E.; Merritt, J.M.; and Miller, R.E. “Infrared-Infrared double resonance spectroscopy of HCCCN solvated in superfluid helium droplets” *58<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy*. Columbus, OH. June 16-20, 2003.
4. Douberly, G.E.; Merritt, J.M.; and Miller, R.E. “Infrared-Infrared double resonance spectroscopy of HCN-HCCH in helium droplets: conformer switching via single mode excitation” *58<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy*. Columbus, OH. June 16-20, 2003.
5. Douberly, G.E.; Merritt, J.M.; and Miller, R.E. “IR-IR double resonance spectroscopy: isomerization dynamics of the linear HCN-HF and bent HF-HCN

- complexes embedded in helium nanodroplets” 59<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 21-25, 2004.
6. Merritt, J.M.; Douberly, G.E.; and Miller, R.E. “Photo-induced chemistry in liquid helium droplets” 228th ACS National Meeting, Philadelphia, PA, August 22-26, 2004.
  7. Douberly, G.E.; Falconer, T.M.; and Miller, R.E. “Infrared laser spectroscopy of the HCN-Sodium complex embedded in a helium nanodroplet” 60<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 20-24, 2005.
  8. Douberly, G.E.; and Miller, R.E. “Infrared laser spectroscopy of dopants in and on helium nanodroplets: rotational and vibrational dynamics” Gordon Research Conference: *Molecular and Ionic Clusters*. Ventura, CA. February 19-24, 2006.
  9. Douberly, G.E.; and Miller, R.E. “The HCN-X (X=Na, K, Rb, Cs) complexes formed on the surface of helium nanodroplets” 61<sup>st</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 19-23, 2006.
  10. Douberly, G.E.; and Miller, R.E. “The HCN-Ca and HCN-Sr complexes formed on the surface of helium nanodroplets: spectroscopic probes of solvation dynamics” 61<sup>st</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 19-23, 2006.
  11. Douberly, G.E.; Ricks, A.M.; Ticknor, B.W.; and Duncan, M.A “Infrared spectroscopy of protonated molecular clusters isolated in the gas phase” Gordon Research Conference: *Gaseous Ions: Structures, Energetics, and Reactions*. Ventura, CA. February 25- March 2, 2007.
  12. Douberly, G.E.; Ticknor, B.W.; Ricks, A.M.; and Duncan, M.A “Infrared spectroscopy of size-selected protonated molecular clusters” 62<sup>nd</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 18-22, 2007.
  13. Douberly, G.E.; Ticknor, B.W.; Ricks, A.M.; and Duncan, M.A “Infrared spectroscopy of  $H^+(C_2H_2)_n$ -Ar and  $H^+(C_2H_4)_n$ Ar (n=1,2)” 62<sup>nd</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 18-22, 2007.
  14. Douberly, G.E.; Ricks, A.M.; Ticknor, B.W.; and Duncan, M.A “Infrared spectroscopy of size-selected carbocations isolated in the gas phase” 29<sup>th</sup>. International Symposium on Free Radicals. Big Sky, MT. August 12-17, 2007.
  15. Douberly, G.E.; Ricks, A.M.; Ticknor, B.W.; and Duncan, M.A “Infrared spectroscopy of size-selected carbocations isolated in the gas phase” Southeast

- Regional Meeting of the American Chemical Society. Greenville, SC. October 27, 2007.
16. Merritt, J.M.; Douberly, G.E.; and Miller, R.E. "Photo-induced isomerization and chemical reaction dynamics in superfluid helium droplets" American Physical Society National Meeting. New Orleans, LA. March 10-14, 2008.
  17. Douberly, G.E. "Alkaline earth metal atom complexes with HCN trapped on/in helium droplets: vibrational excitation induced solvation and desolvation" American Physical Society National Meeting. New Orleans, LA. March 10-14, 2008.
  18. Douberly, G.E.; Ricks, A.M.; and Duncan, M.A. "Infrared spectroscopy of size-selected carbocations I:  $C_3H_3^+$ ,  $C_3H_5^+$ , and  $C_4H_9^+$ " 63<sup>rd</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 16-20, 2008.
  19. Douberly, G.E.; Ricks, A.M.; and Duncan, M.A. "Infrared spectroscopy of size-selected carbocations II:  $C_6H_7^+$ ,  $C_7H_7^+$ , and  $C_7H_9^+$ " 63<sup>rd</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 16-20, 2008.
  20. Ricks, A.M.; Douberly, G.E.; and Duncan, M.A. "Infrared spectroscopy of size-selected protonated molecular clusters:  $(N_2)_nH^+$ ,  $(CO)_nH^+$ , and  $((CH_3)_2CO)_nH^+$ ." 63<sup>rd</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 16-20, 2008.
  21. Douberly, G.E.; Ricks, A.M.; and Duncan, M.A. "Infrared spectroscopy of size-selected carbocations and protonated molecular clusters" Gordon Research Conference: *Molecular and Ionic Clusters*. Aussois, France. September 7-12, 2008.
  22. Douberly, G.E. "Progress towards helium nanodroplet spectroscopy of reactive metal cluster systems" Air Force Office of Scientific Research, 2009 Molecular Dynamics Contractor's Meeting. San Diego, CA. May 17-19, 2009.
  23. Morrison, A.; Douberly, G.E. "Helium nanodroplet spectroscopy using an external cavity quantum cascade laser" 64<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 22-26, 2009.
  24. Ricks, A.M.; Douberly, G.E.; and Duncan, M.A. "Infrared spectroscopy of size-selected protonated molecular clusters:  $(N_2)_2H^+$ ,  $(CO)_2H^+$ , and  $(O_2)_2H^+$ " 64<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 22-26, 2009.
  25. Douberly, G.E. "Spectroscopy of molecular clusters in 0.4 kelvin helium nanodroplets" XXI Dynamics of Molecular Collisions Meeting, Snowbird, UT. July 5-10, 2009.

26. Morrison, A.; Douberly, G.E. "Thermochemistry of small biomolecules in helium droplet nanoreactors" 238<sup>th</sup> ACS National Meeting, Washington, DC. August 16-20, 2009.
27. Morrison, A.M.; Flynn, S.D.; Liang, T.; Douberly, G.E. "Hydrocarbon radicals isolated in helium nanodroplets" 65<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 21-25, 2010.
28. Morrison, A.M.; Flynn, S.D.; Liang, T.; Douberly, G.E. "Stark spectroscopy of CH<sub>3</sub>F solvated in helium nanodroplets" 65<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 21-25, 2010.
29. Flynn, S.D.; Morrison, A.M.; Liang, T.; Douberly, G.E. "Infrared laser spectroscopy of (HCl)<sub>m</sub>-(H<sub>2</sub>O)<sub>n</sub> clusters in helium nanodroplets" 65<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 21-25, 2010.
30. Morrison, A.M.; Liang, T.; Flynn, S.D.; Douberly, G.E. "Spectroscopy and reactions of hydrocarbon radicals in helium nanodroplets" 2010 Molecular and Ionic Clusters Conference. Toukamachi, Niigata, Japan. September 5-10, 2010.
31. Morrison, A.M.; Flynn, S.D.; Liang, T.; Douberly, G.E. "Hydrocarbon radicals isolated in helium nanodroplets" 62<sup>nd</sup> Southeast Regional Meeting of the American Chemical Society (SERMACS) New Orleans, LA. December 1-4, 2010.
32. Flynn, S.D.; Morrison, A.M.; Liang, T.; Douberly, G.E. "Infrared laser spectroscopy of (HCl)<sub>m</sub>-(H<sub>2</sub>O)<sub>n</sub> clusters in helium nanodroplets" 62<sup>nd</sup> Southeast Regional Meeting of the American Chemical Society (SERMACS) New Orleans, LA. December 1-4, 2010.
33. Liang, T.; Morrison, A.M.; Flynn, S.D.; Douberly, G.E. "Infrared laser spectroscopy and *ab initio* calculations of Al-(CO)<sub>n</sub> clusters in helium nanodroplets" 62<sup>nd</sup> Southeast Regional Meeting of the American Chemical Society (SERMACS) New Orleans, LA. December 1-4, 2010.
34. Morrison, A.M.; Liang, T.; Flynn, S.D.; Douberly, G.E. "Spectroscopy and dynamics of non-equilibrium molecular clusters in helium nanodroplets" 482<sup>nd</sup> Heraeus Seminar: Helium Nanodroplets – Confinement for Cold Molecules and Cold Chemistry. Bad Honnef, Germany. May 29 to June 1, 2011.
35. Flynn, S.D.; Morrison, A.M.; Liang, T.; Douberly, G.E. "Non-cyclic isomers of (H<sub>2</sub>O)<sub>4</sub> in helium nanodroplets: infrared spectroscopy and *ab initio* calculations" 66<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 20-24, 2011.
36. Liang, T.; Morrison, A.M.; Flynn, S.D.; Douberly, G.E. "Rovibrational spectroscopy of aluminum carbonyl clusters in helium nanodroplets" 66<sup>th</sup> Ohio

- State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 20-24, 2011.
37. Morrison, A.M.; Douberly, G.E. "Experimental Thermochemistry of gas phase cytosine tautomers" 66<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 20-24, 2011.
  38. Morrison, A.M.; Liang, T.; Douberly, G.E. "Automatic tuning of an Aculight optical parametric oscillator" 66<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 20-24, 2011.
  39. Douberly, G.E. "Hydrocarbon Radical Reactions in Helium Nanodroplets" International Symposium on Free Radicals. Port Douglas, Australia. July 24-29, 2011.
  40. Flynn, S.D.; Douberly, G.E. "Helium Nanodroplet Isolation of Ionic Liquid Vapor: Infrared Laser Spectroscopy of [EMIM][Tf<sub>2</sub>N]" 67<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 17-22, 2012.
  41. Raston, P.L.; Liang, T.; Flynn, S.D.; Morrison, A.M.; Douberly, G.E. "Infrared Spectroscopy of OH and OH-C<sub>2</sub>H<sub>2</sub> embedded in Helium Nanodroplets" 67<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 17-22, 2012.
  42. Morrison, A.M.; Douberly, G.E. "On the Outcome of the Reactions between Hydrocarbon radicals and O<sub>2</sub> in Helium Nanodroplets" 67<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 17-20, 2012.
  43. Liang, T.; Raston, P.L.; Douberly, G.E. "Probing trans-HOOO/DOOO and HOOO-(O<sub>2</sub>)<sub>n</sub> Clusters: A HENDI Approach" 67<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 17-22, 2012.
  44. Liang, T.; Raston, P.L.; Douberly, G.E. "Anomalous Λ-doubling in the infrared spectrum of the hydroxyl radical in helium nanodroplets" 68<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 16-21, 2013.
  45. Liang, T.; Raston, P.L.; Douberly, G.E. "Helium nanodroplet isolation spectroscopy and ab initio calculations of HO<sub>3</sub>-(O<sub>2</sub>)<sub>n</sub> clusters (n=0-4)" 68<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 16-21, 2013.
  46. Raston, P.L.; Liang, T.; Obi, E.I.; Douberly, G.E. "Infrared spectroscopy and tunneling dynamics of the vinyl radical in <sup>4</sup>He Nanodroplets" 68<sup>th</sup> Ohio State

- University International Symposium on Molecular Spectroscopy. Columbus, OH. June 16-21, 2013.
47. Raston, P.L.; Moradi, C.P.; Agarwal, J.; Turney, J.M.; Schaefer, III H.F.; Douberly, G.E. "The Ethyl radical in superfluid helium nanodroplets: rovibrational spectroscopy and ab initio computations" 68<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 16-21, 2013.
  48. Obi, E.I.; Douberly, G.E. "Rovibrational spectroscopy of the OH-O<sub>3</sub> and C<sub>2</sub>H<sub>4</sub>-O<sub>3</sub> complexes in <sup>4</sup>He nanodroplets" 68<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 16-21, 2013.
  49. Moradi, C.P.; Douberly, G.E. "Spectroscopy of the CH<sub>3</sub>-HCl complex in helium nanodroplets" 68<sup>th</sup> Ohio State University International Symposium on Molecular Spectroscopy. Columbus, OH. June 16-21, 2013.
  50. Liang, T.; Raston, P.L.; Douberly, G.E. "Helium Nanodroplet Isolation Spectroscopy and ab initio Computations of HO<sub>3</sub>-(O<sub>2</sub>)<sub>n</sub> Clusters (n=0-4)" Dynamics of Molecular Collisions 2013. Granlibakken, CA. July 7-12, 2013.
  51. Moradi, C.P.; Liang, T.; Raston, P.L.; Douberly, G.E. "Helium Nanodroplet Isolation Spectroscopy and Ab Initio Calculations of HO-(O<sub>2</sub>)<sub>n</sub> Clusters (n=0-5)" International Symposium on Free Radicals. Potsdam, Germany. July 21-26, 2013.
  52. Moradi, C.P.; Liang, T.; Raston, P.L.; Douberly, G.E. "Hydrocarbon Radicals in Superfluid Helium Nanodroplets: Rovibrational Spectroscopy and Ab Initio Calculations" International Symposium on Free Radicals. Potsdam, Germany. July 21-26, 2013.
  53. Leavitt, C.M.; Moradi, C.P.; Stanton, J.F.; Douberly, G.E. "Helium Nanodroplet Isolation and Rovibrational Spectroscopy of Hydroxymethylene" 69<sup>th</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 16-20, 2014.
  54. Liang T.; Raston P.L.; Douberly, G.E. "Infrared Laser Stark Spectroscopy and Ab Initio Computations of the OH-CO complex" 69<sup>th</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 16-20, 2014.
  55. Moradi, C.P.; Leavitt, C.M.; Acrey, B.W.; Douberly, G.E. "Infrared Laser Spectroscopy of the Helium-Solvated Allyl and Allyl Peroxy Radicals" 69<sup>th</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 16-20, 2014.
  56. Leavitt, C.M.; Raston, P.L.; Moody, G.; Shirley, C.; Douberly, G.E. "Vibrational Spectroscopy and Gas-Phase Thermochemistry of the Model Dipeptide N-Acetyl Glycine Methyl Amide" 69<sup>th</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 16-20, 2014.

57. Douberly, G.E.; Moradi, C.P. "On the Stark Effect in Open Shell Complexes Exhibiting Partially Quenched Electronic Angular Momentum" 70<sup>th</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 21-26, 2015.
58. Brice, J.T.; Leavitt, C.M.; Moradi, C.P.; Douberly, G.E.; Hernandez, F.J.; Pino, G.A. "Infrared Laser Spectroscopy and ab initio Computations of OH-(D<sub>2</sub>O)<sub>N</sub> Complexes in Helium Nanodroplets" 70<sup>th</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 21-26, 2015.
59. Moradi, C.P.; Broderick, B.M.; Agarwal, J.; Schaefer, H.F.; Douberly, G.E. "Vibrational-Torsional Coupling Revealed in the Infrared Spectrum of He-Solvated n-Propyl Radical" 70<sup>th</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 21-26, 2015.
60. Leavitt, C.M.; Brice, J.T.; Douberly, G.E.; Hernandez, F.J.; Pino, G.A. "Infrared Laser Stark Spectroscopy of the OH-CH<sub>3</sub>OH Complex Isolated in Superfluid Helium Droplets" 70<sup>th</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 21-26, 2015.
61. Broderick, B.M.; Moradi, C.P.; Douberly, G.E.; McCaslin, L.; Stanton, J.F. "Reactive Intermediates in <sup>4</sup>He Nanodroplets: Infrared Laser Stark Spectroscopy of Dihydroxycarbene" 70<sup>th</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 21-26, 2015.
62. Moradi, C.P.; Douberly, G.E. "Infrared Laser Stark Spectroscopy of the Pre-reactive Cl-HCl Complex Formed in Superfluid <sup>4</sup>He Droplets" 70<sup>th</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 21-26, 2015.
63. Kaufmann, M.; Broderick, B.M.; Douberly, G.E. "Helium Nanodroplet Infrared Spectroscopy of the Tropylium Radical" 70<sup>th</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 21-26, 2015.
64. Broderick, B.M.; Moradi, C.P.; McCaslin, L.; Stanton, J.F.; Douberly, G.E. "Reactive Intermediates in <sup>4</sup>He Nanodroplets: Infrared Laser Stark Spectroscopy of Dihydroxycarbene" 33<sup>rd</sup> International Symposium on Free Radicals. Olympic Valley, CA. August 2-7, 2015.
65. Brice, J.T.; Leavitt, C.M.; Moradi, C.P.; Hernandez, F.J.; Pino, G.A.; Douberly, G.E. "Infrared Laser Spectroscopy and Ab Initio Computations of OH(D<sub>2</sub>O)<sub>N</sub> Complexes in Helium Nanodroplets" 33<sup>rd</sup> International Symposium on Free Radicals. Olympic Valley, CA. August 2-7, 2015.
66. Brice, J.T.; Douberly, G.E. "Mid-infrared signatures of hydroxyl containing water clusters: Infrared laser spectroscopy of OH-H<sub>2</sub>O and OH(D<sub>2</sub>O)<sub>n</sub> (n=1-3)" The 67th Southeastern and 71st Southwest Regional Meeting of the American Chemical Society. Memphis, TN. November 4-7, 2015.



67. Douberly, G.E. “On the Stark effect in open shell complexes exhibiting partially quenched electronic angular momentum” *Developments in Spectroscopic Investigation of Intermolecular Interactions and Dynamics of Molecular Clusters*; 2015 Pacifichem, Honolulu, Hawaii. December 15-16, 2015.
68. Douberly, G.E. “Infrared laser spectroscopy and ab initio computations of OH-(D<sub>2</sub>O)<sub>N</sub> complexes in helium nanodroplets” *Quantum Fluid Clusters*; 2015 Pacifichem, Honolulu, Hawaii. December 19-20, 2015.
69. Brown, A.R.; Broderick, B.M.; Leavitt, C.M.; Moradi, C.P.; Douberly, G.E.; McCaslin, L.; Stanton, J.F. “Reactive Intermediates in He Nanodroplets: Infrared Laser Stark Spectroscopy of Hydroxymethylene, Dihydroxycarbene, and Hydroxymethoxycarbene” Gordon Research Conference on *Molecular and Ionic Clusters*. Ventura, CA. January 17-22, 2016.
70. Brice, J.T.; Moradi, C.P.; Douberly, G.E. “On the Stark and Zeeman Effects in Open Shell Complexes Exhibiting Partially Quenched Electronic Angular Momentum: Infrared Laser Spectroscopy of OH-C<sub>2</sub>H<sub>2</sub>” Gordon Research Conference on *Molecular and Ionic Clusters*. Ventura, CA. January 17-22, 2016.
71. Franke, P.; Brice, J.T.; Leavitt, C.M.; Hernandez, F.J.; Pino, G.A.; Douberly, G.E. “Infrared Spectroscopy of OH·-CH<sub>3</sub>OH: Hydrogen-Bonded Intermediate Along the Hydrogen Abstraction Reaction Path” Gordon Research Conference on *Molecular and Ionic Clusters*. Ventura, CA. January 17-22, 2016.
72. Pullen, G.T.; Moradi, C.P.; Douberly, G.E.; Sibert, E.L. “Infrared Laser Spectroscopy of the *n*-propyl and *i*-propyl Radicals in Helium Droplets: Significant Bend-Stretch Coupling Revealed in the CH stretch Region” Gordon Research Conference on *Molecular and Ionic Clusters*. Ventura, CA. January 17-22, 2016.
73. Moradi, C.P.; Douberly, G.E.; Tabor, D.P.; Sibert, E. “Infrared Laser Spectroscopy of the *n*-propyl and *i*-propyl Radicals in Helium Droplets: Significant Bend-Stretch Coupling Revealed in the CH stretch Region” 71<sup>st</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 20-24, 2016.
74. Brown, A.R.; Brice, J.T.; Douberly, G.E. “Infrared Spectrum of Fulvenallene and Fulvenallenyl” 71<sup>st</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 20-24, 2016.
75. Franke, P.R.; Moradi, C.P.; Kaufmann, M.; Xie, C.; Guo, H.; Douberly, G.E. “Two-center Three-electron Bonding in ClNH<sub>3</sub> revealed via Helium Droplet Infrared Spectroscopy: Entrance Channel Complex along the Cl + NH<sub>3</sub> → ClNH<sub>2</sub> + H Reaction” 71<sup>st</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 20-24, 2016.

76. Douberly, G.E. “Infrared Zeeman Spectroscopy of Radicals in Helium Droplets” 32<sup>nd</sup> Symposium on Chemical Physics. University of Waterloo, Waterloo, Ontario, Canada. November 4-6, 2016.
77. Franke, P.R.; Tabor, D.; Moradi, C.P.; Douberly, G.E.; Agarwal, J.; Schaefer, H.F.; Sibert, E.L. “Infrared Laser Spectroscopy of the *n*-propyl and *i*-propyl Radicals: Stretch-Bend Fermi Coupling in the Alkyl CH Stretch Region” 2017 *Pacific Conference on Spectroscopy and Dynamics*. Asilomar, CA. January 19-22, 2017.
78. Pullen, G.T.; Franke, P.R.; Douberly, G.E.; Lee, Y.P. “Infrared Spectra of the *n*-propyl and *i*-propyl Radicals in Solid Para-Hydrogen” 72<sup>nd</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 19-23, 2017.
79. Brown, A.R.; Franke, P.R.; Douberly, G.E. “Infrared Spectrum of the Cyclobutyl Radical in He Droplets” 72<sup>nd</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 19-23, 2017.
80. Franke, P.R.; Douberly, G.E. “The O<sub>2</sub> + Ethyl Reaction in Helium Nanodroplets: Infrared Spectroscopy of the Ethyl Peroxy Radical” 72<sup>nd</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 19-23, 2017.
81. Bunn, H.; Raston, P.; Douberly, G.E. “Laser Spectroscopy of Vinyl Alcohol Embedded in Helium Droplets” 72<sup>nd</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 19-23, 2017.
82. Brice, J.T.; Douberly, G.E. “O(<sup>3</sup>P) Doped Helium Droplets” 72<sup>nd</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 19-23, 2017.
83. Brown, A.R.; Franke, P.R.; Douberly, G.E. “Infrared Spectrum and Ring-opening Pathway of the Cyclobutyl Radical” 34<sup>th</sup> International Symposium on Free Radicals. Hayama, Japan. August 27 – September 1, 2017.
84. Franke, P.R.; Douberly, G.E. “The Ethyl + O<sub>2</sub> Reaction in Helium Nanodroplets: Infrared Spectroscopy of the Ethyl Peroxy Radical” Gordon Research Conference on *Molecular and Ionic Clusters*. Barga, Italy. February 25 – March 2, 2018.
85. Brown, A.R.; Franke, P.R.; Douberly, G.E. “Infrared Spectrum and Ring-opening Pathway of the Cyclobutyl Radical” 3<sup>rd</sup> Conference on Cold and Controlled Molecules and Ions. Athens, GA. March 25-29, 2018.
86. Daniel Leicht, Gary E. Douberly, Masashi Tsuge, Daniel T. Mauney, J. Philipp Wagner, David C. McDonald II, Yuan-Pern Lee, Michael A. Duncan “Infrared Laser Spectroscopy of the Mass-selected Protonated CO Dimer” 3<sup>rd</sup> Conference on Cold and Controlled Molecules and Ions. Athens, GA. March 25-29, 2018.

87. Gregory T. Pullen, Peter R. Franke, Gary E. Douberly, Yuan-Pern Lee “Infrared Spectra of Propene in Helium Nanodroplets and Solid *para*-Hydrogen Matrices” 3<sup>rd</sup> Conference on Cold and Controlled Molecules and Ions. Athens, GA. March 25-29, 2018.
88. Franke, P.R.; Douberly, G.E. “The Ethyl + O<sub>2</sub> Reaction in Helium Nanodroplets: Infrared Spectroscopy of the Ethyl Peroxy Radical” 3<sup>rd</sup> Conference on Cold and Controlled Molecules and Ions. Athens, GA. March 25-29, 2018.
89. Pullen, G.T.; Franke, P.R.; Douberly, G.E.; Lee, Y.P. “Infrared Spectra of Propene in Helium Nanodroplets and Solid *para*-Hydrogen” 73<sup>rd</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 18-22, 2018.
90. Brown, A.R.; Brice, J.T.; Franke, P.R.; Douberly, G.E. “An Updated Look at the Infrared Spectrum of Fulvenallene and Fulvenallenyl” 73<sup>rd</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 18-22, 2018.
91. Franke, P.R.; Douberly, G.E. “Rotamers of Isoprene: Infrared Spectroscopy in Helium Droplets and Ab Initio Thermochemistry” 73<sup>rd</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 18-22, 2018.
92. Douberly, G.E. “Anomalous Zeeman Splitting in the Rovibrational Spectrum of the OH Radical Solvated in Superfluid Helium, Or: How I Learned to Stop Worrying and Love the Proverbial Droplet Effects” 74<sup>th</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 17-21, 2019.
93. Franke, P.R.; Duncan, M.A.; Douberly, G.E. “Infrared Photodissociation Spectroscopy and Multireference Anharmonic Vibrational Study of the HO<sub>4</sub><sup>+</sup> Molecular Cation” 74<sup>th</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 17-21, 2019.
94. Pullen, G.T.; Douberly, G.E.; Haupa, K.A.; Lee, Y.-P. “Tunneling Reactions of Hydrogen Addition to Propene in a Solid Para-Hydrogen Matrix” 74<sup>th</sup> International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 17-21, 2019.
95. Pullen, G.T.; Franke, P.R.; Douberly, G.E. “Infrared Spectra of the Butyl Radicals in Superfluid Helium Nanodroplets” 35<sup>th</sup> International Symposium on Free Radicals. Hangzhou, China. September 15-20, 2019.
96. Douberly, G.E. “Infrared Spectroscopy of Alkyl Radicals in Helium Droplets” 35<sup>th</sup> Symposium on Chemical Physics. University of Waterloo, Waterloo, Ontario, Canada. November 1-3, 2019.
97. Pullen, G.T.; Douberly, G.E.; Lewandowski, H.J. “Development of a CBGB source and a QCL laser system for studying the IR spectroscopy of clusters”

- International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 22-25, 2020.
98. Bercaw, R.M.; Franke, P.R.; Moore, K.B.; Schaefer, H.F.; Douberly, G.E. "tert-Butyl Peroxy Radical: Ground and First Excited State Energetics and Fundamental Frequencies" International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 22-25, 2020.
  99. Franke, P.R.; Douberly, G.E. "Sequential Capture of O(3P) and HCN by Helium Nanodroplets: Infrared Spectroscopy of the van der Waals Complex Supplemented by Ab Initio Computations of the Potential Energy Surface and Bound States" International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 22-25, 2020.
  100. King, K; Pullen, G.T.; Franke, P.R.; Lee, Y.-P.; Douberly, G.E. "Infrared Spectroscopy of Butyl Radicals in He Nanodroplets" International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 22-25, 2020.
  101. Pullen, G.T.; Douberly, G.E.; Lewandowski, H. "Development of a CBGB Source and a QCL Laser System for Studying the IR Spectroscopy of Clusters" International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 22-25, 2020.
  102. Pullen, G.T.; Douberly, G.E.; Lewandowski, H. "Development of a CBGB Source and a QCL Laser System for Studying the IR Spectroscopy of Clusters" International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 21-25, 2021.
  103. Chan, Y.-C.; Douberly, G.E.; Nesbitt, D.J. "Design and Characterization of a Stable, Broadly Tunable Home-built Mid-IR Optical Parametric Oscillator for High-Resolution Infrared Spectroscopy" International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 17-21, 2024.
  104. Bercaw, R.M.; Nambiar, S.R.; Douberly, G.E. "Infrared Spectroscopy of CN-C<sub>2</sub>H<sub>2</sub> Radical Complex in Helium Nanodroplets" International Symposium on Molecular Spectroscopy. Champaign-Urbana, IL. June 17-21, 2024.

## Refereed Publications

(Web of Science: h-index=28, Citations=2583, Average per item=26.9, 5/13/2024. Google Scholar: h-index=32, i10-index=67, Citations=3248, 5/13/2024)

1. Matsui, H.; Pan, S.; Douberly, G.E. "Fabrication of nanocrystal tube using peptide tubule as template and its application as signal-enhancing cuvette" *Journal of Physical Chemistry B*. (2001), 105(9), 1683-1686.
2. Matsui, H.; Porrata, P.; Douberly, G.E. "Protein tubule immobilization on self-assembled monolayers on Au substrates" *Nano Letters*. (2001), 1(9), 461-464.
3. Matsui H.; Douberly, G.E. "Organization of peptide nanotubes into macroscopic bundles" *Langmuir*. (2001), 17(25), 7918-7922.
4. Matsui, H.; Gologan, B.; Pan, S.; Douberly, G.E. "Controlled immobilization of peptide nanotube-templated metallic wires on Au surfaces" *European Physical Journal D: Atomic, Molecular and Optical Physics*. (2001), 16(1-3), 403-406.
5. Douberly, G.E.; Pan, S.; Walters, D.; Matsui, H., "Fabrication of protein tubules: Immobilization of proteins on peptide tubules" *Journal of Physical Chemistry B*. (2001), 105(32), 7612-7618.
6. Douberly, G.E.; Miller, R.E., "The growth of HF polymers in helium nanodroplets: Probing the barriers to ring insertion" *Journal of Physical Chemistry B*. (2003), 107 (19), 4500-4507.
7. Douberly, G.E.; Nauta, K.; Miller, R.E., "The infrared spectrum of acetylene-HF in helium nanodroplets" *Chemical Physics Letters*. (2003), 377(3,4), 384-390.
8. Merritt, J.M.; Douberly, G.E.; Miller, R.E., "Infrared-infrared double resonance spectroscopy of cyanoacetylene in helium nanodroplets" *Journal of Chemical Physics*. (2004), 121(3), 1309-1316.
9. Douberly, G.E.; and Miller, R.E., "The isomers of HF-HCN formed in helium nanodroplets: infrared spectroscopy and *ab initio* calculations" *Journal of Chemical Physics*. (2005), 122, 024306.
10. Douberly, G.E.; Merritt, J.M.; and Miller, R.E., "Infrared-infrared double resonance spectroscopy in helium nanodroplets: photo-induced isomerization" *Physical Chemistry Chemical Physics*. (2005), 7(3), 463-468.
11. Lindsay, C.M.; Douberly, G.E.; and Miller, R.E., "Rotational and vibrational dynamics of H<sub>2</sub>O and HDO in helium nanodroplets" *Journal of Molecular Structure*. (2006), 786, 96-104.

12. Choi, M.Y.; Douberly, G.E.; Falconer, T.M.; Lewis, W.K.; Lindsay, C.M.; Merritt, J.M.; Stiles, P.L.; and Miller, R.E., "Infrared spectroscopy of helium nanodroplets: novel methods for physics and chemistry" *International Reviews of Physical Chemistry*. (2006), 25(1-2), 15-75.
13. Paesani, F.; Whaley, K.B.; Douberly, G.E.; and Miller, R.E., "Rovibrational Spectra for the HCCCN-HCN and HCN-HCCCN binary complexes in  $^4\text{He}$  droplets" *Journal of Physical Chemistry A*. (2007), 111(31), 7516-7528.
14. Douberly, G.E.; Merritt, J.M.; and Miller, R.E., "Infrared – infrared double resonance spectroscopy of the isomers of HCN-Acetylene and HCN-Cyanoacetylene in helium nanodroplets" *Journal of Physical Chemistry A*. (2007), 111(31), 7282-7291.
15. Douberly, G.E.; and Miller, R.E., "Rotational dynamics of HCN-M (M=Na, K, Rb, Cs) van-der-Waals complexes formed on the surface of helium nanodroplets" *Journal of Physical Chemistry A*. (2007), 111(31), 7292-7302.
16. Merritt, J.M.; Douberly, G.E.; Stiles, P.L.; and Miller, R.E., "Infrared spectroscopy of pre-reactive Aluminum-, Gallium-, and Indium-HCN entrance channel complexes solvated in helium nanodroplets" *Journal of Physical Chemistry A*. (2007), 111(49), 12304-12316.
17. Douberly, G.E.; Ricks, A.M.; Ticknor, B.W.; Schleyer P.v.R.; and Duncan, M.A., "Infrared spectroscopy of the t-butyl cation in the gas phase" *Journal of the American Chemical Society*. (2007), 129, 13782.
18. Douberly, G.E.; Ricks, A.M.; Ticknor, B.W.; and Duncan, M.A., "The structure of protonated acetone and its dimer: Infrared photodissociation spectroscopy from 800 to 4000  $\text{cm}^{-1}$ ," *Physical Chemistry Chemical Physics*, (2008), 10, 77-79.
19. Douberly, G.E.; Ricks, A.M.; Schleyer, P.v.R.; and Duncan, M.A., "Infrared Spectroscopy of Gas Phase  $\text{C}_3\text{H}_5^+$ : Allyl and 2-Propenyl Cations," *Journal Chemical Physics*, (2008), 128, 021102.
20. Douberly, G.E.; Ricks, A.M.; Ticknor, B.W.; and Duncan, M.A., "Structure of protonated carbon dioxide clusters: Infrared photodissociation spectroscopy and ab initio calculations," *Journal of Physical Chemistry A*. (2008), 112(5), 950-959.
21. Douberly, G.E.; Ricks, A.M.; Ticknor, B.W.; McKee, W. C.; Schleyer, P.v.R.; and Duncan, M.A., "Infrared spectroscopy of protonated acetylene and its clusters" *Journal of Physical Chemistry A*. (2008), 112(9), 1897-1906.
22. Douberly, G.E.; Ricks, A.M.; Schleyer, P.v.R.; and Duncan, M.A., "Infrared spectroscopy of gas phase benzenium ions: Protonated benzene and protonated toluene from 750 to 3400  $\text{cm}^{-1}$ " *Journal of Physical Chemistry A*. (2008), 112, 4869-4874.

23. Ricks, A.M.; Bakker, J.M.; Douberly, G.E.; and Duncan, M.A., "Infrared spectroscopy of  $\text{Co}^+(\text{CO})_n$  complexes in the gas phase" *Journal of Physical Chemistry A*, (2009), 113, 4701-4708.
24. Ricks, A.M.; Douberly, G.E.; and Duncan, M.A., "IR photodissociation spectroscopy of  $\text{O}_4^+$ ,  $\text{O}_6^+$ , and  $\text{O}_8^+$  cluster ions" *International Journal of Mass Spectrometry*, (2009), 283, 69-76.
25. Stiles, P.L.; Douberly, G.E.; and Miller, R.E., "High-resolution spectroscopy of Mg-HF and Mg-(HF)<sub>2</sub> solvated in helium nanodroplets" *Journal of Chemical Physics*, (2009), 130, 184313.
26. Douberly, G.E.; and Miller, R.E., "Vibrational dynamics of the linear and bent isomers of HF-N<sub>2</sub>O trapped in 0.4 K helium nanodroplets" *Chemical Physics*, (2009), 361, 118-124.
27. Douberly, G.E.; Ricks, A.M.; and Duncan, M.A., "Infrared spectroscopy of perdeuterated protonated water clusters in the vicinity of the clathrate cage structure" *Journal of Physical Chemistry A*, (2009), 113, 8449-8453.
28. Ricks, A.M.; Douberly, G.E.; and Duncan, M.A., "Infrared spectroscopy of protonated naphthalene and its relevance for the unidentified infrared bands" *Astrophysical Journal*, (2009), 702, 301-306.
29. Ricks, A.M.; Douberly, G.E.; and Duncan, M.A., "Infrared Spectroscopy of the protonated nitrogen dimer: The complexity of shared proton vibrations" *Journal of Chemical Physics*, (2009), 131, 104312.
30. Ricks, A.M.; Douberly, G.E.; Schleyer, P.v.R.; and Duncan, M.A., "Infrared spectroscopy of protonated ethylene: The nature of proton binding in the non-classical structure" *Chemical Physics Letters*, (2009), 480, 17-20.
31. Ricks, A.M.; Douberly, G.E.; Schleyer, P.v.R.; and Duncan, M.A., "Infrared spectroscopy of  $\text{C}_3\text{H}_3^+$  ions: the cyclopropenyl and propargyl cations" *Journal of Chemical Physics*, (2010), 132, 051101.
32. Douberly, G.E.; Stiles, P.L.; Miller, R.E.; Schmied, R.; and Lehmann, K.K., "(HCN)<sub>m</sub>-M<sub>n</sub> (M=K, Ca, Sr): Vibrational excitation induced solvation and desolvation of dopants in and on helium nanodroplets" *Journal of Physical Chemistry A*, (2010), 114, 3391-3402.
33. Douberly, G.E.; Walters, R.S.; Cui, J.; Jordon, K.D.; and Duncan, M.A., "Infrared spectroscopy of small protonated water clusters,  $\text{H}^+(\text{H}_2\text{O})_n$  (n=2-5): Isomers, argon tagging, and deuteration" *Journal of Physical Chemistry A*, (2010), 114, 4570-4579.

34. Flynn, S.D.; Skvortsov, D.; Morrison, A.M.; Liang, T.; Choi, M.Y.; Douberly, G.E.; Vilesov, A.F., "Infrared spectra of HCl-H<sub>2</sub>O clusters in helium nanodroplets" *Journal of Physical Chemistry Letters*, (2010), 1, 2233-2238.
35. Morrison, A.M.; Flynn, S.D.; Liang, T.; Douberly, G.E., "Infrared spectroscopy of (HCl)<sub>m</sub>(H<sub>2</sub>O)<sub>n</sub> clusters in helium nanodroplets: Definitive assignments in the HCl stretch region" *Journal of Physical Chemistry A*, (2010), 114, 8090-8098.
36. Liang, T.; Flynn, S.D.; Morrison, A.M.; Douberly, G.E., "Quantum cascade laser spectroscopy and photo-induced chemistry of Al-(CO)<sub>n</sub> clusters in helium nanodroplets" *Journal of Physical Chemistry A*, (2011), 115, 7437-7447.
37. Morrison, A.M.; Agarwal, J.; Schaefer, III H.F.; Douberly, G.E., "Infrared laser spectroscopy of the CH<sub>3</sub>OO radical formed from the reaction of CH<sub>3</sub> and O<sub>2</sub> within a helium nanodroplet" *Journal of Physical Chemistry A*, (2012), 116, 5299-5304.
38. Liang, T.; Douberly, G.E., "On the Al + HCN reaction in helium nanodroplets" *Chemical Physics Letters*, (2012), 551, 54-59.
39. Raston, P.L.; Liang, T.; Douberly, G.E., "Infrared spectroscopy of HOOO and DOOO in <sup>4</sup>He nanodroplets" *Journal of Chemical Physics*, (2012), 137, 184302.
40. Morrison, A.M.; Raston, P.L.; Douberly, G.E., "Rotational relaxation dynamics of the methyl radical in helium nanodroplets" *Journal of Physical Chemistry A*, (2013), 117, 11640-11647.
41. Liang, T.; Raston, P.L.; Douberly, G.E., "Helium nanodroplet isolation spectroscopy and ab initio calculations of HO<sub>3</sub>-(O<sub>2</sub>)<sub>n</sub> clusters" *ChemPhysChem*, (2013), 14, 764-770.
42. Morrison, A.M.; Liang, T.; Douberly, G.E., "Automation of an 'Aculight' continuous-wave Optical Parametric Oscillator" *Review of Scientific Instruments*, (2013), 84, 013102.
43. Raston, P.L.; Liang, T.; Douberly, G.E., "Anomalous Λ-doubling in the infrared spectrum of the hydroxyl radical in helium nanodroplets" *Journal of Physical Chemistry A*, (2013), 117, 8103-8110.
44. Raston, P.L.; Liang, T.; Douberly, G.E., "Infrared spectroscopy and tunneling dynamics of the vinyl radical in <sup>4</sup>He Nanodroplets" *Journal of Chemical Physics*, (2013), 138, 174302.
45. Raston, P.L.; Agarwal, J.; Turney, J.M.; Schaefer, III H.F.; Douberly, G.E., "The Ethyl radical in superfluid helium nanodroplets: Rovibrational spectroscopy and ab initio computations" *Journal of Chemical Physics*, (2013), 138, 194303.



46. Obi, E.I.; Leavitt, C.M.; Raston, P.L.; Moradi, C.P.; Flynn, S.D.; Vaghjiani, G.L.; Boatz, J.A.; Chambreau, S.D.; Douberly, G.E., "Helium Nanodroplet Isolation and Infrared Spectroscopy of the Isolated Ion- Pair 1-ethyl-3-methylimidazolium bis(trifluoromethylsulfonyl)imide" *Journal of Physical Chemistry A*, (2013), 117, 9047-9056.
47. Moradi, C.P.; Morrison, A.M.; Klippenstein, S.J.; Goldsmith, C.F.; Douberly, G.E., "The propargyl + O<sub>2</sub> reaction in helium droplets: entrance channel barrier or not?" *Journal of Physical Chemistry A*, (2013), 117, 13626-13635.
48. Gomez, L.F.; Sliter, R.; Skvortsov, D.; Hoshina, H.; Douberly, G.E.; Vilesov, A.F., "Infrared spectra in the 3 μm region of ethane and ethane clusters in He droplets" *Journal of Physical Chemistry A*, (2013), 117, 13648-13653.
49. Raston, P.L.; Douberly, G.E., "Rovibrational spectroscopy of formaldehyde in helium nanodroplets" *Journal of Molecular Spectroscopy*, (2013), 292, 15-19.
50. Liang, T.; Magers, D.B.; Raston, P.L.; Allen, W.D.; Douberly, G.E., "Dipole moment of the HOOO radical: Resolution of a structural enigma" *Journal of Physical Chemistry Letters*, (2013), 4, 3584-3589.
51. Leavitt, C.M.; Moradi, C.P.; Acrey, B.W.; Douberly, G.E., "Infrared laser spectroscopy of the helium-solvated allyl and allyl peroxy radicals" *Journal of Chemical Physics*, (2013), 139, 234301.
52. Raston, P.L.; Liang, T.; Douberly, G.E., "Observation of the  $Q(3/2)$   $\Lambda$ -doublet transitions for  $X^2\Pi_{3/2}$  OD in Helium Nanodroplets" *Molecular Physics*, (2014), 112, 301-303.
53. Leavitt, C.M.; Moradi, C.P.; Stanton, J.F.; Douberly, G.E., "Communication: Helium Nanodroplet Isolation and Rovibrational Spectroscopy of Hydroxymethylene" *Journal of Chemical Physics*, (2014), 140, 171102.
54. Raston, P.L.; Douberly, G.E.; Jäger W. "Single and Double Resonance Spectroscopy of Methanol Embedded in Superfluid Helium Nanodroplets" *Journal of Chemical Physics*, (2014), 141, 044301.
55. Leavitt, C.M.; Moore, K.B.; Raston, P.L.; Agarwal, J.; Moody, G.H.; Shirley, C.C.; Schaefer, H.F.; Douberly, G.E. "Liquid Hot NAGMA Cooled to 0.4 Kelvin: Benchmark Thermochemistry of a Gas-Phase Peptide" *Journal of Physical Chemistry A*, (2014), 118, 9692-9700.
56. Douberly, G.E.; Raston, P.L.; Liang, T.; Marshall, M.D. "Infrared Rovibrational Spectroscopy of OH-C<sub>2</sub>H<sub>2</sub> in <sup>4</sup>He nanodroplets: Parity Splitting due to Partially Quenched Electronic Angular Momentum" *Journal of Chemical Physics*, (2015), 142, 134306.

57. Broderick, B.M.; McCaslin, L.; Moradi, C.P.; Stanton, J.F.; Douberly, G.E. "Reactive Intermediates in  $^4\text{He}$  Nanodroplets: Infrared Laser Stark Spectroscopy of Dihydroxycarbene" *Journal of Chemical Physics*, (2015), 142, 144309.
58. Moradi, C.P.; Douberly, G.E. "On the Stark effect in open shell complexes exhibiting partially quenched electronic angular momentum: Infrared laser Stark spectroscopy of OH-C<sub>2</sub>H<sub>2</sub>, OH-C<sub>2</sub>H<sub>4</sub>, and OH-H<sub>2</sub>O" *Journal of Molecular Spectroscopy*, (2015), 314, 54-62.
59. Moradi, C.P.; Douberly, G.E. "Infrared Laser Spectroscopy of the L-shaped Cl-HCl Complex Formed in Superfluid  $^4\text{He}$  Nanodroplets" *Journal of Physical Chemistry A*, (2015), 119, 12028-12035.
60. Hernandez, F.J.; Brice, J.T.; Leavitt, C.M.; Pino, G.A.; Douberly, G.E. "Infrared Spectroscopy of OH·CH<sub>3</sub>OH: Hydrogen-Bonded Intermediate Along the Hydrogen Abstraction Reaction Path" *Journal of Physical Chemistry A*, (2015), 119, 8125-8132.
61. Broderick, B.M.; Moradi, C.P.; Douberly, G.E. "Infrared Laser Stark Spectroscopy of Hydroxymethoxycarbene in  $^4\text{He}$  Nanodroplets" *Chemical Physics Letters*, (2015), 639, 99-104.
62. Hernandez, F.J.; Brice, J.T.; Leavitt, C.M.; Liang, T.; Raston, P.L.; Pino, G.A.; Douberly, G.E. "Mid-Infrared Signatures of Hydroxyl Containing Water Clusters: Infrared Laser Stark Spectroscopy of OH-H<sub>2</sub>O and OH(D<sub>2</sub>O)<sub>n</sub> (n=1-3)" *Journal of Chemical Physics*, (2015), 143, 164304.
63. Moradi, C.P.; Xie, C.; Kaufmann, M.; Guo, H.; Douberly, G.E. "Two-center three-electron bonding in ClNH<sub>3</sub> revealed via helium droplet infrared laser Stark spectroscopy: Entrance channel complex along the Cl + NH<sub>3</sub> → ClNH<sub>2</sub> + H reaction" *Journal of Chemical Physics*, (2016), 144, 164301.
64. Kaufmann, M.; Leicht, D.; Havenith, M.; Broderick, B.M.; Douberly, G.E. "Infrared Spectroscopy of the Tropylium Radical in Helium Droplets" *Journal of Physical Chemistry A*, (2016), 120, 6768-6773.
65. Brice, J.T.; Liang, T.; Raston, P.L.; McCoy, A.B.; Douberly, G.E. "Infrared Stark and Zeeman spectroscopy of OH-CO: The entrance channel complex along the OH + CO → *trans*-HOCO reaction pathway" *Journal of Chemical Physics*, (2016), 145, 124310.
66. Franke, P.R.; Tabor, D.; Moradi, C.P.; Douberly, G.E.; Agarwal, J.; Schaefer, H.F.; Sibert, E.L. "Infrared Laser Spectroscopy of the *n*-propyl and *i*-propyl Radicals: Stretch-Bend Fermi Coupling in the Alkyl CH Stretch Region" *Journal of Chemical Physics*, (2016), 145, 224304.

67. Douberly, G.E.; Miller, R.E.; Xantheas, S.S. "Formation of Exotic Networks of Water Clusters in Helium Droplets Facilitated by the Presence of Neon Atoms" *Journal of the American Chemical Society*, (2017), 139, 4152-4156.
68. Straatsma C.J.E.; Fabrikant, M.I.; Douberly, G.E.; Lewandowski, H.J. "Production of Carbon Clusters C<sub>3</sub> to C<sub>12</sub> with a Cryogenic Buffer-Gas Beam Source" *Journal of Chemical Physics*, (2017), 147, 124201.
69. Raston, P.L; Obi, E.I.; Douberly, G.E. "Infrared Spectroscopy of the Entrance Channel Complex Formed Between the Hydroxyl Radical and Methane in Helium Nanodroplets" *Journal of Physical Chemistry A*, (2017), 121, 7597-7602.
70. Brown, A.R; Franke, P.R.; Douberly, G.E. "Helium Nanodroplet Isolation of the Cyclobutyl, 1-Methylallyl and Allylcarbinyl Radicals: Infrared Spectroscopy and Ab Initio Computations" *Journal of Physical Chemistry A*, (2017), 121, 7576-7587.
71. Brice, J.T.; Franke, P.R.; Douberly, G.E. "Sequential Capture of O(<sup>3</sup>P) and HCN by Helium Nanodroplets: Infrared Spectroscopy and Ab Initio Computations of the <sup>3</sup>Σ<sup>-</sup>O-HCN Complex" *Journal of Physical Chemistry A*, (2017), 121, 9466-9473.
72. Franke, P.R.; Douberly, G.E. "Rotamers of Isoprene: Infrared Spectroscopy in Helium Droplets and Ab Initio Thermochemistry" *Journal of Physical Chemistry A*, (2018), 122, 148-158.
73. Pullen, G.T; Franke, P.R.; Lee, Y.-P.; Douberly, G.E. "Infrared Spectroscopy of Propene in Solid *para*-Hydrogen and Helium Droplets: the Role of Matrix Shifts in the Analysis of Anharmonic Resonances" *Journal of Molecular Spectroscopy*, (2018), 354, 7-14.
74. Franke, P.R.; Brice, J.T.; Moradi, C.P.; Schaefer, H.F.; Douberly, G.E. "Ethyl + O<sub>2</sub> in Helium Nanodroplets: Infrared Spectroscopy of the Ethylperoxy Radical" *Journal of Physical Chemistry A*, (2019), 123, 3558-3568.
75. Brown, A.R; Brice, J.T.; Franke, P.R.; Douberly, G.E. "Infrared Spectrum of Fulvenallene and Fulvenallenyl in Helium Droplets" *Journal of Physical Chemistry A*, (2019), 123, 3782-3792.
76. Franke, P.R.; Moore, K.B.; Schaefer, H.F.; Douberly, G.E. "*tert*-Butyl Peroxy Radical: Ground and First Excited State Energetics and Fundamental Frequencies" *Physical Chemistry Chemical Physics*, (2019), 21, 9747-9758.
77. Bowman, M.C.; Douberly, G.E.; Schaefer, H.F. "Convergent Energies and Anharmonic Vibrational Spectra of Ca<sub>2</sub>H<sub>2</sub> and Ca<sub>2</sub>H<sub>4</sub> Constitutional Isomers" *Physical Chemistry Chemical Physics*, (2019), 21, 10914-10922.

78. Pullen, G.T; Franke, P.R.; Haupa, K.A.; Lee, Y.-P.; Douberly, G.E. "Infrared Spectroscopy of *n*-Propyl and *i*-Propyl Radicals in Solid *para*-Hydrogen" *Journal of Molecular Spectroscopy*, (2019), 363, 111170.
79. Davis, M.M.; Weidman, J.D.; Abbott, A.S.; Douberly, G.E.; Turney, J.M.; Schaefer, H.F. "Characterization of the 2-Methylvinoxy Radical + O<sub>2</sub> Reaction: A Focal Point Analysis and Composite Multireference Study" *Journal of Chemical Physics*, (2019), 151, 124302.
80. Misiewicz, J.P.; Moore, K.B; Franke, P.R.; Morgan, W.J.; Turney, J.M.; Douberly, G.E.; Schaefer, H.F. "Sulfurous and Sulfonic Acids: Predicting the Infrared Spectrum and Setting the Surface Straight" *Journal of Chemical Physics*, (2020), 152, 024302.
81. Franke, P.R.; Duncan, M.A.; Douberly, G.E. "Infrared Photodissociation Spectroscopy and Anharmonic Vibrational Study of the HO<sub>4</sub><sup>+</sup> Molecular Ion" *Journal of Chemical Physics*, (2020), 152, 174309.
82. Douberly, G.E.; Widicus Weaver, S.L. "The 75<sup>th</sup> International Symposium on Molecular Spectroscopy" *Journal of Physical Chemistry A*, (2020), 124, 4873-4874.
83. Leicht, D.; Rittgers, B.M.; Douberly, G.E.; Wagner, J.P.; McDonald, D.C.; Mauney, D.T.; Tsuge, M.; Lee, Y-P; Duncan, M.A. "Infrared Spectroscopy of H<sup>+</sup>(CO)<sub>2</sub> in the Gas Phase and in *para*-Hydrogen Matrices" *Journal of Chemical Physics*, (2020), 153, 084305.
84. Franke, P.R.; Stanton, J.F.; Douberly, G.E. "How to VPT2: Accurate and Intuitive Simulations of CH Stretching Infrared Spectra Using VPT2+K with Large Effective Hamiltonian Resonance Treatments" *Journal of Physical Chemistry A*, (2021), 125, 1301-1324.
85. Mull, H.F.; Franke, P.R.; Sargent, C.; Douberly, G.E.; Turney, J.M.; Schaefer, H.F. "Four isomers of In<sub>2</sub>H<sub>2</sub>: a careful comparison between theory and experiment" *Molecular Physics*, (2021), 119, 21-22. DOI: 10.1080/00268976.2021.1979675
86. Bralick, A.K.; Abbott, B.Z.; Douberly, G.E.; Schaefer, H.F. "The isomerisation of H<sub>2</sub>XY to HXYH (X, Y = O, S, and Se)\*" *Molecular Physics*, (2021), 119, 17-18. DOI: 10.1080/00268976.2021.1976429
87. Mull, H.F.; Turney, J.M.; Douberly, G.E.; Schaefer, H.F. "Kinetic stability of pentazole" *Journal of Physical Chemistry A*, (2021), 121, 9092-9098. DOI: 10.1021/acs.jpca.1c06252
88. Li, G.; Yao, Y.; Lü, S.; Xie, Y.; Douberly, G.E.; Schaefer, H.F. "Potential energy profile for the Cl + (H<sub>2</sub>O)<sub>3</sub> → HCl + (H<sub>2</sub>O)<sub>2</sub>OH reaction. A CCSD(T) study"

- Physical Chemistry Chemical Physics*, (2021), 23, 26837-26842. DOI: 10.1039/D1CP04309A
89. King, K.E.; Franke, P.R.; Pullen, G.T.; Schaefer, H.F.; Douberly, G.E. "Helium droplet infrared spectroscopy of the butyl radicals", *Journal of Chemical Physics*, (2022), 157, 084311. DOI: 10.1063/5.0102287
  90. Begley, J.M.; Aroeira, G.J.R.; Turney, J.M.; Douberly, G.E.; Schaefer, H.F. "Enthalpies of formation for Criegee intermediates: A correlation energy convergence study", *Journal of Chemical Physics*, (2023), 158, 034302. DOI: 10.1063/5.0127588
  91. Goodlett, S.M.; Turney, J.M.; Douberly, G.E.; Schaefer, H.F. "The noncovalent interaction between water and the  $^3P$  ground state of the oxygen atom", *Molecular Physics*, (2023), 121, e2086934. DOI: 10.1080/00268976.2022.2086934
  92. Tang, C.L.; Heide, A.G.; Heide, A.D.; Douberly, G.E.; Schaefer, H.F. "Exploring the  $Tl_2H_2$  potential energy surface: a comparative analysis with group 13 systems and experiment", *Journal of Computational Chemistry*, (2024), 45, 985-994. DOI: 10.1002/jcc.27293
  93. Poncelet, E.J.; Mull, H.F.; Abate, Y.; Robinson, G.H.; Douberly, G.E.; Schaefer, H.F. "A wealth of structures for the  $Ge_2H_2^+$  radical cation: comparison of theory and experiment", *Physical Chemistry Chemical Physics*, (2024), 26, 12444-12452. DOI: 10.1039/D3CP06098E
  94. Givhan, R.H.; Goodlett, S.M.; Douberly, G.E.; Turney, J.M.; Schaefer, H.F. " $Pb_2H_2^+$ : convergent quantum mechanical study of seven lead hydride cation structures. Toward laboratory identification", *Molecular Physics*, (2024), e2307497. DOI: 10.1080/00268976.2024.2307497
  95. Raston, P.L.; Douberly, G.E. "Infrared laser Stark spectroscopy of methyl fluoride in  $^4He$  nanodroplets", *ChemPhysChem*, (2024), e202400224. DOI: 10.1002/cphc.202400224
  96. Beck, I.T.; Lahm, M.E.; Douberly, G.E.; Schaefer, H.F. "Convergent ab initio analysis of the multi-channel  $HObR + H$  reaction", *Journal of Chemical Physics*, (2024), 160, 124304. DOI: 10.1063/5.0200276

## Book Chapters

1. Douberly, G.E. (2022). Infrared Spectroscopy of Molecular Radicals and Carbenes in Helium Droplets. In: Slenczka, A., Toennies, J.P. (eds) Molecules in Superfluid Helium Nanodroplets. Topics in Applied Physics, vol 145. Springer, Cham.  
[https://doi.org/10.1007/978-3-030-94896-2\\_4](https://doi.org/10.1007/978-3-030-94896-2_4)

## Teaching Activities

### Courses Taught:

Fall 2001	CHM 10L	General Chemistry Laboratory (UNC)
Spring 2002	CHM 11L	General Chemistry Laboratory (UNC)
Fall 2008	CHEM 3110 CHEM 8140	Fundamentals of Physical Chemistry Physical Chemistry Seminar
Fall 2009	CHEM 3110	Fundamentals of Physical Chemistry
Spring 2010	CHEM 3512L CHEM 8140	Experimental Methods Laboratory II Physical Chemistry Seminar
Fall 2010	CHEM 3110	Fundamentals of Physical Chemistry
Spring 2011	CHEM 3512L CHEM 8140	Experimental Methods Laboratory II Physical Chemistry Seminar
Fall 2011	CHEM 3110	Fundamentals of Physical Chemistry
Spring 2012	CHEM 8960	Molecular Spectroscopy
Fall 2012	CHEM 3110 CHEM 8140	Fundamentals of Physical Chemistry Physical Chemistry Seminar
Fall 2013	CHEM 3511	Experimental Methods Lab I
Spring 2014	CHEM 8960	Molecular Spectroscopy
Summer 2014	CHEM 3511	Experimental Methods Lab I
Fall 2014	CHEM 3110	Fundamentals of Physical Chemistry

Spring 2015	CHEM 8210	Chemical Applications of Group Theory
Fall 2015	CHEM 3110	Fundamentals of Physical Chemistry
Spring 2016	CHEM 8960	Molecular Spectroscopy
Fall 2016	CHEM 3110 CHEM 4000L	Fundamentals of Physical Chemistry Chemistry Internship
Spring 2017	CHEM 8960	Molecular Spectroscopy
Fall 2017	CHEM 3110	Fundamentals of Physical Chemistry
Spring 2018	CHEM 8960	Molecular Spectroscopy
Fall 2018	CHEM 8920	Thermodynamics and Statistical Mechanics
Fall 2019	CHEM 1212	Freshman Chemistry II
Spring 2020	CHEM 8960	Molecular Spectroscopy
Fall 2020	CHEM 8210	Chem. Apps. of Group Theory (w/ R. Scott)
Spring 2021	CHEM 1312H	Honors Freshman Chemistry II
Fall 2021	CHEM 8920 CHEM 3511 CHEM 8140	Thermodynamics and Statistical Mechanics Experimental Methods Laboratory I Physical Chemistry Seminar
Spring 2022	CHEM 8960 CHEM 8140	Molecular Spectroscopy Physical Chemistry Seminar
Fall 2023	CHEM 8920	Thermodynamics and Statistical Mechanics

**Postdoctoral Fellows Supervised as Major Professor:**

Paul L. Raston (Ph.D. David Anderson, University of Wyoming), 2011-2013. Current Position: Assistant Professor, James Madison University, Harrisonburg, VA, USA.

Christopher M. Leavitt (Ph.D. Mark Johnson, Yale University), 2013-2014. Current Position: Intel, Portland, OR, USA.

Bernadette Broderick (Ph.D. Arthur Suits, Wayne State University), 2014-2015. Current Position: Assistant Professor, University of Missouri, Columbia, MO, USA.

### **Graduate Students Supervised as Major Professor:**

Alexander M. Morrison, M.S., 2008-2012  
Steven D. Flynn, M.S., 2009-2013  
Caitlyne C. Shirley, M.S., 2011-2014  
Tao Liang, Ph.D., 2009-2014  
Emmanuel I. Obi, M.S., 2011-2014  
Bradley Acrey, M.S., 2011-2014  
Christopher P. Moradi, Ph.D., 2011-2016  
Joseph T. Brice, Ph.D., 2013-2019  
Alaina R. Brown, Ph.D., 2014-2019  
Peter R. Franke, Ph.D., 2014-2020  
Gregory T. Pullen, Ph.D., 2015-2020  
Travis Jones, M.S., 2016-2021  
Kale King, PhD, 2016-2022  
Ronald Bercaw, present graduate student, 2018-  
Sachin Nambiar, present graduate student, 2020-

### **Undergraduate Students Supervised in Research:**

Sean Marrache (University of Georgia), spring 2009.  
Chris Moradi (University of Georgia), summer, fall 2010.  
Amanda Westbrook (University of Georgia), summer, fall 2010.  
Trey Gunter (University of Georgia), summer, fall 2010.  
Parsa Shokoohi (University of Georgia), fall 2010.  
Bradley Acrey (University of Georgia), spring 2011.  
Emmanuel Obi (University of Georgia), summer 2011.  
Grant Moody (University of Georgia), spring 2012-spring 2013. (Honors Thesis)  
Chris Harrington (University of Georgia), spring 2012.  
Rodrigo Tapia (University of Georgia), fall 2013-spring 2014.  
Joseph Tyberg (University of Georgia), fall 2013-fall 2014.  
Evan Brakefield (University of Georgia), spring 2014-fall 2014.  
Ali Mohammadzadeh (University of Georgia), spring 2014-fall 2014.  
Dylan Duggins (University of Georgia), spring-summer 2016.  
Brittany Minnick (University of Georgia), summer 2017.  
Ty Faulkner (James Madison University), summer 2016, 2017.  
Rebekah Soliday (James Madison University), summer 2018.  
William White (Georgia Institute of Technology), summer 2018.  
Caitlin Bellora (University of Georgia), summer 2018 to spring 2019.  
Rashi Bhatnagar (University of Georgia), fall 2020.

### **High School Students Supervised in Research:**



William White, Clarke-Central High School, Athens, GA. Summer 2016

### **Visiting Graduate Students Supervised in Research:**

Federico J. Hernandez (June 21 to October 1, 2014): Instituto de Investigaciones en Físico-Química de Córdoba, Argentina

Matin Kauffman (April 1 to July 1, 2015): Ruhr Universität Bochum, Germany

### **Other Teaching Activities:**

Graduate Faculty, 2008-present.

Coordinator: Summer Undergraduate Research Opportunities (SURO), 2012-2017

UGA Center for Teaching and Learning Fellows for Innovative Teaching, 2015-2016

### **Graduate Student Advisory Committees:**

David Osborne, 2009-2013.

Frank Pickard, 2009-2011.

Chris Stoudemayer, 2009-2010.

Beulah Narendrapurapu, 2009-2013.

Ali Saddiqi, 2009-2014.

Pierre Negri, 2009-2012.

Antonio Braithwaite, 2009-2013.

Brandon Magers, 2014

Wayne Mullinax, 2012-2016.

Jonathan Maner, 2011-2017.

Kimberly Reishus, 2010-2014

Al Fischer, 2013-2018.

Andrew Launder, 2014-2017.

Chenyang Li, 2014-2015.

Preston Hoobler, 2015-2018.

Scott Akin, 2015-2016.

Kevin Moore, 2013-2018.

Timothy Ward, 2014-2018.

David McDonald, 2014-2018.

Austen Scruggs, 2014-2021.

Marcus Bartlett, 2013-2019.

Brandon Rittgers, 2015-present.

Adam Abbott, 2016-2021.

Joshua Marks, 2016-2021

Jonathon Misiewicz, 2018-2020.

Michael Bowman, 2017-2020.

Matthew Davis, 2018-2020.

Mark Wolf, 2018-2021.

Heather Jaeger, 2009-2010.

Biswajit Bandyopadhyay, 2009-2012.

Bryson Dye, 2009-2012.

Bryan Perdue, 2009-2013.

Alexander Sokolov, 2010-2014.

Justin O'Toole, 2011-2012.

Jonathan Mosely, 2009-2014.

Kimberly Schuldt, 2011-2014.

Kaushik Jagannathan, 2011-2015.

Yudong Qiu, 2011-2015.

Walter Turner, 2013-2017.

Andreas Copan, 2014-2018.

Xiao Wang, 2014-2018.

Marissa Estep, 2015-2018.

Kevin Murphy, 2015-2018.

Jonathon Vandezande, 2013-2017.

Elizabeth Day, 2014-2018.

Boyi Zhang, 2016-2021.

Whitney James Morgan, 2016-2019.

Xiangji Liu, 2013-2019.

Bryan Soto, 2014-2019.

Michael Pogash, 2015-2020.

Jared Weidman, 2016-2020.

Mitchell Lahm, 2017-2021.

Kayla Warren, 2017-2022.

Jason Colley, 2017-present.

Ramesh Basnet, 2017-2022.

Zachary McQueen, 2018-present.

Walker Jones, 2018-present. Anna Doner, 2018-2023.  
Gustavo Ribeiro Aroeira, 2018-2022 Laura Olive, 2022-present  
Ian Beck, 2022-present

External Committee Member: James D. Pickering, Ph.D. “Alignment and Imaging of Molecular Complexes Embedded in Helium Nanodroplets”. Aarhus University. November 23, 2018.

## **Departmental and University Service**

Physical Sciences Journal Committee, Fall 2008.  
DoC Graduate Admissions Committee, Fall 2009-Spring 2013.  
Addressing Misconceptions in Chemistry Learning Community, 2009-2012.  
Peach State Louis Stokes Alliance for Minority Participation (PSLAMP), 2009-2012.  
DoC Undergraduate Advisor, Spring 2010-2018.  
DoC Undergraduate Advising Committee, 2010-2019.  
DoC IT professional associate hiring committee, October 2011.  
DoC Undergraduate Curriculum Committee (Chair), 2012-2019.  
DoC Undergraduate Coordinator, May 2013-2019.  
DoC Website Development Committee, September 2014.  
DoC Graduate Admissions Committee, Fall 2014-Spring 2018.  
DoC Post-Tenure Review Committee (Henry Schaefer), Spring 2015.  
OVPR-Faculty Research Grants Review Committee, March 2016.  
DoC Post-Tenure Review Committee (Richard Morrison), Spring 2016.  
DoC Post-Tenure Review Committee (Robert Phillips), Spring 2016.  
DoC Post-Tenure Review Committee (Vladimir Popik), Spring 2017.  
OVPR-Faculty Research Grants Review Committee, March 2017.  
DoC Graduate Admissions Committee (co-Chair), Fall 2018-Spring 2019.  
DoC Post-Tenure Review Committee (Jon Amster), Spring 2019.  
DoC Graduate Coordinator Assistant, hiring committee, Spring 2019.  
Building Steering Committee, interdisciplinary STEM buildings, Spring 2019-2022  
DoC Sr. Accountant, hiring committee, Fall 2019.  
DoC Fiscal Affairs Manager, hiring committee, Fall 2019.  
NSF DeLTA project (Paula Lemons PI), Leadership Action Team, Fall 2019-2022.  
DoC Head, Fall 2019-2022.  
Assoc. Dean, Franklin College of Arts and Sciences, Fall 2022-present  
Building Steering Committee, Science Hill Modernization phases 1-3, Fall 2022-present