

## **JULIANE L. FRY, Ph.D.**

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### **RESEARCH INTERESTS**

Atmospheric chemistry; aerosol formation; chemistry-climate interactions; air pollution; aerosol chemical composition; field measurements; molecular spectroscopy; atmospheric modeling; chemical kinetics; satellite observations of atmospheric composition; environmental and climate policy; renewable energy.

### **EDUCATION**

- 9/01- **CALIFORNIA INSTITUTE OF TECHNOLOGY** Pasadena, CA  
12/05 Ph.D., Atmospheric Chemistry, December 2005  
Thesis: "Spectroscopy and Kinetics of Atmospheric Reservoir Species"  
Advisors: Prof. Mitchio Okumura and Prof. Paul Wennberg
- 9/00- **FREIE UNIVERSITÄT BERLIN** Berlin, Germany  
7/01 Fulbright Fellow, Physics Department
- 9/95- **UNIVERSITY OF ROCHESTER** Rochester, NY  
5/00 BS May 2000 cum laude; Major: Chemistry, Minors: Physics, German, Women's Studies

### **HONORS**

- ◆ Selected to participate in Atmospheric Chemistry Gordon Research Conference, 2007
- ◆ Selected to participate in US/Nordic Workshops on Biogenic Secondary Organic Aerosol, 2007-2008
- ◆ Travel Grant Award from UC Berkeley Science, Technology & Engineering Policy White Paper Competition, 2007
- ◆ American Association of University Women Dissertation Fellowship, 2005
- ◆ Selected to participate in Atmospheric Chemistry Gordon Research Conference and ACCESS VIII Colloquium for emerging scientists, 2005
- ◆ Dow Chemical Company Travel Fellowship, 2003
- ◆ National Science Foundation Graduate Research Fellowship, 2001-2004
- ◆ Fulbright Fellowship, 2000-2001
- ◆ Flagg Award for achievement in chemical research, May 2000
- ◆ ACS Women's Chemists Committee Travel Award to attend 219<sup>th</sup> National Meeting, 2000
- ◆ Merck Award for intellectual achievement in chemistry, 1999
- ◆ Wendy Jill Fread Prize for service to fellow students, 1999
- ◆ University of Rochester Take Five Scholarship for broadening studies, 1999-2000
- ◆ National Merit Scholar, 1995-1999

### **EXPERIENCE: RESEARCH**

- 7/06- **UNIVERSITY OF CALIFORNIA - BERKELEY** Department of Chemistry  
Postdoctoral Scholar, Atmospheric Chemistry  
Advisor: Prof. Ron Cohen
- ◆ Study partitioning of organic nitrates between gaseous and aerosol phases
  - ◆ Measure kinetics of aerosol formation from NO<sub>3</sub> oxidation of volatile organic compounds
  - ◆ Techniques: Aerosol flow tube, smog chamber, and thermal dissociation laser induced fluorescence (TD-LIF) detection of NO<sub>3</sub>, NO<sub>2</sub>, HNO<sub>3</sub> and organic nitrate; chemical kinetics modeling of multiphase reactions

- 9/01- **CALIFORNIA INSTITUTE OF TECHNOLOGY** Division of Chemistry  
12/05 Graduate Research Assistant, Atmospheric Chemistry  
Advisors: Prof. Paul Wennberg and Prof. Mitchio Okumura
- ◆ Study spectroscopy and kinetics of molecules of atmospheric significance
  - ◆ Techniques: Overtone vibrational predissociation spectroscopy, LIF detection of OH radicals, FTIR spectroscopy, submillimeter wave rotational spectroscopy, cavity ringdown spectroscopy
  - ◆ Model reaction kinetics using RKKM theory, simulate spectra using *ab initio* models
  - ◆ Species studied: HOONO, H<sub>3</sub>CC(O)OONO<sub>2</sub>, CH<sub>3</sub>OOH, and HOCH<sub>2</sub>OOH
- 9/00- **FRITZ-HABER-INSTITUTE OF THE MAX PLANCK SOCIETY**  
7/01 Department of Physical Chemistry, Berlin, Germany  
Research fellow, Ultrafast Surface Dynamics group  
Advisor: Prof. Martin Wolf
- ◆ Study femtosecond reaction dynamics of laser-induced H recombination and 2H + O on Ru(001)
  - ◆ Techniques: Two-pulse correlation desorption and mass spectrometry
  - ◆ Model energy transfer and desorption yield for ultrafast reactions
  - ◆ Compare modeled dependence on experimental parameters and to experiments to elucidate energy transfer mechanisms
- 5/99- **UNIVERSITY OF ROCHESTER** Department of Chemistry, Rochester, NY  
5/00 Research Assistant, Organic Device Science  
Advisor: Prof. Lewis Rothberg
- ◆ Develop Sum Frequency Generation (SFG) spectroscopy apparatus for studies of interfaces in organic LED devices
  - ◆ Synthesize model systems (thiols on Au surface) to characterize SFG spectroscopic technique

#### **EXPERIENCE: PROFESSIONAL**

- 1/06- **ENVIRONMENTAL AND ENERGY STUDY INSTITUTE**, Washington, DC  
5/06 Climate Fellow  
Advisor: Fredric Beck, Senior Policy Associate
- ◆ Write weekly Climate Change News, covering scientific and policy developments
  - ◆ Conduct research and write white papers and fact sheets on historical climate records, significant climate research milestones, international energy supply and demand, carbon policy alternatives
  - ◆ Plan and facilitate congressional briefings on diverse energy and climate topics
  - ◆ Attend and report on hearings, briefings, and meetings on Capitol Hill

#### **EXPERIENCE: TEACHING**

- 3/02- **CALIFORNIA INSTITUTE OF TECHNOLOGY** Divisions of Chemistry and Division of  
6/05 Environmental Science and Engineering, Pasadena, CA  
Teaching Assistant, Molecular Spectroscopy (CHM) and Atmospheric Chemistry (ESE)
- 9/96- **UNIVERSITY OF ROCHESTER** Department of Chemistry, Rochester, NY  
5/00 Teaching Assistant, General Chemistry and Molecular Spectroscopy
- 1/98- **UNIVERSITY OF ROCHESTER** Department of Physics, Rochester, NY  
9/98 Teaching Assistant, Mechanics Laboratory  
Summer Physics Program Instructor  
Program Direction: Prof. Priscilla Auchincloss
- ◆ Designed curriculum for 4-week Summer Physics program for 9<sup>th</sup> and 10<sup>th</sup> grade girls
  - ◆ Taught lessons, administered labs, organized field trips and projects
  - ◆ Evaluated program through surveys and wrote final report for funding agency

## MANUSCRIPTS IN PREPARATION

J.L. Fry, A. Kiendler-Scharr, A.W. Rollins, P.J. Wooldridge, A. Mensah, and R.C. Cohen, "Organic nitrate and secondary organic aerosol yield from NO<sub>3</sub> oxidation of  $\beta$ -pinene evaluated using a gas-phase kinetics/aerosol partitioning model."

## PUBLICATIONS

J. Matthews, J.L. Fry, C.M. Roehl, P.O. Wennberg, and A. Sinha, "Vibrational overtone initiated unimolecular dissociation of HOCH<sub>2</sub>OOH and HOCD<sub>2</sub>OOH: Evidence for mode selective behavior," *Journal of Chemical Physics*, **128**, 184306, May 15, 2008.

C.M. Roehl, Z. Marka, J.L. Fry, and P.O. Wennberg, "Near-UV photolysis cross sections of CH<sub>3</sub>OOH and HOCH<sub>2</sub>OOH determined via action spectroscopy," *Atmospheric Chemistry and Physics*, **7**, 713-720, February 14, 2007.

J.L. Fry, J.N. Matthews, J.R. Lane, C.M. Roehl, A. Sinha, H.G. Kjaergaard, and P.O. Wennberg, "OH-Stretch Vibrational Spectroscopy of Hydroxymethyl Hydroperoxide," *Journal of Physical Chemistry A*, **110**, 7072-7079, June 8, 2006.

B.J. Drouin, C.E. Miller, J.L. Fry, D.T. Petkie, P. Helminger, and I.R. Medvedev, "Submillimeter measurements of isotopes of nitric acid," *Journal of Molecular Spectroscopy*, **236**, 29-34, March 2006.

J.L. Fry, B.J. Drouin, and C.E. Miller, "Rotational spectroscopy and dipole moment *cis-cis* HOONO and DOONO," *Journal of Chemical Physics*, **124**, 084304, February 28, 2006.

A.B. McCoy, J.L. Fry, J.S. Francisco, A.K. Mollner, and M. Okumura, "Role of OH-stretch/torsion coupling and quantum yield effects in the first OH overtone spectrum of *cis-cis* HOONO," *Journal of Chemical Physics*, **122**, 104311, March 8, 2005.

J.L. Fry, S.A. Nizkorodov, M. Okumura, C.M. Roehl, J.S. Francisco, and P.O. Wennberg, "*Cis-cis* and *trans-perp* HOONO: Action spectroscopy and isomerization kinetics," *Journal of Chemical Physics*, **121**, 1432-1448, July 15, 2004.

B.J. Drouin, J.L. Fry, and C.E. Miller, "Rotational spectroscopy of *cis-cis* HOONO," *Journal of Chemical Physics*, **120**, 5505-5508, March 22, 2004.

S.A. Nizkorodov, J.D. Crouse, J.L. Fry, C.M. Roehl, and P.O. Wennberg, "Near-IR photodissociation of peroxy acetyl nitrate," *Atmospheric Chemistry and Physics*, **4**, 1269-1289, March 1, 2004.

## TALKS

J.L. Fry, "Atmospheric chemistry of nitrogen oxides," Berkeley Atmospheric Science Center Seminar Series, University of California – Berkeley, April 29, 2008.

J.L. Fry, "Atmospheric chemistry: From air pollution to climate change," Reed College, March 13, 2008.

J.L. Fry, "NO<sub>3</sub> + monoterpenes at the SAPHIR (Simulation of Atmospheric PHotochemistry In a large Reaction) Chamber," NO<sub>3</sub> Intercomparison Campaign Data Discussion Meeting, Forschungszentrum Jülich, Jülich, Germany, November 29, 2007.

J.L. Fry, "Spectroscopy and kinetics of atmospheric reservoir species," Department of Chemical Engineering, Carnegie Mellon University, Pittsburgh, PA, April 17, 2006.

J.L. Fry, "Spectroscopy and kinetics of atmospheric reservoir species...and some thoughts on scientists in DC," Department of Atmospheric and Oceanic Science, University of Maryland, College Park, MD, April 7, 2006.

J.L. Fry, M. Okumura, and P.O. Wennberg, "Spectroscopy and kinetics of atmospheric reservoir species: HOONO," Laboratory of Atmospheric Chemistry, Paul Scherer Institute, Villigen, Switzerland, December 19, 2005.

- J.L. Fry, M. Okumura, and P.O. Wennberg, "Spectroscopy and kinetics of atmospheric reservoir species: HOONO and HOCH<sub>2</sub>OOH," National Oceanic and Atmospheric Administration Aeronomy Lab, Boulder, CO, December 12, 2005.
- J.L. Fry, "Spectroscopy and kinetics of HOONO and hydroxymethyl hydroperoxide (HMHP)," Berkeley Atmospheric Sciences Center, University of California – Berkeley, November 18, 2005.
- J.L. Fry, "Chemistry in Earth's Atmosphere," Oceanside Branch of the American Association of University Women, Vista Chico, CA, October 15, 2005.
- J.L. Fry, S. Nizkorodov, C.M. Roehl, A.B. McCoy, J.S. Francisco, A.K. Mollner, B.J. Drouin, M. Okumura and P.O. Wennberg, "Kinetics and Spectroscopy of HOONO," ACCESS VIII Colloquium of the Gordon Research Conference on Atmospheric Chemistry, Yellowstone National Park, September 3, 2005.
- J.L. Fry, S.A. Nizkorodov, C.M. Roehl, M. Okumura, P.O. Wennberg, A.B. McCoy, and J.S. Francisco, "*Cis-cis* and *trans-perp* HOONO: I. Action spectroscopy and isomerization kinetics, II. Simulating the spectrum: Torsion – OH coupling," 228<sup>th</sup> American Chemical Society National Meeting, Philadelphia, PA, August 22, 2004.
- J.L. Fry, S.A. Nizkorodov, C.M. Roehl, M. Okumura, P.O. Wennberg, C.E. Miller, and B.J. Drouin, "Action spectroscopy, isomerization kinetics, and rotational spectroscopy of HOONO," Dow Chemical Company, Midland, MI, May 20, 2004.
- J.L. Fry, S.A. Nizkorodov, C.M. Roehl, M. Okumura, P.O. Wennberg, C.E. Miller, and B.J. Drouin, "Action spectroscopy, isomerization kinetics, and rotational spectroscopy of HOONO," National Oceanic and Atmospheric Administration Aeronomy Lab, Boulder, CO, April 16, 2004.
- J.L. Fry, C.E. Miller, and B.J. Drouin, "Rotational spectroscopy of *cis-cis* HOONO," Earth Sciences Division, Jet Propulsion Laboratory, Pasadena, CA, March 15, 2004.
- J.L. Fry, M. Okumura, and P.O. Wennberg, "Peroxynitrous Acid (HOONO) in the Atmosphere: Photochemistry and Kinetics," Southern California Inorganic Photochemistry Conference, Catalina Island, CA, October 18-19, 2003.
- J.L. Fry, S. Nizkorodov, C.M. Roehl, M. Okumura, P.O. Wennberg, "Action Spectroscopy of HOONO: Two conformers." The Ohio State University Molecular Spectroscopy Conference, Columbus, OH, June 16-20, 2003.

## POSTERS

- H.-P. Dorn et al, "Intercomparison Campaign of NO<sub>3</sub> and N<sub>2</sub>O<sub>5</sub> Detection Techniques at the Atmosphere Simulation Chamber SAPHIR," American Geophysical Union Fall Meeting, San Francisco, CA, December 10-14, 2007.
- A.W. Rollins, J.L. Fry, P.J. Wooldridge, and R.C. Cohen, "Detection of NO<sub>3</sub> and N<sub>2</sub>O<sub>5</sub> by thermal dissociation with LIF detection of NO<sub>2</sub> and NO<sub>3</sub>," American Geophysical Union Fall Meeting, San Francisco, CA, December 10-14, 2007.
- J.L. Fry, S.A. Nizkorodov, A.B. McCoy, J.S. Francisco, A.K. Mollner, B.J. Drouin, M. Okumura, and P.O. Wennberg, "Kinetics and Spectroscopy of HOONO," Atmospheric Chemistry Gordon Research Conference, Big Sky, MT, September 4-9, 2005.
- J.L. Fry, S. Nizkorodov, C.M. Roehl, J.D. Crouse, M. Okumura, and P.O. Wennberg, "Action Spectroscopy of HOONO." 20<sup>th</sup> Informal Symposium on Kinetics and Photochemical Processes in the Atmosphere, Riverside, CA, February 18, 2003.
- J.L. Fry, "Weakly bound complexes of importance in the atmosphere," Caltech Women's Science Symposium, Pasadena, CA, November 12-13, 2002.
- J.L. Fry, C.M. Liberatore, L.J. Rothberg, "Vibrational spectroscopy of interfaces using sum frequency generation." 219<sup>th</sup> American Chemical Society National Meeting, San Francisco, CA, March 26, 2000.

J.L. Fry, N. Simhai, E. Bones, "University of Rochester Undergraduate Chemistry Council: "Bonding" students with faculty and the real world outside campus." 219<sup>th</sup> American Chemical Society National Meeting, San Francisco, CA, March 26, 2000.

L. Balogh, D.R. Swanson, J. Fry, D.A. Tomalia, "Component transfer without interface resistance: Interactions of copper(II) ions with poly(amidoamine) dendrimers." 216<sup>th</sup> American Chemical Society National Meeting, Boston, MA, August 23, 1998.

## REPORTS

J.L. Fry, "I. Research Report: Action Spectroscopy in a Flow Cell for Investigation of Atmospherically Important HO<sub>2</sub>-complexes; II. In-Field Proposal: Surface Sum Frequency Generation Spectroscopic Study of the Mechanism of Total Oxidation of VOCs over TiO<sub>2</sub>; III. Out-of-Field Proposal: Site-Specific Mutagenesis Study of the Role of Protein-Chromophore Interactions in Primary Photochemical Reactions of Rhodopsin." Candidacy Report, California Institute of Technology, Pasadena, CA, February 2003.

J. Fry, "Modeling ultrafast surface reaction dynamics: predictions for the dependence of reaction yield on initiating laser pulse length." Fulbright Report, Fritz-Haber-Institut and Freie Universität Berlin, July 2001.

J.L. Fry, "Vibrational spectroscopy of interfaces using resonance-enhanced sum frequency generation." Senior Thesis, University of Rochester, May 2000.

## PROFESSIONAL ACTIVITIES & AFFILIATIONS

- ◆ Proposal reviewer: National Oceanic and Atmospheric Administration (NOAA)
- ◆ Manuscript reviewer: Journal of Chemical Physics, Atmospheric Chemistry and Physics
- ◆ Chair, Conference on Climate Variability and Change session on "Impacts of Climate Change" and Conference on Climate Variability and Change and Symposium on Policy and Socio-Economic Research joint session on "Climate Policy, Vulnerability, and Adaptation," American Meteorological Society National Meeting, January 20-24, 2008.
- ◆ Member, American Chemical Society
- ◆ Member, American Geophysical Union

## SERVICE AND VOLUNTEER ACTIVITIES

- ◆ Mentored high school student science fair project on ozone absorption by water, 2008
- ◆ Organized Berkeley Great Decisions Foreign Policy Discussion Group, 2008
- ◆ Guest Commentary on RealClimate.org, 2007
- ◆ Member and webmaster of American Meteorological Society Committee on Climate Variability and Change, 2007
- ◆ Opinion Editorials for Midland Daily News and the Environmental and Energy Study Institute, 2006
- ◆ Presented keynote lecture to the Carlsbad-Oceanside-Vista Chico branch of the American Association of University Women on "Chemistry in Earth's Atmosphere," Oct. 15, 2005
- ◆ Organized Pasadena Great Decisions Foreign Policy Discussion Group, 2002-2005
- ◆ Served on Caltech Graduate Student Council Academics Committee, 2002-2005, including serving as Secretary, 2003-2004
- ◆ Served as board member of the Aero Association of the California Institute of Technology (flying club with 7 airplanes and 100 members), 2004-2005
- ◆ Served on the University of Rochester Undergraduate Chemistry Council, 1997-2000, including serving as Chair, 1999-2000

## ACTIVITIES

- ◆ Private pilot (VFR) since March 2005
- ◆ Webpage design

## REFERENCES

Ron Cohen, Associate Professor of Chemistry and Director, Berkeley Atmospheric Sciences Center, University of California – Berkeley, Berkeley, CA (510) 642-2735, [rccohen@berkeley.edu](mailto:rccohen@berkeley.edu)

Paul Wennberg, Professor of Atmospheric Chemistry, California Institute of Technology, Pasadena, CA (626)395-2447, [wennberg@gps.caltech.edu](mailto:wennberg@gps.caltech.edu)

Mitchio Okumura, Associate Professor of Chemistry, California Institute of Technology, Pasadena, CA (626)395-6557, [mo@caltech.edu](mailto:mo@caltech.edu)

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Lewis Rothberg, Professor of Chemistry, University of Rochester, Rochester, NY (585)275-8286, [rothberg@chem.rochester.edu](mailto:rothberg@chem.rochester.edu)