

James E. Penner-Hahn

- Address:** Department of Chemistry, University of Michigan, Ann Arbor, MI 48109.
734/764-7324. jeph@umich.edu
- Born:** August 27, 1957
- Education:** May 1979. B.S. with highest honors in Chemistry, Purdue University, West Lafayette, IN.
February, 1984. Ph.D. in Inorganic Chemistry, Stanford University, Stanford, CA.
- Thesis:** "X-ray Absorption Studies of Metalloprotein Structure: Cytochrome P-450, Horseradish Peroxidase, Plastocyanin, and Laccase." Advisor, Keith O. Hodgson.
- Postdoctoral Research:** (Jointly with Professors Keith O. Hodgson and Edward I. Solomon). Research Associate at Stanford Synchrotron Radiation Laboratory, February 1984 - August 1985. Polarization dependent studies of x-ray absorption near edge structure and the relation of this structure to metal-ion electronic structure.

Professional Experience

- Assistant Professor, Department of Chemistry, University of Michigan, 1985-1990.
Associate Professor, Department of Chemistry, University of Michigan, 1990-1994.
Visiting Scientist, Chalmers University of Technology, Göteborg, Sweden, 1992.
Associate Faculty Member, Biophysics Research Div., Univ. of Michigan, 1991-2002.
Professor, Department of Chemistry, University of Michigan, 1994-present.
Visiting Scientist, Département de Biologie Cellulaire et Moléculaire, Centre d'Études de Saclay, 1998-1999.
Associate Vice President for Research, 2000-2002
Research Professor of Biophysics, University of Michigan, 2002-present.
Chair, Biophysics Research Division, 2002-2007

Current Research Interests

Biophysical and Physical Inorganic Chemistry. Spectroscopic investigation of metal site structure in bioinorganic systems with particular emphasis on manganoenzymes involved in oxygen metabolism (the photosynthetic oxygen evolving complex and Mn catalase) and zinc alkyl-transfer enzymes. Organometallic chemistry of Cu and Zn, with emphasis on structural characterization of reaction intermediates. Development of new techniques in x-ray spectroscopy, including the use of polarization properties to study the physical basis of x-ray absorption edge structure. Correlation of optical and x-ray absorption properties of metal ions, and the relationship of these properties to metal-ion electronic structure. *In situ* study of metal speciation in biological tissue.

Current Teaching Interests

Development of collaborative, inquiry based laboratory courses for introductory chemistry. Use of networked computers for implementation of discovery based experiments in large courses. Development of teaching material to facilitate incorporation of biological examples in introductory chemistry courses.

Honors and Awards:

Phi Beta Kappa, Purdue University, 1978.
Phi Kappa Phi, Purdue University, 1978
Outstanding Chemistry Senior, Purdue University, 1979.
National Science Foundation pre-doctoral fellowship. 1979-82.
Camille and Henry Dreyfus Foundation Distinguished New Faculty Award Recipient. 1985.
US Young Investigator for the IUPAC assembly, 1988.
Alfred P. Sloan Research Fellow, 1991-1993.
University of Michigan, Faculty Recognition Award, 1994.
Fogarty Senior International Fellowship, 1998-1999.
Akron Section Award (American Chemical Society), 2000.
Farrel Lytle Award, 2003
Elected Fellow of the AAAS

Organizations and Activities

Member, American Chemical Society. 1976-present.
Member, American Crystallographic Association. 1984-present.
Member, American Physical Society. 1986-present.
Member, Biophysical Society. 1989-present.
Member, Institute for Protein Structure and Design, University of Michigan, Ann Arbor, 1985-1995.
Executive Committee, 1988-1989.
Member, Center for Catalysis and Surface Science, University of Michigan, Ann Arbor, 1986-1996.

Departmental Service

Executive committee, Department of Chemistry, University of Michigan, 1992-1995, 1999-2000.
Associate Chair for Undergraduate Affairs, Department of Chemistry, 1995-1998
Search committees in physical chemistry (3 times), inorganic chemistry, and analytical chemistry.
Committee service: Curriculum Committee, Admissions Committee, Graduate Committee,
Computer Committee.
Physical Chemistry Cluster coordinator, 1994-1998, 1999-2002

University Service

Rackham Graduate School, Division II Board,, 1992-4, Chair 1994. Executive Board, Rackham
Graduate School, University of Michigan, 1997-2000.
Senate Assembly, University of Michigan, 1999-2002.
Associate Vice President for Research, University of Michigan, 2000-2002.
President's Information Revolution Commission, University of Michigan, 2001-2002.
Chair, Ford Nuclear Reactor Decommissioning Team, 2000-2003
Chair, 4th Wiesner Symposium: "Braving the New World: Benefits and Challenges of the Genomic
Revolution", December 7-8, 2001.
LS-CAT Management Board (board overseeing construction and operation of the State of Michigan
LS-CAT beam-line at Argonne National Laboratory), 2001-present.
Dean Search Committee, College of Literature, Science, and the Arts, 2003.
Dean's Advisory Committee on the Life Sciences Initiative, 2002-2003.
Natural Sciences Divisional Evaluation Committee, College of LS&A, 2002-2004.
Dean's Advisory Committee on Gender in the Life Sciences, 2003-present.
Executive Committee, College of Literature, Sciences, and the Arts, 2004-2006.
Director, Molecular Biophysics Training Grant
Executive Committee, Chemical Biology Interdepartmental Ph.D. program, 2004-present.
Executive Committee, Office of International Programs, 2004-5.

Other Service

Local organizing committee. Third International Conference on EXAFS. Stanford, July 1984.
Co-editor, "EXAFS and Near-Edge Structure - III", Springer-Verlag Proceedings in Physics, Volume 2 (1984).
Local organizing committee. International Conference on X-ray Instrumentation. Stanford, July, 1985.
Program committee. 5th International Conference on X-ray Absorption Fine Structure. Seattle, August, 1988.
BioSync study group to evaluate Structural Biology and Synchrotron Radiation, 1991.
Executive committee, Stanford Synchrotron Radiation Laboratory Users Organization. 1992-1994.
International XAFS Society, Executive committee, 1992-1994; Associate Chair, 1998-2000; Chair 2000-2002.
Invited U.S. Observer, International Union of Pure and Applied Chemistry, 37th General Assembly, Lisbon, Portugal, August 5-12, 1993.
NSF Instrumentation and Instrument Development Review Panel, 1993-1995.
BioSync study group to evaluate Structural Biology and Synchrotron Radiation, 1997.
Chair, Program Committee, Xth International XAFS Conference, Chicago, August 1998.
BioCAT Advisory Committee, Illinois Institute of Technology, 1995-1998, Chair 1998-2003.
Member, Board of Governors, Consortium for Advanced Radiation Sources, University of Chicago, 1998-present.
Chair, Commission on XAFS, International Union of Crystallography, 2000-2003.
Scientific Advisory Committee, Alberta Synchrotron Institute, 2001-2004.
U.S. Department of Energy BERAC Subcommittee on Biological Applications of Synchrotron Radiation, 2002.
Hamburg Outstation. External Review Panel, European Molecular Biology Laboratory, review of the EMBL, 2003.
Scientific Advisory Committee, ChemMatCARS synchrotron source, 2004-present.
Chair, Third Midwest Metals Meeting, Ann Arbor, June 2004.
Organizing Committee, Twelfth International Conference on Biological Inorganic Chemistry, Ann Arbor, July 2005.
Chair, Scientific Advisory Committee, National Synchrotron Light Source, 2004-present.

Editorial Boards Editorial Board, *Inorganic Chemistry*, 1995-7; 2000-2002.
Editorial Board, *J. Inorganic Biochemistry*, 1996-present
Editorial Board, *J. Biol. Inorg. Chem.*, 1998-2001; 2004-2007
Co-editor, *Journal of Synchrotron Radiation*, 1995-8.

Current 1 postdoctoral scholars

Research Group: 5 graduate students
4 undergraduates

Ph.D. Theses supervised:

Him-Tai Tsang, October, 1990. "X-ray Absorption Spectroscopic Studies of Metalloproteins: Hg-substituted Blue Copper Proteins, the MerR Metalloregulatory Protein, and Phthalate Dioxygenase."
Shengke Wang, February 1991. "Polarized X-ray Absorption Spectroscopic Studies of Iron Porphyrins and Metal Hexamines."
Geoffrey S. Waldo, October 1991. "Spectroscopic and Kinetic Characterization of *Lactobacillus Plantarum* Manganese Catalase"

Patrick G Allen, January, 1993. "New Experimental Methods for Extended X-ray Absorption Fine Structure Spectroscopy."

Kimber Clark, November, 1993. "Structural Characterization of Zinc Sites in Metalloproteins Using X-ray Absorption Spectroscopy."

Pamela J. Riggs-Gelasco, December, 1994. "Structural Characterization of the Manganese Cluster of the Oxygen Evolving Complex of Photosystem II Using X-ray Absorption Spectroscopy"

Timothy L. Stemmler, May 1996. "Kinetic and Spectroscopic Characterization of the Native and Inhibitor Bound Forms of the *Lactobacillus plantarum* Mn Catalase and Related Proteins"

David L. Tierney, September 1996. "XAS Characterization of Bacterial Superoxide Dismutase and NMR Characterization of Substrate Binding in Phthalate Dioxygenase"

Hui Huang, May 1997, "Structural Characterization of Organocopper Reagents"

Kelly A. Daly, May, 1998, "Determination of Electronic Structure and Dynamics for Transition Metal Systems Using X-ray Spectroscopy"

Eileen Yi-Iun Yu, January, 1999, "Structural Characterizations of the Manganese Cluster in the Oxygen Evolving Complex of Photosystem II Using X-Ray Absorption And X-Ray Standing Wave Measurements"

Pamela Sue Demarois, , April, 1999, "Structure and Reactivity of Manganese in Photosystem II"

Katrina Peariso, September, 2000, "Investigation of Zinc in Biological Systems Using X-ray Absorption Spectroscopy. I. EXAFS Characterization of Zinc-Dependent Alkyltransferase Proteins; II. Exploring the Role of Zinc in the Early Development of *Danio Rerio* Embryos Using X-ray Florescence Microprobe Imaging and Micro-XANES"

Stephanie Eden Gabelnick, August 2002, "Metalloprotein Investigations Using Capillary Electrophoresis with X-ray Fluorescence Detection"

Derek W. Yoder, October 2002, "Physical Characterization of Manganese Catalase and its Halide-Bound Forms"

Daniel Tobin, September 2003, "XAS Investigation of Zn Metalloproteins and Enzymes"

Tsu-Chien Weng, February 2004, "X-ray absorption spectroscopy studies on redox-active manganese"

Craig P. McClure, May 2004, "X-ray Absorption and X-ray Fluorescence Studies of Metalloproteins"

Current Grant Support

1. "Structural Investigations of Metalloprotein Metal Sites", National Institutes of Health (R01-GM38047), J.E. Penner-Hahn, \$496,100 total direct costs, 12/1/00-11/30/05.
2. "Structure and Reactivity Studies of Mn Redox Enzymes", National Institutes of Health (R01-GM45205), James E. Penner-Hahn, \$462,000 total direct costs, 8/1/00-7/31/05.
3. "High Throughput Characterization of the Yeast Metallome", National Institutes of Health GM070545), James E. Penner-Hahn, \$721,000 total direct costs, 4/1/04-3/31/08.
4. "Michigan Molecular Biophysics Program ", National Institutes of Health (Training Grant), James E. Penner-Hahn, \$2,208,645 total direct costs, 7/1/03-6/31/08.

Invited Presentations

- "Near-edge and EXAFS Studies of Oriented Single Crystals", SSRL Users Group Meeting, Stanford, CA, October 21-22, 1982.
- "Polarized X-ray Absorption Spectroscopy of Oriented Single Crystals", 185th ACS National Meeting, Seattle, WA, March 20-25, 1983.
- "Polarization Studies of EXAFS and Edges on Single Crystals", Third International Conference on EXAFS, Stanford, CA, July 16 - Aug. 20, 1984.

"Single Crystal X-ray Absorption Spectroscopy of Plastocyanin", Workshop on New Methods in X-ray Absorption, Scattering, and Diffraction, Bristol, England, Aug. 5-6, 1984.

"X-Ray Absorption Near Edge Structure: A New Tool for Studying Metal-Ion Electronic Structure", University of Michigan (Inorganic Seminar), October 14, 1985.

"X-Ray Absorption Near Edge Structure: A New Tool for Studying Metal-Ion Electronic Structure", Northern Illinois University, March 4, 1986.

"EXAFS and XANES Studies of High-Valent Metal-oxo Porphyrins Relevant to Horseradish Peroxidase", International Conference on Biophysics and Synchrotron Radiation, Frascati, Italy, July 14-16, 1986.

"X-Ray Absorption Near Edge Structure", University of Michigan (Physical Chemistry Seminar), Fall, 1986.

"Proposal for a University of Michigan Beam Line", Annual Users Meeting of the Advanced Photon Source, Argonne, Illinois, November 13-14, 1986.

"Chemical Forms of Sulfur in Heavy Petroleum as Revealed by XANES: Preliminary Results", Chevron Oil Field Research Corporation, La Habra, California, January 23, 1987.

"EXAFS Spectroscopy: Basic Principles and Applications to Inorganic Structure", GMI, Flint, Michigan, May 26, 1987.

"X-ray Absorption Spectroscopic Investigations of the Iron Sites in *P. Cepacia* Phthalate Oxygenase", International Conference on Bioinorganic Chemistry, Noordwijkerhout, The Netherlands, July 6-10, 1987.

"Use of X-ray Absorption Spectroscopy for Characterizing Metal Clusters in Proteins: Possibilities and Limitations", National ACS Meeting, New Orleans, August 30-Sept 4, 1987.

"X-ray Absorption Spectroscopy of Mixed Valence Mn Complexes and the Photosynthetic Oxygen Evolving System", Symposium on Frontiers of Biomedical Science, Philadelphia, April 15, 1988.

"X-ray Absorption Spectroscopy of Phthalate Dioxygenase", Symposium on Synchrotron Radiation in Structural Biology, Brookhaven National Laboratory, May 22-25, 1988.

"X-ray Absorption Spectroscopy of the Mn in the Photosynthetic Oxygen Evolving Complex", Gordon Conference on Physico-Chemical Methods in Photosynthesis, July 4-8, 1988.

"X-ray Absorption Spectroscopy of Mn in Biological Molecules", 5th International Conference of X-ray Absorption Fine Structure, Seattle, August 22-26, 1988.

"Structural Characterization of the Fe sites in Phthalate Dioxygenase", Oregon Graduate Center, Portland, August 29, 1988.

"Use of X-ray Absorption Spectroscopy for Characterizing Metal Clusters in Proteins: Possibilities and Limitations", Biophysics, University of Michigan, September 26, 1988.

"The role of Polarized Measurements in X-ray Absorption Spectroscopy. Elucidation of Near Edge Structure and Applications to Chemical Systems". Workshop on Chemical Applications of Synchrotron Radiation, Argonne National Laboratory, October 3-4, 1988.

"Structural Characterization of the Fe sites in Phthalate Dioxygenase", Purdue University, West Lafayette, November 17, 1988.

"X-ray Absorption Spectroscopy: A New Tool for Elucidation of Metal-Ion Electronic Structure", Franklin & Marshall College, November 18, 1988.

"Potentials and Limitations of X-ray Absorption Spectroscopy", Molecular Biophysics Faculty Seminar, University of Michigan, January 19, 1989.

"Structural Characterization of the Fe sites in Phthalate Dioxygenase", North Carolina State University, Department of Biochemistry, February 9, 1989.

"Experience of an EXAFS User with Array Detectors", Workshop on X-ray Absorption Fine Structure and Array Detectors, Brookhaven National Laboratory, May 17, 1989.

"Structural Properties of the Mn Site(s) in the Photosynthetic Oxygen Evolving Complex", American Society for Photobiology, Boston, July 3-7, 1989.

- "Structural Characterization of the Mn Sites in the Photosynthetic Oxygen Evolving Complex", Chemistry Division, Argonne National Laboratory, June 27, 1989.
- "Structural Characterization of the Iron Sites in Phthalate Dioxygenase Using X-ray Absorption Spectroscopy", Los Alamos National Laboratory, Los Alamos, New Mexico, October 6, 1989.
- "Sulfur Speciation in Heavy Petroleums Using X-ray Absorption Near Edge Structure", Chevron Oil Field Research Company, La Habra, California, October 13, 1989.
- "Structural Characterization of the Manganese Sites in the Photosynthetic Oxygen Evolving Complex Using X-ray Absorption Spectroscopy", 1989 Conference on the Structure and Function of Photochemical Reaction Centers, University of Chicago, December 3-4, 1989.
- "Structural Characterization of the Manganese Sites in the Photosynthetic Oxygen Evolving Complex Using X-ray Absorption Spectroscopy", Parke-Davis Pharmaceutical Research Division, Ann Arbor, Michigan, December 5, 1989.
- "Structural Characterization of the Fe Sites in *Pseudomonas Cepacia* Phthalate Dioxygenase", International Chemical Congress of Pacific Basin Societies, Honolulu, Hawaii, December 17-22, 1989.
- "Comparison of the Mn Sites in the Photosynthetic Oxygen Evolving Complex and the *L. Plantarum* Mn Catalase", Gordon Research Conference on Metals in Biology, Ventura, California, January 22-26, 1990.
- "Structural Characterization of the Mn Sites in the Photosynthetic Oxygen Evolving Complex", Chalmers Technological University, Göteborg, Sweden, February 4, 1990.
- "Structural Characterization of the Mn Sites in the Photosynthetic Oxygen Evolving Complex", Lund University, Lund, Sweden, February 6, 1990.
- "Applications of X-ray Absorption Spectroscopy to the Characterization of Metalloproteins: Potential and Limitations", Biophysical Society, Baltimore, February 18-22, 1990.
- "X-ray Absorption Spectroscopy of the Mn Sites in the Photosynthetic Oxygen Evolving Complex", Biophysical Society, Baltimore, February 18-22, 1990.
- "Structural Characterization of the Hg Sites in MerR", UCLA Colloquium on The Inorganic Chemistry/Molecular Biology Interface, Taos, NM February 24-March 1, 1990.
- "Characterization of the Mn Sites in Mn Redox Proteins: Recent Studies of the Photosynthetic Oxygen Evolving Complex and the Mn Catalase", Emory University, March 5, 1990.
- "Characterization of the Mn Sites in Mn Redox Proteins: Recent Studies of the Photosynthetic Oxygen Evolving Complex and the Mn Catalase", University of Georgia, March 6, 1990.
- "Characterization of the Mn Sites in Mn Redox Proteins: Recent Studies of the Photosynthetic Oxygen Evolving Complex and the Mn Catalase", University of South Carolina, March 7, 1990.
- "Structural Characterization of the Mn Sites in Mn Redox Enzymes: Studies of the Photosynthetic Oxygen Evolving Complex and Mn Catalase", Third International Conference on Biophysics and Synchrotron Radiation, Stanford, Ca., July 2-6, 1990.
- "Polarized X-ray Absorption Spectroscopy of Biological Molecules", Sixth International Conference on X-ray Absorption Fine Structure, York, UK, August 5-11, 1990.
- Invited Lecturer, workshop of Bioinorganic Chemistry: "Structural Characterization of the Mn Sites in Mn Redox Enzymes", and "X-ray Absorption Spectroscopy in Bioinorganic Chemistry", Indian Institute of Technology, Madras, India, Dec 9-15, 1990.
- "Structural Characterization of the Mn Sites in Mn Redox Enzymes: X-ray Absorption Spectroscopy in Bioinorganic Chemistry", Rochester University, January 8, 1991.
- "Potentials and Limitations of X-ray Absorption Spectroscopy", Symposium on Macromolecular Structure Determination, American Chemical Society Meeting, Atlanta, April 14-20, 1991.
- "Polarized X-ray Absorption Spectroscopy of Biological Molecules", Sixth International Conference on X-ray Absorption Fine Structure, York, UK, August 5-11, 1990.
- "Polarized X-ray Absorption Spectroscopy of Biological Molecules", Symposium on Synchrotron Radiation, American Crystallographic Association, Toledo, July 22-26, 1991.

- "Potential and Limitations of X-ray Absorption Spectroscopy," Catalysis & Surface Science Colloquium, University of Michigan, September 27, 1991.
- "Chemical Applications of Synchrotron Radiation", Seminar Series (3 seminars) in Mexico City, January 10-12, 1992.
- "Structural Characterization of the Fe Sites in Phthalate Dioxygenase", Institut für Physik, Medizinische Universität zu Lübeck, Germany, January 26, 1992.
- "X-ray Absorption Spectroscopy of Cu Proteins", Symposium on Cu Proteins, Chalmers University of Technology, Göteborg, Sweden, June 12, 1992.
- "Chemical Applications of X-ray Absorption Spectroscopy", Institut für Anorganische Chemie der Universität, Frankfurt Am Main, Germany, July 9, 1992.
- "Structural Characterization of Organocuprate Complexes in Solution", Department of Chemistry, Marburg University, Marburg, Germany, July 8, 1992.
- "Applications of Polarized XAFS in Structural Biology", Fourth International Conference of Biophysics and Synchrotron Radiation, Tsukuba, Japan, September 1-5, 1992.
- "Structural Characterization of the Metal Sites in Mn Redox Proteins: Mn catalase and the Oxygen Evolving Complex", The Ohio State University, October 12, 1992.
- "X-Ray Absorption Spectroscopy of the Mn Site in the Photosynthetic Oxygen Evolving Complex: Characterization of Reduced Derivatives", SSRL users organization Annual Meeting, Stanford, California, October 22-23, 1992.
- "Structural Characterization of the Metal Sites in Mn Redox Proteins: Mn catalase and the Oxygen Evolving Complex", University of Michigan, Enzyme Discussion Group, February 3, 1993.
- "Polarized X-ray Absorption Fine Structure", Department of Chemistry, University of Buffalo, March 19, 1993.
- "X-Ray Absorption Fine Structure Spectroscopy of Biological Molecules", ACS National Meeting, Denver, March 28-April 2, 1993.
- "X-Ray Absorption Spectroscopy of the Mn Site in the Oxygen Evolving Complex: Characterization of Reduced Derivatives", ACS National Meeting, Denver, March 28-April 2, 1993.
- "X-Ray Absorption Spectroscopy of the Mn Site in the Photosynthetic Oxygen Evolving Complex: Characterization of Reduced Derivatives", American Society for Photobiology, Chicago, June 26-30, 1993.
- "Polarized XAFS? Why not just use crystallography?" Workshop on Chemical Applications of XAFS, Stanford, California, July 7-8, 1993.
- "XAFS in Chemistry and Biology: Potential and Limitations". Workshop on Chemical Applications of XAFS, Stanford, California, July 7-8, 1993.
- "Applications of X-ray Absorption Spectroscopy to Inorganic Chemistry: Potential and Limitations", Debye Institute, Department of Metal-Mediated Organic Synthesis", August 4, 1993.
- "Structural Characterization of the Metal Sites in Mn Redox Proteins: Mn catalase and the Oxygen Evolving Complex", North Carolina State University, November 10, 1993.
- "X-ray Absorption Spectroscopy of Metalloproteins", Oakland University, December 8, 1993
- "Structural Characterization of the Mn sites in the Photosynthetic Oxygen Evolving Complex", Louisiana State University, March 11, 1994
- "Graduate School in Chemistry. Why you should go. Why you shouldn't go.", Dow Foundation program for fellowship students, Midland, Michigan, April 7, 1994
- "Structural Characterization Of The Mn Ligand Environment In Mn Catalase", American Chemical Society Meeting, Washington, D.C., August 22-28, 1994.
- "Characterization of the Mn Sites in Manganese Redox Proteins: Mn Catalase and the Photosynthetic Oxygen Evolving Complex", Eighth International Conference on X-ray Absorption Fine Structure, Berlin, August 27-Sept. 5, 1994
- "X-Ray Absorption Spectroscopy of Crystals. Why Not Just Use Crystallography?", Argonne National Laboratory, November 2, 1994

- “Overview of X-ray Spectroscopy of Photosystem II”, ESF Conference on Oxygen Evolution, Gif sur Yvette, France, November 5-10, 1994.
- “Characterization of the Mn Sites in Manganese Redox Proteins: Mn Catalase and the Photosynthetic Oxygen Evolving Complex”, University of Western Ontario, London, Canada, November 23, 1994.
- “Structural Characterization of the Mn Site in the Photosynthetic Oxygen Evolving Complex”, Ohio State University, December 15, 1994.
- “Structural Characterization of the Mn Site in the Photosynthetic Oxygen Evolving Complex”, Gordon Conference on Metals in Biology, Ventura, California, January 23-27, 1995
- “Structural Characterization of the Mn Site in the Photosynthetic Oxygen Evolving Complex”, University of Nebraska, January 31, 1995.
- “Structural Characterization of the Mn Site in the Photosynthetic Oxygen Evolving Complex”, University of Virginia, February 13, 1995.
- “Graduate School in Chemistry. Why you should go. Why you shouldn’t go.”, Dow Foundation program for fellowship students, Midland, Michigan, April 7, 1995
- “X-Ray Absorption Spectroscopy of Crystals (Why Not Just Use Crystallography?)”, 1995 Kilpatrick Lecture, Illinois Institute of Technology, April 25, 1995.
- “Structural Characterization Of The Mn Cluster In PSII Using X-Ray Absorption Spectroscopy”, International Congress on Photosynthesis, Montpellier, France, August 20-25, 1995.
- “Polarized X-ray Absorption Spectroscopy”, Fifth International Conference on Biophysics and Synchrotron Radiation, Grenoble, France, August 21-25, 1995.
- "X-Ray Absorption Spectroscopy Of The Mn Site In The Photosynthetic Oxygen Evolving Complex", University of Texas, El Paso, April 26, 1996.
- "X-Ray Absorption Spectroscopy Of The Mn Site In The Photosynthetic Oxygen Evolving Complex", University of Houston, April 29, 1996.
- "Structural Characterization Of The Mn Cluster In Photosystem II Using X-Ray Absorption Spectroscopy", Great Lakes Regional ACS Meeting, Illinois State University, May 22, 1996.
- "Mn-catalase and the OEC in Photosynthesis", Oxygen Intermediates in Non-Heme Metallobiochemistry, Minneapolis, MN, June 23-27, 1996.
- "Structural Studies of Mn Enzymes", International Union of Crystallography, Seattle, August 8-17, 1996.
- “Oxidation State Of The Mn In The Photosynthetic Oxygen Evolving Complex”, ESF Conference on Biophysics of Photosynthesis, Sitges, Spain, October 5-10, 1996.
- “X-Ray Absorption Spectroscopy Of Mn Enzymes”, ACS National Meeting, San Francisco, April 13-17, 1997.
- “Structural Characterization of Organometallic Reagents: The Role of X-ray Absorption in Understanding Organic Reactivity”, Workshop on Biological and Chemical Applications of EXAFS Spectroscopy, NSLS, May 21, 1997.
- “Metal Containing Enzymes”, St. Thomas College, November 20, 1997.
- "Characterization of the Mn cluster in the photosynthetic oxygen evolving complex", Departmental Colloquium, University of Cincinnati, April 10, 1998.
- “Zn Speciation during zebrafish development”, Workshop on Biological and Chemical Applications of Synchrotron Radiation, NSLS, May 17, 1998
- "X-Ray Absorption Spectroscopy Of Mn Enzymes", Sixth International Conference on Biophysics and Synchrotron Radiation, Chicago, August 4-8, 1998.
- "X-ray Absorption Spectroscopy in the Era of Synchrotron-based crystallography. Is it obsolete?", Sixth International Conference on Biophysics and Synchrotron Radiation, Chicago, August 4-8, 1998.
- “X-ray Absorption Spectroscopy in Coordination Chemistry. Application to Mn Enzymes”, International Conference on Coordination Chemistry, Florence, August 30-September 4, 1998.

"Structural Characterization of the Mn cluster in Photosynthetic Oxygen Evolution", Centre d'Etude Atomique, Saclay, France, September 21, 1998.

"Structural Characterization of the Mn cluster in Photosynthetic Oxygen Evolution", Institut de Chimie Moleculaire et Organique, Université de Paris, Sud, Orsay, October 7, 1998.

"Spectroscopically Quiet" Metals: Zinc in Biological Systems", Workshop on Biological Applications of X-ray Absorption Spectroscopy, Grenoble, France, February 15-16, 1999.

"Characterization of "Spectroscopically Quiet" Metals: Zinc in Biological Systems", Workshop on XAFS, DESY, Hamburg, Germany, June 16-20, 1999.

"Structural Characterization of the Mn Cluster in the Photosynthetic Oxygen Evolving Complex", Max Planck Institut für Strahlenchemie, Mülheim, Germany, June 30, 1999.

"X-Ray Absorption Spectroscopy of Crystals (Why Not Just Use X-ray Diffraction?)", Institut für Angewandte Physik, Heinrich-Heine-Universität, Düsseldorf, Germany, July 1, 1999.

"Structural Characterization of the Mn Cluster in the Photosynthetic Oxygen Evolving Complex", Lehrstuhl für Biochemie der Pflanzen, Ruhr-Universität, Bochum, Germany, July 2, 1999.

"New Roles for Zinc in Biology: Zinc catalyzed alkyl-transfer chemistry", Centre d'Etude Atomique, Saclay, France, July 12, 1999.

"Polarized X-ray Absorption Fine Structure", Synchrotron Radiation Satellite of the International Union of Crystallography Meeting, Daresbury, England, August 1-4, 1999.

"Structural Characterization of the Mn Cluster in the Photosynthetic Oxygen Evolving Complex", Miami University, September 16, 1999

"The role for x-ray absorption spectroscopy in the era of structural genomics", NRC Workshop on Biological Applications of Synchrotron Radiation, Saskatoon, October 21-23, 1999.

"Characterization of "Spectroscopically Quiet" Metals: Zinc in Biological Systems", Clark University, February 21, 2000.

"Characterization of "Spectroscopically Quiet" Metals: Zinc in Biological Systems", Worcester Polytechnic Institute, February 23, 2000.

"Characterization of "Spectroscopically Quiet" Metals: Zinc in Biological Systems", University of Massachusetts, February 24, 2000.

"Structural Characterization of the Mn Cluster in the Photosynthetic Oxygen Evolving Complex", Brown University, February 25, 2000.

"Characterization of "Spectroscopically Quiet" Metals: Zinc in Biological Systems", European Synchrotron Radiation Facility, June 20, 2000.

"Polarized X-Ray Absorption Spectroscopy of Iron Porphyrins", First International Conference on Porphyrins and Phthalocyanines, Dijon, France, June 25 – 30, 2000.

"Zn catalyzed alkyl-transfer reactions: A new class of biological Zn sites", BioXAS Conference, Orsay, France, July 3-4, 2000.

"XAFS studies of Zn containing alkyl transfer enzymes", 11th International XAFS Conference, Ako, Japan, July 26-31, 2000.

"Biological Water Oxidation: Characterization of the Mn Cluster in the Photosynthetic Oxygen Evolving Complex", Kalamazoo College, October 19, 2000.

"Life at the Interface of Biology and Inorganic Chemistry. Frontiers in Bioinorganic Chemistry", Akron Section Award Address, Nov. 15, 2000.

"Characterization of "Spectroscopically Quiet" Metals: Zinc in Biological Systems", International Symposium on Advances in Bioinorganic Chemistry, Mumbai, India, November 20-24, 2000.

"Biological Water Oxidation: Characterization of the Mn Cluster in the Photosynthetic Oxygen Evolving Complex", IIT Bombay, Mumbai, India, Nov. 25, 2000.

"Biological Water Oxidation: Characterization of the Mn Cluster in the Photosynthetic Oxygen Evolving Complex", IIT Madras, Chennai India, Nov 27, 2000.

"Molecular Oxygen Evolution in Photosynthesis", University of Hyderabad, Hyderabad, India, Nov. 28, 2000.

- “Biological Water Oxidation: Characterization of the Mn Cluster in the Photosynthetic Oxygen Evolving Complex”, IIT Delhi, New Delhi, India, Nov. 30, 2000.
- “Non-crystallographic Structure Determination: The Role for XAS in the Era of Structural Genomics”, Workshop on Structural Molecular Biology At SESAME, Nicosia, Cyprus, December 6-7, 2000.
- “Spectroscopically Challenged Metal: Characterization of the Role of Zn in Biology” Wayne State University, December 19, 2000.
- “Zn catalyzed alkyl-transfer reactions: A new class of biological Zn sites”, Boston University, February 12, 2001
- “Structural Characterization of the Mn cluster in the Photosynthetic Oxygen Evolving Complex Using X-ray Absorption” Bowling Green State University, February 14, 2001
- “Characterization of Spectroscopically Quiet Metals: Zinc in Biological Systems”, NSLS Users Meeting, Upton, NY, May 22, 2001.
- “X-ray Absorption Spectroscopy of Zinc Sites in Proteins. When is a Tetrathiolate not a Tetrathiolate?”, Workshop on Advanced Methods of EXAFS Data Modeling, National Synchrotron Light Source, May 23, 2001.
- “Spectroscopically Challenged Metals: Structural Characterization of Zn sites in Biology”, College of Charleston, October 11, 2001
- “Radiation Damage Of Redox-Sensitive Transition Metal Ions”, Workshop on Radiation Damage in X-ray Crystallography, Argonne National Laboratory, December 1-2, 2001.
- “Spectroscopically Challenged Metals: Structural Characterization of Zn sites in Biology”, Department of Biochemistry, University of Alberta, December 19, 2001.
- “Zn promoted alkyl transfer enzymes”, Metals in Biology Gordon Research Conference, January 20-25, 2002.
- “Characterization of "Spectroscopically Quiet" Metals: Zinc in Biological Systems”, Department of Chemistry, Yale University, February 12, 2002.
- “Structural characterization of Zn sites in non-crystalline proteins. The role of x-ray absorption for studies of spectroscopically challenged metals”, Zinc Signals 2002, April 11-13, 2002 Grand Cayman, BWI
- “Characterization of "Spectroscopically Quiet" Metals: Zinc in Biological Systems”, Department of Chemistry, University of Firenze, Italy, May 6, 2002.
- “Characterization of "Spectroscopically Quiet" Metals: Zinc in Biological Systems”, Midwest Metals Meeting, Chicago, May 10-12, 2002
- “Applications of x-ray absorption spectroscopy to inorganic and bioinorganic chemistry”, ACS National Meeting, Boston, August 18-22, 2002.
- “X-ray Absorption Spectroscopy at a Third Generation Synchrotron: Towards a new paradigm for XAFS”, Workshop on Structural Biology Applications at PETRA III, Hamburg, Germany, September 12-13, 2002.
- “Biological EXAFS at 3rd generation sources: Is brighter better?” Stanford Synchrotron Radiation Laboratory Users Meeting, October 7-8, 2002
- “Characterization of "Spectroscopically Quiet" Metals: Zinc in Biological Systems”, Department of Chemistry, University of New Mexico, January 24, 2003.
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- “Characterization of ‘Spectroscopically Quiet’ Metals: Zinc in Biological Systems”, Beijing Synchrotron Radiation Facility, Chinese Academy of Sciences, Beijing, February 24, 2003.
- “Characterization of ‘Spectroscopically Challenged’ Metals: Zinc in Biological Systems”, Willamette University, Willamette, OR, April 17, 2003.
- “Biological Applications of EXAFS and XANES. Examples from the Zn Enzymes”, Workshop on Biological Applications of Synchrotron Radiation, Baton Rouge, LA, June 2-6, 2003.

- “ ‘Spectroscopically quiet’ metals: Zinc in biological systems”, EMBO Practical Workshop on Biological EXAFS, Hamburg, Germany, June 17-22, 2003
- “XAS at 3rd generation synchrotrons: challenges and limitations” ”, EMBO Practical Workshop on Biological EXAFS, Hamburg, Germany, June 17-22, 2003
- “Characterization of Spectroscopically Silent Metals: The Role of Zn in Biology”, Plenary Talk, Twelfth International Conference on XAFS, Lund, Sweden, June 22-27, 2003.
- “On the prospects for high - throughput XAS studies using third – generation synchrotron sources”, Second BioXAS Study Weekend: Genomics and BioXAS, Orsay, France, June 29-30, 2003.
- “Zinc catalyzed alkyl-transfer enzymes”, Eleventh International Conference on Bioinorganic Chemistry, Cairns, Australia, July 19-23, 2003.
- “Experimental Techniques in x-ray absorption spectroscopy”, Summer Workshop on Structural Molecular Biology, Stanford University, September 15-17, 2003.
- “Applications of synchrotron Radiation to Inorganic Chemistry”, Department of Chemistry, University of Science and Technology, Hefei, China, October 20, 2003.
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- “Characterization of Spectroscopically Silent Metals: The Role of Zn in Biology”, Department of Chemistry, Yonsei University, Seoul Korea, February 27, 2004.
- “Characterization of Spectroscopically Silent Metals: The Role of Zn in Biology”, Department of Chemistry, Notre Dame University, April 15, 2004.
- “Zinc-containing alkyl-transfer enzymes - a new class of biological Zn sites”, 87th Canadian Chemistry Conference, London, Ontario Canada, May 29-June 1, 2004.
- “X-ray Absorption Spectroscopy as a probe of Zn electronic structure”, Symposium on “Bridging Technologies for Structural Biology”, Pacific Northwest National Laboratory. June 14-16, 2004.
- “Zn promoted alkyl transfer enzymes: A New Role for Zn in Biology”, Inorganic Chemistry Gordon Conference, July 18-23, 2004.
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- “Spectroscopically Challenged Metals: Characterization of Zn Sites in Biology”, Wayne State University, September 9, 2004.
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Peer-Reviewed Publications

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