Curriculum Vitae

Christopher M. Cheatum

Department of Chemistry,
University of Iowa
Iowa City, IA 52242

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Educational and Professional History

Education and Training

Massachusetts Institute of Technology
Two-Dimensional Infrared Spectroscopy of Proteins
Postdoctoral Fellow, 2001–2003

University of Wisconsin – Madison
Physical Chemistry
Ph.D., 2001

University of New Mexico
Chemistry
B.S., 1995

Professional and Academic Positions

July 2011 – Present
Associate Professor
Department of Chemistry, University of Iowa

July 2003 – June 2011
Assistant Professor
Department of Chemistry, University of Iowa

April 2001 – June 2003
Postdoctoral Fellow
Department of Chemistry, Massachusetts Institute of Technology

June 1995 – April 2001
Graduate Research Assistant
Department of Chemistry, University of Wisconsin – Madison

June 1993 – May 1995
Undergraduate Research Assistant
Department of Chemistry, University of New Mexico

Honors and Awards

CLAS Dean's Scholar Award, 2011
National Science Foundation CAREER Award, 2007
National Parkinson Foundation Hekkila Research Scholar Award, 2001
National Parkinson Foundation Postdoctoral Fellowship, 2001
Proctor and Gamble Fellowship, 1999
Celanese Award for Outstanding Graduate Research, 1999
Undergraduate Science, Math, and Engineering Scholarship, 1994

Professional Affiliations

American Chemical Society
American Physical Society

Publications

1. *3-Picolyl Azide Adenine Dinucleotide as a Probe of Femtosecond to Picosecond Time Scale Enzyme Dynamics*, Samrat Dutta, Yun-Liang Li, Jon C. D. Houtman, Amnon Kohen, Christopher M. Cheatum, J. Phys. Chem. B, **116,** 542-548 (2012)
2. *2D IR Spectroscopy of Azido-Nicotinamide Adenine Dinucleotide in Water,* Samrat Dutta, William Rock, Richard J. Cook, Amnon Kohen and Christopher M. Cheatum, J. Chem. Phys. **135,** 055106-6 (2011).
3. *2D IR Spectroscopy of the C-D Stretching Vibration of the Deuterated Formic Acid Dimer,* Michael Nydegger, William Rock, Christopher Cheatum, Phys. Chem. Chem. Phys. **13,** 6098-6104 (2011)
4. *Characterizing the Dynamics of Functionally Relevant Complexes of Formate Dehydrogenase,* Jigar N. Bandaria, Samrat Dutta, Michael W. Nydegger, William Rock, Amnon Kohen, Christopher M. Cheatum, Proc. Natl. Acad. Sci. U.S.A. **107**, 17974-17979 (2010)
5. *Characterization of Azido-NAD$^+$ to Assess its Potential as a 2D IR Probe of Enzyme Dynamics,* Samrat Dutta, Richard J. Cook, Jon C.D. Houtman, Amnon Kohen, Christopher M. Cheatum, Analytical Biochem. **407**, 241-246 (2010).
6. *2D IR Study of 3-Azidopyridine as a Potential Spectroscopic Reporter of Protonation State,* Michael W. Nydegger, Samrat Dutta, Christopher M. Cheatum, J. Chem. Phys. **133**, 134506-1–134506-8 (2010).
7. *Efforts Toward Developing Probes of Protein Dynamics: Vibrational Dephasing and Relaxation of Carbon-Deuterium Stretching Modes in Deuterated Leucine,* Jörg Zimmermann, Kenan Gundogdu, Matthew E. Cremeens, Jigar N. Bandaria, Gil Tae Hwang, Megan C. Thielges, Christopher M. Cheatum, and Floyd E. Romesberg, J. Phys. Chem. B **113**, 7991-7994 (2009)
8. *Exploring the Molecular Origins of Protein Dynamics in the Active Site of Human Carbonic Anhydrase II,* Sarah E. Hill, Jigar N. Bandaria, Michelle Fox, Elizabeth Vanderah, Amnon Kohen, Christopher M. Cheatum, J. Phys. Chem B **113**, 11505-11510 (2009)
9. *Examination of Enzymatic H-Tunneling Through Kinetics and Dynamics,* Jigar N. Bandaria, Christopher M. Cheatum, Amnon Kohen, J. Am. Chem. Soc. **131** 10151-10155 (2009)
10. *Fast Enzyme Dynamics at the Active Site of Formate Dehydrogenase,* Jigar Bandaria, Samrat Dutta, Sarah E. Hill, Amnon Kohen, Christopher M. Cheatum, J. Am. Chem. Soc. **130**, 22-23 (2008)
11. *Relaxation and Anharmonic Couplings of the O-H Stretching Vibration of Asymmetric Strongly Hydrogen-Bonded Complexes,* Kenan Gundogdu, Jigar Bandaria, Michael W. Nydegger, William Rock, Christopher M. Cheatum, J. Chem. Phys. **127**, 044501 (2007)
12. *Vibrational Energy Relaxation of Excited C-D Stretches in $CDCl_3$, $CDBr_3$, and CDI_3,* Kenan Gundogdu, Jigar Bandaria, Michael W. Nydegger, Sarah E. Hill, Christopher M. Cheatum, J. Chem. Phys. **125**, 174503 (2006)
13. *Two Dimensional Infrared Spectroscopy of Antiparallel ß-Sheet Secondary Structures,* Nurettin Demirdoven, Christopher M. Cheatum, Hoi Sung Chong, Munira Khalil, Jasper Knoester, and Andrei Tokmakoff, J. Am. Chem. Soc. **126**, 7981- 7990 (2004)

14. *Signatures of ß-Sheet Secondary Structure in Two-Dimensional Infrared Spectroscopy,* Christopher M. Cheatum, Andrei Tokmakoff, and Jasper Knoester, J. Chem. Phys. **120**, 8201-8215 (2004)
15. *Transient Raman Observations of Heme Vibrational Dynamics in Five-Coordinate Iron Porphyrins,* Joseph J. Loparo, Christopher M. Cheatum, Mark R. Ondrias, and M. Cather Simpson, Chem. Phys. **286**, 353-374 (2003).
16. *Excited-State Dynamics in 8-Hydroxyquinoline Dimers,* Christopher M. Cheatum, Max M. Heckscher, and F. Fleming Crim, Chem. Phys. Lett. **349**, 37-42 (2001).
17. *CH_2I_2 Fundamental Vibrational Relaxation in Solution Studied by Transient Electronic Absorption Spectroscopy,* Christopher M. Cheatum, Max M. Heckscher, and F. Fleming Crim, J. Chem. Phys. **115**, 7086-7093 (2001).
18. *Controlling the Bimolecular Reaction and Photodissociation of HNCO through Selective Excitation of Perturbed Vibrational States,* Ephraim Woods III, H. Laine Berghout, Christopher M. Cheatum, and F. Fleming Crim, J. Phys. Chem. A **104,** 10356-10361 (2000).
19. *Using Stretching and Bending Vibrations to Direct the Reaction of Cl Atoms with Isocyanic Acid (HNCO),* Ephraim Woods III, Christopher M. Cheatum, and F. Fleming Crim, J. Chem. Phys. **111,** 5829-5837 (1999).
20. *Photofragment Energy Distributions and Dissociation Pathways in Dimethyl Sulfoxide,* Gail M. Thorson, Christopher M. Cheatum, Martin J. Coffey, and F. Fleming Crim, J. Chem. Phys. **110**, 10843-10849 (1999).
21. *Transient Raman Observations of Heme Electronic and Vibrational Photodynamics in Deoxyhemoglobin,* M. C. Simpson, E. S. Peterson, C. F. Shannon, D. D. Eads, J. M. Friedman, C. M. Cheatum, and M. R. Ondrias, J. Am. Chem. Soc. **119,** 5110-5117 (1997).
22. *A Simple Model of the HNCO (1A') Excited State Potential Energy Surface and a Classical Trajectory Analysis of the Vibrationally Directed Bond- Selected Photodissociation,* Steven S. Brown, Christopher M. Cheatum, David A. Fitzwater, and Fleming Crim, J. Chem. Phys. **105**, 10911-10918 (1996).

Submitted/ In preparation

1. *Relationship of Femtosecond-Picosecond Dynamics to Enzyme-Catalyzed H-Transfer*, Christopher M. Cheatum and Amnon Kohen, Trends in Curr. Chem., (Submitted)
2. *Hydrogen Donor-Acceptor Fluctuations from Kinetic Isotope Effects: A Phenomenological Model.* Daniel Roston, Christopher M. Cheatum, Amnon Kohen, Biochemistry, (Submitted)
3. *Infrared Upconversion Detected by an Inexpensive CMOS Array with Applications to 2D IR Spectroscopy,* William Rock and Christopher M. Cheatum, Opt. Lett., (Submitted)
4. *Multiple Active-Site Probes of the Dynamics of a Transition-State-Analog Complex of Formate Dehydrogenase*, Samrat Dutta, Yun-Liang Li, Amnon Kohen, Christopher M. Cheatum, (In Prep)
5. *Dynamic Signatures of Enzymatic Transition-State Analogs*, Yun-Liang Li, William Rock, Amnon Kohen, Christopher M. Cheatum, (In Prep)
6. *Comparison of Pulse Shaping and Four-Wave Mixing Methods for 2D IR Spectroscopy,* William Rock, Yun-Liang Li, Christopher M. Cheatum, (In Prep.)

7. *^{15}N-Labeled 3-AzidoPyridine: Elimination of Fermi-Resonances and Sensitivity to Protonation State,* William Rock, Yun-Liang Li, Rui Song, Scott H. Brewer, Edward E. Fenlon, Christopher M. Cheatum, (In Prep)
8. *Analysis of Non-Gaussian Dynamics of Cyanate Anion in Solution*, William Rock, Yun-Liang Li, Christopher M. Cheatum, (In Prep)

Recent and Forthcoming Conferences and Presentations
Invited Talks

2D IR Probes of Biomolecules with Applications to Enzyme Dynamics, Christopher M. Cheatum, American Chemical Society National Meeting, Philadelphia, Pennsylvania (August 2012)

Characterizing Heterogeneous Dynamics in Solutions and Proteins, Christopher M. Cheatum, Symposium in honor of F. Fleming Crim, Madison, Wisconsin (May 2012)

The Dynamic Signature of the Enzymatic Transition State Probed by 2D IR, Christopher M. Cheatum, Department of Chemistry, University of New Mexico, Albuquerque, New Mexico (June 2011)

The Dynamic Signature of the Enzymatic Transition State Probed by 2D IR, Christopher M. Cheatum, XV International Conference on Time-Resolved Vibrational Spectroscopy, Ascona, Switzerland (June 2011)

Functionally Relevant Enzyme Dynamics at Femtosecond to Picosecond Time Scales, Christopher M. Cheatum, American Chemical Society National Meeting, Anaheim, California (March 2011)

Functionally Relevant Enzyme Dynamics at Femtosecond to Picosecond Time Scales, Christopher M. Cheatum, Department of Chemistry, University of Iowa, Iowa City, Iowa (October 2010)

3-Picolyl Azide Adenine Dinucleotide: A New 2D IR Probe of Enzyme Dynamics, Christopher M. Cheatum, 5th International Conference on Coherent Multidimensional Spectroscopy, Minneapolis, Minnesota (August 2010)

Femtosecond to Picosecond Enzyme Dynamics, Christopher M. Cheatum and Jigar N. Bandaria, American Chemical Society National Meeting, Salt Lake City, Utah, (March 2009)

Probing the Dynamics of Enzymes Using 2D IR, Christopher M. Cheatum 4th International Conference on Coherent Multidimensional Spectroscopy, Kyoto, Japan (August 2008)

Watching the Protein Mambo: Fast Enzyme Dynamics, Christopher M. Cheatum, Vibrational Spectroscopy Gordon Research Conference, South Hadley, Massachusetts (August 2008)

Watching the Protein Mambo: Fast Enzyme Dynamics, Christopher M. Cheatum, 63rd Ohio State University International Symposium on Molecular Spectroscopy, Columbus, Ohio (June 2008)

Watching the Protein Mambo: Fast Enzyme Dynamics, Christopher M. Cheatum, Department of Chemistry, University of Pennsylvania, Philadelphia, Pennsylvania (April 2008)

Watching the Protein Mambo: Fast Enzyme Dynamics, Christopher M. Cheatum, Department of Chemistry, Lehigh University, Bethlehem, Pennsylvania (March 2008)

Watching the Protein Mambo: Fast Enzyme Dynamics, Christopher M. Cheatum, Department of Chemistry, Boston University, Boston, Massachusetts (March 2008)

Watching the Protein Mambo: Fast Enzyme Dynamics, Christopher M. Cheatum, Materials and Optical Sciences Seminar, Massachusetts Institute of Technology, Cambridge, Massachusetts (March 2008)

Watching the Protein Mambo: Fast Enzyme Dynamics, Christopher M. Cheatum, Department of Chemistry, The Ohio State University, Columbus, Ohio (February 2008)

Watching the Protein Mambo: Fast Enzyme Dynamics, Christopher M. Cheatum, Department of Chemistry, University of Maryland, College Park, Maryland (February 2008)

Watching the Protein Mambo: Fast Enzyme Dynamics, Christopher M. Cheatum, Optical Science and Technology Center Symposium, University of Iowa, Iowa City, Iowa (February 2008)

Watching the Protein Mambo: Fast Enzyme Dynamics, Christopher M. Cheatum, Department of Chemistry, University of Illinois at Urbana-Champaign, Urbana, Illinois (January 2008)

Watching the Protein Mambo: Fast Enzyme Dynamics, Christopher M. Cheatum, Department of Chemistry, University of Notre Dame, South Bend, Indiana (January 2008)

Watching the Protein Mambo: Fast Enzyme Dynamics, Christopher M. Cheatum, Department of Chemistry, University of Colorado, Boulder, Colorado (November 2007)

Watching the Protein Mambo: Fast Enzyme Dynamics, Christopher M. Cheatum, Department of Chemistry, Colorado State University, Ft. Collins, Colorado (November 2007)

Watching the Protein Mambo: Fast Enzyme Dynamics, Christopher M. Cheatum, Department of Chemistry, University of Wisconsin – Madison, Madison, Wisconsin (November 2007)

Spectroscopic Probes of Enzyme-Ligand Interaction Dynamics, Christopher M. Cheatum, Telluride Workshop on Vibrational Dynamics, Telluride, Colorado (August 2007)

Spectroscopic Probes of Enzyme-Ligand Interaction Dynamics, Christopher M. Cheatum, Jigar N. Bandaria, Samrat Dutta, Sarah Hill, and Amnon Kohen, American Chemical Society National Meeting, Chicago, Illinois (March 2007)

The Dynamics of Enzyme-Substrate Interactions, Christopher M. Cheatum, Department of Chemistry, University of South Florida, Tampa, Florida (September 2005)

The Dynamics of Enzyme-Substrate Interactions, Christopher M. Cheatum, Telluride Workshop on Protein Dynamics, Telluride, Colorado (August 2005)

Two-Dimensional Infrared Spectroscopy: New Tools for Studying Chemical Reaction Dynamics, Christopher M. Cheatum, Department of Physics, University of Iowa, Iowa City, Iowa (April 2004)

Two-Dimensional Infrared Spectroscopy: New Tools for Studying Chemical Reaction Dynamics, Christopher M. Cheatum, Department of Chemistry, Physical and Environmental Chemistry Seminar, University of Iowa, Iowa City, Iowa (October 2003)

Contributed Talks

Spectroscopic Probes of Enzyme-Ligand Interaction Dynamics, Christopher M. Cheatum, Jigar N. Bandaria, Samrat Dutta, Sarah Hill, and Amnon Kohen, American Physical Society National Meeting, Denver, Colorado (March 2007)

Using Isotope-Edited Vibrational Spectroscopy to Probe Molecular Dynamics, Christopher M. Cheatum, American Chemical Society National Meeting, San Francisco, California (September 2006)

Time-Resolved Probes of Intermolecular Interactions: From Solvent Isotope Effects to Enzyme Dynamics, Christopher M. Cheatum, Isotopes in Chemistry and Biology Gordon Conference, Ventura, California (February 2006)

Press Coverage

Enzymes' Many Movements, Chem. & Eng. News, **87**, April 27, 2009

Courses Taught
Principles of Chemistry I
Principle of Chemistry I Honors
Physical Chemistry I
Chemical Kinetics and Reaction Dynamics

Students Supervised

Name	Years	Degree	Outcome
Ph.D. Candidates			
Andrea Grafton	Fall 2011 – Present	pre-comp	
Jon Humston	Fall 2011 – Present	pre-comp	
Phil Pagano (joint: Kohen)	Fall 2010 – Present	pre-comp	
Lahiru Wijenayaka	Fall 2011 – Present	pre-comp	
Qi Guo (joint: Kohen)	Fall 2009 – Present	post-comp	
William Rock	Fall 2005 – Spring 2012	Ph.D.	Postdoc, Max-Planck Institute, Meinz, Germany
Samrat Dutta	Fall 2005 – Fall 2010	Ph.D.	Postdoc, University of Maryland with John Fourkas
Michael W. Nydegger	Fall 2004 – Summer 2010	Ph.D.	Instructor, Cloud County Comm. College, Concordia Kansas
Jigar N. Bandaria (joint: Kohen)	Spring 2004 – Spring 2009	Ph.D.	Postdoc, University of California Berkeley with
Sarah E. Hill	Fall 2003 – Spring 2009	Ph.D.	Lecturer, Michigan Institute of Technology
M.S. Candidates			
Jameson Keck	Fall 2009 – Spring 2011	M.S.	Unknown
Dominic Hull	Fall 2009 – Spring 2011	M.S.	University of Iowa Instructional Labs
Irene Metz	Fall 2008 – Fall 2009	M.S.	Unknown
Brian Hatvick	Fall 2004 – Spring 2006	M.S.	Unknown
Postdocs			
Yunliang Li	June 2010 – Present		
Kenan Gundogdu	September 2004 – October 2006		Assistant Professor Physics North Carolina State Univ.
Undergraduate Students			
Chase Penino	Fall 2011 – Present		
Yunfan Xing	Fall 2011 – Spring		

	2012	
Emily Batkie	Fall 2010 – Spring 2011	Medical School
Joe Cook	Fall 2009 – Summer 2010	Medical School
Michelle Fox	Spring 2007	Grad. School Univ. of Texas
Nathaniel Coleman	Summer 2007	Grad. School Univ. of Iowa
Elizabeth Vanderah	Summer 2004, 2005, & 2006	Medical School

Service

Professional

Reviewer for Proceedings of the National Academy of Sciences U.S.A. (5 manuscript since 2003, 4 in 2011)
Reviewer for Journal of Physical Chemistry (29 manuscripts since 2003, 4 in 2011)
Reviewer for Journal of Physical Chemistry Letters (3 manuscripts since 2003, 3 in 2011)
Reviewer for Journal of Chemical Physics (13 manuscripts since 2003, 3 in 2011)
Reviewer for Journal of the American Chemical Society (9 manuscripts since 2003, 5 in 2011)
Reviewer for Accounts of Chemical Research (2 manuscript since 2003, 1 in 2011)
Reviewer for Biophysical Journal (2 manuscripts since 2003)
Reviewer for Cell Biochemistry and Biophysics (2 manuscripts since 2003)
Reviewer for Chemical Physics (2 manuscripts since 2003)
Reviewer for Laser Physics Letters (1 manuscript since 2003)
Reviewer for the National Science Foundation (23 proposals since 2003, 2 in 2011)
Reviewer for the Department of Energy (5 proposal since 2003, 4 in 2011)
Reviewer for the Petroleum Research Fund (ACS) (2 proposals since 2003)
Session Chair, XV International Conference on Time-Resolved Vibrational Spectroscopy (June 2011)
Discussion Leader, Vibrational Spectroscopy Gordon Research Conference, , Biddeford, Maine (August 2010)
Symposium Chair, 5th International Conference on Coherent Multidimensional Spectroscopy, Minneapolis, Minnesota (August 2010)
Discussion Leader, Biomolecules in the Gas Phase Gordon Research Conference, Tilton, New Hampshire (July 2009)

Department

Undergraduate Advisor, Fall 2009 – Present
Graduate Curriculum Committee, Fall 2010 – Present
Instructional Equipment Committee, Fall 2004 – Present (Chair, Fall 2005 – Present)
Undergraduate Curriculum Committee, Fall 2007 – Fall 2011
Organized Department Recruiting Seminars, Summer 2009- Summer 2010
Shops and Services Committee (Machine Shop), Fall 2004 – Present
Physical Chemistry Search Committee, Fall 2005 – Spring 2006
Publicity/Fundraising Committee, Fall 2004 – Fall 2006
Co-organized the April 2004 Working Weekend (with Ned Bowden)
Co-organized the October 2006 Working Weekend (with Lei Geng)

College

Vice-Chair/Chair-Elect Collegiate Faculty Assembly Fall 2012-Spring2013
Dean's Search Committee Fall 2011 – Spring 2012
Faculty Assembly Unit Representative Fall 2004 – Spring 2012
Faculty Assembly Nominations Committee Spring 2010
Faculty Assembly Strategic Planning Committee Fall 2005

Outreach

Coached a STEM Lego League team for students in 5th and 6th grade at Lemme and Twain Elementary Schools, Fall 2011
Helped to run a weekly after school science club for 3rd though 6th grade students from Lemme and Twain Elementary Schools in Iowa City, Fall 2010 – Spring 2011
Chemistry Demonstration for 5th and 6th grade students at Lemme Elementary, (May 2010)
Organized a field trip for 3rd and 4th grade students from Lemme Elementary to see demonstrations from lab and from NNI@UI, March 2010