

Jörg C. Woehl

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University of Wisconsin-Milwaukee
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Profile

Development of novel techniques for the trapping and manipulation of single molecules in solution

High-resolution laser spectroscopy (single molecule spectroscopy, hole-burning spectroscopy at liquid helium temperatures)

Widefield, confocal scanning, and near-field scanning optical imaging of single molecules and related nanoparticles on surfaces

Theory of the near-field intensity distribution of aperture probes and of the point spread function of far-field microscopes

Education

Ph.D. (Physical Chemistry), University of California at Riverside, 1996

Thesis Advisor: **Bryan E. Kohler**

Title: “Measuring Internal Electrostatic Fields and Potentials at Molecular and Atomic Resolution using Hole Burning Spectroscopy”

Vordiplom (equiv. B.Sc.; Chemistry), University of Tübingen (Germany), 1990

Experience

University of Wisconsin-Milwaukee, 2004 - date

Associate Professor, Physical Chemistry (2010 - date)

Assistant Professor, Physical Chemistry (2004 - 2010)

- Experimental and theoretical investigation of nanoscale optical imaging and manipulation of single molecules in solution
- Determination of molecular electric fields at the active site of proteins
- Development of novel near-field optical probes
- Calculation of point spread functions in far-field optical microscopy
- Teaching:
 - Chem 223: Elementary Quantitative Analysis; Lecture and Lab (U/G, 4 cr); 2006-2007

Experience (continued)

- Chem 561: Physical Chemistry I (Chemical Thermodynamics); Lecture (U/G, 3 cr); 2004/2005, 2005/2006, 2006/2007, 2007/2008, 2008/2009, 2009/2010
- Chem 562: Physical Chemistry II (Kinetics, Statistical Mechanics, Quantum Chemistry); Lecture (U/G, 3 cr); 2010/2011
- Chem 584: Advanced Chemistry Laboratory II; Lab (U; 2 cr); 2009/2010
- Chem 662: Chemical Kinetics and Dynamics; Lecture (U/G, 3 cr); 2005/2006, 2006/2007, 2007/2008, 2009/2010, 2010/2011
- Chem 762: Topics in Physical Chemistry: Laser Spectroscopy (G, 3 cr); 2008/2009
- Chem 900: Chemistry Colloquium; 2006/2007, 2007/2008

Université Joseph Fourier Grenoble (France), 1999 - 2004

Maître de Conférences, Laboratoire de Spectrométrie Physique

- Near-field scanning optical microscopy of II-VI quantum dots at l-He temperature
- Confocal scanning optical microscopy of single molecules at room temperature and l-He temperature
- Teaching:
 - Classical Mechanics; Lecture, Lab, and Discussion (U); 2000/2001, 2001/2002, 2002/2003
 - Electrostatics, Magnetostatics, and Electrodynamics; Lecture, Lab, and Discussion (U); 1999/2000, 2000/2001, 2001/2002, 2002/2003.
 - Geometrical Optics; Lab and Discussion (U); 2003/2004
 - Electrodynamics: Electric and Magnetic Properties of Matter; Discussion (G); 2003/2004
 - Electrodynamics: Wave Optics; Lab and Discussion (G); 2003/2004
 - Nanosciences and Single Molecules; Lecture (G); 2003/2004

Université Bordeaux 1 (France), 1996 - 1999

Postdoctoral Research Associate with Michel Orrit, Centre de Physique Moléculaire Optique et Hertzienne

- Single molecule spectroscopy in the optical near-field
- Electric field effect measurements on single molecule lines

Funding History

“Development of a single molecule analyzer for genetic profiling”, UWM Research Foundation Catalyst Grant, 07/01/10 – 06/30/2011, **\$70,000**, PI

“Measuring molecular electric fields at the active site of a protein using single molecule and hole-burning techniques”, National Science Foundation, Structure and Reactivity Program, 09/01/09 – 08/31/12, **\$522,800**, co-PI

Funding History (continued)

“Development of Instrumentation for Single Molecule Trapping and Spectroscopy for Chemistry Research”, National Science Foundation, Chemistry Research Instrumentation and Facilities Program (CRIF-ID: Instrument Development), 09/01/2008 – 08/31/2011, **\$320,944**, PI

“Measuring Molecular Electric Fields at the Active Sites of Proteins: Development of High Resolution Single Molecule and Hole-Burning Techniques”, UWM Graduate School Research Growth Initiative, 07/01/08 – 06/30/09, **\$180,700**, PI

“Development of Next Generation Aperture Probes for High Resolution Optical Microscopy in Biological and Material Sciences”, UWM Research Foundation, MiTAG, 07/01/07 - 12/31/08, **\$50,000**, PI

“MRI: Acquisition of a High-Resolution Scanning Electron Microscope for an Interdisciplinary, Multi-User Facility Serving Life, Physical, and Materials Sciences”, National Science Foundation, 09/01/07 - 08/31/10, **\$603,617**, Co-PI

“Development of novel, high performance fiber probes for the optical imaging of single molecules on surfaces”, UWM Graduate School Research Committee Award, 07/01/05 - 06/30/06, **\$14,833**, PI

“Electron Transport and Electronic Structure of Single Molecule Bridges”, Volkswagen Foundation Germany, 07/01/00 – 06/30/03, €72,961, Co-PI

Patent Applications and Invention Disclosures

C. A. Carlson and **J. C. Woehl**

"Nanoparticle electrostatic trap", **Provisional Patent 61/336,449** filed by the UWM Research Foundation in January 2010; utility application filed in January 2011

J. H. Aldstadt, P. Geissinger, B. A. Ruddy, **J. C. Woehl** and J. A. Frost

“Photon Trapping Spectrometer for Long Pathlength Absorbance Measurement”, Invention Disclosure Report filed with the UWM Research Foundation in October 2009

C. A. Carlson and **J. C. Woehl**

"Methods for Formation of Optical Fiber Tips for Use in Near Field Scanning Optical Microscopy", **Provisional Patent 60/956,138** filed by the UWM Research Foundation in August 2007

M. J. Nasse and **J. C. Woehl**

“Software to calculate accurate illumination, detection and total point spread functions for polarization microscopy using conventional/widefield and confocal microscopes, explicitly taking into account spherical aberrations”, Copyrighted by the UWM Research Foundation in April 2010.

Honors and Awards

- 2009** Graduate School/UWM Foundation Research Award, University of Wisconsin – Milwaukee.
- 2009** Graduate School Research Fellow, Graduate School, University of Wisconsin – Milwaukee.
- 2004** Member of the Scientific Organizing Committee of the 36th International Chemistry Olympiad in Kiel, Germany.
- 2002-2004** PEDR Award for Scientific Research (Prime d'Encadrement Doctoral et de Recherche) of the Ministère de l'Éducation Nationale, de l'Enseignement Supérieur et de Recherche (MENRT; French Ministry of National Education, Research, and Technology), France.
- 1998-1999** Postdoctoral Research Fellow of the Centre National de la Recherche Scientifique (CNRS; National Center for Scientific Research), France.
- 1997-1998** Postdoctoral Research Fellow of the German Academic Exchange Service (DAAD; Deutscher Akademischer Austauschdienst, Postdoc Program), Germany.
- 1996-1997** Postdoctoral Research Fellow of the “European Network on Single Molecule Spectroscopy”, France.
- 1996** Scholarship of the Western Spectroscopy Association (WSA), University of California at Riverside.
- 1995** Nomination as Outstanding Graduate Student of the University of California at Riverside.
- 1988-1994** Scholarship Award of the German National Merit Foundation (Studienstiftung des deutschen Volkes), awarded to the top 0.25% of German undergraduate and graduate students.
- 1993** Research Award of the Society for Advancement of Materials and Process Engineering (SAMPE), University of California at Riverside.
- 1991-1992** “Foreign Studies Program” Fellow of the German National Merit Foundation (Studienstiftung des deutschen Volkes), Germany.
- 1991-1992** Fulbright Fellow of the German-American Fulbright-Hays Exchange Program, University of California at Riverside.

Honors and Awards (continued)

- 1991** Vordiplom with highest score (equiv. to a GPA of 4.0) from the University of Tübingen, Germany.
- 1987** Gold Medalist and winner of 1st place overall (among 108 participants from 27 countries) at the 19th International Chemistry Olympiad in Veszprém and Budapest, Hungary.
- 1987** Selected into the German Delegation to the 19th International Chemistry Olympiad in Veszprém and Budapest, Hungary.
- 1987** Graduated 1st of high-school promotion at the Markgrafen-Gymnasium Durlach, Germany.

Publications

Journal articles and book chapters - invited

B. E. Kohler, R. I. Personov, and **J. C. Woehl**
“Electric field effects in molecular systems studied via persistent hole burning”
Laser Techniques in Chemistry, A. B. Myers and T. R. Rizzo Eds., Vol. XXIII, pp. 283-323, John Wiley & Sons, Inc., New York, 1995

Journal articles and book chapters - contributed

1. Y. Hu, P. Geissinger, and **J. C. Woehl**
“Potential of protoporphyrin IX and metal derivatives for single molecule fluorescence studies”
J. Lumin. **131**, 477-481 (2011)
2. C. A. Carlson, N. L. Sweeney, M. J. Nasse, and **J. C. Woehl**
"The corral trap: fabrication and software development"
Proc. SPIE **7571**, 757108-1--6 (2010)
3. M. J. Nasse and **J. C. Woehl**
“Realistic modeling of the illumination point spread function in confocal scanning optical microscopy”
J. Opt. Soc. Am. A **27**, 295-302 (2010)
4. C. A. Carlson and **J. C. Woehl**
"Fabrication of optical tips from photonic crystal fibers"
Rev. Sci. Instrum. **79**, 103707-1--5 (2008)
This paper has been selected for reproduction in the November 10, 2008 issue of *Virtual Journal of Nanoscale Science & Technology* and the November 2008 issue of *Virtual Journal of Ultrafast Science*.

Journal articles and book chapters - contributed (continued)

5. M. J. Nasse, **J. C. Woehl**, and S. Huant
"High-resolution mapping of the three-dimensional point spread function in the near-focus region of a confocal microscope"
Appl. Phys. Lett. **90**, 031106-1--3 (2007)
6. A. Drezet, **J. C. Woehl**, and S. Huant
"Diffraction of light by a planar aperture in a metallic screen"
J. Math. Phys. **47**, 072901-1--10 (2006)
7. P. Geissinger, M. R. DuPrey, I. J. Schwabacher, **J. C. Woehl**, and B. J. Prince
"Evaluation and properties of a model for the determination of internal electric fields in proteins from the Stark effect of spectral holes"
Optic. Spectros. **98**, 669-674 (2005)
8. A. Drezet, M. Brun, **J. C. Woehl**, and S. Huant
"Surface-plasmon mediated near-field optical addressing of single nano-objects: a simple analysis"
J. Kor. Phys. Soc. **47**, S130-S134 (2005)
9. N. Chevalier, M. J. Nasse, M. Stark, J. F. Motte, **J. C. Woehl**, S. Huant, P. Reiss, J. Bleuse, and F. Chandezon
"CdSe single-nanocrystal-based active optical tips for near-field optics: towards a nanosource of light"
J. Kor. Phys. Soc. **47**, S126-S129 (2005)
10. N. Chevalier, M. J. Nasse, **J. C. Woehl**, P. Reiss, J. Bleuse, F. Chandezon, and S. Huant
"CdSe single-nanoparticle based active tips for near-field optical microscopy"
Nanotechnology **16**, 613-618 (2005)
11. P. Geissinger, **J. C. Woehl**, and B. J. Prince
"A quantum-mechanical model for the determination of internal electric fields at protein active sites from the Stark effect on persistent spectral holes"
J. Lumin. **107**, 220-229 (2004)
12. A. Drezet, S. Huant, and **J. C. Woehl**
"In situ characterization of optical tips using single fluorescent nanobeads"
J. Lumin. **107**, 176-181 (2004)
13. A. Drezet, M. J. Nasse, S. Huant, and **J. C. Woehl**
"The optical near-field of an aperture tip"
Europhys. Lett. **66**, 41-47 (2004)
14. M. Brun, N. Chevalier, A. Drezet, S. Huant, J.-F. Motte, H. Mariette, M. Stark, F. Tinjod, and **J. C. Woehl**

Journal articles and book chapters - contributed (continued)

- “Carrier-diffusion-limited remote optical addressing of single quantum dots”
Physica E (Amsterdam) **21**, 219-222 (2004)
15. M. Brun, A. Drezet, H. Mariette, N. Chevalier, **J. C. Woehl**, and S. Huant
“Remote optical addressing of single nano-objects”
Europhys. Lett. **64**, 634-640 (2003)
16. A. Drezet, **J. C. Woehl**, and S. Huant
“Diffraction by a small aperture in conical geometry: application to metal-coated tips used in near-field scanning optical microscopy”
Phys. Rev. E **65**, 046611-1--8 (2002)
17. M. Brun, S. Huant, **J. C. Woehl**, J.-F. Motte, L. Marsal, and H. Mariette
“Excitons and multi-excitons in single CdTe quantum dots probed by near-field spectroscopy”
Solid State Commun. **121**, 407-410 (2002)
18. A. Drezet, **J. C. Woehl**, and S. Huant
“Far-field emission of a tapered optical fibre tip: a theoretical analysis”
J. Microsc. **202**, 359-361 (2001)
19. A. Drezet, **J. C. Woehl**, and S. Huant
“Extension of Bethe's diffraction model to conical geometry: application to near-field optics”
Europhys. Lett. **54**, 736-740 (2001)
20. M. Brun, S. Huant, **J. C. Woehl**, J. F. Motte, L. Marsal, and H. Mariette
“Low-temperature near-field spectroscopy of CdTe quantum dots”
J. Microsc. **202**, 202-208 (2001)
21. B. E. Kohler and **J. C. Woehl**
“Effects of electrostatic fields and potentials on the electronic energies of conjugated organic molecules”
J. Phys. Chem. A **103**, 2435-2445 (1999)
22. Y. Durand, **J. C. Woehl**, B. Viellerobe, W. Göhde, and M. Orrit
“New design of a cryostat-mounted scanning near-field optical microscope for single molecule spectroscopy”
Rev. Sci. Instrum. **70**, 1318-1325 (1999)
23. C. Brunel, P. Tamarat, B. Lounis, **J. C. Woehl**, and M. Orrit
“Stark effect on single molecules of dibenzanthanthrene in a naphthalene crystal and in a n-hexadecane Shpol'skii matrix”
J. Phys. Chem. A **103**, 2429-2434 (1999)

Journal articles and book chapters - contributed (continued)

24. B. E. Kohler and **J. C. Woehl**
“Effects of internal electric fields and electrostatic potentials on optical spectra of linear polyenes”
Synth. Met. **84**, 859-860 (1997)
25. B. E. Kohler and **J. C. Woehl**
“Conjugation lengths in long polyene chains”
Synth. Met. **84**, 851-852 (1997)
26. P. Geissinger, B. E. Kohler, and **J. C. Woehl**
“Experimental determination of internal electric fields in ordered systems: myoglobin and cytochrome C”
Synth. Met. **84**, 937-938 (1997)
27. P. Geissinger, B. E. Kohler, and **J. C. Woehl**
“Measuring internal electric fields in proteins using hole-burning spectroscopy”
Proceedings of the International Conference on Lasers '96, pp. 319-326, Society for Optical and Quantum Electronics, Washington, D.C., 1997
28. B. E. Kohler and **J. C. Woehl**
“Classical and quantum mechanical models for Stark experiments”
Mol. Cryst. Liq. Cryst. **291**, 119-134 (1996)
29. P. Geissinger, B. E. Kohler, and **J. C. Woehl**
“Transition frequency and internal electric field for protoporphyrin-IX in myoglobin”
Mol. Cryst. Liq. Cryst. **283**, 249-254 (1996)
30. P. Geissinger, B. E. Kohler, and **J. C. Woehl**
“Internal electric fields and inhomogeneous broadening: protoporphyrin-IX in myoglobin”
Mol. Cryst. Liq. Cryst. **283**, 69-74 (1996)
31. P. Geissinger, B. E. Kohler, and **J. C. Woehl**
“Electric field and structure in the myoglobin heme pocket”
J. Phys. Chem. **99**, 16527-16529 (1995)
32. P. Geissinger, B. E. Kohler, and **J. C. Woehl**
“Determination of the internal electric field at the porphin core of protoporphyrin IX in myoglobin”
Proceedings of the Seventh International Conference on Unconventional Photoactive Systems, pp 52-53, 1995
33. B. E. Kohler and **J. C. Woehl**
“Measuring internal electric fields with atomic resolution”
J. Chem. Phys. **102**, 7773-7781 (1995)

Journal articles and book chapters - contributed (continued)

Addendum (not erratum) in B. E. Kohler and **J. C. Woehl**, “Erratum: Measuring internal electric fields with atomic resolution [J. Chem. Phys. 102, 7773 (1995)]”, J. Chem. Phys. **104**, 3148-3148 (1996)

34. B. E. Kohler and **J. C. Woehl**
“A simple model for conjugation lengths in long polyene chains”
J. Chem. Phys. **103**, 6253-6256 (1995)

Presentations

Invited talks

C. A. Carlson and **J. C. Woehl**
“Corral trap confinement and manipulation of single molecules”
SPIE Photonics West, San Francisco, CA, 2011

J. C. Woehl
“‘Catch, Hold, and Release’: Controlled Manipulation of Single Molecules in Solution”
Beloit College, Beloit, WI, 2010

P. Geissinger and **J. C. Woehl**
“Development of Methods for Measurement of Electric Fields at Protein Active Sites and Elucidation of their Contribution to Protein Function”
University of Canterbury, Christchurch (New Zealand), 2010

P. Geissinger and **J. C. Woehl**
“Elucidating the Contribution of Molecular Electric Fields at Protein Active Sites to Protein Function: Development of Methods for Measurement of Protein Electric Fields”
Biennial Australia/New Zealand Humboldt Conference, University of Otago, Dunedin (New Zealand), 2010

J. C. Woehl
“Imaging and trapping of single molecules”
University of Wisconsin - Whitewater, Whitewater, WI, 2009

J. C. Woehl
“Innovative tools for imaging individual molecules”
First Look Forum - UWM Research Foundation
University of Wisconsin - Milwaukee, Milwaukee, WI, 2008

J. C. Woehl
“From Abbe to optical nanoscopy - and beyond”

Invited talks (continued)

University of Wisconsin - Oshkosh, Oshkosh, WI, 2008

J. C. Woehl

“Imaging of single nano-objects in the optical near- and far-field -- and vice-versa”

University of Wisconsin - Milwaukee, Milwaukee, WI, 2004

J. C. Woehl

“Optical near-field imaging of single nano-objects”

University of California at Riverside, Riverside, CA, 2003

J. C. Woehl

“Detection and manipulation of luminescent nano-objects with an optical probe”

University of Marseille (France), 2003

M. Brun, A. Drezet, S. Huant, and **J. C. Woehl**

”Near-field scanning optical microscopy of single nano-objects”

Scanning Probe Microscopy 2003 (SPM'03), Nizhny Novgorod (Russia), 2003

J. C. Woehl

“Surpassing the classical limits: near-field scanning optical microscopy”

Commissariat à l’Energie Atomique (CEA), Grenoble (France), 2002

J. C. Woehl

"Imaging and spectroscopy of single molecules at nanometer spatial resolution"

University of Wisconsin-Milwaukee, Milwaukee, WI, 1999

B. E. Kohler and **J. C. Woehl**

"How the microscopic environment affects the spectroscopic properties of a probe molecule: octatetraene in Shpol'skii systems"

217th National Meeting of the American Chemical Society, Anaheim, CA, 1999

J. C. Woehl

"Molecular nanoprobe of electric fields"

Université Joseph Fourier Grenoble (France), 1998

J. C. Woehl

"New developments in single molecule spectroscopy and microscopy”

University of Chemnitz (Germany), 1998

J. C. Woehl

"Effects of electric fields and electrostatic potentials on the spectra of conjugated organic molecules”

University of Karlsruhe (Germany), 1997

B. E. Kohler and **J. C. Woehl**

Invited talks (continued)

“Measuring internal electric fields using hole burning spectroscopy: experiment and simulation”

University of Regensburg (Germany), 1994

Contributed talks

J. C. Woehl and C. A. Carlson

“The electrostatic corral: Trapping single DNA molecules in solution”

2011 OSA Optics&Photonics Congress, Monterey, CA, 2011

J. C. Woehl and C. A. Carlson

“Catch, hold, and release: Manipulating single DNA molecules in solution”

55th Annual Meeting of the Biophysical Society, Baltimore, MD, 2011

C. A. Carlson and **J. C. Woehl**

“Trapping single DNA molecules in solution”

SPIE Photonics West, San Francisco, CA, 2011

C. A. Carlson and **J. C. Woehl**

“‘Catch, hold, and release’: Controlled manipulation of single molecules in free solution”

58th Annual Western Spectroscopy Association Conference, Pacific Grove, CA, 2011

C. A. Carlson and **J. C. Woehl**

“‘Catch, hold, and release’: controlled manipulation of single molecules in solution”

70th Annual Physical Electronics Conference, Milwaukee, WI, 2010

C. A. Carlson and **J. C. Woehl**

“The corral trap: electrostatic trapping of single molecules in solution”

70th Annual Physical Electronics Conference, Milwaukee, WI, 2010

J. C. Woehl and C. A. Carlson

“The electrostatic corral: a new approach for nanoscale trapping of single molecules”

SPIE Photonics West, San Francisco, CA, 2010

C. A. Carlson and **J. C. Woehl**

“Trapping of single molecules - a novel technique”

38th Great Lakes Regional Meeting of the American Chemical Society, Chicago, IL, 2009

C. A. Carlson and **J. C. Woehl**

“Fabrication of photonic crystal optical tips for near-field scanning optical microscopy”

Contributed talks (continued)

2007 Laboratory for Surface Studies Student Summer Symposium, University of Wisconsin-Milwaukee, Milwaukee, WI, 2007

P. Geissinger, M. R. DuPrey, I. J. Schwabacher, **J. C. Woehl**, and B. J. Prince
“Electric fields at protein active sites as determined by hole-burning Stark spectroscopy”

32nd Annual Meeting of the Federation of Analytical Chemistry and Spectroscopy Societies (FACSS) and 51st International Conference on Analytical Sciences and Spectroscopy (ICASS), Quebec City, QC (Canada), 2005

M. Brun, A. Drezet, S. Huant, J.-F. Motte, and **J. C. Woehl**

“Local and remote optical addressing of single nano-objects”

8th International Conference on Hole Burning, Single Molecule and Related Spectroscopies: Science and Applications (HBSM'03), Bozeman, MT, 2003

M. Brun, N. Chevalier, A. Drezet, S. Huant, J.-F. Motte, H. Mariette, M. Stark, F. Tinjod, and **J. C. Woehl**

“Carrier-diffusion-limited remote optical addressing of single quantum dots”

11th International Conference on Modulated Semiconductor Structures (MSS11), Nara, Japan, 2003

J. C. Woehl

“Dynamics of single molecules in artificial membranes”

Colloquium “Fluorescence and Biology”, Université Joseph Fourier Grenoble (France), 2002

B. E. Kohler and **J. C. Woehl**

“Spectroscopic determination of molecular charge distributions: octatetraene in n-alkanes”

Pacific Conference on Analytical Chemistry and Spectroscopy of the Society for Applied Spectroscopy, Fullerton, CA, 1995

P. Geissinger, B. E. Kohler and **J. C. Woehl**

“Determination of the protonation state of protoporphyrin IX in myoglobin from the measured internal electric field”

Pacific Conference on Analytical Chemistry and Spectroscopy of the Society for Applied Spectroscopy, Fullerton, CA, 1995

G. Gradl, B. E. Kohler, C. Westerfield, and **J. C. Woehl**

“Probing internal electric fields via photochemical holeburning studies”

Pacific Conference on Chemistry and Spectroscopy and 29th Western Regional Meeting of the American Chemical Society, Pasadena, CA, 1993

Poster presentations

Poster presentations (continued)

Y. Hu, B. Moran, H. Wagie, J. C. Woehl, and **P. Geissinger**

“Single molecule and hole-burning spectroscopies for the determination of molecular electric fields in proteins”

55th Annual Meeting of the Biophysical Society, Baltimore, MD, 2011

C. A. Carlson and **J. C. Woehl**

“The corral trap: Theory and software development”

58th Annual Western Spectroscopy Association Conference, Pacific Grove, CA, 2011

A. A. Patel, C. A. Carlson, and **J. C. Woehl**

“The electrostatic corral – Fabrication and characterization”

American Chemical Society – Southeast Wisconsin Younger Chemist Committee, Milwaukee, WI, 2010

C. A. Carlson and **J. C. Woehl**

“The corral trap: The electrostatic trapping of single molecules”

American Chemical Society – Southeast Wisconsin Younger Chemist Committee, Milwaukee, WI, 2010

T. S. Ababneh and **J. C. Woehl**

“Construction of a near-field optical module for a confocal microscope”

American Chemical Society – Southeast Wisconsin Younger Chemist Committee, Milwaukee, WI, 2010

Y. Hu, P. Geissinger, and **J. C. Woehl**

“The determination of molecular electric fields in proteins: A single molecule approach”

American Chemical Society – Southeast Wisconsin Younger Chemist Committee, Milwaukee, WI, 2010

T. S. Ababneh and **J. C. Woehl**

“Near-field optical microscope for ultra-high resolution imaging”

70th Annual Physical Electronics Conference, Milwaukee, WI, 2010

Y. Hu, P. Geissinger, and **J. C. Woehl**

“The determination of molecular electric fields in proteins: a single molecule approach”

70th Annual Physical Electronics Conference, Milwaukee, WI, 2010

Yi Hu, Peter Geissinger, and **Jörg C. Woehl**

“A single molecule approach for the determination of molecular electric fields in proteins”

17th International Conference on Dynamical Processes in Excited States of Solids (DPC '10), Argonne, IL

Poster presentations (continued)

C. A. Carlson and **J. C. Woehl**

“The corral trap: electrostatic trapping of single molecules in solution”
Chemistry Department Awards Day, University of Wisconsin-Milwaukee,
Milwaukee, WI, 2010

T. Ababneh and **J. C. Woehl**

“Optical Imaging Beyond The Diffraction Limit”
Chemistry Department Awards Day, University of Wisconsin-Milwaukee,
Milwaukee, WI, 2010

Y. Hu, P. Geissinger, and **J. C. Woehl**

“A method for the determination of molecular electric fields using a single molecule approach”
Chemistry Department Awards Day, University of Wisconsin-Milwaukee,
Milwaukee, WI, 2010

C. A. Carlson and **J. C. Woehl**

“Trapping of molecular-sized objects: a novel approach”
Inaugural Meeting American Chemical Society – Southeast Wisconsin Younger Chemist Committee, Milwaukee, WI, 2009

Y. Hu, P. Geissinger, and **J. C. Woehl**

“Toward the quantitative determination of molecular electric fields in single proteins”
Inaugural Meeting American Chemical Society – Southeast Wisconsin Younger Chemist Committee, Milwaukee, WI, 2009

T. S. Ababneh and **J. C. Woehl**

“Viewing the world through nanometer eyes: Near-field optical microscopy for ultra-high resolution imaging”
2009 Laboratory for Surface Studies Student Summer Symposium, University of Wisconsin-Milwaukee, Milwaukee, WI, 2009

D. A. Brooks, C. A. Carlson, and **J. C. Woehl**

“Characterization of model systems for developing a single molecule trap”
2009 Laboratory for Surface Studies Student Summer Symposium, University of Wisconsin-Milwaukee, Milwaukee, WI, 2009

Y. Hu, P. Geissinger, and **J. C. Woehl**

“Toward the quantitative determination of molecular electric fields in single proteins”
2009 Laboratory for Surface Studies Student Summer Symposium, University of Wisconsin-Milwaukee, Milwaukee, WI, 2009

C. A. Carlson and **J. C. Woehl**

“Trapping of molecular-sized objects: A novel approach”

Poster presentations (continued)

238th National Meeting of the American Chemical Society, Washington, DC, 2009

Y. Hu, P. Geissinger, and **J. C. Woehl**

“Toward the quantitative determination of molecular electric fields in single proteins”

238th National Meeting of the American Chemical Society, Washington, DC, 2009

C. A. Carlson and **J. C. Woehl**

“A new tool for nanoscale trapping of single molecules”

International Conference *Seeing at the Nanoscale VII*, Santa Barbara, CA, 2009

C. A. Carlson and **J. C. Woehl**

“Development of photonic crystal fiber optical tips”

International Conference *Seeing at the Nanoscale VII*, Santa Barbara, CA, 2009

Y. Hu and **J. C. Woehl**

“Single molecule spectroscopy of protoporphyrin IX”

Chemistry Department Awards Day, University of Wisconsin-Milwaukee, Milwaukee, WI, 2009

C. A. Carlson and **J. C. Woehl**

“Development of novel optical tips from photonic crystal fibers”

Chemistry Department Awards Day, University of Wisconsin-Milwaukee, Milwaukee, WI, 2009

D. A. Brooks, C. A. Carlson, and **J. C. Woehl**

“Characterization of model systems for developing a single molecule trap”

Chemistry Department Awards Day, University of Wisconsin-Milwaukee, Milwaukee, WI, 2009

D. A. Brooks, C. A. Carlson, and **J. C. Woehl**

“Characterizing the movement of single molecules in thin films for the development of a two-dimensional trap”

38th Great Lakes Regional Meeting of the American Chemical Society, Chicago, IL, 2009

C. A. Carlson and **J. C. Woehl**

“Development of novel optical tips from photonic crystal fibers”

38th Great Lakes Regional Meeting of the American Chemical Society, Chicago, IL, 2009

T. S. Ababneh and **J. C. Woehl**

“Development of a near-field optical microscope for fluorescence imaging at ultra-high optical resolution”

38th Great Lakes Regional Meeting of the American Chemical Society, Chicago, IL, 2009

Poster presentations (continued)

Y. Hu and **J. C. Woehl**

“Single molecule spectroscopy of protoporphyrin IX”

38th Great Lakes Regional Meeting of the American Chemical Society, Chicago, IL, 2009

D. A. Brooks, C. A. Carlson, and **J. C. Woehl**

“Characterization of model systems for developing a single molecule trap”

36th Annual Conference of the National Organization for the Professional Advancement of Black Chemist and Chemical Engineers, Saint Louis, MO, 2009

C. A. Carlson and **J. C. Woehl**

“Development of photonic crystal fiber optical tips for near-field imaging and single molecule manipulations”

235th National Meeting of the American Chemical Society, New Orleans, LA, 2008

J. J. Feng, C. A. Carlson, and **J. C. Woehl**

“Towards new techniques for trapping single molecules in phospholipid films”

235th National Meeting of the American Chemical Society, New Orleans, LA, 2008

C. A. Carlson, J. J. Feng, D. Brooks, and **J. C. Woehl**

“New advancements towards single molecule trapping and manipulation”

2008 Laboratory for Surface Studies Student Summer Symposium, University of Wisconsin-Milwaukee, Milwaukee, WI, 2008

T. S. Ababneh and **J. C. Woehl**

“Development of a near-field optical microscope for ultra-high resolution imaging”

2008 Laboratory for Surface Studies Student Summer Symposium, University of Wisconsin-Milwaukee, Milwaukee, WI, 2008

Y. Hu and **J. C. Woehl**

“Single molecule detection of protoporphyrin IX at room temperature”

2008 Laboratory for Surface Studies Student Summer Symposium, University of Wisconsin-Milwaukee, Milwaukee, WI, 2008

J. J. Feng, C. A. Carlson, and **J. C. Woehl**

“Fabrication of ultrathin monolayer films for single molecule manipulation”

Poster presented at the Chemistry Department Awards Day, University of Wisconsin-Milwaukee, Milwaukee, WI, 2008

C. A. Carlson and **J. C. Woehl**

“Development of photonic crystal fiber optical tips for near-field imaging and single molecule manipulations”

Poster presentations (continued)

Chemistry Department Awards Day, University of Wisconsin-Milwaukee, Milwaukee, WI, 2008

Y. Hu and **J. C. Woehl**

“Single molecule detection of protoporphyrin IX at room temperature”
Chemistry Department Awards Day, University of Wisconsin-Milwaukee, Milwaukee, WI, 2008

C. A. Carlson and **J. C. Woehl**

“Development of novel near-field optical tips for single molecule imaging and manipulation”
2007 UW System Chemistry Faculties Meeting, Green Bay, WI, 2007

C. A. Carlson and J. C. Woehl

“Development of novel optical tips for near-field imaging and manipulation of single molecules”
234th National Meeting of the American Chemical Society, Boston, MA, 2007

C. A. Carlson and **J. C. Woehl**

“Novel aperture probes for near-field scanning optical microscopy”
International Conference Seeing at the Nanoscale V, Santa Barbara, CA, 2007

J. J. Feng, C. A. Carlson, and J. C. Woehl

“Fabrication of ultrathin molecular films for use in single molecule manipulation”
2007 Laboratory for Surface Studies Student Summer Symposium, University of Wisconsin-Milwaukee, Milwaukee, WI, 2007

T. S. Ababneh and **J. C. Woehl**

“Toward fluorescence imaging at ultra-high optical resolution”
2007 Laboratory for Surface Studies Student Summer Symposium, University of Wisconsin-Milwaukee, Milwaukee, WI, 2007

Y. Hu and **J. C. Woehl**

“Characterization of metal protoporphyrin IXs for single molecule detection”
2007 Laboratory for Surface Studies Student Summer Symposium, University of Wisconsin-Milwaukee, Milwaukee, WI, 2007

C. A. Carlson and J. C. Woehl

“Development of novel optical tips for near-field imaging and manipulation of single molecules”
September 2007 Meeting of the *Milwaukee Section of the American Chemical Society*, Racine, WI, 2007

J. J. Feng, C. A. Carlson, and **J. C. Woehl**

"Fabrication of ultrathin monolayer films for single molecule manipulation"

Poster presentations (continued)

Chemistry Department Awards Day, University of Wisconsin-Milwaukee, Milwaukee, WI, 2007

T. S. Ababneh and **J. C. Woehl**

“Toward fluorescence imaging at ultra-high optical resolution”

Chemistry Department Awards Day, University of Wisconsin-Milwaukee, Milwaukee, WI, 2007

M. J. Nasse, C. A. Carlson, C. R. Baiz, and **J. C. Woehl**

“Electronic structure and dynamics of electron transport molecules”

2006 UW System Chemistry Faculties Meeting, Oshkosh, WI, 2006

C. A. Carlson and **J. C. Woehl**

“A comparison of chemical etching fabrication methods of optical fiber probes”

Chemistry Department Awards Day, University of Wisconsin-Milwaukee, Milwaukee, WI, 2006

Y. Hu and **J. C. Woehl**

“Suitability of metal protoporphyrin IX derivatives for single molecule spectroscopy”

Chemistry Department Awards Day, University of Wisconsin-Milwaukee, Milwaukee, WI, 2006

Y. Hu, M. J. Nasse, **J. C. Woehl**

“Imaging of GFP tagged salmonella in the small intestine”

Chemistry Department Awards Day, University of Wisconsin-Milwaukee, Milwaukee, WI, 2006

C. R. Baiz and **J. C. Woehl**

“Spectroscopic studies and quantum calculations of electron transport molecules”

Chemistry Department Awards Day, University of Wisconsin-Milwaukee, Milwaukee, WI, 2006

T. S. Ababneh, M. J. Nasse, and **J. C. Woehl**

“Right-angle turns in optical setups using mirrors and prisms”

Chemistry Department Awards Day, University of Wisconsin-Milwaukee, Milwaukee, WI, 2006

Y. Hu, M. J. Nasse, and **J. C. Woehl**

“Fluorescence imaging of GFP labeled salmonella”

37th Great Lakes Regional Meeting of the American Chemical Society, Milwaukee, WI, 2006

M. J. Nasse, S. Huant and **J. C. Woehl**

“Experimental and theoretical determination of the 3D point spread function of a microscope objective”

Poster presentations (continued)

37th Great Lakes Regional Meeting of the American Chemical Society, Milwaukee, WI, 2006

C. A. Carlson and **J. C. Woehl**

“Chemically etched optical fiber tips: A comparison of three different fabrication methods”

37th Great Lakes Regional Meeting of the American Chemical Society, Milwaukee, WI, 2006

C. R. Baiz, M. J. Nasse, and **J. C. Woehl**

“Electronic spectroscopy and quantum calculations of 9,10-bis(phenylethynyl) anthracene derivatives”

37th Great Lakes Regional Meeting of the American Chemical Society, Milwaukee, WI, 2006

M. J. Nasse, S. Huant and **J. C. Woehl**

“Experimental and theoretical near focus intensity distribution in confocal microscopy”

2006 Laboratory for Surface Studies Student Summer Symposium, University of Wisconsin-Milwaukee, Milwaukee, WI, 2006

C. A. Carlson and **J. C. Woehl**

“Chemically etched optical fiber tips: a comparison of three different fabrication methods”

2006 Laboratory for Surface Studies Student Summer Symposium, University of Wisconsin-Milwaukee, Milwaukee, WI, 2006

M. J. Nasse, S. Huant and **J. C. Woehl**

“3D Intensity distribution in the near-focus region of a microscope objective”

9th International Conference on Hole Burning, Single Molecule and Related Spectroscopies: Science and Applications (HBSM), Aussois (France), 2006

M. J. Nasse, C. A. Carlson, C. R. Baiz, and **J. C. Woehl**

“Electronic structure and dynamics of electron transport molecules”

9th International Conference on Hole Burning, Single Molecule and Related Spectroscopies: Science and Applications (HBSM), Aussois (France), 2006

P. Geissinger, M. R. DuPrey, I. J. Schwabacher, **J. C. Woehl**, and B. J. Prince

“Electric fields at protein active sites as determined by hole-burning Stark spectroscopy”

Pacificchem 2005 – The International Chemical Congress of Pacific Basin Societies, Honolulu, HI, 2005

M. J. Nasse, D. Charrier, S. Huant, J. F. Motte, and **J. C. Woehl**

“Room-temperature imaging and dynamics of electron transport molecules”

Poster presentations (continued)

52nd Annual Conference of the Western Spectroscopy Association, Pacific Grove, CA, 2005

P. Geissinger, **J. C. Woehl**, and **B. J. Prince**

“Electric fields at protein active sites as determined by hole-burning Stark spectroscopy”

227th National Meeting of the American Chemical Society, Anaheim, CA, 2004

M. J. Nasse, D. Charrier, and **J. C. Woehl**

“Single molecule microscopy”

Keulks Symposium, University of Wisconsin-Milwaukee, Milwaukee, WI, 2004

M. J. Nasse, A. Drezet, S. Huant, and J. C. Woehl

“Fluorescent nanosensors for optical fields”

4th International Symposium on Physics, Chemistry & Biology with Single Molecules, Kloster Banz, Germany, 2004

P. Geissinger, **J. C. Woehl**, and **B. J. Prince**

“Determination of internal electric fields at protein active sites by Stark-shifted persistent spectral hole burning”

Australasian Conference on Optics, Lasers, & Spectroscopy, University of Melbourne, Melbourne, Victoria, Australia, 2003

P. Geissinger, **J. C. Woehl**, and B. J. Prince

“A quantum-mechanical model for the determination of internal electric fields at protein active sites from the Stark effect on persistent spectral holes”

8th International Conference on Hole Burning, Single Molecule and Related Spectroscopies: Science and Applications (HBSM), Bozeman, MT, 2003

P. Geissinger, **J. C. Woehl** and B. J. Prince

“Internal electric fields at protein active sites”

35th Great Lakes Regional Meeting of the American Chemical Society, Chicago, IL, 2003

A. Drezet, S. Huant, and J. C. Woehl

“Characterizing optical near-field probes using fluorescent nano-objects”

3rd International Symposium on Physics, Chemistry & Biology with Single Molecules, Tutzing, Germany, 2002

A. Drezet, S. Huant, and **J. C. Woehl**

”In situ characterization of optical near-field probes in aperture NSOM”

7th International Conference on Near-Field Optics (NFO-7), Rochester, NY, 2002

A. Drezet, J.-F. Motte, S. Huant, **J. C. Woehl**, H. B. Weber, and H. v. Löhneysen

”Towards near-field detection of single molecules between nanoelectrodes”

7th International Conference on Near-Field Optics (NFO-7), Rochester, NY, 2002

Poster presentations (continued)

A. Drezet, **J. C. Woehl**, and S. Huant

"Far-field emission of a tapered optical tip: a simple analytical model"
6th International Conference on Near-Field Optics (NFO-6), Enschede, The Netherlands, 2000

M. Brun, J.-F. Motte, **J. C. Woehl**, H. Mariette, and S. Huant

"Low-temperature near-field spectroscopy of II-VI semiconductor nanostructures"
6th International Conference on Near-Field Optics (NFO-6), Enschede, The Netherlands, 2000

Ch. Brunel, Ph. Tamarat, **J. C. Woehl**, B. Lounis, and M. Orrit

"Stark effect measurements on single dibenzanthanthrene molecules in n-hexadecane and naphthalene crystals"
6th International Meeting on Hole Burning and Related Spectroscopies: Science and Applications, Hourtin (France), 1999

J. C. Woehl, B. Viellerobe, Y. Durand, and M. Orrit

"Investigating single molecules with a near-field scanning optical microscope for variable temperatures"
6th International Meeting on Hole Burning and Related Spectroscopies: Science and Applications, Hourtin, France, 1999

Y. Durand, **J. C. Woehl**, B. Viellerobe, and M. Orrit

"First results of a scanning near-field optical microscope for single molecule spectroscopy at variable temperatures"
4th International Workshop on Single Molecule Detection and Ultrasensitive Analysis in Life Sciences, Berlin (Germany), 1998

J. C. Woehl, Y. Durand, , B. Viellerobe, and M. Orrit

"First results from a new design of a near-field scanning optical microscope for single-molecule spectroscopy at room temperature and at low temperatures"
Trinocular 98 of Microscopies, Strasbourg-Illkirch Graffenstaden (France), 1998

Y. Durand, **J. C. Woehl**, and M. Orrit

"New design of a scanning near-field optical microscope for single molecule spectroscopy at low temperatures"
3rd International Workshop on Single Molecule Detection: Basics and Applications in Life Sciences, Berlin, Germany, 1997

P. Geissinger, B. E. Kohler, and **J. C. Woehl**

"Evaluation of Stark measurements in myoglobin and cytochrome C"
44th Annual Conference of the Western Spectroscopy Association, Pacific Grove, CA, 1997

Poster presentations (continued)

P. Geissinger, B. E. Kohler, and **J. C. Woehl**

"Experimental determination of internal electric fields in ordered systems: myoglobin and cytochrome C"

13th International Conference on Science and Technology of Synthetic Metals, Snowbird, UT, 1996

B. E. Kohler and **J. C. Woehl**

"Measuring internal electric fields and potentials with atomic resolution"

43rd Annual Conference of the Western Spectroscopy Association, Pacific Grove, CA, 1996

P. Geissinger, B. E. Kohler, and **J. C. Woehl**

"Experimental determination of internal electric fields at the sites of prosthetic groups in proteins"

43rd Annual Conference of the Western Spectroscopy Association, Pacific Grove, CA, 1996

P. Geissinger, B. E. Kohler, and **J. C. Woehl**

"The internal electric field and its origin in protoporphyrin IX substituted myoglobin"

Western Biotech Conference of the American Chemical Society, San Diego, CA, 1995

B. E. Kohler and **J. C. Woehl**

"Experimental determination of molecular charge distributions: octatetraene in n-alkanes"

7th International Conference on Unconventional Photoactive Solids, Stanford, CA, 1995

P. Geissinger, B. E. Kohler, and **J. C. Woehl**

"Determination of the internal electric field at the porphyrin core of protoporphyrin IX in myoglobin"

7th International Conference on Unconventional Photoactive Solids, Stanford, CA, 1995

B. E. Kohler and **J. C. Woehl**

"Measuring molecular electric fields"

42nd Annual Conference of the Western Spectroscopy Association, Pacific Grove, CA, 1995

P. Geissinger, B. E. Kohler and **J. C. Woehl**

"Stark effect on spectral holes in protoporphyrin IX substituted myoglobin: probing molecular fields"

42nd Annual Conference of the Western Spectroscopy Association, Pacific Grove, CA, 1995

Poster presentations (continued)

G. Gradl, B. E. Kohler, C. Westerfield, and **J. C. Woehl**

“Measuring molecular electric fields via Stark effect studies on photochemical holes: octatetraene in n-alkanes”

41st Annual Conference of the Western Spectroscopy Association, Pacific Grove, CA, 1994

B. E. Kohler, L. Peteanu, C. Westerfield, **J. C. Woehl**, and Y. Yang

“Probing internal electric fields by hole burning studies”

40th Annual Conference of the Western Spectroscopy Association, Pacific Grove, CA, 1993