ANDREI TOKMAKOFF – CURRICULUM VITAE

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PROFESSIONAL EXPERIENCE

2007- Professor of Chemistry, Massachusetts Institute of Technology

2003-07 Associate Professor of Chemistry, Massachusetts Institute of Technology

1998-03 Assistant Professor of Chemistry, Massachusetts Institute of Technology

1996-98 National Science Foundation Postdoctoral Research Fellow with Prof. Graham Fleming.
Department of Chemistry and the James Franck Institute, University of Chicago (1996-97)
Department of Chemistry, University of California, Berkeley; and Lawrence Berkeley National Laboratory (1997-98)

1995-96 Alexander von Humboldt Research Fellow with Prof. Alfred Laubereau.
Department of Physics, Technical University, Munich

EDUCATION

1995 Ph.D. in Chemistry, Stanford University
Research Advisor: Michael D. Fayer

1991 M.S. in Chemistry, Stanford University

1988 B.S. in Chemistry, California State University, Sacramento

AWARDS AND HONORS

2009 Fellow of the Optical Society of America

2009 Peter B. Sherry Memorial Lecture, Georgia Institute of Technology

2003 Bryce Crawford Jr. Lecturer, University of Minnesota

2002 National Fresenius Award (Phi Lambda Upsilon)

2002 Alfred P. Sloan Research Fellowship

2002 Coblentz Award (Coblentz Society)

2001 Richard E. Heikkila Research Scholar Award (National Parkinson Foundation)

2001 Outstanding Young Investigator (Time-Resolved Vibrational Spectroscopy Conference)

2000 David and Lucile Packard Fellowship for Science and Engineering

1999 Research Corporation Research Innovation Award

1995 National Science Foundation Postdoctoral Fellowship in Chemistry

1994 Alexander von Humboldt Foundation Research Fellowship

PRINCIPAL RESEARCH INTERESTS

Molecular dynamics in solution. Development of experimental methods to study transient molecular structure and its time-evolution in molecular condensed phases and biological systems. Study of water: structure, dynamics, and hydrophobicity. Study of chemical reactions in solution. Conformation and dynamics of peptides and proteins. Dynamics of protein folding and binding. Molecular recognition and self-assembly. Mechanics of bio-inspired polymers. Development of two-dimensional vibrational spectroscopies. Development of methods for generating, characterizing and femtosecond infrared electric fields. Theory and simulation of molecular dynamics for interpreting nonlinear spectroscopies. Quantum mechanics, statistical mechanics, and spectroscopy of disordered systems and collective excitations.

Professional Activities

Reviewer: National Science Foundation, Department of Energy (DOE), Air Force Office of Scientific Research, Petroleum Research Fund of the ACS, Dutch National Research Council (NWO).

Ad Hoc Reviewer: DOE Site Review Panel, Argonne (1999), NIH Special Emphasis Panel (2008).

Referee: *Journal of Chemical Physics, Journal of Physical Chemistry, Physical Review Letters, Science, Proceeding of the National Academy of Sciences USA, Journal of the American Chemical Society, Optics Letters, Biophysical Journal, Angewandte Chemie Int. Ed., Chemical Physics Letters, Chemical Physics, Physical Review E*

Frontiers in Science Symposium, National Academy of Sciences, Irvine, CA, November 1998

DOE Workshop on Electron Initiated Processes and Radical Chemistry in Water, Richland, WA Sept. 2002

Symposium Organizer/Co-Organizer: OSA Frontiers in Optics/Laser Science Meeting, October 2004; APS National Meeting, March 2005; ACS National Meeting, March 2008.

Conference Organizing/Program Committee: International Conference on Ultrafast Phenomena, 2004-present; International Symposium on Coherent Multidimensional Spectroscopy, 2004-present; International Conference on Time-Resolved Vibrational Spectroscopy, 2005-present.

Conference Chair: Fourteenth International Conference on Time-Resolved Vibrational Spectroscopy, 2009.

Editorial Committees: *Advances in Chemical Physics*; *Annual Reviews of Physical Chemistry* (2007-2012)*; Journal of Chemical Physics* (2008-2010)*.*

Advisory Committee: Munich-Centre for Advanced Photonics (2008-2011).

Representative Publications (of 112)

- "Coherent 2D IR Spectroscopy: Molecular structure and dynamics in solution," M. Khalil, N. Demirdöven and A. Tokmakoff, *J. Phys. Chem. A*, **107** (2003) 5258-5279.
- "Conformational changes during the nanosecond to millisecond unfolding of ubiquitin," H.-S. Chung, M. Khalil, A.W. Smith, Z.Ganim and A. Tokmakoff, *Proc. Nat'l Acad. Sci., USA*, **102** (2005) 612-617.
- "Transient 2D IR spectroscopy of ubiquitin unfolding dynamics," Hoi Sung Chung, Ziad Ganim, Kevin C. Jones, and Andrei Tokmakoff, *Proc. Nat'l Acad. Sci., USA*, **104** (2007) 14237-14242.
- "Spectral signatures of heterogeneous protein ensembles revealed by MD simulations of 2DIR spectra," Ziad Ganim and Andrei Tokmakoff, *Biophys. J.*, **91** (2006) 2636-2646.
- "Two-dimensional infrared spectroscopy of antiparallel β-sheet secondary structure," N. Demirdöven, C. M. Cheatum, H.-S. Chung, M. Khalil, J. Knoester, A. Tokmakoff, *JACS*, **126** (2004) 7981-7990.
- "Water penetration into protein secondary structure revealed by hydrogen-deuterium exchange 2D IR spectroscopy," Lauren P. DeFlores and Andrei Tokmakoff, *.J. Am. Chem. Soc.*, **128** (2006) 16520.
- "Probing local structural events in β-hairpin unfolding with transient nonlinear infrared spectroscopy," Adam W. Smith and Andrei Tokmakoff, *Ang. Chemie, Int. Ed.*, **46** (2007) 7984-7987.
- "Amide I two-dimensional infrared spectroscopy of proteins," Ziad Ganim, Hoi Sung Chung, Adam W. Smith, Lauren P. DeFlores, Kevin C. Jones, and Andrei Tokmakoff, *Acc. Chem. Res.*, in press.
- "Hydrogen bonds in liquid water are broken only fleetingly," J. D. Eaves, J. J. Loparo, C. J. Fecko, S. T. Roberts, A. Tokmakoff and P. L. Geissler, *Proc. Nat'l Acad. Sci., USA*, **102** (2005) 13019-13022.
- "Ultrafast hydrogen bond dynamics in the infrared spectroscopy of water," C. J. Fecko, J. D. Eaves, J. J. Loparo, A. Tokmakoff and P. L. Geissler, *Science*, **301** (2003) 1698-1702.
- "Multidimensional infrared spectroscopy of water. I. Vibrational dynamics in 2D IR lineshapes," Joseph J. Loparo, Sean T. Roberts, and Andrei Tokmakoff, *J. Chem. Phys.*, **125** (2006) 194521.
- "Multidimensional infrared spectroscopy of water. II. Hydrogen bond switching dynamics," Joseph J. Loparo, Sean T. Roberts, and Andrei Tokmakoff, *J. Chem. Phys.*, **125** (2006) 194522.