

HOLLY M. BEVSEK

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EDUCATION

University of Pittsburgh, Pittsburgh, Pennsylvania, 1989–1996
Ph.D. in Chemistry, April 1996
Thesis Title: “Electron Spectroscopic and Theoretical Studies of the Chemical Reaction Dynamics of Molecular Penning Ionization”
Thesis Advisor: Professor Peter E. Siska

Marquette University, Milwaukee, Wisconsin, 1985–1989
B.S. in Chemistry with Physics Minor, May 1989
Thesis Title: “Binding Energies of Positron Complexes with Atoms and Atomic Ions”
Thesis Advisor: Professor David M. Schrader

ACADEMIC POSITIONS

Assistant Professor, Department of Chemistry, The Citadel, Charleston, SC, 29409; 2006–present

Visiting Assistant Professor, Department of Chemistry, The Citadel, 2005–2006

Visiting Assistant Professor, Department of Chemistry, Susquehanna University, Selinsgrove, PA, 17870; 2002–2005

Dutton Fellow in Chemistry, Lyman Briggs School and Department of Chemistry, Michigan State University, East Lansing, MI, 48824; 1997–2002

Visiting Postdoctoral Fellow, Chemical Sciences Division, Lawrence Berkeley National Laboratory/University of California-Berkeley, 1996–1997

TEACHING EXPERIENCE

Assistant Professor/Visiting Assistant Professor, Department of Chemistry, The Citadel, 2005–present

- Introduction to Chemistry I and II (with laboratories); non-science majors
General Chemistry I (with laboratory); science and engineering majors
Physical Chemistry 2 (with laboratory)
Designed informal cooperative activities. Designed and wrote new inquiry-based experiments for Introduction to Chemistry. Currently designing and writing new experiments for the kinetics/quantum mechanics semester of Physical Chemistry.

TEACHING EXPERIENCE, CONT.

Visiting Assistant Professor, Department of Chemistry, Susquehanna University, 2002–2005

- College Chemistry I and II (with laboratories); science majors
Physical Chemistry I and II (with laboratories)
Molecular Spectroscopy (with laboratory)
Seminar
Designed informal/formal cooperative activities. Sole responsibility for design, implementation, and upkeep of physical chemistry and molecular spectroscopy laboratories including maintenance of a GC/MS, DSC, and various spectrometers.
- Laboratory Coordinator, College Chemistry Laboratory I and II, Fall 2002, Spring/Fall 2004
Designed and wrote new laboratory manuals for both courses, including nine inquiry-based experiments. Co-designed a four-week water chemistry research project and organized a poster presentation session which served as a partial assessment of the students' work.

Dutton Fellow in Chemistry, Lyman Briggs School and Department of Chemistry, Michigan State University, 1997–2002

- General Chemistry I and II, Lyman Briggs School, 1997–2002; science majors
Designed web-based tutorials; designed informal/formal cooperative activities; supervised undergraduate teaching assistants; advised several honors chemistry projects.
- Laboratory Coordinator, General Chemistry Laboratories I and II, Lyman Briggs School, 1997–2002
Designed and wrote laboratory manuals for both courses, with over half of the experiments being inquiry-based; designed a biology/chemistry interdisciplinary research project for LBS 172L, acted as research advisor for approximately 30 student groups, and organized a poster presentation session jointly with the biology class; designed several computer-interfaced laboratories; supervised graduate and undergraduate teaching assistants; responsible for laboratory equipment including a GC, FTIR, and UV-vis spectrometer; responsible for laboratory management including adherence to safety and waste disposal regulations.
- General Chemistry, Department of Chemistry, Fall 2001, Spring 2002
Designed informal cooperative learning activities for large enrollment classes. Supervised graduate teaching assistants.
- Coordinator, Advanced Placement Chemistry (on-line), Department of Chemistry, 2000–2001
Designed on-line lessons and homework, held virtual office hours, designed and supervised two on-site laboratory sessions.

RESEARCH INTERESTS

- Nanochemistry
- Atmospheric chemistry
- Chemistry of carbonaceous materials, e.g., soot, activated carbon fibers
- Chemical education

RESEARCH EXPERIENCE

Assistant Professor/Visiting Assistant Professor, Department of Chemistry, The Citadel, 2005–present

- *Collaboration with Eric Borguet, Department of Chemistry, Temple University.* Study of reactivity/adsorption properties of carbon nanotubes and fibers, using diffuse reflectance FTIR. Professor Borguet's group uses transmission FTIR and surface science techniques to discern reactive and adsorptive features of these materials at UHV pressures; my laboratory does similar studies at high pressures.
- Kinetic study of the reaction of NO_2 with α - and γ - Fe_2O_3 using diffuse reflectance infrared Fourier transform spectroscopy.

Visiting Assistant Professor, Department of Chemistry, Susquehanna University, 2002–2005

- Kinetic study of the reaction of NO_2 with α - and γ - Fe_2O_3 using diffuse reflectance infrared Fourier transform spectroscopy.
- Analysis of student explanations of equilibrium demonstrations in general chemistry classes.
- Design and implementation of a test to diagnose misconceptions regarding stoichiometry and basic thermodynamics in general chemistry students.
- Analysis of polycyclic aromatic hydrocarbons from emissions of the Centralia, PA coal mine fire using GC/MS.

Dutton Fellow in Chemistry, Lyman Briggs School, Michigan State University, 1997–2002

- Supervised one postdoctoral and one undergraduate professorial assistant.
- Research advisor for senior thesis: "Application of a New Model Using Demonstrations to Increase Students' Understanding of Chemical Equilibrium".
- Developed, piloted, and assessed a new method of demonstration presentation to encourage active learning.
- Extension of demonstration presentation project for use in large-enrollment lecture classes.
- Acted as advisor for two graduate students "Mentored Teaching Experience", a requirement for a Teaching Certificate from the College of Natural Science. Projects were "Collaborative Learning in General Chemistry" and "An Active Learning Approach to Qualitative Analysis".
- Research advisor on approximately 30 student independent projects, including the review of proposals, experimental procedures, and data analysis. All presented their results in a poster session; two groups additionally presented their research at an University-wide presentation.
- Research advisor for two Honors General Chemistry Laboratory students. Projects were "Spectrophotometric Determination of Lead" and "Spectrophotometric Determination of Mercury".
- Investigation of how general chemistry students' understanding of atomic structure changed as a result of traditional teaching compared to innovative teaching techniques, i.e., cooperative learning.

RESEARCH EXPERIENCE, CONT.

Visiting Scholar, Department of Chemistry, Michigan State University, Summer 2001

Professor Lynmarie A. Posey, collaborator

- Performed laser spectroscopy and mass spectrometry of gas-phase solvated transition metal clusters.

Visiting Scholar, Department of Chemistry, Michigan State University, Summer 1998

Professor Marcos Dantus, collaborator

- Investigated femtosecond photodissociation dynamics of O_3 .
- Designed interlock system for molecular beam vacuum system.

Visiting Postdoctoral Fellow, Chemical Sciences Division, Lawrence Berkeley National Laboratory, 1996–1997

Professor Yuan T. Lee and Dr. Arthur G. Suits, advisors

- Utilized resonance-enhanced multiphoton ionization techniques to investigate structure and energetics of $O_2 \cdot O_2^*$ dimers.
- Investigated the reaction dynamics of $C(^3P_j) + \text{propylene}$ using crossed molecular beams and electron-impact ionization of products prior to analysis with a quadrupole mass filter.

Graduate Research Assistant, Department of Chemistry, University of Pittsburgh, 1989–1996

Professor Peter E. Siska, advisor

- Investigated collision energy dependence of the reaction dynamics of the Penning ionization systems $He^*(2^1S) + H_2, D_2, HD,$ and CO using crossed molecular beams and electron spectroscopy.
- Performed inelastic quantum mechanical scattering calculations on the system $He^*(2^{1,3}S) + H_2$ to model its electron energy spectrum.
- Performed *ab initio* calculations on the system $He^*(2^{1,3}S) + H_2$ to determine the effect of H_2 bond length on intermolecular potential energy.
- Performed inelastic quantum mechanical scattering calculations on the system $He^*(2^{1,3}S) + CO$ to model the real and imaginary parts of the optical potential.

HONORS AND AWARDS

Honorary Member of the Lyman Briggs School Graduating Class of 2002 (student-voted award; Michigan State University)

Distinguished Member, National Society of Collegiate Scholars, 1999 (Michigan State University)

Department of Education Fellowship, 1992 (University of Pittsburgh)

Member of Phi Lambda Upsilon Chemistry Honor Society, 1991 (University of Pittsburgh)

Safford Award for Excellence as a Graduate Student Teacher, 1991 (University of Pittsburgh)

University of Pittsburgh Predoctoral Fellowship, 1989-90

Albert S. Puehlicher Memorial Scholarship, 1985-89 (Marquette University)

Member of Sigma Pi Sigma Physics Honor Society, 1988 (Marquette University)

Wisconsin Chemical Society Scholarship, 1986-87 (Marquette University)

GRANTS

The Citadel, Citadel Foundation Research Grant "Role of Water in the Reaction of NO₂ with Soot". Award: \$2,943.07. Funding period: 7/1/07–6/30/08.

The Citadel, Citadel Foundation New Faculty Research Grant "Reactivity of NO₂ with Single-Walled Carbon Nanotubes". Award: \$3,000. Funding period: 11/19/06–6/30/07.

Susquehanna University, Summer Research Partners (undergraduate stipend) "Investigation of NO₂ with Iron Oxide". Award: \$2,400. Funding period: 6/1/04–8/13/04.

Susquehanna University, University Research Grant (external peer review, internal funding) "Investigation of Interfacial and Bulk Processes in the reaction of NO₂ with Water-Coated Soot". Award: \$5,000. Funding period: 3/28/03–3/28/05.

Susquehanna University, Summer Research Partners (undergraduate stipend) "Investigation of Interfacial and Bulk Processes in the reaction of NO₂ with Water-Coated Soot". Award: \$2,400. Funding period: 6/1/03–8/15/03; "Characterization of Polycyclic Aromatic Hydrocarbons from the Centralia Mine Fire". Award: \$2,400. Funding period: 6/1/03–8/15/03.

The Camille and Henry Dreyfus Foundation, Inc., Special Grant Program in the Chemical Sciences "A New Model to Increase Student Learning Using Lecture Demonstrations in General Chemistry" (SG-01-065). Award: \$25,949. Funding Period: 1/30/01–9/30/06.

STUDENT RESEARCH ADVISING**Undergraduate**

Pao Shun Ting (Fall 2007–Spring 2008)
Tzu Hung Chu (Fall 2006–Spring 2007)
Sheena Binkley (Spring 2005)
Brian Hixson (Spring 2004–Spring 2005)
Erica Wagner (Summer 2004)
Joleen Rudy (Fall 2003–Spring 2004)
Lindsay Shaffer (Fall 2003)
Derek Butcher (Summer 2003)
Megan Janssen (Summer 2003)
Benjamin Lorson (Fall 2001–Spring 2002)
Laura Boutni (Fall 2001–Spring 2002)

The Citadel, Chemistry, B.S. 2008
The Citadel, Chemistry, B.S. 2007
Susquehanna University, Chemistry, B.S. 2006
Susquehanna University, Chemistry, B.S. 2005
Susquehanna University, Biochemistry, B.S. 2006
Susquehanna University, Chemistry, B.S. 2004
Susquehanna University, Chemistry, B.S. 2004
Susquehanna University, Chemistry, B.S. 2005
Susquehanna University, Biochemistry, B.S. 2006
Michigan State University, Chemistry, B.S. 2005
Michigan State University, Chemistry, B.S. 2002

Graduate

Randall Hicks (Fall 2000–Spring 2001)
Emily Brown (Spring 2000)

Michigan State University, Chemistry, Ph.D. 2002
Michigan State University, Chemistry, Ph.D. 2001

PROFESSIONAL AFFILIATIONS

American Chemical Society (1990–present)
Divisions of Physical Chemistry and Chemical Education
American Geophysical Union (2004–present)
Sigma Xi (2007–present)

OUTREACH

“Using Demonstrations to Promote Conceptual Understanding in Chemistry: Making Connections on the Macroscopic, Microscopic, and Symbolic Levels”, Lilly Seminar Series, Michigan State University, September 29, 2006. Participants were MSU faculty, graduate students, and local community college instructors.

“Using Demonstrations to Promote Conceptual Understanding in Chemistry: Making Connections on the Macroscopic, Microscopic, and Symbolic Levels”, offered through the Division of Science and Mathematics Education, Michigan State University, September 30, 2006. Participants were local high school teachers.

“Fostering Inquiry in the K-6 Classroom”, offered through the Science and Math in Motion program, Susquehanna University, June 14, 2005. Participants were local K-6 teachers.

“Using Demonstrations to Foster Inquiry: Making Connections on the Macroscopic, Microscopic, and Symbolic Levels”, offered through the Science and Math in Motion program, Susquehanna University, June 13, 2005. Participants were local junior high/high school teachers.

SERVICE

Member of college Curriculum and Instruction Committee, 8/07–, The Citadel
Academic advisor for seven students, 8/07–, The Citadel
Member of Krause Leadership Symposium Planning Committee, 3/07–, The Citadel
Reviewer of Chapters 7, 9-11; Tro “Chemistry in Focus”
Reviewer of Chapters 10-13; Atkins, de Paula, and Friedman “Quanta, Matter, and Change”
Member of departmental curriculum, facilities, introductory, and general chemistry committees, 8/06–, The Citadel
Organized outside speaker seminar series, 8/04–4/05, Susquehanna University
Interim department chair, 1/04–7/04, Susquehanna University
Junior mentor for two new faculty members, 8/03–5/05, Susquehanna University
Member of teaching load review committee, 9/02–5/04, Susquehanna University
Member of Susquehanna Science Seminar Series steering committee, 9/02–5/05, Susquehanna University
Member of four search committees (three chemistry, one physics), 9/02–3/03, Susquehanna University
Academic advisor for ten students, 8/02–5/05, Susquehanna University
Secretary, Michigan State University American Chemical Society Local Section, 8/00–8/01
Reviewer, Journal of Chemical Education, 6/00–present, Michigan State University, Susquehanna University, The Citadel
Advisor, Chem Club (Student Affiliates of the American Chemical Society), 8/99–7/02, Michigan State University
Faculty Liaison, Lyman Briggs Alumni Association, 8/98–8/01, Michigan State University

SELECTED PRESENTATIONS
Oral Presentations

"Effect of Macroscopic, Microscopic, and Symbolic Representations Upon Student Understanding of an Equilibrium Demonstration"

H. M. Bevsek‡, H. Lim, D. Ebert-May, 18th Biennial Conference on Chemical Education, Iowa State University, 2004, Abstract S214.

"Improving General Chemistry Students' Understanding of Demonstrations through the Use of Different Conceptual Representations"

H. Lim, B. Lorson, H. M. Bevsek‡, 223th National Meeting of the American Chemical Society, Orlando, FL, 2002, Abstract CHED 590.

"Teaching Chemistry Electronically"

Explorations in Instructional Technology, Michigan State University, November 2, 2001 (Invited).

"First Direct Detection and Spectroscopy of O₄*"

Air Force High Energy Density Matter Contractor's Conference, Chantilly, VA, 1997 (Invited).

"First Direct Detection and Spectroscopy of O₄*"

Aeronomy Program, Molecular Physics Laboratory, SRI International, Palo Alto, CA, 1997 (Invited).

"Physical Chemistry at the University of Pittsburgh"

Talk addressed to participants of the "Research Experience for Undergraduates in Physics at the University of Pittsburgh: Emphasis on Minorities" program.

Department of Physics, University of Pittsburgh, Pittsburgh, Pennsylvania, 1994. (Invited)

‡Indicates presenter. Underline indicates undergraduate research assistant.

SELECTED PRESENTATIONS, CONT.
Poster Presentations

"Study of the Reaction of NO₂ with Multi-Walled Carbon Nanotubes"

Tzu-Hung Chu‡ and Holly M. Bevsek, 233rd National Meeting of the American Chemical Society, Chicago, IL, 2007, Abstract CHED 486.

"Study of the Reaction of NO₂ with Multi-Walled Carbon Nanotubes"

Tzu-Hung Chu‡ and Holly M. Bevsek, Undergraduate Research Conference, The Citadel, Charleston, SC, 2007.

"Reaction Kinetics of NO₂ with - and -Fe₂O₃"

Holly M. Bevsek and Brian C. Hixson‡, 229th National Meeting of the American Chemical Society, San Diego, CA, 2005, Abstract CHED 648.

"Development of a Concept Inventory to Identify Thermodynamic Misconceptions of College Chemistry Students"

Joleen Rudy‡ and Holly Bevsek, Senior Scholars Day, Susquehanna University, April 27, 2004.

"The Effect of Ducks and Their Waste on the Nitrogen Balance of the Red Cedar River"

Martinique Kling‡, Scott Ross‡, and Holly Bevsek, University Undergraduate Research and Creative Activity Forum, Michigan State University, March 31, 2000.

"Undergraduate Students' Conceptions of the Quantum Mechanical Atom"

Holly M. Bevsek‡ and Diane Ebert-May, Gordon Research Conference: Innovations in College Chemistry Teaching, Connecticut College, June 19-24, 1999.

"Direct Observation of Metastable O₄*"

H. M. Bevsek‡, F. C. Sailes, A. S. Bracker, and A. G. Suits, 213th National Meeting of the American Chemical Society, San Francisco, CA, 1997, Abstract PHYS 383.

"Atomic Orbital Alignment in Photodissociation"

A. S. Bracker‡, H. M. Bevsek, D. A. Blunt, F. C. Sailes, A. G. Suits, and Y. T. Lee
213th National Meeting of the American Chemical Society, San Francisco, California, 1997, Abstract PHYS 366.

"*Ab initio* Study of the He*(2¹S) + H₂ Interaction"

H. M. Bevsek‡, M. F. Falcetta, and P. E. Siska, 207th National Meeting of the American Chemical Society, San Diego, CA, 1994, Abstract PHYS 210.

"Penning Ionization Spectroscopy of He*(2¹S) + H₂ and Its Isotopes"

H. M. Bevsek‡, D. C. Dunlavy, and P. E. Siska
Abstract of Papers, 14th International Symposium on Molecular Beams, Pacific Grove, California, 1992.

"Orbital Interpretation of He*(2¹S) + CO Reaction Dynamics from Penning Ionization Electron Spectroscopy"

H. M. Bevsek‡ and P. E. Siska
Manhattan Poster Project, New York, New York, 1991.

‡Indicates presenter. Underline indicates undergraduate research assistant.

PUBLICATIONS

"Reaction Kinetics of NO₂ with γ -Fe₂O₃", B. C. Hixson, E. L. Wagner, and H. M. Bevsek, *to be submitted to J. Phys. Chem. in December 2007*.

"Effect of Macroscopic and Microscopic Representations Upon Student Understanding of an Equilibrium Demonstration", *J. Chem. Ed.*, Holly M. Bevsek, Heejun Lim, and Diane Ebert-May, *submitted; in revision*.

"An Active Learning Qualitative Analysis Experiment for the General Chemistry Lab Curriculum", Randall W. Hicks and Holly M. Bevsek, *to be submitted to J. Chem. Educ.*

"Direct detection and spectroscopy of O₄^{*}", H. M. Bevsek, M. Ahmed, D. S. Peterka, F. C. Sailes, and A. G. Suits, *Disc. Farad. Soc.*, **108** 131 (1997).

"Crossed-beam reaction of carbon atoms with hydrocarbon molecules. IV: Chemical dynamics of methylpropargyl radical formation, C₄H₅, from reaction of C(³P_j) with propylene, C₃H₆ (X¹A')", R. I. Kaiser, D. Stranges, H. M. Bevsek, Y. T. Lee, and A. G. Suits, *J. Chem. Phys.* **106** 4945 (1997).

"A vibrationally adiabatic theory of molecular Penning ionization", H. M. Bevsek and P. E. Siska, *J. Chem. Phys.* **102**, 1934 (1995).

"Nascent vibrational populations in He*(2^{1,3}S) + H₂, HD, and D₂ Penning ionization from electron spectroscopy in crossed supersonic molecular beams", H. M. Bevsek, D. C. Dunlavy, and P. E. Siska, *J. Chem. Phys.* **102**, 133 (1995).

"Recent Retreats in Penning Ionization: A New Look at the He*(2¹S) + Ar → He + Ar⁺ + e⁻ Reaction in Crossed Molecular Beams", E. J. Longley, D. C. Dunlavy, M. F. Falcetta, H. M. Bevsek, and P. E. Siska, *J. Phys. Chem.* **97**, 2097 (1993).

Underline indicates undergraduate research assistant.