

CURRICULUM VITAE

JOHN H. FREDERICK

Senior Fellow
National Association of State Universities and Land-Grant Colleges
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Washington, DC 20005
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EDUCATION

1985 Harvard University
Ph.D. Chemistry

1982 Harvard University
A.M. Chemistry

1980 Princeton University
A.B. Chemistry

POSITIONS HELD

Administrative

2007- Senior Fellow
National Association of State Universities and Land-Grant Colleges

2001-2007 Executive Vice-President and Provost
University of Nevada, Reno

1999-2001 Chair, Department of Chemistry
University of Nevada, Reno

1990-2001 Director, Chemical Physics Ph.D. Program
University of Nevada, Reno

Academic

1998- Professor, Department of Chemistry
University of Nevada, Reno

1993-1998 Associate Professor, Department of Chemistry
University of Nevada, Reno

1988-1993 Assistant Professor, Department of Chemistry
University of Nevada, Reno

1985-1988 Postdoctoral Research Associate, Department of Chemistry
University of Washington

1982-1985 Tutor, Currier House
Harvard University

1980-1982, Teaching Fellow, Department of Chemistry
1984 Harvard University

LEADERSHIP EXPERIENCE

Senior Fellow, NASULGC, July, 2007 – present

Responsibilities:

- assist with strategy development and implementation of the Science and Math Teaching Imperative (SMTI);
- data gathering and analysis of science and math education in the U.S.;
- coordination of SMTI with chief academic officers of NASULGC member institutions and disciplinary societies;
- development of presentations and white papers to promote SMTI initiative; and
- assist with other NASULGC initiatives as needed.

Executive Vice-President and Provost, July, 2001 – June, 2007

Responsibilities:

- oversight of all academic programs at the university, including direct supervision of ten deans, development of curriculum, professional development of faculty, and interface to external constituencies (school district, university associations, Nevada System of Higher Education (NSHE) institutions, NASULGC, American Association of State Colleges and Universities (AASCU));
- administrative leadership of the institution in the absence of the president, coordination of all administrative and academic divisions of the university;
- leadership of the university strategic planning process, including academic master planning, facilities planning, coordination of campus master planning, and budget planning;
- management of university resources, including allocation of professional and classified positions, allocation of space, and allocation of operating budgets;
- spokesperson to the public on university academic and administrative issues;
- assistance with special events, official ceremonies, and fund raising activities.

Achievements:

- established the 2002 University Strategic Plan, with amendments in 2003 and 2004 (see <http://www.unr.edu/planning>). The strategic plan resulted in:
 - the creation of several new academic units, including the Core Curriculum Office, the School of the Arts, the Academy for the Environment, the School of Public Health, and the School for Social Research and Justice Studies;
 - a realignment of our academic colleges in which new Colleges of Liberal Arts and of Science replaced the College of Arts and Science and School of Mines;
 - the realignment and, in some cases, outsourcing of administrative support functions to improve efficiency and cost-effectiveness;

- greater support of activities that diversify the University's revenue sources, including resources to support our fund raising efforts;
 - a system of greater accountability for use of resources and an emphasis on recycling resources at every level; and
 - increased support of information technology resources, including a desktop life-cycle replacement fund, implementation of campus-wide wireless networking, and software to support paperless processing.
- supervised the development of the University's campus master plan (see <http://www.unr.edu/masterplan>) and its approval by the Board of Regents, the City Planning Commission, the City Council, and the Regional Planning Commission. The master plan includes:
 - an expansion of the campus from its present 240 acres to an area more than three times as large;
 - the development of a health sciences campus that includes the School of Medicine, the School of Nursing, the School of Public Health, and other clinical sciences;
 - the creation of an agricultural sciences district to house our expanding programs in biotechnology, animal science, and environmental sciences;
 - the expansion of student residential housing on and near the campus;
 - a commitment to the principles of sustainability in building and campus grounds planning; and
 - the establishment of a vibrant commercial district adjacent to the campus.
 - organized the Nevada System of Higher Education Northern Region Strategic Plan. The plan is a collaborative document outlining the coordination of the University, three community colleges, and the Desert Research Institute to deliver programs to the residents of northern Nevada. I chaired the group of academic vice-presidents who authored the plan.
 - planned several new academic facilities, including a Science and Math Center, a Biomedical research facility, a Cooperative Extension office in Las Vegas, and the adaptive re-use of the University library (a new major facility, the Mathewson-IGT Knowledge Center will replace the library in 2008) and student union (also to be replaced in 2008).
 - introduced a new merit raise system for University faculty. The new system strongly ties merit raises to performance evaluation and clarifies the evaluative roles of chairs, directors, deans, and vice-presidents. The new system also distributes the University's merit pool more equitably among the faculty.
 - realigned University budget and soft-money accounts to better match revenue sources with institutional needs. The realignment provides a dependable budget for colleges each year so that annual budget planning is more effective.
 - improved guidelines and processes for promotion and tenure applications and sabbatical leave applications. Common standards and procedures are now utilized by all colleges, and reviews are conducted electronically via a secure web site.
 - enhanced internal communication with faculty, staff, and students. New mechanisms for communication include bi-weekly lunches with deans, monthly lunches with small groups of department chairs, biweekly email to campus of

deans' meeting summaries, regular meetings with Faculty Senate leaders, and frequent open meetings with faculty, staff, and students.

- initiated special programs for profoundly-gifted teenage students, in collaboration with the Davidson Institute for Talent Development (<http://www.ditd.org>). The University has partnered with the Davidson Institute to create the THINK Summer Institute, a summer program for 12-15 year-olds. In Fall 2006, we established the Davidson Academy, an accelerated secondary school for profoundly gifted students, leading eventually to undergraduate studies at the University (see the *N.Y. Times*, October 26, 2005 issue, p. A25).
- served in external leadership service positions:
 - NASULGC Council on Academic Affairs, Committee on Institutional Effectiveness (2003-06); Committee on Access and Diversity (2006-2007)
 - NASULGC Council on Academic Affairs, Executive Committee (2006-2007)
 - Leadership Reno-Sparks Alumni Association Advisory Board (2004-2007)
 - Nevada Governor Jim Gibbons' transition team for education (2006-2007)
- delivered public presentations as representative of the university administration:
 - "Universities and Cities Making Great Communities" (2006-07)
 - Soc. of College and University Planning nat'l meeting, Chicago, July 2007
 - Soc. of College and University Planning Pacific regional meeting, Salt Lake City, March 2007
 - American Planning Association national meeting, San Antonio, April 2006
 - "The University at the Start of a New Academic Year" (2006)
 - Observations* television show;
 - "Internationalization at the University of Nevada" (2006)
 - NASULGC Commission on International Programs summer meeting;
 - "The Future of Higher Education in Nevada" (2006)
 - Observations* radio show;
 - "An Investment in Excellence" (2005)
 - Spanish Springs Rotary Club,
 - Sparks Rotary Club,
 - UNR Foundation Board;
 - "Current Issues at the University of Nevada" (2005)
 - High Desert Forum, KUNR radio;
 - "The University Campus Master Plan" (2005)
 - High Desert Forum, KUNR radio;
 - "Welcoming Remarks from the University of Nevada" (2005)
 - Nevada-California International Consortium (NIC) Opening Ceremony, Tokyo, Japan (presentation in Japanese);
 - "The University of Nevada, Reno On the Move" (2004)
 - Reno Chapter of the Scottish Rite Masons;
 - "Changes Over 50 Years— The Evolving University of Nevada" (2003-2006)
 - Annual Golden Class Reunion Dinners
 - "University Academic Reorganization" (2003)
 - High Desert Forum, KUNR radio;
 - "The Importance of Outreach in the Land-Grant Mission" (2002)
 - 4-H Statewide Symposium;
 - Honorary Degree Presentations, University of Nevada, Reno
 - Dolores Huerta, September 11, 2004
 - John Hume, January 30, 2003
 - John Noble, May 16, 2002.

Chairman, Department of Chemistry, July, 1999 – July, 2001

Responsibilities:

- oversight of all personnel in the Department of Chemistry, including direct supervision of 17 faculty, four classified staff, two professional staff, and six technical staff members, and general oversight of 45 graduate students and 12 postdoctoral research associates;
- academic administration, including development of curriculum, professional development of chemistry faculty, and interface to college dean and university administration;
- leadership of departmental long-range planning, including curricular planning, facilities planning, staff expansion planning, and budget planning;
- management of departmental resources, including personnel, space, and budgets;
- external promotion of departmental accomplishments and advocacy on behalf of departmental needs.

Achievements:

- worked with college dean to plan expansion of Chemistry facilities through addition of new instructional laboratory wing. This concept replaced moribund plans for a new Chemistry building for which funding was unavailable. Our plans ultimately led to the successful proposal for a new Science and Math Center for the University.
- reallocated glassblower position to be more cost-effective. The department replaced its glassblower with a part-time arrangement in which the U.C. Davis Chemistry glassblower spent one week each month in Reno handling our department's needs. This was not only sufficient for our needs, but cost only a fraction of the salary for a full-time glassblower.
- supported the development of smaller scale organic chemistry labs. This reduced chemical and waste disposal costs.
- initiated life-cycle replacement of computers in the department's instructional computer lab. At the same time, the department upgraded its email server.
- successfully nominated several Chemistry faculty for college, university, and national awards, including the college researcher award (Kent Ervin), the college teaching award (Hyung Shin), a University Foundation professorship (Bob Sheridan), a Dreyfus Young Faculty award (David Leitner— the first won by a young faculty member at Nevada), and the CASE Nevada Professor of the Year Award (Gene Lemay).
- led College of Arts and Science strategic planning effort with the chair of History. The college plan called for the reallocation of funds to its development office to enhance the college's ability to expand its resource base. The planning process also resulted in a revised college mission statement.

- organized the 2001/2 Rocky Mountain Chemistry Chairs Conference. Originally scheduled for September 2001, the conference was postponed until 2002 after the New York and Washington terrorist attacks. The conference featured speakers from the National Institutes of Health, the National Science Foundation, and Research Corporation among others.

Director, Chemical Physics Ph.D. program, July, 1990- July, 2001

Responsibilities:

- administrative oversight of program, including coordination of affiliated faculty (six in Chemistry, nine in Physics), updating student guidelines and general catalog entries, serving as primary contact for the program, and general reporting of program outcomes to the university administration;
- coordination of student recruitment and oversight of student progress in the program, including organization of comprehensive exams and service on student graduate committees;
- coordination of the Chemical Physics curriculum.

Achievements:

- authored proposal to create the Chemical Physics Ph.D. program in 1990.
- established student guidelines and processes for entrance and comprehensive exams involving faculty exam-writing committees. These processes took the best features of the respective Chemistry and Physics entrance and comprehensive exam systems and combined them.
- wrote the Chemical Physics program self-study in preparation for external program review in spring 1999. This was the first interdisciplinary program review conducted by the University.
- helped students to achieve their Ph.D. degree in an average time of a little under 5 years. This compares with an average time to degree of more than 5.5 years for Chemistry Ph.D.s at Nevada.

Professional Service Activities

Co-organizer, NASULGC Council on Academic Affairs summer meeting

Seattle, WA, July 14-17, 2006 (with Provost David Dooley, Montana State, Provost Mary Ann Swain, Binghamton University, SUNY)

Officer of the Telluride Science Research Center, 1997 – 2005

President 2001-2005

Treasurer 1997-2000

The Telluride Summer Research Center is a non-profit organization dedicated to facilitating scientific workshops each summer in Telluride, Colorado. The officers administer the Center, setting the workshop schedule, communicating with workshop organizers and the Center Board, coordinating with local representatives for housing and meeting venues, and managing the Center budget.

Officer of the Sierra Nevada Section, American Chemical Society, 1990 – 1993

Chairman 1992, 1993

Program Chairman 1991

Secretary-Treasurer 1990

The Sierra Nevada Section is a local affiliate section of the American Chemical Society. Its officers organize meetings of local ACS members, sponsor special activities and lectures, and provide liaison to the national organization.

AWARDS AND HONORS

1996	Board of Regents Outstanding Faculty Member University of Nevada, Reno
1996	F. Donald Tibbitts Distinguished Teacher Award University of Nevada, Reno
1995	Alan Bible Teaching Excellence Award College of Arts and Science, University of Nevada, Reno
1992	EPSCoR Visiting Scientist West Virginia University
1990-92	Visiting Scientist, Institute for Molecular Science Okazaki, Japan (summers)
1981-84	National Science Foundation, Graduate Fellowship Harvard University
1980	Robert Thornton McCay Prize in Physical Chemistry Princeton University
1980	Sigma Xi Book Award in Chemistry Princeton University
1978-80	Robert A. Welch Foundation research fellow University of Texas, San Antonio (summers)
1976-77	National Honor Society scholarship Princeton University

SCHOLARLY ACTIVITIES

Grants Received

(TOTAL: 19, AMOUNT: \$ 2.7 million)

2002-2007 \$1,170,000	“Synthesis and Characterization of a Light-Driven Molecular Motor” National Science Foundation, Nanoscale Science and Engineering Program (co-PI with Profs. T.W. Bell, J.I. Cline, and C.R. Cremo)
2001-2004 \$60,000	“A Phase-Space Perspective of Quantum Dynamical Processes” American Chemical Society, Petroleum Research Fund
1998-2001 \$285,000	“Dynamics of Photoisomerization and Nonadiabatic Relaxation Processes” National Science Foundation, Chemistry Division
1998-2001 \$117,600	“Undergraduate Research in Chemistry at Nevada” National Science Foundation, Research Experiences for Undergraduates
1997-1998 \$2,179	“Integrating Computers Into the Chemistry Curriculum: A First Step” Instructional Enhancement Grant Program, University of Nevada, Reno
1995-1996 \$169,600	“Computer Workstation Cluster for Theoretical Chemistry and Chemical Physics” National Science Foundation, Chemical Instrumentation Program (principal author; PI: Prof. H.K. Shin).

Grants Received (cont.)

1995-1998 \$90,000	“Undergraduate Research in Chemistry at Nevada” National Science Foundation, Research Experiences for Undergraduates (co-PI with Prof. R.R. Conry).
1995-1996 \$8,400	“Ultrafast Dynamics of Isolated and Surface-Adsorbed Molecules” NATO International Scientific Exchange Program (co-PI with Prof. V.N. Zadkov, Moscow State University, Russia).
1995-1998 \$196,243	“Theoretical Models for Photoisomerization Dynamics” National Science Foundation, Chemistry Division
1994-1996 \$50,000	“Molecular Gyroscopes: A Study of the Interactions Between Methyl Rotors and Molecular Rotation” American Chemical Society, Petroleum Research Fund
1992-1993 \$2,000	“Reciprocal Workshop for Young Investigators in Molecular Science” International Activities Committee, University of Nevada, Reno
1991-1995 \$161,000	“Quantum Dynamics of Large Molecular Systems” National Science Foundation, Chemistry Division
1991-1992 \$16,350	“U.S.-Japan Seminar: Workshop for Young Investigators in Molecular Science” National Science Foundation, INT: Japan Seminar Program, 1991-1992, (co-PI with Prof. K.M. Ervin).
1991-1992 \$10,450	“Spectroscopy and Dynamics of Photoisomerization in Large Molecules” National Science Foundation, U.S.-Japan Cooperative Photoconversion and Photosynthesis Research Program
1990-1992 \$40,000	“Low Frequency Dynamics of Large Molecules in Excited Electronic States” American Chemical Society, Petroleum Research Fund
1990-1992 \$268,300	“Computer for Theoretical Chemistry and Chemical Physics” National Science Foundation, Chemical Instrumentation Program (principal author; PI: Prof. L.T. Scott).
1990 \$8,024	“Dynamics and Spectroscopy of Low Frequency Motions in Large Molecules” Research Advisory Board, University of Nevada, Reno
1990 \$5,000*	“Relaxation Dynamics of Vibrationally Excited Polyatomics in Host Matrices” Pittsburgh Supercomputing Center, *5.0 Service Units
1988-1990 \$18,000	“Effect of Rotation on Intramolecular Vibrational Dynamics” American Chemical Society, Petroleum Research Fund

Research Publications

(TOTAL: 48)

“Hydrodynamic analysis of dynamical tunneling,” Babyuk, D.; Wyatt, R.E.; and Frederick, J.H., *J. Chem. Phys.* **119**, 6482-6488(2003).

“Previtamin D conformations and the wavelength-dependent photoconversions of previtamin D,” Dmitrenko, O., Frederick, J.H., and Reischl, W., *J. Photochem. Photobiol. A: Chem.* **130**, 125-131 (2001).

“The out-of-plane modes in *cis*-1,3,5-hexatriene: Frequency shifts in the 2^1A_1 and 1^1B_1 states,” Woywod, C., Snyder, J.A., and Frederick, J.H., *J. Phys. Chem.* **105**, 2903-2910 (2001).

“ S_1 - S_2 vibronic coupling in *cis*-1,3,5-hexatriene. I. Electronic structure calculations,” Woywod, C.; Livingood, W.C., and Frederick, J.H., *J. Chem. Phys.* **114**, 1631-1644 (2001).

“ S_1 - S_2 vibronic coupling in *cis*-1,3,5-hexatriene. II. Theoretical investigation of absorption and resonance Raman spectra,” Woywod, C.; Livingood, W.C., and Frederick, J.H., *J. Chem. Phys.* **114**, 1645-1662 (2001).

“Multidimensional quantum dynamics with trajectories: A novel numerical implementation of Bohmian mechanics,” Nerukh, D.A. and Frederick, J.H., *Chem. Phys. Lett.* **332**, 145-153 (2000).

“*Ab initio* studies of conformational stability in previtamin D, vitamin D, and related model compounds,” Dmitrenko, O.; Frederick, J.H.; and Reischl, W., *J. Mol. Struct. (THEOCHEM)* **530**, 85-96 (2000).

“ S_1 - S_2 vibronic coupling in *trans*-1,3,5-hexatriene. I. Electronic structure calculations,” Woywod, C.; Livingood, W.C.; and Frederick, J.H., *J. Chem. Phys.* **112**, 613-625 (2000).

“ S_1 - S_2 vibronic coupling in *trans*-1,3,5-hexatriene. II. Theoretical investigation of absorption and resonance Raman spectra,” Woywod, C.; Livingood, W.C.; and Frederick, J.H., *J. Chem. Phys.* **112**, 626-640 (2000).

“General formulation of the vibrational kinetic energy operator in internal bond-angle coordinates,” Frederick, J.H. and Woywod, C., *J. Chem. Phys.* **111**, 7255-7271 (1999).

“Theoretical studies of the first strongly allowed singlet states of 3-desoxy analogs of previtamin D, vitamin D, and their *E*-isomers,” Dmitrenko, O.; Vivian, J.T.; Reischl, W.; and Frederick, J.H., *J. Mol. Struct. (THEOCHEM)* **467**, 195-220 (1999).

“Excited state dynamics and chemical control of large molecules,” Vachev, V.D. and Frederick, J.H., in *Structure and Dynamics of Electronic Excited States*, ed. by J. Laane, H. Takahashi, and A. Bandrauk (Springer, Berlin, 1999), p. 137-162.

“Chiral dissociation dynamics of molecular ratchets: Preferential senses of rotary motion in microscopic systems,” Fukui, K.; Frederick, J.H.; and Cline, J.I., *Phys. Rev. A* **58**, 929-934 (1998).

“Nonlinear dynamics of torsion-rotation interactions: A model study of toluene,” Vivian, J.T.; Lehn, S.A.; and Frederick, J.H., *J. Chem. Phys.* **107**, 6646-6658 (1997).

Research Publications (cont.)

“Ground and excited properties of the previtamin D conformers,” Dmitrenko, O.; Reischl, W.; Vivian, J.T.; and Frederick, J.H., published on the internet at <http://www.netsci-journal.com/97v3/dmitrenko/dmitrenko.htm>.

“Canonical sampling of classical phase space: Application to molecular vibration-rotation dynamics,” Fukui, K.; Cline, J.I.; and Frederick, J.H., *J. Chem. Phys.* **107**, 4551-4563 (1997).

“Classical trajectory studies of μ - v - j vector correlations in large molecule fragmentation: The photodissociation of CF_3NO ,” Fukui, K.; Frederick, J.H.; and Cline, J.I., *J. Chem. Phys.* **107**, 4564-4578 (1997).

“Optical switching through photoisomerization: Basics of the mechanism in rhodopsin and stilbene,” Vachev, V.D.; Nojima, K.; and Frederick, J.H., in *Photosensitive Optical Materials and Devices, SPIE Conference Proceedings*, ed. by M.P. Andrews (SPIE, Bellingham, Washington, 1997), vol. **2998**, p. 257-267.

“Computer simulation of the photoisomerization dynamics of stilbene,” Vachev, V.D.; Grishanin, B.A.; Frederick, J.H.; and Zadkov, V.N., in *Fast Elementary Processes in Chemical and Biological Systems*, ed. by A. Tramer, AIP Conference Proceedings, vol. **364**, 54-62 (1996).

“Dynamics of light-induced quantum transitions in polyatomic molecules,” Grishanin, B.A.; Zadkov, V.N.; Vachev, V.D.; and Frederick, J.H., *Russ. J. Exptl. Theor. Phys.* **109**, 2021-2034 (1996). (in Russian) English translation: *JETP* **82**, 1088-1094 (1996).

“Models for statistical decomposition of metal clusters: Vibrational frequency distributions,” Shvartsburg, A.A.; Ervin, K.M.; and Frederick, J.H., *J. Chem. Phys.* **104**, 8458-8469 (1996).

“Models for statistical decomposition of metal clusters: Decay on multiple electronic states,” Shvartsburg, A.A.; Frederick, J.H.; and Ervin, K.M., *J. Chem Phys.* **104**, 8470-8484 (1996).

“Thermal coupling reactions of 1-phenyl-3,4-dimethylphosphole within the coordination sphere of palladium(II),” Wilson, W.L.; Fischer, J.; Wasylshen, R.E.; Eichele, K.; Catalano, V.J.; Frederick, J.H.; and Nelson, J.H., *Inorg. Chem.* **35**, 1486-1496 (1996).

“The (n, π^*) absorption spectrum of benzophenone: A new model for the excited state dynamics,” Vachev, V.D. and Frederick, J.H., *Chem. Phys. Lett.* **249**, 476-484 (1996).

“Potential energy surface hopping algorithms for polyatomic molecules: Theoretical study,” Grishanin, B.A.; Zadkov, V.N.; Frederick, J.H.; and Vachev, V.D., in *Laser Chemistry, Biophysics and Biomedicine, SPIE Conference Proceedings*, ed. by V.N. Zadkov (SPIE, Bellingham, Washington, 1996), vol. **2802**, p. 6-14.

“Computer simulation of the structure, torsional potentials, excited state dynamics and spectra of conjugated π -electron systems,” Vachev, V.D. and Frederick, J.H., in *Laser Techniques for State-Selected and State-to-State Chemistry III, SPIE Conference Proceedings*, ed. by J.W. Hepburn (SPIE, Bellingham, Washington, 1995), vol. **2548**, p. 381-392.

Research Publications (cont.)

“Ultrafast dynamics of surface-adsorbed conjugated molecules,” Kotkov, S.Yu.; Zadkov, V.N.; Grishanin, B.A.; Vachev, V.D.; and Frederick, J.H., in *SPIE Conference Proceedings: Laser Techniques for Surface Science* (SPIE, Bellingham, Washington, 1995) vol. **2547**, p. 312-319.

“Quasiclassical molecular dynamics simulation of the photoisomerization of stilbene,” Vachev, V.D.; Frederick, J.H.; Grishanin, B.A.; Zadkov, V.N.; and Koroteev, N.I., *J. Phys. Chem.* **99**, 5247-5263 (1995).

“Simple models for excited state dynamics of conjugated molecules,” Frederick, J.H.; Vachev, V.D.; and Hadder, J.E., *SPIE Conference Proceedings: Laser Applications in the Life Sciences 1994*, ed. by P.A. Apanasevich, S.G. Kruglik, N.I. Koroteev, and V.N. Zadkov (SPIE, Bellingham, Washington, 1995), vol. **2370**, 402-413.

“Thermal dimerization of 1-substituted-3,4-dimethylphospholes within the coordination sphere of platinum(II),” Wilson, W.L.; Rahn, J.A.; Alcock, N.W.; Fischer, J.; Frederick, J.H.; and Nelson, J.H., *Inorg. Chem.* **33**, 109-117 (1994).

“Stilbene isomerization dynamics on a multidimensional potential energy surface: Molecular dynamics simulations,” Vachev, V.D.; Frederick, J.H.; Grishanin, B.A.; Zadkov, V.N.; and Koroteev, N.I., *Chem. Phys. Lett.* **215**, 306-314 (1993).

“A quantum mechanical representation in phase space,” Torres-Vega, Go. and Frederick, J.H., *J. Chem. Phys.* **98**, 3103-3120 (1993).

“The excited state dynamics of conjugated molecules: Theoretical studies of slow vibrations,” Frederick, J.H., in *NATO ASI Series: Structures and Conformations of Non-Rigid Molecules*, J. Laane, M. Dakkouri, B. van der Veken, and H. Oberhammer, eds. (Kluwer Academic Publishers, Dordrecht, Netherlands, 1993), pp. 45-64.

“Molecular Hamiltonians for highly constrained model systems,” Hadder, J.E. and Frederick, J.H., *J. Chem. Phys.* **97**, 3500-3520 (1992).

“Vibrational mode dynamics of photocyclization in *cis*-stilbene and its related compounds,” Yoshihara, K.; Petek, H.; Fujiwara, Y.; Penn, J.H.; and Frederick, J.H., *Time-Resolved Vibrational Spectroscopy V*, H. Takahashi, ed. (Springer-Verlag, Berlin, 1992), p. 194-7.

“Theoretical treatment of low frequency motions in excited state molecules,” Frederick, J.H. and Hadder, J.E., *Time-Resolved Vibrational Spectroscopy V*, H. Takahashi, ed. (Springer-Verlag, Berlin, 1992), p. 302-3.

“Numerical method for the propagation of quantum mechanical wave functions in phase space,” Torres-Vega, Go. and Frederick, J.H., *Phys. Rev. Lett.* **67**, 2601-2604 (1991).

“Models for stilbene photoisomerization: Experimental and theoretical studies of the excited state dynamics of 1,2-diphenylcycloalkenes,” Frederick, J.H.; Fujiwara, Y.; Penn, J.H.; Yoshihara, K.; and Petek, H., *J. Phys. Chem.* **95**, 2845-2858 (1991).

“Quantum mechanics in phase space: New approaches to the correspondence principle,” Torres-Vega, Go. and Frederick, J.H., *J. Chem. Phys.* **93**, 8862-8874 (1990).

Research Publications (cont.)

“Is the non-radiative decay of S_1 *cis*-stilbene due to the dihydrophenanthrene channel? Suggestive evidence from photophysical measurements on 1,2-diphenylcycloalkenes,” Petek, H.; Yoshihara, K.; Fujiwara, Y.; Lin, Z.; Penn, J.H.; and Frederick, J.H., *J. Phys. Chem.* **94**, 7539-7543 (1990).

“HOD spectroscopy and photodissociation dynamics: Selectivity in OH/OD bond breaking,” Zhang, J.; Imre, D.G.; and Frederick, J.H., *J. Phys.Chem.* **93**, 1840-1851 (1989).

“Quantum vibrational eigenstates from classical origins,” Frederick, J.H. and Heller, E.J., *Comp.Phys.Commun.* **51**, 83-102 (1988).

“Ring torsional dynamics and spectroscopy of benzophenone: A new twist,” Frederick, J.H., Heller, E.J., Ozment, J.L., and Pratt, D.W., *J. Chem. Phys.* **88**, 2169-2184 (1988).

“Intramolecular vibration-rotation energy transfer and the orientational dynamics of isolated highly excited molecules,” McClelland, G.M., Nathanson, G.M., Frederick, J.H., and Farley, F.W., in *Excited States, Vol. 7: Rotational Effects in the Behavior of Excited Molecules*, ed. by E.C. Lim and K.K Innes (Academic Press, London, 1988), p. 83-106.

“Multidimensional quantum eigenstates from the semiclassical dynamical basis set,” Frederick, J.H., and Heller, E.J., *J. Chem. Phys.* **87**, 6592-6608 (1987).

“Uniform semiclassical quantization of multidimensional systems: Application to vibration-rotation eigenvalues,” Frederick, J.H., *Chem. Phys. Lett.* **131**, 60-64 (1986).

“Nonlinear dynamics of vibration-rotation interactions: Rigid bender H_2O ,” Frederick, J.H. and McClelland, G.M., *J. Chem. Phys.* **84**, 4347-4363 (1986).

“Semiclassical quantization of the vibration-rotation problem,” Frederick, J.H. and McClelland, G.M., *J. Chem. Phys.* **84**, 876-890 (1986).

“Classical trajectory study of vibration-rotation interaction in highly excited triatomic molecules,” Frederick, J.H., McClelland, G.M., and Brumer, P., *J. Chem. Phys.* **83**, 190-207 (1985).

Patent Application

“Light-Driven Rotary Molecular Motors,” Provisional Application Ser. No. 60,407,520, filed August 31, 2003. Co-inventors: Thomas W. Bell, Joseph I. Cline III, Christine R. Cremo, and Stephen L. Gillett.

Invited Research Presentations (1996-2001)

- “Spectroscopy and dynamics of molecules near conical intersections”
Northwest Regional Meeting of the ACS, Seattle, WA, June 14-17, 2001.
Pacifichem meeting, Honolulu, HI, December 14-19, 2000.
- “Excited state dynamics and a new paradigm for photochemistry”
Department of Chemistry, University of California, Davis, October 10, 2000.
Department of Chemistry, University of Washington, October 20, 1999.
- “Nonadiabatic relaxation and photochemistry in polyenes”
217th National Meeting of the ACS, Anaheim, CA, March 21-25, 1999.
Department of Chemistry, University of Pittsburgh, March 2, 1999.
Department of Chemistry, Ohio State University, March 1, 1999.
- “Molecular gyroscopes: Model studies of torsion-rotation interactions in molecules”
American Mathematical Society, San Antonio, TX, January 13-16, 1999.
- “The simplicity of complexity”
Sierra Nevada Section, American Chemical Society, February 19, 1999.
University of Nevada Science and Technology Day keynote luncheon address,
November 16, 1998.
- “Excited state dynamics and the changing face of photochemistry”
Gordon Research Conference, Colby-Sawyer College, June 28– July 3, 1998.
- “Molecular gyroscopes: The nonlinear dynamics of methyl rotors”
Department of Chemistry, Case Western Reserve University, March 5, 1998.
Department of Chemistry, University of Akron, March 6, 1998.
- “The photodissociation dynamics of CF_3NO ”
Telluride Summer Workshop on “Intramolecular Dynamics,” July 27-August 2, 1997.
- “From spectroscopy to control: The photoisomerization dynamics of *cis*-stilbene”
Department of Chemistry, University of Texas, Austin, April 17, 1997.
Department of Chemistry, Texas A&M University, April 7, 1997.
- “Molecular gyroscopes: Nonlinear dynamics of torsion-rotation interactions”
Telluride Summer Workshop on “Intramolecular Dynamics,” July 28-August 3, 1996.
- “Controlling the chemistry of large molecules: Photochemistry in the 21st century,”
American Conference of Theoretical Chemistry, Park City, Utah, July 20-25, 1996.
- “The chemistry of light”
Richard D. Burkhart Retirement Symposium, University of Nevada, June 8, 1996.
- “Excited state dynamics of conjugated molecules”
Depts. of Physics and Chemistry, St. Petersburg University, Russia, May 28, 1996.
International Laser Center, Moscow State University, Russia, May 24, 1996.

Prior to 1996, I delivered invited seminars on topics related to my research activities at 40 institutions of higher education/research, 6 international meetings, and 5 Telluride workshops, and a short course on “Molecular dynamics and the correspondence between classical and quantum mechanics.” 18 of these lectures were delivered in other countries, including Japan, Russia, Belarus, Mexico, and Germany. I have also given 17 contributed papers at regional (3), national (12), and international (2) meetings.

Teaching Activities

Formal Courses Taught

Harvard University: (Graduate Teaching Fellow)

Foundations of Chemistry (discussion section and laboratory)
Introduction to Chemistry (discussion section and laboratory)
Organic Chemistry (laboratory)
Quantum Mechanics (discussion section)— graduate course

University of Nevada: (Assistant, Associate, and Full Professor)

First-Year-Experience in Chemistry and Physics (1 semester)
Molecules and Life in the Modern World (5 semesters)
General Chemistry I (2 semesters)
General Chemistry for Scientists and Engineers I (4 semesters)
General Chemistry for Scientists and Engineers II (7 semesters)

Advanced Physical Chemistry (1 semester) — graduate course
Theoretical Physical Chemistry (2 semesters) — graduate course
Statistical Thermodynamics (2 semesters) — graduate course
Quantum Chemistry (4 semesters) — graduate course

Theses and Dissertations Directed

Kathleen Nojima, B.S. (Chemistry), 1996.

“Photoinduced molecular dynamics and selectivity of isomerization of *cis*-stilbene”

Truc-Ha Duong, B.S. (Chemistry), 2001.

“Furthering the search towards true nanotechnology: The photon-driven molecular rotor”

Ming Yan, M.S. (Physics) 1991.

“Applications of time-dependent quantum mechanics to the theory of atom-surface scattering”

Yun Zhu, M.S. (Physics) 1993.

“Relaxation dynamics of polyatomics in the condensed phase”

Alexandre A. Shvartsburg, M.S. (Chemistry) 1995.

“Statistical modeling of the unimolecular decay kinetics of metal clusters: Phonons and electrons”

William Livingood, M.S. (Chemistry) 2000.

“ S_1 - S_2 vibronic coupling in hexatriene: Electronic structure calculations”

Kazuhiko Fukui, Ph.D. (Chemical Physics) 1997.

“Theoretical studies of large molecule photodissociation: Scalar and vector correlations in product state distributions”

James T. Vivian, Ph.D. (Chemical Physics) 1998.

“Molecular gyroscopes: Classical and quantum studies of torsion-rotation interactions”

Kelly Burt, Ph.D. (Chemical Physics) 2005.

“Theoretical and computational modeling of a light-driven molecular motor”

Graduate Committees

I have served on a total of 29 graduate committees (12 M.S. and 17 Ph.D.), and chaired seven of those committees. I have directed research projects for a total of 15 undergraduate (including two senior theses), 11 graduate, and 7 postdoctoral students between 1989 and 2005.

University and Professional Service

Manuscript and Proposal Review

Granting Agencies:

National Science Foundation
Chemistry Division
Chemical Instrumentation Program
Materials Science Division
American Chemical Society, Petroleum Research Fund
Air Force Office of Scientific Research

Journals:

<i>Journal of the American Chemical Society</i>	<i>Chemical Physics Letters</i>
<i>Journal of Chemical Physics</i>	<i>Physica Scripta</i>
<i>Journal of Physical Chemistry</i>	<i>Physical Review</i>
<i>Chemical Physics</i>	<i>Physical Review Letters</i>
<i>Theoretical Chemistry Accounts</i>	

Publishers:

Prentice-Hall Educational Software: LOGAL Explorer software for general chemistry
American Chemical Society Publications
University Science Books
Physical Chemistry: A Modern Approach, by D.A. McQuarrie and J. Simon

Review Panels:

Research Advisory Board, University of Nevada, Reno, 1992–1996
Summer Institute in Japan, National Science Foundation, 1994
Associateship Programs, National Research Council, 1997-2002
Educational Testing Service, GRE in Chemistry, 1999-2001
Nevada State Committee of Selection, Rhodes Scholarship Trust, 1999-2001
Committee of Visitors, Chemistry Division, National Science Foundation, 2001.
Review Panel, Chemical Dynamics Group, Argonne National Laboratory, 2004.

Scientific Meetings/Symposia Organized

Symposium in Theoretical Chemistry, 44th Northwest Regional American Chemical Society Meeting, Reno, Nevada, June, 1989
U.S.-Japan Workshop for Young Investigators in Molecular Science, Okazaki, Japan, October, 1991 (co-organizers: K.M. Ervin, H. Petek, K. Yamashita)

Scientific Meetings/Symposia Organized (cont.)

Symposium on Gas Phase versus Liquid Phase Chemical Dynamics, American Physical Society Meeting, San Jose, California, March 20-24, 1995 (co-organizer: Prof. A.B. Myers (Rochester))

Telluride Workshop on “Theory of Nonadiabatic Processes”, Telluride Summer Research Center, July 30-August 5, 2000 (co-organizer: Prof. J.F. Stanton (Texas)).

Rocky Mountain Chemistry Chairs Conference, Reno, NV, January 8-10, 2003.

Summary of Institutional Committee and Board Assignments

Department of Chemistry:

Undergraduate Recruitment and Advising Committee (1988-1993, chair 1997)

Alumni Relations Committee (1989-1993)

Graduate Study Committee (1992-1993, 1996-1999)

Annual Evaluation Committee (1993, 1996, 1998, 2000-2001)

Graduate Admissions Committee (chair, 1993-1996)

Faculty Recruiting Committee (1994-present, chair: 1995-96)

Long-Range Planning Committee (1995-2001; chair 1999-2001)

Faculty Supervisor, Chemical Physics Computing Facility (1990-1999)

College of Arts and Science:

Science Subcommittee of the Core Curriculum Board (1989-1993)

Mathematics Subcommittee of the Core Curriculum Board (1990-1993)

Personnel Review Committee (1993-94, 1995-2001; chair 1999-2000)

Alan Bible Teaching Excellence Award Committee (chair, 1995-1996)

College Strategic Planning Committee (2000-2001, co-chair with E. Raymond)

University:

Computing Master Plan Committee (1989-90)

UNR International Division, Japan Accreditation Self-Study Team (1991-1993)

Honors Program Board (1992-2001)

Research Advisory Board (1992-1996)

IRTC Sub-committee for Research Computing (1993-95)

Ad Hoc Committee to Review Medical School Realignment (1995)

Ad Hoc Committee to Review UNR Personnel Policies and Procedures (1995-1996)

Forum for the Future (University Academic Master Plan Committee, 1995-1996)

Undergraduate Education Sub-committee (chair)

Research and Graduate Education Sub-committee

University Accreditation Self-Study Steering Committee (1996-1997)

Standard VII. Instructional Staff Sub-committee (co-chair with M. Hildreth)

Task Force on Work and Family Issues (1997-2000)

President's Council (2001-2007)

University Planning Council (chair, 2001-2005)

Academic Leadership Council (chair, 2001-2007) (formerly Council of Deans)

Facilities Resource Committee (chair, 2001-2003)

Campus Master Plan Work Group (chair, 2002-2004)

Space Utilization Task Force (chair, 2002-2003)

Merit Policy Review Committee (chair, 2001-2004)

Search Committee, Athletics Director (chair, spring 2004)

Search Committee, Vice-President for Research and Dean of the Graduate School (chair, spring 2005)

Nevada System of Higher Education:

Academic Affairs Council (2001-2007)

Northern Region Master Planning Committee (chair, 2003-2004)

Health Science Center Executive Steering Committee (2005-2007)

Walker Basin Project Executive Steering Committee (2006-2007)