

## KATHERINE A. WILLETS

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### EDUCATION

- Ph.D. Stanford University.** Stanford, CA  
Physical chemistry, June 2005.  
Dissertation: *Novel fluorophore systems for single-molecule imaging: photophysics, mechanism, and applications*
- A.B. Dartmouth College.** Hanover, NH  
Chemistry, with high honors, magna cum laude, June 1999.  
Honor's thesis: *The effect of pressure on the miscibility of polymer blends*

### PROFESSIONAL EXPERIENCE

- **Assistant Professor** 2007-present  
*Department of Chemistry, The University of Texas at Austin, Austin, TX*
- **Postdoctoral Researcher** 2005-2007  
*Department of Chemistry, Northwestern University, Evanston, IL*  
Advisor: Professor Richard P. Van Duyne
- **Graduate Researcher** 1999-2005  
*Department of Chemistry, Stanford University, Stanford, CA*  
Advisor: Professor W.E. Moerner
- **Undergraduate Researcher** 1998-1999  
*Department of Chemistry, Dartmouth College, Hanover, NH*  
Advisor: Professor Jane E.G. Lipson
- **Undergraduate Research Intern** 1996  
*Department of Chemistry, Dartmouth College, Hanover, NH*  
Advisor: Professor Charles Braun

### AWARDS AND HONORS

- Air Force Office of Scientific Research Young Investigator Award. 2008.
- New faculty summer research award, UT Austin. 2008.
- Natural Sciences Foundation Advisory Council Teaching Excellence Award, UT Austin, 2007-2008.
- Physical chemistry student poster award, *Single Molecule Sensors of Local Environment*, ACS National Meeting, August 2004.
- Evelyn Laing McBain Graduate Fellowship, Stanford University, 2003.
- Elden Bennett Hartshorn Medal, Dartmouth College, June 1999.
- Paul R. Shafer & Douglas M. Bowen Award, Dartmouth College, June 1999.

- Phi Beta Kappa, 1999.

### **PUBLICATIONS (PEER-REVIEWED)**

**K.A. Willets.** "Surface-enhanced Raman scattering (SERS) for probing internal cellular structure and dynamics," *Anal Bioanal Chem.* 394, 85-94 (2009).

S.J. Lord, N.R. Conley, H.D. Lee, S.Y. Nishimura, A.K. Pomerantz, **K.A. Willets**, Z. Lu, H. Wang, N. Liu, R. Samuel, R. Weber, A. Semyonov, M. He, R.J. Twieg, W.E. Moerner, "DCDHF fluorophores for single-molecule imaging in cells," *ChemPhysChem* **10**, 55-65 (2009).

R.J. Stiles\*, **K.A. Willets**\*, L.J. Sherry, Jennifer M. Roden, R.P. Van Duyne, "Investigating Tip-Nanoparticle Interactions in Spatially Correlated Total Internal Reflection Plasmon Spectroscopy and Atomic Force Microscopy," *J. Phys. Chem. C* **112**, 11696-11701 (2008) \*shared first authorship.

S.J. Lord, Z. Lu, H. Wang, **K.A. Willets**, P.J. Schuck, H.D. Lee, S.Y. Nishimura, R.J. Twieg, W.E. Moerner, "Photophysical Properties of Acene DCDHF Fluorophores: Long-Wavelength Single-Molecule Emitters Designed for Cellular Imaging," *J. Phys. Chem. A.* **111**, 8934-8941 (2007).

H. Wang, Z. Lu, S.J. Lord, **K.A. Willets**, J.A. Bertke, S.D. Bunge, W. E. Moerner, R.J. Twieg, "The Influence of Tetrahydroquinoline Rings in Dicyanomethylenedihydrofuran (DCDHF) Single-Molecule Fluorophores," *Tetrahedron* **63**, 103-114 (2007).

**K.A. Willets**, R.P. Van Duyne, "Localized Surface Plasmon Resonance Spectroscopy and Sensing," *Annu. Rev. Phys. Chem.* **58**, 267-297 (2007).

S.Y. Nishimura, S.J. Lord, L.O. Klein, **K.A. Willets**, M. He, Z. Lu, R.J. Twieg, W.E. Moerner, "Diffusion of Lipid-like Single-Molecule Fluorophores in the Cell Membrane," *J. Phys. Chem. B* **110**, 8151-8157 (2006).

R.J. Twieg, H. Wang, Z. Lu, S.Y. Kim, S.J. Lord, S.Y. Nishimura, P.J. Schuck, **K.A. Willets**, W.E. Moerner, "Synthesis, Properties and Applications of Dicyanomethylenedihydrofuran (DCDHF) Single-Molecule Fluorophores," *Nonlinear Optics, Quantum Optics* **34**, 241-246 (2005).

P.J. Schuck, **K.A. Willets**, D.P. Fromm, R.J. Twieg, W.E. Moerner, "A Novel Fluorophore for Two-Photon-Excited Single-Molecule Fluorescence," *Chem. Phys.* **318**, 7-11 (2005).

**K.A. Willets**, S.Y. Nishimura, P.J. Schuck, R.J. Twieg, W.E. Moerner, "Nonlinear Optical Chromophores as Nanoscale Emitters for Single-Molecule Spectroscopy," *Accts. Chem. Res.* **38**, 549-556 (2005).

**K.A. Willets**, P.R. Callis, and W.E. Moerner, "Experimental and Theoretical Investigations of Environmentally Sensitive Single-Molecule Fluorophores," *J. Phys. Chem. B* **108**, 10465-10473 (2004).

**K.A. Willets**, O. Ostroverkhova, M. He, R.J. Twieg, and W.E. Moerner, "Novel Fluorophores for Single-Molecule Imaging," *J. Am. Chem. Soc.* **125**, 1174-1175 (2003).

J.E.G. Lipson, M. Tambasco, **K.A. Willets**, and J.S. Higgins, "Correlations between the Effects of Pressure and Molecular Weight on Polymer Blend Miscibility," *Macromolecules* **36**, 2977-2984 (2003).

N.B. Bowden, **K.A. Willets**, W.E. Moerner, and R.M. Waymouth, "Synthesis of Fluorescently-Labeled Polymers and Their Use in Single-Molecule Imaging," *Macromolecules* **35**, 8122-8125 (2002).

#### **ADDITIONAL PUBLICATIONS**

**K.A. Willets**, W.P. Hall, L.J. Sherry, X. Zhang, J. Zhao, R.P. Van Duyne, "Nanoscale Localized Surface Plasmon Resonance Biosensors," *Nanobiotechnology II*. Eds. C.A. Mirkin and C.M. Niemeyer. Weinheim: Wiley-VCH, 2006.

**K.A. Willets**, R.J. Twieg, W.E. Moerner, "Single Molecule Magic," *OE Magazine* **4**, 13-15 (2004).

**K.A. Willets**, O. Ostroverkhova, S. Hess, M. He, R.J. Twieg, W.E. Moerner, "Novel Fluorophores for Single-Molecule Imaging," *Proc. SPIE* **5222**, 150-157 (2003).

#### **INVITED TALKS**

"Simultaneous measurement of the optical and structural properties of single metallic nanoparticles." Baylor University, Waco, TX. November 21, 2008.

"Spatially Correlated Total Internal Reflection Plasmon Spectroscopy and Atomic Force Microscopy." University of Northern Iowa, Cedar Falls, IA. June 10, 2008.

"Spatially Correlated Total Internal Reflection Plasmon Spectroscopy and Atomic Force Microscopy." Agilent Technologies, Santa Clara, CA. April 15, 2008.

"New approaches for single nanoparticle localized surface plasmon resonance measurements." Becton-Dickinson, Durham, NC. September 13, 2007.

#### **CONFERENCE PRESENTATIONS AND POSTERS**

*Regular and random nanoparticle arrays for LSPR and SERS.* Invited oral, presented at 232<sup>nd</sup> American Chemical Society National Meeting, Division of Polymeric Materials: Science & Engineering, San Francisco, CA, September 2006.

*Exploring dynamics in polymers and cells with novel nonlinear single-molecule fluorophores.* Poster, presented at 52<sup>nd</sup> Western Spectroscopy Association Meeting, Pacific Grove, CA, January 2005.

*Single molecule sensors of local environment.* Poster, presented at 228<sup>th</sup> American Chemical Society National Meeting, Sci-Mix and Physical Chemistry sessions, Philadelphia, PA, August 2004.

*Experimental and theoretical investigations of environmentally sensitive single-molecule fluorophores.* Poster, presented at CLEO/QELS Conference on Lasers and Electro Optics, Quantum Electronics and Laser Science, San Francisco, CA, May 2004.

*A new class of fluorophores for single-molecule imaging.* Oral, presented at the 47<sup>th</sup> Annual Meeting of SPIE, San Diego, CA, August 2003.

*Optically sensing the state of a single molecule.* Invited oral, presented at CLEO/QELS Conference on Lasers and Electro Optics, Quantum Electronics and Laser Science, Baltimore, MD, June 2003.

*Novel fluorophores for single-molecule imaging.* Poster, presented at 7<sup>th</sup> Annual Paul Flory Conference, Stanford, CA, February 2003.

*Single-polymer rotational dynamics studied with a perylene diimide-labeled polybutadiene chain.* Poster, presented at 6<sup>th</sup> Annual Paul Flory Conference, Stanford, CA, February 2002.

## **SERVICE**

### *UT Austin*

- Analytical division coordinator, 2008-present.
- REU student host, summer 2008.
- Analytical/physical chemistry seminar coordinator, 2008-present.
- Center for Nano- and Molecular Science faculty search committee, 2007-2008.
- Physical chemistry faculty search committee, 2007-2008.
- Analytical chemistry graduate admissions committee, 2007-2008.
- Senate of College Councils Undergraduate Research Award faculty reviewer, 2007.

### *External service*

- Grant reviews: DOE, NSF (Panel), CUNY system
- Journal reviews: Accounts of Chemical Research, Nano Letters, Langmuir

**TEACHING UT AUSTIN**

- Chem 456, Analytical Chemistry, Fall 2007, 2008.
- Chem 390L, Optical spectroscopy and microscopy, Spring 2009.