

Curriculum Vitae

Niels H. Damrauer

I. Personal Data

Niels Harley Damrauer
Born: December 17, 1970
Denver, Colorado U.S.A.
Professor of Chemistry
University of Colorado

Department of Chemistry and Biochemistry
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II. Academic Degrees

September, 1994 – University of California, Berkeley, CA
February, 2000 Ph.D. Chemistry
Advisor: Professor James K. McCusker
Dissertation Title: “Franck-Condon State Evolution in Metal-to-Ligand Charge Transfer Chromophores: Influence of Electronic Structure, Ligand Structure, and Solvent Environment on Photo-Induced Excited-State Dynamics”

September, 1989 – University of Pennsylvania, Philadelphia, PA
May, 1994 B.S. Chemistry (w/ honors)
Advisor (September, 1993 – April, 1994) : Professor Robin Hochstrasser
Research Title: “Nanosecond Studies of the HgI₂ Photodissociation Reaction in Solution”

Advisor (January, 1992 – December, 1992) : Professor Donald Berry
Research Title: “Studies of Species Containing Silicon-Tungsten Multiple Bond Character”

III. Stages of Academic Development

• Research Experience

August 2003 – Present: Department of Chemistry, University of Colorado Boulder, CO

August 2003 – April 2011: Assistant Professor of Chemistry

April 2011 – July 2019: Associate Professor of Chemistry

July 2019 – Present: Professor of Chemistry

The research program brings together strategies for actively controlling reactivity of electronically complex systems. We are especially interested in excited-state reactivity and in discovering new types of photochemistry and physical methods for achieving it. Areas being targeted are control of photochemistry using complex shaped laser fields and control of excited-state transformations by synthetic manipulation of molecular structure. This research is motivated by a desire to understand fundamental mechanisms important for conversion of sunlight to electricity or fuel stocks. We recognize that strategies for such energy conversion must be developed and exploited rapidly in order to mitigate the effects of greenhouse gas production by traditional carbonaceous energy resources. We aim to continue developing and refining physiochemical tools that allow us to understand and control photochemical transformations.

Oct. 2001 – June 2003: Dept. of Chemistry, Massachusetts Institute of Technology, Cambridge, MA

Advisor: Professor Daniel Nocera

National Institutes of Health Postdoctoral Fellowship: Experiments were designed and implemented to measure proton and electron transfer rates in model metalloporphyrin/diimide donor-acceptor systems exhibiting proton-coupled electron transfer (PCET) pathways. Our research goals were to understand, at a detailed mechanistic level, how proton motion can modulate electron transfer, thereby, shedding light on how PCET functions in bioenergetic conversion and storage.

March 2000 – July 2001: Dept. of Physics, University of Würzburg, Würzburg, Germany

Advisor: Professor Gustav Gerber

Alexander von Humboldt Postdoctoral Fellowship: Adaptive femtosecond pulse shaping techniques were used to actively control complex photochemical and photophysical processes. Achievements included the demonstration that shaped laser pulses – discovered through adaptive learning – can selectively excite one type of charge-transfer chromophore within a solution-phase mixture of two distinct non-interacting chromophores.

1994 – 2000: Dept. of Chemistry, University of California, Berkeley, CA

Advisor: Professor James McCusker

Ph.D. Research Project: Time resolved spectroscopies, synthesis, and theory were used to characterize the solution phase excited-state dynamics of novel ruthenium polypyridyl charge transfer complexes exhibiting such properties as time-dependent electronic delocalization. Experiences included construction of femtosecond and nanosecond transient absorption spectrometers, synthesis of novel aryl-substituted bipyridine ligands and new Group VIII coordination complexes, and implementation of modern computational methods. Ultrafast transient absorption spectroscopy was used to time-resolve primary kinetic events in the excited-state evolution of these species including intersystem crossing, solvation, and intraligand structural dynamics.

June 1994 – Aug. 1994: Dept. of Chemistry, University of Colorado at Denver, Denver, CO

Advisor: Professor Robert Damrauer

Ab initio studies were undertaken to determine the energies of reactions between a variety of four-atom neutral silicon containing species and related three-atom anionic bases. The goal was to discover the energy of barriers to proton transfer in these species.

Sept. 1993 – May 1994: Dept. of Chemistry, University of Pennsylvania, Philadelphia, PA

Advisor: Professor Robin Hochstrasser

Research was undertaken with the goal of observing and understanding the nanosecond time-scale evolution of the HgI radical in the condensed phase. These studies were an important addition to experiments in the group which focused on the femtosecond time-scale dynamics of the condensed phase photo-dissociation reaction of HgI₂.

June 1993 – Aug. 1993: Dept. of Chemistry, University of Colorado, Boulder, CO

Advisor: Professor Charles Depuy

Ab initio studies were undertaken to determine the ground-state potential energy surfaces of anion clusters including that formed by the reaction of CN⁻ and H₂CS. Reaction coordinates linking various isomers through structural changes were elucidated.

Jan. 1992 – May 1992 and Sept. 1992 – Dec. 1992: Dept. of Chemistry, University of Pennsylvania, Philadelphia, PA

Advisor: Professor Donald Berry

Studies were undertaken with the goal of determining bonding characteristics and reactivity for organometallic species exhibiting enhanced Si-W multiple bond character. Research included the exploration of insertion chemistry of chalcogens into tungsten disilene complexes.

June 1991 – Aug. 1991 and June 1992 – Aug. 1992: Dept. of Chemistry, University of Colorado at Denver, Denver, CO

Advisor: Professor Robert Damrauer

Research was undertaken to explore synthetic routes for the preparation of organosilicon cage compounds. In addition, a semi-empirical computational study was completed which explored the gas phase reactivity of four-coordinate aluminum species with acids of known strength.

• **Awards and Fellowships**

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| 2018 | Recognition in 2018 JACS Young Investigator Virtual Issue |
| 2009 | Alfred P. Sloan Research Fellowship |
| 2009 | National Science Foundation Faculty Early Career Development Award (CAREER) |
| 2008 | Honda Initiation Grant Award |
| 2002 – 2003 | National Institutes of Health Postdoctoral Research Fellowship · MIT |

• **Current and Previous Funding**

Sponsor	Title	Support	Duration
Department of Energy; Office of Basic Energy Sciences	<i>Molecular Control of Spin-Entangled Triplet Excitons from Singlet Fission</i>	\$1.3 M total with \$482,000 to Damrauer	36 month period 9/1/18-9/30/21
National Science Foundation	<i>SusChEM: Design Principles Inspired by Symmetry for Controlling Singlet Fission in Structurally Well-Defined Covalent Dimers</i>	\$480,000 awarded to Damrauer and Sammakia	36 month period 5/1/2017 – 4/30/2020
ACS Petroleum Research Foundation	<i>Acene Dimers: Synthesis, Structure, and Photochemical Properties</i>	\$110,000 awarded to Sammakia with Damrauer as Co-PI	24 month period 07/01/2017 - 08/31/2019
US Department of Education	<i>Graduate Program in Catalysis and Biocatalysis</i>	\$885,834; Damrauer is co-PI on this Graduate Fellowship Training Grant	36 month period + 12 month NCE 8/15/15-8/14/19
University of Colorado at Boulder Innovative Seed Grant	<i>Driving Ordered Chromophore Aggregation on Nanoparticle Oxides</i>	\$30,000 to Damrauer, \$16,000 to Eaves	12 month period 7/1/14 – 6/30/15
National Science Foundation	<i>NSMDS: Computational Design and Synthetic Exploitation of Earth-Abundant-Sourced Photocatalysts for C-X Activation</i>	\$826,000 awarded to Damrauer	48 month period 10/15/2013 – 10- 14-2017
Department of Energy; Office of Basic Energy Sciences	<i>Applications of Adaptive Quantum Control to Research Questions in Solar Energy Conversion</i>	\$560,000	60 month period; 10/15/2011 – 10/14/2016
Center for Revolutionary Solar Photoconversion (CRSP)	<i>Time-Resolved Charge Injection Study of Self-Repairing Water Oxidation Catalyst Activity</i>	\$82,000 awarded to Damrauer, Jonas, and Rogers	12 month period; beginning in 2012
Renewable and Sustainable Energy Initiative (RASEI)	<i>Hybrid molecule-semiconductor nanostructures for solar water splitting</i>	\$20,000 (of \$40,000 awarded to Damrauer and Professor Gordana Dukovic of CU Boulder	12 month period; 01/01/2011 – 12/31/2011
Center for Revolutionary Solar Photoconversion (CRSP)	<i>New Materials and Time Resolved Measurements for Optimizing Hole-Transfer Photochemistry</i>	\$50,000 (of \$100,000 awarded to Damrauer and Prof. M. Shores of CSU Dept. Chem.)	12 month period; 01/01/2010 – 12/31/2010
Alfred P. Sloan Research Fellowship		\$50,000	24 month period; 05/01/2009 – 04/30/2011
National Science Foundation	<i>CAREER: Manipulating Molecules and Motivating Students; Explorations of Energy Conversion through Adaptive Control of Electron Transfer Photoreactivity and in New Educational Platforms for Science Discovery in Colorado</i>	\$645,000	60 month period; 03/01/2009 – 02/28/2014
Honda Initiation Grant Competition	<i>Hybrid Materials for Control of Interfacial Hole-Transfer Photochemistry</i>	\$25,000 (of \$50,000 awarded to Damrauer and Prof. M. Shores of CSU Dept. Chem.)	1/1/2009- 12/31/2009.
Department of Energy; Office of Basic Energy	<i>Applications of Adaptive Quantum Control to Research</i>	\$25,000 (supplemental	9/1/2008 –

Sciences	<i>Questions in Solar Energy Conversion</i>	funding)	01/14/2009
National Science Foundation	<i>MRI-Consortium: Acquisition of a Supercomputer by the Front Range Computing Consortium</i>	Damrauer was one of 57 senior personnel on \$4M proposal.	36 month period; 8/1/2008 – 7/31/11
Department of Energy; Office of Basic Energy Sciences	<i>Applications of Adaptive Quantum Control to Research Questions in Solar Energy Conversion</i>	\$525,000	42 month period; 07/15/2007 – 01/14/2011
American Chemical Society, Petroleum Research Fund (PRF-G)	<i>Towards Active Kinetic Control of Electron Transfer: Manipulation of Rates, Direction, and Multi-Electron Photochemistry Using Adaptively-Shaped Laser Fields</i>	\$35,000	24 month period; 09/01/2004 – 08/31/2006
University of Colorado at Boulder, Council on Research and Creative Work (CRCW)	<i>Towards Active Kinetic Control of Electron Transfer using Light</i>	\$5,000	Academic year 2004 – 2005

• Recent Synergistic Activities

- Research and training of students in a program which aims to understand and exploit excited state reactivity in electronically and structurally complex systems.
- Training of graduate students broadly with tools including synthesis, time-resolved and static electronic spectroscopies, quantum chemical applications, and quantum control. Students are receiving a broad education in methods of chemical research.
- Member of the Department of Chemistry and Biochemistry Executive Committee Fall 2016 – Fall 2018.
- Co-director of GAANN Graduate Training grant from the Department of Education in Catalysis and Biocatalysis.
- Member of the RASEI Executive Committee Spring 2014 – 2016
- Development and implementation of new research-based curriculum in the General Chemistry Laboratory Program for Chemistry and Biochemistry majors at CU Boulder.
- Chemical education outreach (K-12) including hosting Denver and Boulder high school students as well as teachers doing fundamental and authentic research in the laboratory during the summer.
- Chemical education outreach through CU Wizards program.
- Co-chair of the RASEI reappointment committee 2012-2013.
- Presentation to University of Colorado Alumni in Boston, MA, April, 2012.
- Co-Organizer of Inter-American Photochemical Society Winter Meeting, 2014; Sarasota, FL ~ 100 participants.
- Member of the Scientific Advisory Board for Sun Catalytix; Cambridge Massachusetts.
- Sabbatical (July 2011 – July 2012) spent as researcher and research manager at Sun Catalytix; Cambridge Massachusetts.
- Member of organizing committee for symposium: *Towards Earth Abundant Solar Photocatalysis*, held in the Inorganic Division at the Denver National meeting of the American Chemical Society, Denver, CO, August, 2011
- Founding fellow of RASEI (Renewable and Sustainable Energy Institute) (2009).
- NSF review panel for Chemical Instrumentation (2009)
- Member of organizing committee: *Workshop on Efficient Conversion of Solar Energy to Electricity and Fuels: Critical Research Directions and Tutorial*; August 13-15, 2008 University of Colorado at Boulder; Sponsored by DOE-BES and the Colorado Renewable Energy Collaboratory; ~ 325 participants.
- Member of Center for Revolutionary Solar Photoconversion (CRSP) and reviewer/advisor for CRSP seed grant proposals. CRSP is a research center in the Colorado Renewable Energy Collaboratory. Named one of five *CRSP Distinguished Colleagues* in 2009.

• Presentations

- 74) “Exploiting symmetry and energy in charge transfer states for singlet fission and photoredox properties” *Invited Seminar Speaker*, University of Washington, February, 2019.

- 73) "Exploiting symmetry and energy in charge transfer states for singlet fission and photoredox properties" *Invited Seminar Speaker*, Rutgers University, November, 2018.
- 72) "Exploiting Symmetry and Intermolecular Orientation in Rigid Polyacene Systems for Singlet Fission Studies" Poster Presentation (including students); Symposium on 'Singlet Fission' Peaceful Valley, CO, June, 2018.
- 71) "Controlling non-radiative decay in transition metal chromophores using structure and spin" *Invited Speaker*, American Chemical Society Fall National Meeting; Symposium honoring Daniel Nocera, Washington DC, August, 2017.
- 70) "Explorations of a New Paradigm for MLCT: Using Structure and Spin to Extend Charge-Transfer Lifetimes in Iron(II) Polypyridyl Complexes" *Invited Speaker*, Gordon Conference on Photochemistry, Bates College, Lewiston, ME, July, 2017.
- 69) "Manipulating Singlet Fission Dynamics in Covalent Dimers with Structural Variables" *Speaker*, Symposium on 'Singlet Fission' Peaceful Valley, CO, June, 2016.
- 68) "Exploring Rigid Dimers of Polyacene-based Materials for Singlet Fission" Poster Presentation (including students); Symposium on 'Singlet Fission' Peaceful Valley, CO, June, 2017.
- 67) "Manipulating Excited State Dynamics with Structural Variables: New Ideas Applied to Iron(II) MLCT Photophysics and in Symmetry Control of Singlet Fission in Covalent Dimers." *Invited Seminar Speaker*, University of California at Irvine, April, 2016.
- 66) "Design Rules for Singlet Fission Electronic Coupling in Covalent Dimers" *Invited Seminar Speaker*, University of Illinois at Urbana Champaign, April, 2016.
- 65) "Spin Control of Charge-Transfer Excited State Lifetimes in Iron(II) Polypyridyl Systems" Presentation at Annual Meeting of Catalysis Collaboratory for Light-Activated Earth Abundant Reagents, Colorado State University, Ft Collins, CO, August, 2015.
- 64) "Exploring Covalent Dimers of Tetracene-based Materials for Singlet Fission" Poster Presentation (including students); Symposium on 'Singlet Fission' Peaceful Valley, CO, June, 2015.
- 63) "Understanding, Control, and Optimization of Singlet Fission in Tetracene-based Materials" Poster Presentation (including students); Symposium on 'Singlet Fission' Peaceful Valley, CO, June, 2014.
- 62) "Efforts to control electronic energy conversion" Presentation to External Advisory Board of RASEI, University of Colorado at Boulder, Boulder, CO, April, 2014.
- 61) "Efforts to control electronic energy conversion in metal complexes and singlet fission materials" *Invited Seminar Speaker*, University of Colorado at Denver, Denver, CO, February, 2014.
- 60) "Coupling in Singlet Fission Dimeric Systems." *Conference Speaker* at symposium on 'Singlet Fission' Organized by Prof. Josef Michl Peaceful Valley, CO, June, 2013.
- 59) "Exploring how excited-state conformational changes impact dissociative electron transfer and proton-coupled electron transfer." *Invited Symposium Speaker*, Symposium on 'Ultrafast Excited-state Dynamics in Transition Metal-containing Systems'; American Chemical Society National Meeting, New Orleans, LA, April, 2013.
- 58) "Manipulating nuclear motions to control excited state energy conversion." *Invited Conference Speaker*, Winter Inter-American Photochemical Society Meeting, Sarasota, FL, January, 2013.
- 57) "Manipulating nuclear motions to control excited state energy conversion." *Invited Symposium Speaker*, Solar Fuels Symposium associated with Research Triangle DOE Energy Frontiers Research Center, Raleigh, NC, November, 2012.
- 56) "Harvesting conformational dynamics for excited state energy conversion." *Invited Conference Speaker*, Gordon Conference on Electron Donor Acceptor Interactions, Salve Regina College, Newport, RI, August, 2012.

- 55) "Exploration of thermodynamic properties in new singlet fission molecular systems for controlling photochemical transformations," *Poster Presentation*; DOE Solar Photochemistry Research Conference; Annapolis, MD, June, 2012
- 54) "From electron transfer to singlet fission: exploiting molecular motions to control excited state energy conversion." *Invited Seminar Speaker*, Chemistry Seminar Series, University of Massachusetts at Dartmouth, Dartmouth, MA, April, 2012.
- 53) "From electron transfer to singlet fission: exploiting molecular motions to control excited state energy conversion." *Invited Speaker*, Modern Optics and Spectroscopy Seminar Series, Massachusetts Institute of Technology, Cambridge, MA, April, 2012.
- 52) "Exploiting molecular motions to control excited state energy conversion in metal complexes and solar-cell materials." *Invited Seminar Speaker*, Inorganic Chemistry Seminar Series, University of Chicago, Chicago, IL, March, 2012.
- 51) "Exploiting molecular motions to control excited state energy conversion in metal complexes and solar-cell materials." *Invited Seminar Speaker*, Chemistry Seminar Series, Université de Sherbrooke, Sherbrooke, Quebec, Canada, February, 2012.
- 50) "Manipulating excited-state energy conversion in transition metal complexes" *Invited Seminar Speaker*, Chemistry Colloquium, Amherst College, Amherst, MA, December, 2011.
- 49) "Manipulating excited-state energy conversion in transition metal complexes through optical pulse shaping and molecular structure," International Symposium on the Photochemistry and Photophysics of Coordination Compounds (ISPPCC), *Invited Conference Speaker*; held in Strasbourg, France, July 2011.
- 48) "Efforts to Understand Kinetic and Thermodynamic Factors Relevant for Controlling Photochemical Transformations with Light," Damrauer, N.H., *Poster Presentation*; DOE Solar Photochemistry Research Conference; Wintergreen, VA, June, 2011.
- 48) "Manipulating singlet fission through optical pulse shaping and implications for molecular design," *Invited Conference Speaker* at symposium on 'Singlet Fission' Organized by Prof. Josef Michl and hosted by NREL, Golden, CO, May, 2011.
- 47) "Manipulating Photochemistry in Organic Semiconductors using Optical Pulse Shaping," *Invited Conference Speaker* at symposium on 'Structural Spectroscopic and Electronic Characterization of Organic Semiconductors' hosted by RASEI, Boulder, CO, February, 2011.
- 46) "Manipulating excited-state energy conversion through optical pulse shaping and molecular structure: From electron transfer in metal complexes to singlet fission in solar cell materials," *Invited Seminar Speaker*, Physical Chemistry Colloquium, Colorado State University, Fort Collins, CO, February, 2011.
- 45) "Manipulating excited-state energy conversion through optical pulse shaping and molecular structure: From electron transfer in metal complexes to singlet fission in solar cell materials," Western Spectroscopy Association, *Invited Conference Speaker*; Pacific Grove, CA, January 2011.
- 44) "Controlling excited-state energy conversion in metal complexes and solar-cell materials through pulse shaping and molecular structure," Damrauer, N.H., *Invited Seminar Speaker*, Physical Chemistry Colloquium, Princeton University, October, 2010.
- 43) "Controlling excited-state energy conversion in metal complexes and solar-cell materials through pulse shaping and molecular structure," Damrauer, N.H., *Invited Seminar Speaker*, Physical Chemistry Colloquium, University of North Carolina at Chapel Hill, September, 2010.
- 42) "Active photochemical control in complex systems for solar energy conversion," Damrauer, N.H., *Invited Symposium Speaker*, Symposium on 'Molecular Models for Solar Energy Conversion and Storage'; American Chemical Society National Meeting, Boston, MA, August, 2010.

- 41) "Controlling photochemistry in complex systems for solar energy conversion," Damrauer, N.H., *Invited Conference Speaker*, Gordon Conference on Atomic and Molecular Interactions, Colby Sawyer College, New London, NH, 2010.
- 40) "Active photochemical control in complex systems for solar energy conversion," Damrauer, N.H., *Invited Symposium Speaker*, Symposium on 'Solar Energy'; American Chemical Society Regional Meeting (Northwest and Rocky Mountain Regions); Pullman, WA, June, 2010.
- 39) "Towards Control of Photochemical Transformations using Pulse Shaping: Exploiting Vibrations to Enhance Product Yield in Tetracene Singlet Fission," Damrauer, N.H., *Oral Presentation*; DOE Solar Photochemistry Research Conference; Annapolis, MD, June, 2010.
- 38) "Controlling excited-state energy conversion in metal complexes and solar-cell materials through pulse shaping and molecular structure," Damrauer, N.H., *Invited Seminar Speaker*, Physical Chemistry Colloquium, University of Rochester; April, 2010.
- 37) "Controlling excited-state energy conversion in metal complexes and solar-cell materials through pulse shaping and molecular structure," Damrauer, N.H., *Invited Seminar Speaker*, Physical Chemistry Colloquium, University of Wisconsin at Madison; April, 2010.
- 36) "Controlling excited-state energy conversion in metal complexes and solar-cell materials through pulse shaping and molecular structure," Damrauer, N.H., *Invited Seminar Speaker*, Physical Chemistry Colloquium, Yale University; April, 2010.
- 35) "Controlling excited-state energy conversion in metal complexes and solar-cell materials through pulse shaping and molecular structure," Damrauer, N.H., *Invited Seminar Speaker*, Chemistry Department Colloquium, Michigan State University; March, 2010.
- 34) "Nuclear Motions and the role they play in the Photophysics of Ruthenium(II) Polypyridyls," Josh Hewitt, Mirvat Abdelhaq and Niels Damrauer, *Poster Presentation by Hewitt and Abdelhaq*; 2009 RASEI Research Symposium and Seed Grant Competition; Boulder, CO, October, 2009.
- 33) "Computational Exploration of High Energy Intermediates via MLCT-Driven Halide Loss in Model Systems," Paul Vallet and Niels Damrauer, *Poster Presentation by Vallet*; 2009 RASEI Research Symposium and Seed Grant Competition; Boulder, CO, October, 2009.
- 32) "Nuclear Motions and the role they play in the Photophysics of Ruthenium(II) Polypyridyls," Josh Hewitt, Mirvat Abdelhaq, and Niels Damrauer, *Poster Presentation by Hewitt and Abdelhaq*; The Sullivan Solar Chemistry Symposium to honor late Professor Patrick Sullivan; Laramie, WY, August, 2009.
- 31) "Manipulating electron transfer phenomena through structure and quantum control," Damrauer, N.H., *Invited Conference Speaker*, Gordon Research Conference on Photochemistry, Bryant University, Providence, RI, 2009.
- 30) "Elements of photochemical control through manipulation of structure and phase-shaping of laser fields," Damrauer, N.H., *Invited Seminar Speaker* Chemistry Colloquium, Georgia Institute of Technology; March, 2009.
- 29) "New Open-Loop Control Methodologies to Identify Phase Sensitivity in the Preparation of Excited-State Populations: Experiments and Simulations to Explore Coherent Controllability of Multiple Exciton Generation in PbSe Quantum Dots," Damrauer, N.H., *Poster Presentation*; DOE Solar Photochemistry Research Conference; Annapolis, MD, June, 2009.
- 28) "Towards Quantum Control in Quantum Dot Systems and in Molecular Electron Transfer Complexes," Erik Grumstrup, Josh Hewitt, Mirvat Abdelhaq, Niels Damrauer, *Poster Presentation*; 2008 Energy Initiative Research Symposium and Seed Grant Competition; Boulder, CO, November, 2008.
- 27) "Controlling Photoinduced Electron Transfer in Donor-Bridge-Acceptor Systems: Electron Delocalization, Ligand Structure and Conformational Dynamics," Heather Meylemans, Mirvat

- Abdelhaq, Joshua Hewitt, Niels Damrauer, *Poster Presentation*; 2008 Energy Initiative Research Symposium and Seed Grant Competition; Boulder, CO, November, 2008.
- 26) "Hybrid Materials for Control of Interfacial Hole-Transfer Photochemistry," Damrauer, N.H. *Invited Oral Presentation*; Honda Initiation Grant Symposium; Cary, NC, November, 2008.
 - 25) "Fundamental explorations towards solar energy conversion" Damrauer, N.H. *Invited Oral Presentation*; University of Colorado Fall Convocation Public Panel Discussion: "Energy Demand vs. Global Warming: CU Boulder's Response to a Global Dilemma" Organized by Professor Carl Koval, director of the Energy Initiative, and featuring Professors Niels Damrauer, Kevin Doran and Will Medlin.; Boulder, CO, October, 2008.
 - 24) "Control of Electron Transfer Rates via Synthetic Modifications in Ruthenium(II) Donor-Bridge-Acceptor Systems," Meylemans, H.A., Abdelhaq, M., Hewitt, J., Damrauer, N.H., *Poster Presentation*, Workshop on Efficient Conversion of Solar Energy to Electricity, Boulder, CO, August, 2008.
 - 23) "Controlling Photoinduced Electron Transfer Rates in Donor-Bridge-Acceptor Systems: Electron Delocalization, Ligand Structure and Conformational Dynamics," Meylemans, H. A., Damrauer, N.H., *Poster Presentation by Meylemans*, Gordon Research Conference on Electron Donor Acceptor Interactions 2008, Newport, RI, August, 2008.
 - 22) "Tools for Elucidating Mechanism Following Adaptive Control and Progress Towards Control of Multiple Exciton Generation," Damrauer, N.H., *Poster Presentation*; DOE Solar Photochemistry Research Conference; Wintergreen, VA, June, 2008.
 - 21) "Ligand Structure and Conformational Dynamics for Control of Photoinduced Electron Transfer Rates," Damrauer, N.H., *Invited Speaker*; Symposium on 'Spectroscopy of Inorganic Systems'; American Chemical Society National Meeting, New Orleans, LA, April, 2008.
 - 20) "Elucidation of Mechanism Following Adaptive Control of Complex Molecules in Solution," Damrauer, N.H., *Invited Speaker*; Symposium on 'Optical Probes of Dynamics in Complex Environments'; American Chemical Society National Meeting, New Orleans, LA, April, 2008.
 - 19) "A Discussion of the 2007 Nobel Peace Prize Given to the IPCC and Al Gore," Damrauer, N.H. *Invited Oral Presentation*; University of Colorado at Denver Nobel Prize Presentation Series; Denver, CO, February, 2008.
 - 18) "Towards Mechanistic Understanding from Adaptive Control: New Analytical and Spectroscopic Tools," Damrauer, N.H., *Invited Conference Speaker* 5th International Workshop on Optimal Control of Quantum Dynamics: Theory and Experiment, Tegernsee, Germany, November, 2007.
 - 17) "Attaining Physical Insight from Control Surfaces and Dimension Reduction," Damrauer, N.H., *Poster Presentation* Gordon Research Conference on Quantum Control of Light and Matter, Newport, RI, August, 2007.
 - 16) "Toward a New Photochemistry: Achieving Control and Understanding Mechanisms during Adaptive Manipulation of Metal Complexes in Solution," Damrauer, N.H., *Oral Presentation (one of four chosen from poster session)* Gordon Research Conference on Renewable Energy 2007, Ventura, CA, January, 2007.
 - 15) "Toward a New Photochemistry: Achieving Control and Understanding Mechanisms during Adaptive Manipulation of Metal Complexes in Solution," Damrauer, N.H., *Poster Presentation* Gordon Research Conference on Renewable Energy 2007, Ventura, CA, January, 2007.
 - 14) "Ligand Structure and Excited-State Motion for Control of Photoinduced Electron Transfer Rates," Damrauer, N.H., *Poster Presentation* Gordon Research Conference on Electron Donor Acceptor Interactions 2006, Newport, RI, August, 2006.
 - 13) "Robust Basis Functions for Control from Dimension Reduction of Adaptive Pulse-Shaping Experiments," Damrauer, N.H., *Oral Presentation* Ultrafast Conference 2006, Asilomar, CA, August, 2006.

- 12) "Towards the Understanding of Control Fields: Dimension Reduction of Adaptive Femtosecond Pulse-Shaping Experiments," Damrauer, N.H., *Invited Seminar Speaker* Chemistry Colloquium, University of Oregon, May, 2006.
- 11) "Controlling Chemical Systems with Light: New Experiments and New Analysis Methods," Damrauer, N.H., *Invited Seminar Speaker* Optical Sciences and Engineering Colloquium, University of Colorado at Boulder, April, 2006.
- 10) "Controlling Chemical Systems with Light: New Experiments and New Analysis Methods," Damrauer, N.H., *Invited Seminar Speaker* Chemistry Colloquium, University of Northern Colorado, April, 2006.
- 9) "From Proton-Coupled Electron Transfer to Quantum Control in Solution: Strategies for Directing Excited-State Reactivity," Damrauer, N.H., *Invited Seminar Speaker* Chemistry Colloquium, University of Denver, February, 2004.
- 8) "From Proton-Coupled Electron Transfer to Quantum Control in Solution: Strategies for Directing Excited-State Reactivity," Damrauer, N.H., *Invited Seminar Speaker* Chemical Physics/Physical Chemistry Colloquium, University of Colorado at Boulder, September, 2003.
- 7) "Optimal Control of Molecular Systems by Adaptive Femtosecond Pulse Shaping," Damrauer, N.H., Gerber, G. *Invited Oral Presentation* Optical Society of America Annual Meeting, Long Beach CA, October, 2001.
- 6) "Quantum Control by Adaptive Femtosecond Pulse Shaping," Damrauer, N.H., Gerber, G. *Invited Oral Presentation* Division of Physical Chemistry, 2000 International Chemical Congress of Pacific Basin Societies, Honolulu, HI, December, 2000.
- 5) "Quantum Control in the Liquid Phase by Adaptive Femtosecond Pulse Shaping," Damrauer, N.H., Gerber, G. *Invited Oral Presentation* Conference on Real Time Probing of Elementary Chemical Processes in Liquids, Paris, France, October, 2000.
- 4) "Femtosecond Dynamics of Aryl-Substituted Bipyridyl Complexes of Ru(II): Real-Time Observation of Electronic Delocalization," Damrauer, N.H. and McCusker, J.K. *Oral Presentation*, Division of Inorganic Chemistry, American Chemical Society National Meeting, Anaheim, CA, March, 1999.
- 3) "Probing the Effect of Delocalization on the Excited-State Evolution of Transition Metal Complexes," Damrauer, N.H. and McCusker, J.K. *Oral Presentation*, Southern California Inorganic Photochemistry Conference, Catalina, CA, July, 1998.
- 2) "Evidence for the Coupling of Chromophore Structural Dynamics to the Process of Solvation," Damrauer, N.H. and McCusker, J.K. *Oral Presentation*, Southern California Inorganic Photochemistry Conference, Catalina, CA, July, 1997.
- 1) "Probing the Effect of Delocalization on the Excited-State Evolution of Transition Metal Complexes," Damrauer, N.H. and McCusker, J.K. *Poster Presentation*, Division of Inorganic Chemistry, American Chemical Society National Meeting, San Francisco, CA, April, 1997.

• Teaching

- 9) Development and implementation of new General Chemistry Laboratory Course; CHEM 1401; Fall 2016, 2017, 2018
- 8) Physical Chemistry II; CHEM 4531; Fall 2005, 2006, 2007, 2009; Spring 2013, 2017, Fall 2019, Spring 2020
- 7) Inorganic Chemistry; CHEM 4011 and 5011; Fall 2012, 2013, 2014, 2015, Spring 2018, 2019, 2020
- 6) Inorganic Chemistry Laboratory; CHEM 4021; Spring 2015
- 5) Honors General Chemistry II; CHEM 1371; Spring 2010, 2011
- 4) Physical Inorganic Chemistry with an emphasis on Solar Energy Conversion CHEM 5061; Spring 2009

- 3) Advanced Molecular Spectroscopy. CHEM 5591; Spring 2005, 2006, 2007
- 2) Seminar Course for Physical Chemistry CHEM 6401; Fall 2004, 2007; Spring 2005, 2008
- 1) Physical Chemistry Laboratory CHEM 4541; Fall 2003, Spring 2014

• **Patent**

- 1) 'Multidimensional Spectrometer'; Martin T. Zanni and Niels H. Damrauer; US Patent 7,760,342 B2; July, 2010. Patent for invention to achieve multidimensional vibrational or electronic spectroscopy using pulse shaping technology.
- 2) 'High Triplet Yield Phenothiazine Donor-Acceptor Complexes for Photoredox Catalysis'; Provisional Patent Application No 62/958,611

Publication List for Niels H. Damrauer

- 69) Dill, R.; Rappé, A.K.; Damrauer, N.H.* Long-lived Antiferromagnetically-Coupled MLCT States in Vanadium(II) Bipyridine and Phenanthroline In Preparation.
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† Articles published prior to independent academic career.

‡ Articles published in Professor Gerber's group list contributing authors in alphabetical order. My contribution to these articles is indicated after each reference.