

ANDREI TOKMAKOFF

PROFESSIONAL EXPERIENCE

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

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

2007- Professor of Chemistry, Massachusetts Institute of Technology

EDUCATION AND TRAINING

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

1991 M.S. in Chemistry, Stanford University

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

1995-96 Alexander von Humboldt Research Fellow. Dept. of Physics, Technical University, Munich

1996-98 NSF Postdoctoral Fellow (Advisor: Graham R. Fleming). Dept. of Chemistry and James Franck Institute, Univ. of Chicago (96-97) and Dept. of Chemistry, UC Berkeley and LBNL (97-98)

AWARDS AND HONORS

1994 Alexander von Humboldt Foundation Research Fellowship

1995 National Science Foundation Postdoctoral Fellowship in Chemistry

1999 Research Corporation Research Innovation Award

2000 David and Lucile Packard Fellowship for Science and Engineering

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

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

2002 Coblenz Award (Coblentz Society)

2002 Alfred P. Sloan Research Fellowship

2002 National Fresenius Award (Phi Lambda Upsilon)

2003 Bryce Crawford Jr. Lecturer, University of Minnesota

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

2009 Fellow of the Optical Society of America

PROFESSIONAL ACTIVITIES

Advisor to 20 graduate students and 6 postdoctoral fellows.

Reviewer: National Science Foundation, Department of Energy (DOE), National Institutes of Health, Air Force Office of Scientific Research, ACS Petroleum Research Fund

Ad Hoc Reviewer: DOE Site Review Panels (1999, 2009); NIH Special Emphasis Panel (2008, 2010); NIH MSFB Study Section (2011)

Referee: *J. Chem. Phys.*, *J. Phys. Chem.*, *Phys. Rev. Lett.*, *Science*, *Nature*, *PNAS*, *J. Am. Chem. Soc.*, *Opt. Lett.*, *Biophys. J.*, *Angewandte Chemie Int. Ed.*, *Chem. Phys. Lett.*,

Member: American Chemical Society (ACS), Biophysical Society, Optical Society of America (OSA)

Workshops: Frontiers in Science Symposium, National Academy of Sciences (1998), DOE Workshop on Electron Initiated Processes and Radical Chemistry in Water (2002).

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

Conference Organizing/Program Committees: International Conference on Ultrafast Phenomena, 2004-2008; International Symposium on Coherent Multidimensional Spectroscopy, 2004-present; International Conference on Time-Resolved Vibrational Spectroscopy, 2005-present.

Conference Chair: 14th International Conference on Time-Resolved Vibrational Spectroscopy, 2009.

Editorial Committees: *Advances in Chemical Physics* (2007-); *Annual Reviews of Physical Chemistry* (2007-2011); *Journal of Chemical Physics* (2008-2010).

Advisory Committees: Munich-Centre for Advanced Photonics (2008-2011), Max-Born-Institute, Berlin (2011-2015).

Patents and Inventions

- “Method and Apparatus for Frequency-Converting Infrared Light,” DeCamp, M.F., and Tokmakoff, A. US Patent No. 7,696,479.
- “Method and Apparatus for Two-Dimensional Spectroscopy,” DeCamp, M.F., and Tokmakoff, A. US Patent No. 7,812,311.
- “Two-Dimensional Fourier Transform Spectrometer,” DeFlores, L.P., and Tokmakoff, A. US Patent Application No. 12/676,536.

Representative Peer-Reviewed Publications (of 125)

- Khalil, M., Demirdöven N., and Tokmakoff, A. (2003). Coherent 2D IR Spectroscopy: Molecular structure and dynamics in solution. *J. Phys. Chem. A* 107, 5258-5279.
- Fecko, C. J., Eaves, J. D., Loparo, J. J., Tokmakoff, A. and Geissler, P. G. (2003). Ultrafast hydrogen bond dynamics in the infrared spectroscopy of water, *Science* 301, 1698-1702.
- Demirdöven, N., Cheatum, C. M., Chung, H.-S., Khalil, M., Knoester, J., and Tokmakoff A. (2004). Two-dimensional infrared spectroscopy of antiparallel β -sheet secondary structure, *J. Am. Chem. Soc.* 126, 7981-7990.
- Eaves, J. D., Loparo, J. J., Fecko, C. J., Roberts, S. T., Tokmakoff, A. and Geissler, P. L. (2005). Hydrogen bonds in liquid water are broken only fleetingly, *PNAS* 102, 13019-13022.
- Chung, H.-S., Khalil, M., Smith, A.W., Ganim, Z. and Tokmakoff, A. (2005) Conformational changes during the nanosecond to millisecond unfolding of ubiquitin, *PNAS* 102, 612-617.
- Loparo, J.J., Roberts, S.T., and Tokmakoff, A. (2006). Multidimensional infrared spectroscopy of water. I. Vibrational dynamics in 2D IR lineshapes. *J. Chem. Phys.* 125, 194521.
- Loparo, J.J., Roberts, S.T., and Tokmakoff, A. (2006). Multidimensional infrared spectroscopy of water. II. Hydrogen bond switching dynamics. *J. Chem. Phys.* 125, 194522.
- DeFlores, L.P. and Tokmakoff, A. (2006) Water penetration into protein secondary structure revealed by hydrogen-deuterium exchange 2D IR spectroscopy. *J. Am. Chem. Soc.* 128 (2006) 16520.
- Ganim, Z. and Tokmakoff, A. (2006) Spectral signatures of heterogeneous protein ensembles revealed by MD simulations of 2DIR spectra. *Biophys. J.* 91, 2636-2646.
- Smith, A.W., and Tokmakoff, A. (2007). Probing local structural events in β -hairpin unfolding with transient nonlinear infrared spectroscopy. *Angewandte Chemie, Int'l Ed.* 46, 7984.
- Chung, H.-S., Ganim, Z., Jones, K.C., and Tokmakoff, A. (2007). Transient 2D IR spectroscopy of ubiquitin unfolding dynamics. *Proc. Nat'l Acad. Sci., USA* 104, 14237-14242.
- DeFlores, L.P., Nicodemus, R.A., Tokmakoff, A. (2007) Two-dimensional Fourier transform spectroscopy in the pump-probe geometry. *Opt. Lett.* 32, 2966.
- Ganim, Z., Chung, H.-S., Smith, A.W., DeFlores, L.P., Jones, K.C., and Tokmakoff, A. (2008). Amide I 2D IR spectroscopy of proteins. *Acc. Chem. Res.* 41, 432.
- Roberts, S.T., Ramasesha, K., and Tokmakoff, A., (2009) Structural Rearrangements in Water Viewed Through Two-Dimensional Infrared Spectroscopy. *Acc. Chem. Res.* 42, 1239-1249.
- Roberts, S.T., Petersen, P.B., Ramasesha, K., Tokmakoff, A., Ufimtsev, I.S., and Martinez, T. J. (2009) Observation of a Zundel-like transition state during proton transfer in aqueous hydroxide solutions. *Proc. Nat'l Acad. Sci., USA* 106, 15154–15159.
- Ganim, Z., Jones, K.C., and Tokmakoff, A. (2010). Insulin Dimer Dissociation and Unfolding Revealed by Amide I 2D IR Spectroscopy. *Phys. Chem. Chem. Phys.* 12, 3579–3588.
- Smith, A.W., Lessing, J., Ganim, Z., Peng, C.S., Tokmakoff, A., Roy, S., Jansen, T.L.C., and Knoester, J. (2010) Melting of a β -hairpin peptide using isotope-edited 2D IR spectroscopy and simulations. *J. Phys. Chem. B*, 114, 10913–10924.
- “Ultrafast 2D IR Anisotropy of Water Reveals Reorientation during Hydrogen-Bond Switching,” Krupa Ramasesha, Sean T. Roberts, Rebecca A. Nicodemus, Aritra Mandal and Andrei Tokmakoff, *Journal of Chemical Physics*, **135** (2011) 054509.

Web-based Textbook

- Tokmakoff, A. (2010) *Time-Dependent Quantum Mechanics and Spectroscopy*, (Massachusetts Institute of Technology), <http://www.mit.edu/~tokmakof/TDQMS/>.

Patents and Inventions

- “Method and Apparatus for Frequency-Converting Infrared Light,” DeCamp, M.F., and Tokmakoff, A. US Patent No. 7,696,479.
- “Method and Apparatus for Two-Dimensional Spectroscopy,” DeCamp, M.F., and Tokmakoff, A. US Patent No. 7,812,311.
- “Two-Dimensional Fourier Transform Spectrometer,” DeFlores, L.P., and Tokmakoff, A. US Patent Application No. 12/676,536.