

# Benjamin J. Knurr

Natural Sciences Department  
Assumption College  
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## Education:

**PhD Chemical Physics** **December 2014**  
University of Colorado, Boulder, CO  
Thesis Title "Infrared Photodissociation Spectroscopy of Anionic Gas Phase Clusters"  
Advisor: Professor J. Mathias Weber

**BA Chemistry** **May 2009**  
Macalester College, St. Paul, MN

## Current Position:

**Assistant Professor** **September 2015 - present**  
Assumption College  
Chemistry faculty teaching primarily general chemistry and physical chemistry (lectures and labs) and performing independent research with undergraduate students.  
*General Chemistry I – CHE 131*  
*General Chemistry II – CHE 132*  
*Physical Chemistry I – CHE 311*  
*Physical Chemistry II – CHE 312*

## Previous Positions:

**Lecturer** **Jan. 15 - Aug. 15**  
University of Colorado Denver  
Primary instructor for an undergraduate and a graduate course offered by the chemistry department.  
*General Chemistry II – CHEM 2061*  
*Environmental Chemistry – CHEM 4700/5700*

**Graduate Research Assistant with Professor J. Mathias Weber** **Nov. 09 - Dec. 14**  
JILA, Department of Chemistry and Biochemistry, University of Colorado Boulder  
Designed a laser vaporization entrainment source for the generation of metal clusters *in vacuo*. Performed infrared photodissociation spectroscopy on a variety of anionic cluster species including naphthalene water clusters and metal carbon dioxide clusters.

## Graduate Teaching Assistant

University of Colorado Boulder  
Supervised laboratory experiments, graded lab reports, taught recitation, held office hours, wrote and graded quizzes, helped write and grade exams, helped with laboratory experiment design. \*Head TA  
additional duties: coordinating all other teaching assistants, writing quizzes for all of the sections, being a resource for other TAs.  
*General Chemistry for Majors – CHEM 1251* **Fall 2014**  
*General Chemistry for Engineers – CHEM 1221 \*Head TA* **Spring 2011**  
*General Chemistry for Engineers – CHEM 1221 \*Head TA* **Fall 2010**  
*General Chemistry for Majors – CHEM 1271* **Spring 2010**  
*General Chemistry for Majors – CHEM 1251* **Fall 2009**

### **Graduate Course Assistant**

Aided in the writing, vetting, and grading of graduate level problem sets and exams.

*Introductory Quantum Mechanics* – CHEM 5581

Fall 2014

*Advanced Molecular Spectroscopy* – CHEM 5591

Spring 2014

*Advanced Molecular Spectroscopy* – CHEM 5591

Spring 2012

### **Undergraduate Research with Professor Tom D. Varberg**

May 07 - May 09

Macalester College, St. Paul, MN

Performed high-resolution laser induced fluorescence spectroscopy on the [17.7]1 state of AuF and the E-2 Pi(1/2)-X-2 Delta(3/2) electronic Transition of TaO. Performed REMPI spectroscopy on hexabenzocoronene in the group of Professor Scott Kable (now at University of New South Wales) at the University of Sydney, Australia with Professor Varberg while on his sabbatical.

### **Awards and Honors:**

Gillman Award for Outstanding TA Leadership

2010 - 2011

Graduate Teaching Excellence Award

Spring 2010

Graduate Teaching Excellence Award

Fall 2009

### **Invited Speaker:**

“Infrared Spectroscopy of Metal CO<sub>2</sub> Clusters”

September 17, 2014

Chemistry Department Seminar

Macalester College, St. Paul, MN

“Infrared Spectroscopy of Anionic Molecular Clusters”

March 14, 2012

Chemistry Seminar

Augsburg College, Minneapolis, MN

### **Outreach:**

#### **CU Wizards Program**

Winter 2011, 2014

Aided in the development of a participatory science show titled “Sink or Swim” with Prof. J. Mathias Weber aimed at elementary and middle school students.

#### **Partnership for Informal Science Education in the Community (PISEC) 2012 - 2014**

Helped design materials for and participated in weekly after school inquiry-based science experiments with middle school students who are under represented in the sciences. Worked closely with the same middle school science teacher and class for all two years.

### **Technical Skills:**

Time-of-flight mass spectrometry

Various ionization techniques (vaporization, supersonic expansion, entrainment, etc.)

Design, use and maintenance of optical systems (lasers, non-linear optics, etc.)

Vacuum equipment maintenance and troubleshooting

Maintenance of custom-built lab equipment and gas-handling procedures

Instrumental design and implementation

General electronic practices

General machining practices (design, milling, lathing, etc.)

Lab safety management, waste management and chemical inventory

Familiar with Windows, Macintosh and Linux operating systems

Various data analysis software and word processing (Origin, Excel, Word, LaTeX, etc.)

Density Functional Theory Calculations (Turbomole, Spartan, Gaussian)

**Professional Memberships:**

American Chemical Society

2009 - present

**Publications:**

1. Knurr B.J., Weber J.M., "Structures of  $[\text{CoO}(\text{CO}_2)_n]^-$  and  $[\text{NiO}(\text{CO}_2)_n]^-$  Clusters studied by Infrared Spectroscopy", *J. Phys. Chem. A* **2015**, 119, p. 843 - 850
2. Knurr B.J., Weber J.M., "Structural Diversity of Copper-CO<sub>2</sub> complexes ? Infrared Spectra and structures of  $[\text{Cu}(\text{CO}_2)_n]^-$  Clusters", *J. Phys. Chem. A* **2014**, 118, p. 10246- 10251
3. Knurr B.J., Weber J.M., "Interaction of Nickel with Carbon Dioxide in  $[\text{Ni}(\text{CO}_2)_n]^-$  Clusters Studied by Infrared Spectroscopy", *J. Phys. Chem. A* **2014**, 118, p. 8753-8757
4. Christopher C.R., Lee S.Y., Gwandu F.B., Matsumoto A.J., Knurr B.J., Mahle, T.K., Morrow Z.W., Varberg T.D., "Rotational and Hyperfine Analysis of the E-2 Pi(1/2)-X-2 Delta(3/2) electronic Transition of TaO", *J. Mol. Spec.* **2014**, 301, p. 25-27
5. Knurr B.J., Weber J.M., "Infrared Spectra and Structures of Anionic Complexes of Cobalt with Carbon Dioxide Ligands", *J. Phys. Chem. A* **2014**, 118, p. 4056-4062
6. Knurr B.J., Weber J.M., "Solvent-Mediated Reduction of Carbon Dioxide in Anionic Complexes with Silver Atoms", *J. Phys. Chem. A* **2013**, 117, p. 10764-10771
7. Knurr B.J., McCoy A.B., Weber J.M., "Vibrationally Induced Charge Transfer in a Bimolecular Model Complex in vacuo", *J. Chem. Phys.* **2013**, 138, p. 224301
8. Knurr B.J., Weber J.M., "Solvent-Driven Reductive Activation of Carbon Dioxide by Gold Anions", *J. Am. Chem. Soc.* **2012**, 134, p. 18804-18808
9. Knurr B.J., Adams C.L., Weber J.M., "Infrared Spectroscopy of Hydrated Naphthalene Cluster Anions", *J. Chem. Phys.* **2012**, 137, p. 104303
10. Adams C.L., Knurr B.J., Weber J.M., "Photoelectron Spectroscopy of 1-Nitropropane and 1-Nitrobutane Anions", *J. Chem. Phys.* **2012**, 136, p. 064307
11. Knurr B.J., Butler E.K., Varberg T.D., "Electronic Spectrum of AuF: Hyperfine Structure of the  $[17.7]1$  State", *J. Phys. Chem. A* **2009**, 113, p. 13428-13435

**Presentations:**

1. "Unraveling the Binding Motifs of CO<sub>2</sub> in  $[\text{Co}(\text{CO}_2)_n]^-$ ,  $[\text{CoO}(\text{CO}_2)_n]^-$  and  $[\text{Cu}(\text{CO}_2)_n]^-$  Clusters," (poster)  
Gordon Research Conference Molecular and Ionic Clusters, Barga, Italy, April 2014
2. "Probing Solvation Effects on CO<sub>2</sub> Reduction in Metal CO<sub>2</sub> Anionic Clusters," (oral - invited)  
Gordon Research Seminar Molecular and Ionic Clusters, Barga, Italy, April 2014
3. "IR Spectroscopy of  $[\text{Ag} \cdot (\text{CO}_2)_n]^-$  Clusters: Reduction of CO<sub>2</sub> Mediated by Solvent Interactions," (oral)  
The Ohio State International Symposium on Spectroscopy, Columbus, OH, June 2013
4. "Infrared Spectra of  $[\text{Ag} \cdot (\text{CO}_2)_n]^-$ : Implications for Reductive Activation of CO<sub>2</sub>," (poster)  
Gordon Research Conference Molecular Interactions, Galveston, TX, February 2013

5. "Reductive Activation of CO<sub>2</sub> Mediated by Solvent Interactions in [Au(CO<sub>2</sub>)<sub>n</sub>]<sup>-</sup> and [Ag(CO<sub>2</sub>)<sub>n</sub>]<sup>-</sup> Clusters," (poster)  
JILA 50 Year Anniversary Celebration, Boulder, CO, June 2012
6. "IR Spectroscopy of Au<sup>-</sup>·(CO<sub>2</sub>)<sub>n</sub> Clusters: Strong Cluster Size Dependence of Metal - Ligand Interaction," (oral)  
The Ohio State International Symposium on Spectroscopy, Columbus, OH, June 2012
7. "IR Spectroscopy of Au<sup>-</sup>·(CO<sub>2</sub>)<sub>n</sub> Clusters: Strong Cluster Size Dependence of Metal - Ligand Interaction," (poster)  
Molecular and Ionic Clusters Gordon Research Conference, Ventura, CA, January 2012
8. "Vibrationally Induced Charge Transfer Reaction In CH<sub>3</sub>NO<sub>2</sub><sup>-</sup>·CH<sub>3</sub>I Clusters," (oral)  
The Ohio State International Symposium on Spectroscopy, Columbus, OH, June 2011