Stanford

W. E. Moerner

Harry S. Mosher Professor and Professor, by courtesy, of Applied Physics

Chemistry

NIH Biosketch available Online Curriculum Vitae available Online

CONTACT INFORMATION

- **Alternate Contact**

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Bio

BIO

W. E. (William Esco) Moerner, the Harry S. Mosher Professor of Chemistry and Professor by courtesy of Applied Physics, has conducted research in physical chemistry, biophysics, and the optical properties of single molecules, and is actively involved in the development of 2D and 3D super-resolution imaging for cell biology. Imaging studies include protein superstructures in bacteria, structure of proteins in cells, studies of chromatin organization, and dynamics of regulatory proteins in the primary cilium. Using powerful microscopes optimized for tracking of single objects in cells, the motions of proteins, DNA, and RNA are being measured in three dimensions in real time to understand processing and binding interactions. A related research area concerns precise analysis of photodynamics of single trapped biomolecules in solution, with applications to photosynthesis, protein-protein interactions, and transport measurements.

Born on June 24, 1953 at Parks Air Force Base in Pleasanton, California, Professor Moerner was raised in San Antonio, Texas. He attended Washington University as a Langsdorf Engineering Fellow, graduating in 1975 with degrees in Physics and Electrical Engineering (both B.S. with top honors), and Mathematics (A.B. summa cum laude). His doctoral research in physics at Cornell University (M.S. 1978, Ph.D. 1982) employed tunable infrared lasers to explore infrared vibrational modes of impurities in crystals. In 1982, he moved from New York to San Jose, California to join the IBM Research Division developing spectral holeburning for frequency domain optical storage and photorefractivity for dynamic hologram formation. After 13 years at IBM, Dr. Moerner accepted a position as Distinguished Professor of Physical Chemistry at UC San Diego, where he broadened his research to include biological systems and biophysics. Recruited to the Stanford Chemistry Department faculty in 1997, he served as Chair of the department from 2011 to 2014.

Professor Moerner’s scientific contributions were recognized with the 2014 Nobel Prize in Chemistry "for the development of super-resolved fluorescence microscopy." One method to surpass the optical diffraction limit (PALM/STORM) uses single-molecule imaging combined with a control mechanism to keep the concentration of emitting molecules at a very low level, followed by sequential localization to reconstruct the underlying structure. The fundamentals of this idea came from early work in the Moerner lab: optical detection and imaging of single molecules (1989) combined with blinking and switching at low temperature, as well as the discovery of optical control of single copies of green fluorescent protein at room temperature (1997). Among many other honors and awards, Professor Moerner was elected fellow of the American Physical Society, Optical Society of America, American Association for the Advancement of Science, American Academy of Arts and Sciences; and member of the National Academy of Sciences.

Today, the Moerner Laboratory uses laser spectroscopy and microscopy of single molecules to probe biological processes, one molecule at a time. Primary thrusts include development and application of fluorescence microscopy far beyond the optical diffraction limit by PALM/STORM and STED approaches, single-molecule tracking in complex cellular environments, invention and validation of methods for precise and accurate 3D optical microscopy in cells, and trapping of single photosynthetic biomolecules in solution for extended study. Through a variety of collaborations, these approaches are applied to explore protein and oligonucleotide localization patterns in bacteria, measure structures of amyloid aggregates in cells, define the behavior of signaling proteins in the primary cilium, quantify photodynamics for photosynthetic proteins and enzymes, and observe the dynamics of DNA and RNA in cells and viruses.

Please visit the Moerner Lab home page for more information.

ACADEMIC APPOINTMENTS

- Professor, Chemistry
- Professor (By courtesy), Applied Physics
- Member, Bio-X
- Faculty Fellow, Stanford ChEM-H
- Member, Wu Tsai Neurosciences Institute

ADMINISTRATIVE APPOINTMENTS

- Chairman, Department of Chemistry, Stanford University, (2011-2014)
- Member, Advisory Board, Center for Biological Imaging at Stanford, (2010-2015)
- Member, Board of Scientific Counselors, NIBIB, (2010-2014)
- Chair, University Health and Safety Committee, (2008-2010)

HONORS AND AWARDS

- Nobel Prize in Chemistry, Nobel Foundation (2014)
- Wu Zheng Kai Chemistry Prize, Fudan University (2018)
- Distinguished Eagle Scout Award, Boy Scouts of America (2017)
- INSPIRE Award for Excellence, San Antonio Independent School District (2016)
- Julio Palmaz Award for Innovation in Healthcare and Biosciences, BioMed SA (2015)
- Peter Debye Award in Physical Chemistry, American Chemical Society (2013)
- Irving Langmuir Prize in Chemical Physics, American Physical Society (2009)
- Wolf Prize in Chemistry, Wolf Foundation of Israel (2008)
- Member, National Academy of Sciences (2007)
- Earle K. Plyler Prize in Molecular Spectroscopy, American Physical Society (2001)
- Fellow, Optical Society of America (1992)
- Fellow, American Physical Society (1992)
- National Winner, Roger I. Wilkinson Outstanding Young Electrical Engineer Award, Eta Kappa Nu (1985)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Trustee, Society for Science and the Public (2018 - present)
- Member, Scientific Advisory Board, Welch Foundation (2017 - present)
- Member, International Advisory Board, Angewandte Chemie (2017 - present)

- Member, Advisory Board, Institute of Atomic and Molecular Sciences, Academica Sinica, Taiwan (2003 - present)
- Member, Corporation Visiting Committee, Department of Chemistry, Massachusetts Institute of Technology (2013 - 2017)
- Editorial Advisory Board Member, Journal of Physical Chemistry (2013 - 2015)
- Member, Board of Scientific Counselors, National Institute of Biomedical Imaging and Bioengineering (2010 - 2014)
- Member, DOE Workshop on Single-Molecule Research in the New Millenium (2005 - 2005)
- Advisory Editor, Single Molecules (2000 - 2002)
- Member, NIH-NIGMS Workshop on Single Molecule Detection and Manipulation (2000 - 2000)
- Member, FAMOS Update Panel, National Research Council (1999 - 2002)
- Member, NIH Bioengineering Symposium Panel on Imaging at the Molecular and Cellular Levels (1998 - 1998)

PROFESSIONAL EDUCATION

- Ph.D., Cornell University , Physics (1982)
- M.S., Cornell University , Physics (1978)
- B. S., Washington University , Physics (1975)
- B. S., Washington University , Electrical Engineering (1975)
- A. B., Washington University , Mathematics (1975)

COMMUNITY AND INTERNATIONAL WORK

- Amateur Radio Emergency Service

LINKS

- Moerner Lab: http://web.stanford.edu/group/moerner
- More information about Prof. Moerner: http://web.stanford.edu/group/moerner/WEM.html

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Most biophysical or chemical experiments in condensed matter measure the average behavior of a huge number, N, of molecules, where N may range from millions to billions to Avogadro's Number. At the same time, most theoretical models are intended to describe the behavior of a single molecule interacting with its surroundings, and averaging over the number of molecules N is normally required to compute an observable. Using precision laser spectroscopic techniques, we have been detecting and probing the detailed properties of individual impurity molecules hidden deep inside a cell, in a protein, or even in a liquid, i.e., the ultimate limit of N=1. This was first done in the Moerner Lab in 1989, and has since expanded dramatically to include many groups around the world. A key reason for doing this is to explore heterogeneity that is normally obscured by ensemble averaging.

Studying one individual molecule in a solid means we are working with an extremely small number of moles of material. You might be aware that the international standards organization, IUPAC, has defined several new prefixes: zepto- for 1E-21, and yocto- for 1E-24. Thus 1 molecule is equivalent to 1.66 yoctomoles. But we think this is unwieldy. Thus we define a new prefix guaca- so that (with apologies to Prof. Avogadro)

1 guacamole = 1 / (Avocado's Number) of moles.

More seriously, it is worth recalling that each molecule we are probing is only 1 or 2 nanometers in size. This means that when we use a laser to select one probe molecule, we can sense details of the immediate local environment of a truly nanoscopic probe.

To achieve this extreme reduction of the concentration and reach the single-molecule level, we use either (a) extremely low concentrations and diffraction-limited confocal, TIRF, or far-field microscopy, or (b) near field optical excitation to pump sample volumes much smaller than the diffraction limit, or (c) superresolution imaging by single-molecule active control. By studying a large number of individual molecules one at a time, we are able not only to observe how the usual ensemble average behavior is formed, but also to see unexpected, surprising behavior normally hidden by the usual ensemble averaging.

The phenomena under study include protein localization patternd in bacteria, chaperonin proteins, and new fluorophores for active-control superresolution imaging. By dispersing the emitted light, even the vibrational mode spectrum of a single molecule may be measured! By measuring correlations in the emitted photon stream, fast dynamics including environmental fluctuations, or the purely quantum-mechanical behavior termed photon antibunching may be probed. In biomolecules, we observe fascinating differences in behavior due to conformational states, local environments, or enzymatic cycle, all of which are obscured in large N experiments.

Importantly, a single molecule can be viewed as a probe of its immediate local nanoenvironment on the scale on the order of the molecular size (~1 nm). Because single molecules are nanoscale emitters, when active control is used to turn molecules on and off, it is possible to build up a super-resolution image of the sample, far beyond the optical diffraction limit, typically on the 40 nm scale. Several advanced optical techniques for obtaining thee-dimensional information from single-molecule photoswitching are underdevelopment, and we apply these methods to imaging a variety of cellular structures in bacteria and in mammalian cells and to tracking of RNA in living yeast.

Teaching

COURSES

2018-19

- Advanced Physical Chemistry - Single Molecules and Light: CHEM 275 (Spr)
- Chemical Principles Accelerated: CHEM 31X (Aut)

2017-18

- Chemical Principles Accelerated: CHEM 31X (Aut)

2016-17

- Chemical Principles Accelerated: CHEM 31X (Aut)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

David Hoffman, Sarah Noll, Steven Yamada

Postdoctoral Faculty Sponsor

Peter Dahlberg, Anna Karin Gustavsson, Leonhard Karl Robert Moeckl, Allison Squires

Doctoral Dissertation Advisor (AC)

Camille Bayas, Colin Comerci, Maurice Youzong Lee, Petar Petrov, Anish Roy, Annina Sartor, Jiarui Wang

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Biophysics (Phd Program)

Publications

PUBLICATIONS

- **Interferometric Scattering Enables Fluorescence-Free Electrokinetic Trapping of Single Nanoparticles in Free Solution.** *Nano letters*
  Squires, A. H., Lavania, A. A., Dahlberg, P. D., Moerner, W. E.
  2019

- **Single-molecule trapping and spectroscopy reveals photophysical heterogeneity of phycobilisomes quenched by Orange Carotenoid Protein.** *Nature communications*
  Squires, A. H., Dahlberg, P. D., Liu, H., Magdaong, N. C., Blankenship, R. E., Moerner, W. E.
  2019; 10 (1): 1172

- **Motional dynamics of single Patched1 molecules in cilia are controlled by Hedgehog and cholesterol.** *Proceedings of the National Academy of Sciences of the United States of America*
  Weiss, L. E., Milenkovic, L., Yoon, J., Stearns, T., Moerner, W. E.
  2019

- **Quantitative Super-Resolution Microscopy of the Mammalian Glycocalyx.** *Developmental cell*
  Möckl, L., Pedram, K., Roy, A. R., Krishnan, V., Gustavsson, A. K., Dorigo, O., Bertozzi, C. R., Moerner, W. E.
  2019

- **Revealing Nanoscale Morphology of the Primary Cilium Using Super-Resolution Fluorescence Microscopy.** *Biophysical journal*
  Yoon, J., Comerci, C. J., Weiss, L. E., Milenkovic, L., Stearns, T., Moerner, W. E.
  2018

- **Identification of PAmKate as a Red Photoactivatable Fluorescent Protein for Cryogenic Super-Resolution Imaging.** *Journal of the American Chemical Society*
  Dahlberg, P. D., Sartor, A. M., Wang, J., Saurabh, S., Shapiro, L., Moerner, W. E.
  2018; 140 (39): 12310–13

- **Resolving Mixtures in Solution by Single-Molecule Rotational Diffusivity.** *Nano letters*
  Yang, H., Moerner, W. E.
  2018

- **Light sheet approaches for improved precision in 3D localization-based super-resolution imaging in mammalian cells [Invited]** *OPTICS EXPRESS*
  Gustavsson, A., Petrov, P. N., Moerner, W. E.
  2018; 26 (10): 13122–47

- **Spatial organization and dynamics of RNase E and ribosomes in Caulobacter crescentus** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Bayas, C. A., Wang, J., Lee, M. K., Schrader, J. M., Shapiro, L., Moerner, W. E.
  2018; 115 (16): E3712–E3721

- **Single-molecule diffusometry reveals the nucleotide-dependent oligomerization pathways of Nicotiana tabacum Rubisco activase** *JOURNAL OF CHEMICAL PHYSICS*
  Wang, Q., Serban, A. J., Wachter, R. M., Moerner, W. E.
  2018; 148 (12): 123319

- **3D single-molecule super-resolution microscopy with a tilted light sheet** *NATURE COMMUNICATIONS*
  Gustavsson, A., Petrov, P. N., Lee, M. Y., Shechtman, Y., Moerner, W. E.
  2018; 9: 123

- **Single-Molecule Imaging of Wnt3A Protein Diffusion on Living Cell Membranes** *BIOPHYSICAL JOURNAL*
  Lippert, A., Janeczek, A. A., Furstenberg, A., Ponjavic, A., Moerner, W. E., Nusse, R., Helms, J. A., Evans, N. D., Lee, S. F.
  2017; 113 (12): 2762–67

- **Observation of live chromatin dynamics in cells via 3D localization microscopy using Tetrapod point spread functions** *BIOMEDICAL OPTICS EXPRESS*
  Shechtman, Y., Gustavssonn, A. N., Petrov, P. N., Dultz, E., Lee, M. Y., Weis, K., Moerner, W. E.
  2017; 8 (12): 5735–48

- **Three-Dimensional Localization of Single Molecules for Super-Resolution Imaging and Single-Particle Tracking.** *Chemical reviews*
  von Diezmann, A., Shechtman, Y., Moerner, W. E.
  2017
- **Super-Resolution Microscopy and Single-Protein Tracking in Live Bacteria Using a Genetically Encoded, Photostable Fluoromodule.** *Current protocols in cell biology*
  Saurabh, S., Perez, A. M., Comerci, C. J., Shapiro, L., Moerner, W. E.
  2017; 75: 4.32.1–4.32.22
- **Super-resolution Imaging of Live Bacteria Cells Using a Genetically Directed, Highly Photostable Fluoromodule.** *Journal of the American Chemical Society*
  Saurabh, S., Perez, A. M., Comerci, C. J., Shapiro, L., Moerner, W. E.
  2016; 138 (33): 10398-10401
- **Removing orientation-induced localization biases in single-molecule microscopy using a broadband metasurface mask** *NATURE PHOTONICS*
  Backlund, M. P., Arbabi, A., Petrov, P. N., Arbabi, E., Saurabh, S., Faraon, A., Moerner, W. E.
  2016; 10 (7): 459-?
- **Enhanced DNA imaging using super-resolution microscopy and simultaneous single-molecule orientation measurements.** *Optica*
  Backer, A. S., Lee, M. Y., Moerner, W. E.
  2016; 3 (6): 3-6
- **Removing Orientation-Induced Localization Biases in Single-Molecule Microscopy Using a Broadband Metasurface Mask.** *Nature photonics*
  Backlund, M. P., Arbabi, A., Petrov, P. N., Arbabi, E., Saurabh, S., Faraon, A., Moerner, W. E.
  2016; 10: 459–62
- **Delayed emergence of subdiffraction-sized mutant huntingtin fibrils following inclusion body formation.** *Quarterly reviews of biophysics*
  Sahl, S. J., Lau, L., Vonk, W. I., Weiss, L. E., Frydman, J., Moerner, W. E.
  2016; 49
- **Single-molecule imaging of Hedgehog pathway protein Smoothened in primary cilia reveals binding events regulated by Patched1.** *Proceedings of the National Academy of Sciences of the United States of America*
  Milenkovic, L., Weiss, L. E., Yoon, J., Roth, T. L., Su, Y. S., Sahl, S. J., Scott, M. P., Moerner, W. E.
  2015; 112 (27): 8320-8325
- **Chromosomal locus tracking with proper accounting of static and dynamic errors** *PHYSICAL REVIEW E*
  Backlund, M. P., Joyner, R., Moerner, W. E.
  2015; 91 (6)
- **Precise Three-Dimensional Scan-Free Multiple-Particle Tracking over Large Axial Ranges with Tetrapod Point Spread Functions.** *Nano letters*
  Shechtman, Y., Weiss, L. E., Backer, A. S., Sahl, S. J., Moerner, W. E.
  2015; 15 (6): 4194-4199
- **Chromosomal locus tracking with proper accounting of static and dynamic errors.** *Physical review. E, Statistical, nonlinear, and soft matter physics*
  Backlund, M. P., Joyner, R., Moerner, W. E.
  2015; 91 (6): 062716-?
- **Single-Molecule Identification of Quenched and Unquenched States of LHCII.** *journal of physical chemistry letters*
  Schlau-Cohen, G. S., Yang, H., Krüger, T. P., Xu, P., Gwizdala, M., van Grondelle, R., Croce, R., Moerner, W. E.
  2015; 6 (5): 860-867
- **Single-Molecule Spectroscopy, Imaging, and Photocontrol: Foundations for Super-Resolution Microscopy (Nobel Lecture).** *Angewandte Chemie (International ed. in English)*
  Moerner, W. E.
  2015; 54 (28): 8067–93
- **Single-molecule spectroscopy and imaging over the decades** *FARADAY DISCUSSIONS*
  Moerner, W. E., Shechtman, Y., Wang, Q.
  2015; 184: 9-36
- **Super-resolution fluorescence of huntingtin reveals growth of globular species into short fibers and coexistence of distinct aggregates.** *ACS chemical biology*

Duim, W. C., Jiang, Y., Shen, K., Frydman, J., Moerner, W. E.
2014; 9 (12): 2767-2778

- **Correlations of three-dimensional motion of chromosomal loci in yeast revealed by the double-helix point spread function microscope.** *Molecular biology of the cell*
  Backlund, M. P., Joyner, R., Weis, K., Moerner, W. E.
  2014; 25 (22): 3619-3629
- **Small-molecule labeling of live cell surfaces for three-dimensional super-resolution microscopy.** *Journal of the American Chemical Society*
  Lee, M. K., Rai, P., Williams, J., Twieg, R. J., Moerner, W. E.
  2014; 136 (40): 14003-14006
- **Optimal point spread function design for 3D imaging.** *Physical review letters*
  Shechtman, Y., Sahl, S. J., Backer, A. S., Moerner, W. E.
  2014; 113 (13): 133902-?
- **Extending single-molecule microscopy using optical fourier processing.** *journal of physical chemistry. B*
  Backer, A. S., Moerner, W. E.
  2014; 118 (28): 8313-8329
- **Bacterial scaffold directs pole-specific centromere segregation** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Ptacin, J. L., Gahlmann, A., Bowman, G. R., Perez, A. M., von Diezmann, A. R., Eckart, M. R., Moerner, W. E., Shapiro, L.
  2014; 111 (19): E2046-E2055
- **Single-molecule motions enable direct visualization of biomolecular interactions in solution** *NATURE METHODS*
  Wang, Q., Moerner, W. E.
  2014; 11 (5): 555-558
- **The role of molecular dipole orientation in single-molecule fluorescence microscopy and implications for super-resolution imaging.** *Chemphyschem*
  Backlund, M. P., Lew, M. D., Backer, A. S., Sahl, S. J., Moerner, W. E.
  2014; 15 (4): 587-599
- **Single-molecule spectroscopy of photosynthetic proteins in solution: exploration of structure-function relationships** *CHEMICAL SCIENCE*
  Schlau-Cohen, G. S., Bockenhauer, S., Wang, Q., Moerner, W. E.
  2014; 5 (8): 2933-2939
- **Exploring bacterial cell biology with single-molecule tracking and super-resolution imaging** *NATURE REVIEWS MICROBIOLOGY*
  Gahlmann, A., Moerner, W. E.
  2014; 12 (1): 9-22
- **Super-resolution fluorescence imaging with single molecules.** *Current opinion in structural biology*
  Sahl, S. J., Moerner, W.
  2013; 23 (5): 778-787
- **Rotational mobility of single molecules affects localization accuracy in super-resolution fluorescence microscopy.** *Nano letters*
  Lew, M. D., Backlund, M. P., Moerner, W. E.
  2013; 13 (9): 3967-3972
- **Single-molecule spectroscopy reveals photosynthetic LH2 complexes switch between emissive states** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Schlau-Cohen, G. S., Wang, Q., Southall, J., Cogdell, R. J., Moerner, W. E.
  2013; 110 (27): 10899-10903
- **Lifetime and Spectrally Resolved Characterization of the Photodynamics of Single Fluorophores in Solution Using the Anti-Brownian Electrokinetic Trap** *JOURNAL OF PHYSICAL CHEMISTRY B*
  Wang, Q., Moerner, W. E.
  2013; 117 (16): 4641-4648
- **Quantitative Multicolor Subdiffraction Imaging of Bacterial Protein Ultrastructures in Three Dimensions** *NANO LETTERS*
  Gahlmann, A., Ptacin, J. L., Grover, G., Quirin, S., von Diezmann, A. R., Lee, M. K., Backlund, M. P., Shapiro, L., Piestun, R., Moerner, W. E.

2013; 13 (3): 987-993

- **Enzymatic activation of nitro-aryl fluorogens in live bacterial cells for enzymatic turnover-activated localization microscopy** *CHEMICAL SCIENCE*
  Lee, M. K., Williams, J., Twieg, R. J., Rao, J., Moerner, W. E.
  2013; 4 (1): 220-225

- **Cellular Inclusion Bodies of Mutant Huntingtin Exon 1 Obscure Small Fibrillar Aggregate Species** *SCIENTIFIC REPORTS*
  Sahl, S. J., Weiss, L. E., Duim, W. C., Frydman, J., Moerner, W. E.
  2012; 2

- **Simultaneous, accurate measurement of the 3D position and orientation of single molecules** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Backlund, M. P., Lew, M. D., Backer, A. S., Sahl, S. J., Grover, G., Agrawal, A., Piestun, R., Moerner, W. E.
  2012; 109 (47): 19087-19092

- **Fluorescence correlation spectroscopy at high concentrations using gold bowtie nanoantennas** *CHEMICAL PHYSICS*
  Kinkhabwala, A. A., Yu, Z., Fan, S., Moerner, W. E.
  2012; 406: 3-8

- **Fluorescent Saxitoxins for Live Cell Imaging of Single Voltage-Gated Sodium Ion Channels beyond the Optical Diffraction Limit** *CHEMISTRY & BIOLOGY*
  Ondrus, A. E., Lee, H. D., Iwanaga, S., Parsons, W. H., Andresen, B. M., Moerner, W. E., Du Bois, J.
  2012; 19 (7): 902-912

- **STED Microscopy with Optimized Labeling Density Reveals 9-Fold Arrangement of a Centriole Protein** *BIOPHYSICAL JOURNAL*
  Lau, L., Lee, Y. L., Sahl, S. J., Stearns, T., Moerner, W. E.
  2012; 102 (12): 2926-2935

- **Microscopy beyond the diffraction limit using actively controlled single molecules** *JOURNAL OF MICROSCOPY*
  Moerner, W. E.
  2012; 246 (3): 213-220

- **A Selenium Analogue of Firefly D-Luciferin with Red-Shifted Bioluminescence Emission** *ANGEWANDTE CHEMIE-INTERNATIONAL EDITION*
  Conley, N. R., Dragulescu-Andrasi, A., Rao, J., Moerner, W. E.
  2012; 51 (14): 3350-3353

- **Extending Microscopic Resolution with Single-Molecule Imaging and Active Control** *ANNUAL REVIEW OF BIOPHYSICS, VOL 41*
  Thompson, M. A., Lew, M. D., Moerner, W. E.
  2012; 41: 321-342

- **Conformational dynamics of single G protein-coupled receptors in solution.** *journal of physical chemistry. B*
  Bockenhauer, S., Fürstenberg, A., Yao, X. J., Kobilka, B. K., Moerner, W. E.
  2011; 115 (45): 13328-13338

- **Three-dimensional superresolution colocalization of intracellular protein superstructures and the cell surface in live Caulobacter crescentus** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Lew, M. D., Lee, S. F., Ptacin, J. L., Lee, M. K., Twieg, R. J., Shapiro, L., Moerner, W. E.
  2011; 108 (46): E1102-E1110

- **Redox cycling and kinetic analysis of single molecules of solution-phase nitrite reductase** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Goldsmith, R. H., Tabares, L. C., Kostrz, D., Dennison, C., Aartsma, T. J., Canters, G. W., Moerner, W. E.
  2011; 108 (42): 17269-17274

- **Sensing cooperativity in ATP hydrolysis for single multisubunit enzymes in solution** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Jiang, Y., Douglas, N. R., Conley, N. R., Miller, E. J., Frydman, J., Moerner, W. E.
  2011; 108 (41): 16962-16967

- **Super-Resolution Imaging of the Nucleoid-Associated Protein HU in Caulobacter crescentus** *BIOPHYSICAL JOURNAL*
  Lee, S. F., Thompson, M. A., Schwartz, M. A., Shapiro, L., Moerner, W. E.

2011; 100 (7): L31-L33

- **Superresolution Imaging of Targeted Proteins in Fixed and Living Cells Using Photoactivatable Organic Fluorophores** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
  Lee, H. D., Lord, S. J., Iwanaga, S., Zhan, K., Xie, H., Williams, J. C., Wang, H., Bowman, G. R., Goley, E. D., Shapiro, L., Twieg, R. J., Rao, J., Moerner, et al
  2010; 132 (43): 15099-15101

- **Three-dimensional tracking of single mRNA particles in Saccharomyces cerevisiae using a double-helix point spread function** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Thompson, M. A., Casolari, J. M., Badieirostami, M., Brown, P. O., Moerner, W. E.
  2010; 107 (42): 17864-17871

- **A spindle-like apparatus guides bacterial chromosome segregation** *NATURE CELL BIOLOGY*
  Ptacin, J. L., Lee, S. F., Garner, E. C., Toro, E., Eckart, M., Comolli, L. R., Moerner, W., Shapiro, L.
  2010; 12 (8): 791-U46

- **Single-Molecule and Superresolution Imaging in Live Bacteria Cells** *COLD SPRING HARBOR PERSPECTIVES IN BIOLOGY*
  Biteen, J. S., Moerner, W. E.
  2010; 2 (3)

- **Watching conformational- and photodynamics of single fluorescent proteins in solution** *NATURE CHEMISTRY*
  Goldsmith, R. H., Moerner, W. E.
  2010; 2 (3): 179-186

- **MOLECULES AND METHODS FOR SUPER-RESOLUTION IMAGING** *METHODS IN ENZYMOLOGY, VOL 475: SINGLE MOLECULE TOOLS, PT B*
  Thompson, M. A., Biteen, J. S., Lord, S. J., Conley, N. R., Moerner, W. E.
  2010; 475: 27-59

- **Physical Principles of Membrane Shape Regulation by the Glycocalyx.** *Cell*
  Shurer, C. R., Kuo, J. C., Roberts, L. M., Gandhi, J. G., Colville, M. J., Enoki, T. A., Pan, H., Su, J., Noble, J. M., Hollander, M. J., O'Donnell, J. P., Yin, R., Pedram, et al
  2019

- **A Bacterial Biomolecular Condensate Sequesters a Signaling Pathway that Drives Spatial Regulation of Gene Expression and Asymmetric Cell Division**
  Lasker, K., von Diezmann, A., Moerner, W. E., Shapiro, L.
  CELL PRESS.2019: 453A

- **Providing 3D for Super-Resolution Microscopy and Single-Particle Tracking in Cells with Single Molecules**
  Moerner, W.
  CELL PRESS.2019: 331A

- **Multi-Step 2D Protein Crystallization via Structural Changes within an Ordered Lattice**
  Herrmann, J., Comerci, C. J., Jabbarpour, F., Shapiro, L., Moerner, W. E., Wakatsuki, S.
  CELL PRESS.2019: 194A

- **Protein Self-Assembly Drives Surface Layer Biogenesis and Maintenance in C. crescentus**
  Herrmann, J., Comerci, C., Yoon, J., Jabbarpour, F., Shapiro, L., Wakatsuki, S., Moerner, W. E.
  CELL PRESS.2019: 159A

- **Viewpoint: Localization Microscopy of Single Molecules Enhanced by 3D Imaging and Light Sheet Illumination.** *Journal of physics D: Applied physics*
  Moerner, W. E.
  2019; 52 (1)

- **Quantitative super-resolution microscopy reveals the architecture of the mammalian glycocalyx and its changes during cancer progression**
  Moeckl, L., Pedram, K., Roy, A., Gustavsson, A., Bertozzi, C., Moerner, W.
  AMER CHEMICAL SOC.2018

- **In Situ Imaging of Spatial Organization of Accessible Chromatin at the Nanoscale with ATAC-see and Single-Molecule Super-Resolution Fluorescence Microscopy**
  Lee, M. Y., Chen, X., Gustavsson, A., Chang, H. Y., Moerner, W. E.
  CELL PRESS.2018: 539A

- **Probing Asymmetric Behavior of a Cell Cycle Regupatory Protein in Live Caulobacter using Single-Molecule Imaging**
  Wang, J., Shapiro, L., Moerner, W. E.
  CELL PRESS.2018: 350A
- **Precise Measurement of Single -Molecule Rotational Diffusivity in Solution**
  Yang, H., Moerner, W. E.
  CELL PRESS.2018: 170A
- **Cryogenic Dissection of the Phycobilisome's Electronic Structure**
  Dahlberg, P. D., Squires, A. H., Sartor, A. M., Liu, H., Blankenship, R. E., Moerner, W. E.
  CELL PRESS.2018: 169A
- **Single-Molecule Measurements of Quenching and Photophysical Heterogeneity in Phycobiliproteins**
  Squires, A. H., Dahlberg, P. D., Liu, H., Blankenship, R. E., Moerner, W. E.
  CELL PRESS.2018: 522A–523A
- **Quantitative Super-Resolution Imaging Reveals Mammalian Glycocalyx Dynamics**
  Moeckl, L., Pedram, K., Roy, A., Bertozzi, C., Moerner, W.
  CELL PRESS.2018: 537A–538A
- **Quantifying Nanoscale Morphological Features of the Primary Cilium Membrane using Super-Resolution Fluorescence Microscopy**
  Yoon, J., Weiss, L., Milenkovic, L., Stearns, T., Moerner, W. E.
  CELL PRESS.2018: 268A
- **A Red Fluorescent Protein for Cryogenic Single-Molecule Superresolution Imaging**
  Sorter, A. M., Dahlberg, P. D., Wang, J., Shapiro, L., Moerner, W. E.
  CELL PRESS.2018: 529A–530A
- **Two-Color Sted Microscopy to Visualize S-Layer Biogenesis in Caulobacter Crescentus**
  Comerci, C. J., Herrmann, J., Shapiro, L., Wakatsuki, S., Moerner, W. E.
  CELL PRESS.2018: 613A
- **Spatial Organization and Dynamics of RNA Processing in Caulobacter Crescentus**
  Bayas, C., Wang, J., Lee, M. K., Schrader, J. M., Shapiro, L., Moerner, W. E.
  CELL PRESS.2018: 251A
- **A Polar Matrix Microdomain Constrains Diffusion and Regulates Intracellular Signaling**
  von Diezmann, A., Lasker, K., Mann, T. H., Ahrens, D. G., Shapiro, L., Moerner, W. E.
  CELL PRESS.2018: 548A
- **Tilted Light Sheet Microscopy with 3D Point Spread Functions for Single-Molecule Super-Resolution Imaging in Mammalian Cells.** *Proceedings of SPIE--the International Society for Optical Engineering*
  Gustavsson, A., Petrov, P. N., Lee, M. Y., Shechtman, Y., Moerner, W. E.
  2018; 10500
- **The story of single molecules, from hole-burning and early FM spectroscopy in solids, to super-resolution nanoscopy in cells and beyond**
  Moerner, W. E., Naumov, A. V., Gladush, M. G., Karimullin, K. R.
  E D P SCIENCES.2018
- **Measurement-based estimation of global pupil functions in 3D localization microscopy** *OPTICS EXPRESS*
  Petrov, P. N., Shechtman, Y., Moerner, W. E.
  2017; 25 (7): 7945-7959
- **Experimental Demonstration of Sparsity-Based Single-Shot Fluorescence Imaging at Sub-wavelength Resolution**
  Mutzafi, M., Shechtman, Y., Dicker, O., Weiss, L., Eldar, Y. C., Moerner, W. E., Segev, M., IEEE
  IEEE.2017
- **Direct single-molecule measurements of phycocyanobilin photophysics in monomeric C-phycocyanin.** *Proceedings of the National Academy of Sciences of the United States of America*
  Squires, A. H., Moerner, W. E.

2017; 114 (37): 9779–84

- **Multicolour localization microscopy by point-spread-function engineering** *NATURE PHOTONICS*
  Shechtman, Y., Weiss, L. E., Backer, A. S., Lee, M. Y., Moerner, W. E.
  2016; 10 (9): 590-594
- **Enhanced DNA imaging using super-resolution microscopy and simultaneous single-molecule orientation measurements** *OPTICA*
  Backer, A. S., Lee, M. Y., Moerner, W. E.
  2016; 3 (6): 659-666
- **Multicolour localization microscopy by point-spread-function engineering.** *Nature photonics*
  Shechtman, Y., Weiss, L. E., Backer, A. S., Lee, M. Y., Moerner, W. E.
  2016; 10: 590–94
- **Dissecting pigment architecture of individual photosynthetic antenna complexes in solution** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Wang, Q., Moerner, W. E.
  2015; 112 (45): 13880-13885
- **Correcting field-dependent aberrations with nanoscale accuracy in three-dimensional single-molecule localization microscopy** *OPTICA*
  von Diezmann, A., Lee, M. Y., Lew, M. D., Moerner, W. E.
  2015; 2 (11): 985-993
- **Single-Molecule Identification of Quenched and Unquenched States of LHCII** *JOURNAL OF PHYSICAL CHEMISTRY LETTERS*
  Schlau-Cohen, G. S., Yang, H., Krueger, T. P., Xu, P., Gwizdala, M., van Grondelle, R., Croce, R., Moerner, W. E.
  2015; 6 (5): 860-867
- **Determining the rotational mobility of a single molecule from a single image: a numerical study** *OPTICS EXPRESS*
  Backer, A. S., Moerner, W. E.
  2015; 23 (4): 4255-4276
- **Single-Molecule Exploration of Photoprotective Mechanisms in Light-Harvesting Complexes** *Conference on Single Molecule Spectroscopy and Superresolution Imaging VIII*
  Yang, H., Schlau-Cohen, G. S., Gwizdala, M., Krueger, T., Xu, P., Croce, R., van Grondelle, R., Moerner, W. E.
  SPIE-INT SOC OPTICAL ENGINEERING.2015
- **Correcting field-dependent aberrations with nanoscale accuracy in three-dimensional single-molecule localization microscopy.** *Optica*
  von Diezmann, A., Lee, M. Y., Lew, M. D., Moerner, W. E.
  2015; 2 (11): 985–93
- **Delayed emergence of subdiffraction-sized mutant huntingtin fibrils following inclusion body formation** *Quarterly Reviews of Biophysics*
  Sahl, S., Moerner, W.
  2015
- **Motion of chromosomal loci and the mean-squared displacement of a fractional Brownian motion in the presence of static and dynamic errors** *Conference on Single Molecule Spectroscopy and Superresolution Imaging VIII*
  Backlund, M. P., Moerner, W. E.
  SPIE-INT SOC OPTICAL ENGINEERING.2015
- **Azimuthal Polarization Filtering for Accurate, Precise, and Robust Single-Molecule Localization Microscopy** *NANO LETTERS*
  Lew, M. D., Moerner, W. E.
  2014; 14 (11): 6407-6413
- **Cby1 promotes Ahi1 recruitment to a ring-shaped domain at the centriole-cilium interface and facilitates proper cilium formation and function** *MOLECULAR BIOLOGY OF THE CELL*
  Lee, Y. L., Sante, J., Comerci, C. J., Cyge, B., Menezes, L. F., Li, F., Germino, G. G., Moerner, W. E., Takemaru, K., Stearns, T.
  2014; 25 (19): 2919-2933
- **Cby1 promotes Ahi1 recruitment to a ring-shaped domain at the centriole-cilium interface and facilitates proper cilium formation and function.** *Molecular biology of the cell*
  Lee, Y. L., Santé, J., Comerci, C. J., Cyge, B., Menezes, L. F., Li, F., Germino, G. G., Moerner, W. E., Takemaru, K., Stearns, T.

2014; 25 (19): 2919-2933

- **A bisected pupil for studying single-molecule orientational dynamics and its application to three-dimensional super-resolution microscopy** *APPLIED PHYSICS LETTERS*
  Backer, A. S., Backlund, M. P., von Diezmann, A. R., Sahl, S. J., Moerner, W. E.
  2014; 104 (19)

- **Robust hypothesis tests for detecting statistical evidence of two-dimensional and three-dimensional interactions in single-molecule measurements** *PHYSICAL REVIEW E*
  Calderon, C. P., Weiss, L. E., Moerner, W. E.
  2014; 89 (5)

- **The regulatory switch of F1-ATPase studied by single-molecule FRET in the ABEL Trap.** *Proceedings of SPIE--the International Society for Optical Engineering*
  Bockenhauer, S. D., Duncan, T. M., Moerner, W. E., Börsch, M.
  2014; 8950: 89500H

- **A bisected pupil for studying single-molecule orientational dynamics and its application to three-dimensional super-resolution microscopy.** *Applied physics letters*
  Backer, A. S., Backlund, M. P., von Diezmann, A. R., Sahl, S. J., Moerner, W. E.
  2014; 104 (19): 193701

- **Robust hypothesis tests for detecting statistical evidence of two-dimensional and three-dimensional interactions in single-molecule measurements.** *Physical review. E, Statistical, nonlinear, and soft matter physics*
  Calderon, C. P., Weiss, L. E., Moerner, W. E.
  2014; 89 (5): 052705

- **Single-molecule orientation measurements with a quadrated pupil** *Conference on Single Molecule Spectroscopy and Superresolution Imaging VII*
  Backer, A. S., Backlund, M. P., Lew, M. D., Diezmann, A. R., Sahl, S. J., Moerner, W. E.
  SPIE-INT SOC OPTICAL ENGINEERING.2014

- **The regulatory switch of F-1-ATPase studied by single-molecule FRET in the ABEL Trap** *Conference on Single Molecule Spectroscopy and Superresolution Imaging VII*
  Bockenhauer, S. D., Duncan, T. M., Moerner, W. E., Boersch, M.
  SPIE-INT SOC OPTICAL ENGINEERING.2014

- **Spectroscopic and transport measurements of single molecules in solution using an electrokinetic trap** *Conference on Single Molecule Spectroscopy and Superresolution Imaging VII*
  Wang, Q., Moerner, W. E.
  SPIE-INT SOC OPTICAL ENGINEERING.2014

- **Quantifying Transient 3D Dynamical Phenomena of Single mRNA Particles in Live Yeast Cell Measurements** *JOURNAL OF PHYSICAL CHEMISTRY B*
  Calderon, C. P., Thompson, M. A., Casolari, J. M., Paffenroth, R. C., Moerner, W. E.
  2013; 117 (49): 15701-15713

- **Photo-induced conformational flexibility in single solution-phase peridinin-chlorophyll-proteins.** *journal of physical chemistry. A*
  Bockenhauer, S. D., Moerner, W. E.
  2013; 117 (35): 8399-8406

- **Single-molecule orientation measurements with a quadrated pupil** *OPTICS LETTERS*
  Backer, A. S., Backlund, M. P., Lew, M. D., Moerner, W. E.
  2013; 38 (9): 1521-1523

- **Easy-DHPSF open-source software for three-dimensional localization of single molecules with precision beyond the optical diffraction limit.** *Protocol exchange*
  Lew, M. D., von Diezmann, A. R., Moerner, W. E.
  2013; 2013

- **The double-helix point spread function enables precise and accurate measurement of 3D single-molecule localization and orientation** *Conference on Single Molecule Spectroscopy and Superresolution Imaging VI*
  Backlund, M. P., Lew, M. D., Backer, A. S., Sahl, S. J., Grover, G., Agrawal, A., Piestun, R., Moerner, W. E.

SPIE-INT SOC OPTICAL ENGINEERING.2013

- **Enzymatic activation of nitro-aryl fluorogens in live bacterial cells for enzymatic turnover-activated localization microscopy†** *Chemical science*
  Lee, M. K., Williams, J., Twieg, R. J., Rao, J., Moerner, W. E.
  2013; 42: 220-225

- **The double-helix point spread function enables precise and accurate measurement of 3D single-molecule localization and orientation.** *Proceedings of SPIE--the International Society for Optical Engineering*
  Backlund, M. P., Lew, M. D., Backer, A. S., Sahl, S. J., Grover, G., Agrawal, A., Piestun, R., Moerner, W. E.
  2013; 8590: 85900

- **Probing Single Biomolecules in Solution Using the Anti-Brownian Electrokinetic (ABEL) Trap** *ACCOUNTS OF CHEMICAL RESEARCH*
  Wang, Q., Goldsmith, R. H., Jiang, Y., Bockenhauer, S. D., Moerner, W. E.
  2012; 45 (11): 1955-1964

- **Enzymatic Activation of Nitro-Aryl Fluorogens in Live Cells for Turnover Activated Localization Microscopy** *26th Annual Symposium of the Protein-Society*
  Lee, M., Williams, J., Twieg, R., Rao, J., Moerner, W.
  WILEY-BLACKWELL.2012: 127–127

- **Analytical Tools To Distinguish the Effects of Localization Error, Confinement, and Medium Elasticity on the Velocity Autocorrelation Function** *BIOPHYSICAL JOURNAL*
  Weber, S. C., Thompson, M. A., Moerner, W. E., Spakowitz, A. J., Theriot, J. A.
  2012; 102 (11): 2443-2450

- **The double-helix microscope super-resolves extended biological structures by localizing single blinking molecules in three dimensions with nanoscale precision** *APPLIED PHYSICS LETTERS*
  Lee, H. D., Sahl, S. J., Lew, M. D., Moerner, W. E.
  2012; 100 (15)

- **Three-Dimensional Super-Resolution Imaging of the Midplane Protein FtsZ in Live Caulobacter crescentus Cells Using Astigmatism** *CHEMPHYSCHEM*
  Biteen, J. S., Goley, E. D., Shapiro, L., Moerner, W. E.
  2012; 13 (4): 1007-1012

- **Widespread mRNA Association with Cytoskeletal Motor Proteins and Identification and Dynamics of Myosin-Associated mRNAs in S. cerevisiae** *PLOS ONE*
  Casolari, J. M., Thompson, M. A., Salzman, J., Champion, L. M., Moerner, W. E., Brown, P. O.
  2012; 7 (2)

- **Anti-Brownian ELectrokinetic (ABEL) Trapping of Single beta(2)-Adrenergic Receptors in the Absence and Presence of Agonist** *Conference on Single Molecule Spectroscopy and Super-Resolution Imaging V*
  Bockenhauer, S., Fuerstenberg, A., Yao, X. J., Kobilka, B. K., Moerner, W. E.
  SPIE-INT SOC OPTICAL ENGINEERING.2012

- **Spectrally Resolved Anti-Brownian ELectrokinetic (ABEL) Trapping of Single Peridinin-Chlorophyll-Proteins in Solution** *Conference on Biophotonics - Photonic Solutions for Better Health Care III*
  Bockenhauer, S. D., Wang, Q., Moerner, W. E.
  SPIE-INT SOC OPTICAL ENGINEERING.2012

- **Conformational Dynamics of Single G Protein-Coupled Receptors in Solution** *JOURNAL OF PHYSICAL CHEMISTRY B*
  Bockenhauer, S., Fuerstenberg, A., Yao, X. J., Kobilka, B. K., Moerner, W. E.
  2011; 115 (45): 13328-13338

- **An Adaptive Anti-Brownian Electrokinetic Trap with Real-Time Information on Single-Molecule Diffusivity and Mobility** *ACS NANO*
  Wang, Q., Moerner, W. E.
  2011; 5 (7): 5792-5799

- **STED Super-resolution Microscopy in Drosophila Tissue and in Mammalian Cells.** *Proceedings of SPIE--the International Society for Optical Engineering*
  Lau, L., Lee, Y. L., Matis, M., Axelrod, J., Stearns, T., Moerner, W. E.
  2011; 7910

- **Corkscrew point spread function for far-field three-dimensional nanoscale localization of pointlike objects** *OPTICS LETTERS*

Lew, M. D., Lee, S. F., Badieirostami, M., Moerner, W. E.
2011; 36 (2): 202-204

- **Exploring protein superstructures and dynamics in live bacterial cells using single-molecule and superresolution imaging.** *Methods in molecular biology (Clifton, N.J.)*
  Biteen, J. S., Shapiro, L., Moerner, W. E.
  2011; 783: 139-158

- **STED Super-resolution Microscopy in Drosophila Tissue and in Mammalian Cells** *Conference on Reporters, Markers, Dyes, Nanoparticles, and Molecular Probes for Biomedical Applications III*
  Lau, L., Lee, Y. L., Matis, M., Axelrod, J., Stearns, T., Moerner, W. E.
  SPIE-INT SOC OPTICAL ENGINEERING.2011

- **Live-cell single-molecule and superresolution imaging of proteins in bacteria** *Conference on Single Molecule Spectroscopy and Imaging IV*
  Biteen, J. S., Moerner, W. E.
  SPIE-INT SOC OPTICAL ENGINEERING.2011

- **Azido Push-Pull Fluorogens Photoactivate to Produce Bright Fluorescent Labels** *JOURNAL OF PHYSICAL CHEMISTRY B*
  Lord, S. J., Lee, H. D., Samuel, R., Weber, R., Liu, N., Conley, N. R., Thompson, M. A., Twieg, R. J., Moerner, W. E.
  2010; 114 (45): 14157-14167

- **Three-dimensional localization precision of the double-helix point spread function versus astigmatism and biplane** *APPLIED PHYSICS LETTERS*
  Badieirostami, M., Lew, M. D., Thompson, M. A., Moerner, W. E.
  2010; 97 (16)

- **Action of the Chaperonin GroEL/ES on a Non-native Substrate Observed with Single-Molecule FRET** *JOURNAL OF MOLECULAR BIOLOGY*
  Kim, S. Y., Miller, E. J., Frydman, J., Moerner, W. E.
  2010; 401 (4): 553-563

- **Optimal strategy for trapping single fluorescent molecules in solution using the ABEL trap** *APPLIED PHYSICS B-LASERS AND OPTICS*
  Wang, Q., Moerner, W. E.
  2010; 99 (1-2): 23-30

- **Photoactivatable azido push-pull fluorophores for single-molecule imaging in and out of cells**
  Lord, S. J., Conley, N. R., Lee, H. D., Lee, M. K., Liu, N., Samuel, R., Twieg, R. J., Moerner, W. E.
  AMER CHEMICAL SOC.2010

- **Single-Molecule Spectroscopy and Imaging of Biomolecules in Living Cells** *ANALYTICAL CHEMISTRY*
  Lord, S. J., Lee, H. D., Moerner, W. E.
  2010; 82 (6): 2192-2203

- **Localizing and Tracking Single Nanoscale Emitters in Three Dimensions with High Spatiotemporal Resolution Using a Double-Helix Point Spread Function** *NANO LETTERS*
  Thompson, M. A., Lew, M. D., Badieirostami, M., Moerner, W. E.
  2010; 10 (1): 211-218

- **Single-Molecule Approaches for Superresolution Imaging, Trapping, and Nanophotonics** *Conference on Lasers and Electro-Optics (CLEO)/Quantum Electronics and Laser Science Conference (QELS)*
  Moerner, W. E.
  IEEE.2010

- **Single-Molecule Optical Spectroscopy and Imaging: From Early Steps to Recent Advances** *Nobel Symposium 138: Single Molecule Spectroscopy in Chemistry, Physics and Biosciences*
  Moerner, W. E.
  SPRINGER-VERLAG BERLIN.2010: 25–60

- **Optimal strategy for trapping single fluorescent molecules in solution using the ABEL trap.** *Applied physics. B, Lasers and optics*
  Wang, Q., Moerner, W. E.
  2010; 99 (1-2): 23–30

- **In vivo Three-Dimensional Superresolution Fluorescence Tracking using a Double-Helix Point Spread Function** *Conference on Single Molecule Spectroscopy and Imaging III*
  Lew, M. D., Thompson, M. A., Badieirostami, M., Moerner, W. E.
  SPIE-INT SOC OPTICAL ENGINEERING.2010

- **Localizing and Tracking Single Emitters in Three Dimensions Using a Double-Helix Point Spread Function** *Conference on Lasers and Electro-Optics (CLEO)/Quantum Electronics and Laser Science Conference (QELS)*
  Thompson, M. A., Lew, M. D., Badieirostami, M., Moerner, W. E.
  IEEE.2010

- **In vivo Three-Dimensional Superresolution Fluorescence Tracking using a Double-Helix Point Spread Function.** *Proceedings - Society of Photo-Optical Instrumentation Engineers*
  Lew, M. D., Thompson, M. A., Badieirostami, M., Moerner, W. E.
  2010; 7571: 75710Z

- **Micrometer-Sized DNA-Single-Fluorophore-DNA Supramolecule: Synthesis and Single-Molecule Characterization** *SMALL*
  Lee, J. K., Jaeckel, F., Moerner, W. E., Bao, Z.
  2009; 5 (21): 2418-2423

- **Large single-molecule fluorescence enhancements produced by a bowtie nanoantenna** *NATURE PHOTONICS*
  Kinkhabwala, A., Yu, Z., Fan, S., Avlasevich, Y., Muellen, K., Moerner, W. E.
  2009; 3 (11): 654-657

- **Lithographic positioning of fluorescent molecules on high-Q photonic crystal cavities** *APPLIED PHYSICS LETTERS*
  Rivoire, K., Kinkhabwala, A., Hatami, F., Masselink, W. T., Avlasevich, Y., Muellen, K., Moerner, W. E., Vuckovic, J.
  2009; 95 (12)

- **Superresolution imaging of protein superstructures in live Caulobacter crescentus cells with EYFP**
  Biteen, J. S., Thompson, M. A., Tselentis, N. K., Shapiro, L., Moerner, W. E.
  AMER CHEMICAL SOC.2009

- **Imaging beyond the diffraction limit in cells using single-molecule active control**
  Moerner, W. E., Biteen, J., Conley, N. R., Lee, H., Lord, S. J., Thompson, M. A., Shapiro, L., Liu, N., Samuel, R., Twieg, R. J.
  AMER CHEMICAL SOC.2009: 555–555

- **Bright, Red Single-Molecule Emitters: Synthesis and Properties of Environmentally Sensitive Dicyanomethylenedihydrofuran (DCDHF) Fluorophores with Bisaromatic Conjugation** *CHEMISTRY OF MATERIALS*
  Lu, Z., Liu, N., Lord, S. J., Bunge, S. D., Moerner, W. E., Twieg, R. J.
  2009; 21 (5): 797-810

- **Three-dimensional, single-molecule fluorescence imaging beyond the diffraction limit by using a double-helix point spread function** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Pavani, S. R., Thompson, M. A., Biteen, J. S., Lord, S. J., Liu, N., Twieg, R. J., Piestun, R., Moerner, W. E.
  2009; 106 (9): 2995-2999

- **DCDHF Fluorophores for Single-Molecule Imaging in Cells** *CHEMPHYSCHEM*
  Lord, S. J., Conley, N. R., Lee, H. D., Nishimura, S. Y., Pomerantz, A. K., Willets, K. A., Lu, Z., Wang, H., Liu, N., Samuel, R., Weber, R., Semyonov, A., He, et al
  2009; 10 (1): 55-65

- **Superresolution Imaging in Live Caulobacter Crescentus Cells Using Photoswitchable Enhanced Yellow Fluorescent Protein** *Conference on Single Molecule Spectroscopy and Imaging II*
  Biteen, J. S., Thompson, M. A., Tselentis, N. K., Shapiro, L., Moerner, W. E.
  SPIE-INT SOC OPTICAL ENGINEERING.2009

- **Photoactivatable DCDHF fluorophores for single-molecule imaging** *Conference on Reporters, Markers, Dyes, Nanoparticles, and Molecular Probes for Biomedical Applications*
  Lord, S. J., Conley, N. R., Lee, H. D., Liu, N., Samuel, R., Twieg, R. J., Moerner, W. E.
  SPIE-INT SOC OPTICAL ENGINEERING.2009

- **Probing High-Q Photonic Crystal Resonances With Fluorescent Molecules** *Conference on Lasers and Electro-Optics/Quantum Electronics and Laser Science Conference (CLEO/QELS 2009)*
  Rivoire, K., Kinkhabwala, A., Moerner, W. E., Vuckovic, J., Hatami, F., Masselink, W. T., Avlasevich, Y., Muellen, K.
  IEEE.2009: 2353–2354

- **Three-Dimensional Super-resolution Single-Molecule Fluorescence Imaging Using a Double-Helix Point Spread Function** *Conference on Lasers and Electro-Optics/Quantum Electronics and Laser Science Conference (CLEO/QELS 2009)*
  Thompson, M. A., Biteen, J. S., Moerner, W. E., Pavani, S. R., Piestun, R.
  IEEE.2009: 1921–1922

- **Super-resolution imaging in live Caulobacter crescentus cells using photoswitchable EYFP** *NATURE METHODS*
  Biteen, J. S., Thompson, M. A., Tselentis, N. K., Bowman, G. R., Shapiro, L., Moerner, W. E.
  2008; 5 (11): 947-949

- **Visualization of Long Human Telomere Mimics by Single-Molecule Fluorescence Imaging** *JOURNAL OF PHYSICAL CHEMISTRY B*
  Pomerantz, A. K., Moerner, W. E., Kool, E. T.
  2008; 112 (42): 13184-13187

- **Cy3-Cy5 covalent heterodimers for single-molecule photoswitching** *JOURNAL OF PHYSICAL CHEMISTRY B*
  Conley, N. R., Biteen, J. S., Moerner, W. E.
  2008; 112 (38): 11878-11880

- **A polymeric protein anchors the chromosomal origin/ParB complex at a bacterial cell pole** *CELL*
  Bowman, G. R., Comolli, L. R., Zhu, J., Eckart, M., Koenig, M., Downing, K. H., Moerner, W. E., Earnest, T., Shapiro, L.
  2008; 134 (6): 945-955

- **Single-molecule motions of oligoarginine transporter conjugates on the plasma membrane of Chinese hamster ovary cells** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
  Lee, H., Dubikovskaya, E. A., Hwang, H., Semyonov, A. N., Wang, H., Jones, L. R., TWIEG, R. J., Moerner, W. E., Wender, P. A.
  2008; 130 (29): 9364-9370

- **A photoactivatable push-pull fluorophore for single-molecule imaging in live cells** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
  Lord, S. J., Conley, N. R., Lee, H. D., Samuel, R., Liu, N., Twieg, R. J., Moerner, W. E.
  2008; 130 (29): 9204-?

- **Controlling Brownian motion of single protein molecules and single fluorophores in aqueous buffer** *OPTICS EXPRESS*
  Cohen, A. E., Moerner, W. E.
  2008; 16 (10): 6941-6956

- **Superresolution Imaging in Live Bacterial Cells by Single-Molecule Active-Control Microscopy** *Conference on Lasers and Electro-Optics/Quantum Electronics and Laser Science Conference (CLEO/QELS 2008)*
  Biteen, J. S., Thompson, M. A., Tselentis, N. K., Shapiro, L., Moerner, W. E.
  IEEE.2008: 246–247

- **Hardware-based anti-Brownian electrokinetic trap (ABEL trap) for single molecules: Control loop simulations and application to ATP binding stoichiometry in multi-subunit enzymes** *Conference on Optical Trapped and Optical Micromanipulation V*
  Jiang, Y., Wang, Q., Cohen, A. E., Douglas, N., Frydman, J., Moerner, W. E.
  SPIE-INT SOC OPTICAL ENGINEERING.2008

- **Interferometry of a single nanoparticle using the Gouy phase of a focused laser beam** *OPTICS COMMUNICATIONS*
  Hwang, J., Moerner, W. E.
  2007; 280 (2): 487-491

- **Gold bowtie nanoantennas for surface-enhanced Raman scattering under controlled electrochemical potential** *CHEMICAL PHYSICS LETTERS*
  Jackel, F., Kinkhabwala, A. A., Moerner, W. E.
  2007; 446 (4-6): 339-343

- **Photophysical properties of acene DCDHF fluorophores: Long-wavelength single-molecule emitters designed for cellular Imaging** *JOURNAL OF PHYSICAL CHEMISTRY A*
  Lord, S. J., Lu, Z., Wang, H., Willetst, K. A., Schuck, P. J., Lee, H. D., Nishimura, S. Y., Twieg, R. J., Moerner, W. E.

2007; 111 (37): 8934-8941

- **New directions in single-molecule imaging and analysis** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Moerner, W. E.
  2007; 104 (31): 12596-12602
- **Principal-components analysis of shape fluctuations of single DNA molecules** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Cohen, A. E., Moerner, W. E.
  2007; 104 (31): 12622-12627
- **Bulk and single-molecule characterization of an improved molecular beacon utilizing H-dimer excitonic behavior** *JOURNAL OF PHYSICAL CHEMISTRY B*
  Conley, N. R., Pomerantz, A. K., Wang, H., Twieg, R. J., Moerner, W. E.
  2007; 111 (28): 7929-7931
- **Modifications of DCDHF single molecule fluorophores to impart water solubility** *TETRAHEDRON LETTERS*
  Wang, H., Lu, Z., Lord, S. J., Moerner, W. E., Twieg, R. J.
  2007; 48 (19): 3471-3474
- **Dicyanomethylenedihydrofuran (DCDHF) single molecule fluorophores for cellular applications**
  Wang, H., Lu, Z., Lord, S. J., Willets, K. A., Moerner, W. E., Twieg, R. J.
  AMER CHEMICAL SOC.2007
- **Internal mechanical response of a polymer in solution** *PHYSICAL REVIEW LETTERS*
  Cohen, A. E., Moerner, W. E.
  2007; 98 (11)
- **Single-molecule tracking.** *Methods in molecular biology (Clifton, N.J.)*
  Vrljic, M., Nishimura, S. Y., Moerner, W. E.
  2007; 398: 193-219
- **Single-molecule electron spin resonance** *APPLIED MAGNETIC RESONANCE*
  von Borczyskowski, C., Koehler, J., Moerner, W. E., Orrit, M., Wrachtrup, J.
  2007; 31 (3-4): 665-676
- **The influence of tetrahydroquinoline rings in dicyanomethylenedihydrofuran (DCDHF) single-molecule fluorophores** *TETRAHEDRON*
  Wang, H., Lu, Z., Lord, S. J., Willets, K. A., Bertke, J. A., Bunge, S. D., Moerner, W. E., Twieg, R. J.
  2007; 63 (1): 103-114
- **Long-wavelength analogue of PRODAN: Synthesis and properties of Anthradan, a fluorophore with a 2,6-donor-acceptor anthracene structure** *JOURNAL OF ORGANIC CHEMISTRY*
  Lu, Z., Lord, S. J., Wang, H., Moerner, W. E., Twieg, R. J.
  2006; 71 (26): 9651-9657
- **Well-controlled living polymerization of perylene-labeled polyisoprenes and their use in single-molecule Imaging** *MACROMOLECULES*
  Gavranovic, G. T., Csihony, S., Bowden, N. B., Hawker, C. J., Waymouth, R. M., Moerner, W. E., Fuller, G. G.
  2006; 39 (23): 8121-8127
- **Single-molecule nanoprobes explore defects in spin-grown crystals** *Festschrift in honor of the 65th Birthday of Robert J Silbey*
  Werley, C. A., Moerner, W. E.
  AMER CHEMICAL SOC.2006: 18939–44
- **COLL 60-Single-molecule fluorescence tracking probes membrane dynamics**
  Moerner, W. E., Hwang, H., Kim, S. Y., Kinkhabwala, A., Nishimura, S.
  AMER CHEMICAL SOC.2006
- **PHYS 496-Lateral movements of single poly(arginine) peptides on the CHO plasma membrane before cellular entry**
  Hwang, H., Kim, S. Y., Goun, E., Jones, L. R., Wender, P. A., Semyonov, A. N., Twieg, R. J., Moerner, W. E.
  AMER CHEMICAL SOC.2006

- **PHYS 665-An improved single-molecule molecular beacon utilizing H-dimer excitonic behavior**
  Conley, N. R., Kurtz, A. H., Wang, H., Twieg, R. J., Moerner, W. E.
  AMER CHEMICAL SOC.2006
- **PHYS 484-DCDHF dyes can probe environmental changes by protein binding in GroEL**
  Kim, S. Y., Cui, J., Lu, Z., Semyonov, A. N., Twieg, R. W., Moerner, W. E.
  AMER CHEMICAL SOC.2006
- **PHYS 488-DCDHF photophysics: Designing new single-molecule fluorophores for cellular imaging**
  Lord, S. J., Lu, Z., Wang, H., Alyono, J., Liu, N., Weber, R., Twieg, R. J., Moerner, W. E.
  AMER CHEMICAL SOC.2006
- **PHYS 252-Single-molecule fluorescence imaging reports on biomolecular dynamics**
  Moerner, W. E., Cohen, A., Conley, N. R., Kim, S. Y., Kinkhabwala, A., Koenig, M., Kurtz, A. H., Lord, S. J., Lu, Z., Wang, H., Twieg, R. J.
  AMER CHEMICAL SOC.2006
- **Single molecules of the bacterial actin MreB undergo directed treadmilling motion in Caulobacter crescentus** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Kim, S. Y., Gitai, Z., Kinkhabwala, A., Shapiro, L., Moerner, W. E.
  2006; 103 (29): 10929-10934
- **Diffusion of lipid-like single-molecule fluorophores in the cell membrane** *JOURNAL OF PHYSICAL CHEMISTRY B*
  Nishimura, S. Y., Lord, S. J., Klein, L. O., Willets, K. A., He, M., Lu, Z. K., TWIEG, R. J., Moerner, W. E.
  2006; 110 (15): 8151-8157
- **Synthesis and properties of the highly environment sensitive fluorophores 2-cyano and 2-propionyl-6-dihexylaminoanthracene (ANTHRADAN)** *231st National Meeting of the American-Chemical-Society*
  Lu, Z., Wang, H., Lord, S. J., Moerner, W. E., Twieg, R. J.
  AMER CHEMICAL SOC.2006
- **Suppressing Brownian motion of individual biomolecules in solution** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Cohen, A. E., Moerner, W. E.
  2006; 103 (12): 4362-4365
- **Toward nanometer-scale optical photolithography: Utilizing the near-field of bowtie optical nanoantennas** *NANO LETTERS*
  Sundaramurthy, A., Schuck, P. J., Conley, N. R., Fromm, D. P., Kino, G. S., Moerner, W. E.
  2006; 6 (3): 355-360
- **Exploring the chemical enhancement for surface-enhanced Raman scattering with Au bowtie nanoantennas** *JOURNAL OF CHEMICAL PHYSICS*
  Fromm, D. P., Sundaramurthy, A., Kinkhabwala, A., Schuck, P. J., Kino, G. S., Moerner, W. E.
  2006; 124 (6)
- **Cholesterol depletion induces solid-like regions in the plasma membrane** *BIOPHYSICAL JOURNAL*
  Nishimura, S. Y., Vrljic, M., Klein, L. O., McConnell, H. M., Moerner, W. E.
  2006; 90 (3): 927-938
- **Scanning interferometric microscopy for the detection of ultrasmall phase shifts in condensed matter** *PHYSICAL REVIEW A*
  Hwang, J., Fejer, M. M., Moerner, W. E.
  2006; 73 (2)
- **Probing the sequence of conformationally induced polarity changes in the molecular chaperonin GroEL with fluorescence spectroscopy** *JOURNAL OF PHYSICAL CHEMISTRY B*
  Kim, S. Y., Semyonov, A. N., TWIEG, R. J., Horwich, A. L., Frydman, J., Moerner, W. E.
  2005; 109 (51): 24517-24525
- **A novel fluorophore for two-photon-excited single-molecule fluorescence** *CHEMICAL PHYSICS*
  Schuck, P. J., Willets, K. A., Fromm, D. P., TWIEG, R. J., Moerner, W. E.
  2005; 318 (1-2): 7-11

- **Distinct constrictive processes, separated in time and space, divide Caulobacter inner and outer membranes** *JOURNAL OF BACTERIOLOGY*
  Judd, E. M., Comolli, L. R., Chen, J. C., Downing, K. H., Moerner, W. E., McAdams, H. H.
  2005; 187 (20): 6874-6882
- **Field enhancement and gap-dependent resonance in a system of two opposing tip-to-tip Au nanotriangles** *PHYSICAL REVIEW B*
  Sundaramurthy, A., Crozier, K. B., Kino, G. S., Fromm, D. P., Schuck, P. J., Moerner, W. E.
  2005; 72 (16)
- **Enhancement of the fluorescence of the blue fluorescent proteins by high pressure or low temperature** *JOURNAL OF PHYSICAL CHEMISTRY B*
  Mauring, K., Deich, J., Rosell, F. I., McAnaney, T. B., Moerner, W. E., Boxer, S. G.
  2005; 109 (26): 12976-12981
- **Nonlinear optical chromophores as nanoscale emitters for single-molecule spectroscopy** *ACCOUNTS OF CHEMICAL RESEARCH*
  Willets, K. A., Nishimura, S. Y., Schuck, P. J., TWIEG, R. J., Moerner, W. E.
  2005; 38 (7): 549-556
- **Monolithically integrated semiconductor fluorescence sensor for microfluidic applications** *SENSORS AND ACTUATORS B-CHEMICAL*
  Thrush, E., Levi, O., Cook, L. J., Deich, J., Kurtz, A., Smith, S. J., Moerner, W. E., Harris, J. S.
  2005; 105 (2): 393-399
- **Soliton-induced waveguides in an organic photorefractive glass** *OPTICS LETTERS*
  Asaro, M., Sheldon, M., Chen, Z. G., Ostroverkhova, O., Moerner, W. E.
  2005; 30 (5): 519-521
- **Method for trapping and manipulating nanoscale objects in solution** *APPLIED PHYSICS LETTERS*
  Cohen, A. E., Moerner, W. E.
  2005; 86 (9)
- **Improving the mismatch between light and nanoscale objects with gold bowtie nanoantennas** *PHYSICAL REVIEW LETTERS*
  Schuck, P. J., Fromm, D. P., Sundaramurthy, A., Kino, G. S., Moerner, W. E.
  2005; 94 (1)
- **Cholesterol depletion suppresses the translational diffusion of class II major histocompatibility complex proteins in the plasma membrane** *BIOPHYSICAL JOURNAL*
  Vrljic, M., Nishimura, S. Y., Moerner, W. E., McConnell, H. M.
  2005; 88 (1): 334-347
- **Visualization of the movement of single histidine kinase molecules in live Caulobacter cells** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Deich, J., Judd, E. M., McAdams, H. H., Moerner, W. E.
  2004; 101 (45): 15921-15926
- **Single-photon sources based on single molecules in solids** *NEW JOURNAL OF PHYSICS*
  Moerner, W. E.
  2004; 6
- **Spectral analysis of strongly enhanced visible light transmission through single C-shaped nanoapertures** *APPLIED PHYSICS LETTERS*
  Matteo, J. A., Fromm, D. P., Yuen, Y., Schuck, P. J., Moerner, W. E., Hesselink, L.
  2004; 85 (4): 648-650
- **Experimental and theoretical investigations of environmentally sensitive single-molecule fluorophores** *JOURNAL OF PHYSICAL CHEMISTRY B*
  Willets, K. A., Callis, P. R., Moerner, W. E.
  2004; 108 (29): 10465-10473
- **Organic photorefractives: Mechanisms, materials, and applications** *CHEMICAL REVIEWS*
  Ostroverkhova, O., Moerner, W. E.
  2004; 104 (7): 3267-3314
- **Gap-dependent optical coupling of single "Bowtie" nanoantennas resonant in the visible** *NANO LETTERS*
  Fromm, D. P., Sundaramurthy, A., Schuck, P. J., Kino, G., Moerner, W. E.

2004; 4 (5): 957-961

- **Integrated semiconductor vertical-cavity surface-emitting lasers and PIN photodetectors for biomedical fluorescence sensing** *IEEE JOURNAL OF QUANTUM ELECTRONICS*
  Thrush, E., Levi, O., Ha, W., Carey, G., Cook, L. J., Deich, J., Smith, S. J., Moerner, W. E., Harris, J. S.
  2004; 40 (5): 491-498

- **Single-molecule fluorescence spectroscopy and microscopy of biomolecular motors** *ANNUAL REVIEW OF PHYSICAL CHEMISTRY*
  Peterman, E. J., Sosa, H., Moerner, W. E.
  2004; 55: 79-96

- **Laser background characterization in a monolithically integrated biofluorescence sensor** *Conference on Advanced Biomedical and Clinical Diagnostic Systems II*
  Thrush, E., Levi, O., Cook, L. J., Deich, J., Smith, S. J., Moerner, W. E., Harris, J. S.
  SPIE-INT SOC OPTICAL ENGINEERING.2004: 59–65

- **Self-trapping of light in an organic photorefractive glass** *OPTICS LETTERS*
  Chen, Z. G., Asaro, M., Ostroverkhova, O., Moerner, W. E.
  2003; 28 (24): 2509-2511

- **Optical measurements of single molecules in cells** *Workshop on Emerging Technologies for the Analysis of Endogenous Biomaterials and Single-Molecule Studies*
  Moerner, W. E.
  ELSEVIER SCI LTD.2003: 544–48

- **Methods of single-molecule fluorescence spectroscopy and microscopy** *REVIEW OF SCIENTIFIC INSTRUMENTS*
  Moerner, W. E., Fromm, D. P.
  2003; 74 (8): 3597-3619

- **Role of temperature in controlling performance of photorefractive organic glasses** *CHEMPHYSCHEM*
  Ostroverkhova, O., He, M., TWIEG, R. J., Moerner, W. E.
  2003; 4 (7): 732-744

- **Fluorescence bleaching reveals asymmetric compartment formation prior to cell division in Caulobacter** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Judd, E. M., Ryan, K. R., Moerner, W. E., Shapiro, L., McAdams, H. H.
  2003; 100 (14): 8235-8240

- **High-performance photorefractive organic glass with near-infrared sensitivity** *APPLIED PHYSICS LETTERS*
  Ostroverkhova, O., Moerner, W. E., He, M., TWIEG, R. J.
  2003; 82 (21): 3602-3604

- **Photorefractive properties of poly(siloxane)-triarylamine-based composites for high-speed applications** *JOURNAL OF PHYSICAL CHEMISTRY B*
  Wright, D., Gubler, U., Moerner, W. E., DeClue, M. S., Siegel, J. S.
  2003; 107 (20): 4732-4737

- **Synthesis and photorefractive properties of multifunctional glasses** *CHEMISTRY OF MATERIALS*
  He, M., TWIEG, R. J., Gubler, U., Wright, D., Moerner, W. E.
  2003; 15 (5): 1156-1164

- **Novel fluorophores for single-molecule imaging** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
  Willets, K. A., Ostroverkhova, O., He, M., TWIEG, R. J., Moerner, W. E.
  2003; 125 (5): 1174-1175

- **Novel fluorophores for single-molecule imaging** *Conference on Nanocrystals and Organic and Hybrid Nanomaterials*
  Willets, K. A., Ostroverkhova, O., Hess, S., He, M., TWIEG, R. J., Moerner, W. E.
  SPIE-INT SOC OPTICAL ENGINEERING.2003: 150–157

- **Exploring novel methods of interferometric detection of ultrasmall phase shifts** *Conference on Manipulation and Analysis of Biomolecules, Cells and Tissues*
  Hwang, J., Fejer, M. M., Moerner, W. E.
  SPIE-INT SOC OPTICAL ENGINEERING.2003: 110–120

- **Synthesis and properties of glassy organic multifunctional photorefractive materials** *International Conference on Photo-Responsive Organics and Polymers (ICPOP 2001)*
  He, M., Twieg, R., Gubler, U., Wright, D., Moerner, W. E.
  ELSEVIER SCIENCE BV.2003: 353–57
- **Optically induced focusing-to-defocusing switching and self-trapping of light in a photorefractive organic glass** *9th International Conference on Photorefractive Effects, Materials, and Devices*
  Chen, Z. G., Asaro, M., Ostroverkbova, O., Moerner, W. E.
  OPTICAL SOC AMERICA.2003: 425–429
- **Single-molecule optical spectroscopy of autofluorescent proteins** *JOURNAL OF CHEMICAL PHYSICS*
  Moerner, W. E.
  2002; 117 (24): 10925-10937
- **Translational diffusion of individual class II MHC membrane proteins in cells** *BIOPHYSICAL JOURNAL*
  Vrljic, M., Nishimura, S. Y., Brasselet, S., Moerner, W. E., McConnell, H. M.
  2002; 83 (5): 2681-2692
- **Synthesis of fluorescently labeled polymers and their use in single-molecule imaging** *MACROMOLECULES*
  Bowden, N. B., Willets, K. A., Moerner, W. E., Waymouth, R. M.
  2002; 35 (21): 8122-8125
- **Recent advances in understanding and development of photorefractive polymers and glasses** *ADVANCED FUNCTIONAL MATERIALS*
  Ostroverkhova, O., Wright, D., Gubler, U., Moerner, W. E., He, M., Sastre-Santos, A., TWIEG, R. J.
  2002; 12 (9): 621-629
- **Photochromic polymers for the optical homodyne detection of ultrasonic surface displacements** *OPTICS LETTERS*
  Gubler, U., Wright, D., Moerner, W. E., Klein, M. B.
  2002; 27 (5): 354-356
- **Monolithic photorefractive organic glasses with large coupling gain and strong beam fanning** *ADVANCED MATERIALS*
  Gubler, U., He, M., Wright, D., Roh, Y., Twieg, R., Moerner, W. E.
  2002; 14 (4): 313-?
- **A dozen years of single-molecule spectroscopy in physics, chemistry, and biophysics** *JOURNAL OF PHYSICAL CHEMISTRY B*
  Moerner, W. E.
  2002; 106 (5): 910-927
- **Organic photorefractive material design strategies** *Conference on Nonlinear Optical Transmission Processes and Organic Photorefractive Materials*
  Wright, D., Gubler, U., Sadhukhan, S., Moerner, W. E., He, M., Twieg, R., DeClue, M., Siegel, J.
  SPIE-INT SOC OPTICAL ENGINEERING.2002: 125–138
- **Biomolecular applications of single-molecule measurements : Kinetics and dynamics of a single enzyme reaction** *Conference on Methods for Ultrasensitive Detection II*
  Paige, M. F., Fromm, D. P., Moerner, W. E.
  SPIE-INT SOC OPTICAL ENGINEERING.2002: 92–103
- **High-performance photorefractive organic glasses: understanding mechanisms and limitations** *Conference on Organic Photorefractive and Photosensitive Materials for Holographic Applications*
  Ostroverkhova, O., Gubler, U., Wright, D., He, M., TWIEG, R. J., Moerner, W. E.
  SPIE-INT SOC OPTICAL ENGINEERING.2002: 21–32
- **High-performance photorefractive polymer composite with 2-dicyanomethylen-3-cyano-2,5-dihydrofuran chromophore** *APPLIED PHYSICS LETTERS*
  Wright, D., Gubler, U., Roh, Y., Moerner, W. E., He, M., TWIEG, R. J.
  2001; 79 (26): 4274-4276
- **Polarized fluorescence microscopy of individual and many kinesin motors bound to axonemal microtubules** *BIOPHYSICAL JOURNAL*
  Peterman, E. J., Sosa, H., Goldstein, L. S., Moerner, W. E.
  2001; 81 (5): 2851-2863

- **ADP-induced rocking of the kinesin motor domain revealed by single-molecule fluorescence polarization microscopy** *NATURE STRUCTURAL BIOLOGY*
  Sosa, H., Peterman, E. J., Moerner, W. E., Goldstein, L. S.
  2001; 8 (6): 540-544

- **Photophysics of DsRed, a red fluorescent protein, from the ensemble to the single-molecule level** *JOURNAL OF PHYSICAL CHEMISTRY B*
  Lounis, B., Deich, J., Rosell, F. I., Boxer, S. G., Moerner, W. E.
  2001; 105 (21): 5048-5054

- **Single-molecule imaging in Caulobacter crescentus.**
  Paige, M. F., Judd, E., Shapiro, L., Moerner, W. E.
  AMER CHEMICAL SOC.2001: U285–U285

- **A comparison of through-the-objective total internal reflection microscopy and epifluorescence microscopy for single-molecule fluorescence Imaging** *SINGLE MOLECULES*
  Paige, M. F., Bjerneld, E. J., Moerner, W. E.
  2001; 2 (3): 191-201

- **Photon antibunching in single CdSe/ZnS quantum dot fluorescence** *CHEMICAL PHYSICS LETTERS*
  Lounis, B., Bechtel, H. A., Gerion, D., Alivisatos, P., Moerner, W. E.
  2000; 329 (5-6): 399-404

- **Single photons on demand from a single molecule at room temperature** *NATURE*
  Lounis, B., Moerner, W. E.
  2000; 407 (6803): 491-493

- **Image amplification and novelty filtering with a photorefractive polymer** *APPLIED PHYSICS LETTERS*
  Goonesekera, A., Wright, D., Moerner, W. E.
  2000; 76 (23): 3358-3360

- **Single-molecule fluorescence resonant energy transfer in calcium concentration dependent cameleon** *JOURNAL OF PHYSICAL CHEMISTRY B*
  Brasselet, S., Peterman, E. J., Miyawaki, A., Moerner, W. E.
  2000; 104 (15): 3676-3682

- **Fluorescence correlation spectroscopy reveals fast optical excitation-driven intramolecular dynamics of yellow fluorescent proteins** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Schwille, P., Kummer, S., Heikal, A. A., Moerner, W. E., Webb, W. W.
  2000; 97 (1): 151-156

- **Photorefractive polymers for laser-based ultrasound detection** *Conference on Organic Photorefractives, Photoreceptors, and Nancomposites*
  Wright, D., Gubler, U., Klein, M. B., Moerner, W. E.
  SPIE-INT SOCIETY OPTICAL ENGINEERING.2000: 110–117

- **The fluorescence dynamics of single molecules of green fluorescent protein** *JOURNAL OF PHYSICAL CHEMISTRY A*
  Peterman, E. J., Brasselet, S., Moerner, W. E.
  1999; 103 (49): 10553-10560

- **Optical methods for exploring dynamics of single copies of green fluorescent protein** *CYTOMETRY*
  Moerner, W. E., Peterman, E. J., Brasselet, S., Kummer, S., Dickson, R. M.
  1999; 36 (3): 232-238

- **Photorefractive properties of poly(N-vinyl carbazole)-based composites for high-speed applications** *CHEMISTRY OF MATERIALS*
  Diaz-Garcia, M. A., Wright, D., Casperson, J. D., Smith, B., Glazer, E., Moerner, W. E., Sukhomlinova, L. I., TWIEG, R. J.
  1999; 11 (7): 1784-1791

- **Homodyne detection of ultrasonic surface displacements using two-wave mixing in photorefractive polymers** *OPTICS COMMUNICATIONS*
  Klein, M. B., Bacher, G. D., Grunnet-Jepsen, A., Wright, D., Moerner, W. E.
  1999; 162 (1-3): 79-84

- **Illuminating single molecules in condensed matter** *SCIENCE*
  Moerner, W. E., Orrit, M.

1999; 283 (5408): 1670-?

- **Design and optimization of chromophores for liquid crystal and photorefractive applications** *Symposium F on Organic Nonlinear Optical Materials and Devices, at the 1999 MRS Spring Meeting*
  TWIEG, R. J., He, M., Sukhomlinova, L., You, F., Moerner, W. E., Diaz-Garcia, M. A., Wright, D., Casperson, J. D., Wortmann, R., Glania, C., Kramer, P., Lukaszuk, K., Matschiner, et al
  MATERIALS RESEARCH SOC.1999: 119–130

- **Homodyne detection of ultrasonic surface displacements using two-wave mixing in photorefractive polymers** *Conference on Process Control and Sensors for Manufacturing II*
  Klein, M. B., Bacher, G. D., Grunnet-Jepsen, A., Wright, D., Moerner, W. E.
  SPIE-INT SOC OPTICAL ENGINEERING.1999: 22–29

- **Simultaneous imaging of individual molecules aligned both parallel and perpendicular to the optic axis** *PHYSICAL REVIEW LETTERS*
  Dickson, R. M., Norris, D. J., Moerner, W. E.
  1998; 81 (24): 5322-5325

- **Synthesis of bifunctional photorefractive polymers with net gain: Design strategy amenable to combinatorial optimization** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
  Bratcher, M. S., DeClue, M. S., Grunnet-Jepsen, A., Wright, D., Smith, B. R., Moerner, W. E., Siegel, J. S.
  1998; 120 (37): 9680-9681

- **High-speed photorefractive polymer composites** *APPLIED PHYSICS LETTERS*
  Wright, D., Diaz-Garcia, M. A., Casperson, J. D., DeClue, M., Moerner, W. E., TWIEG, R. J.
  1998; 73 (11): 1490-1492

- **Spectroscopic determination of trap density in C-60-sensitized photorefractive polymers** *CHEMICAL PHYSICS LETTERS*
  Grunnet-Jepsen, A., Wright, D., Smith, B., Bratcher, M. S., DeClue, M. S., Siegel, J. S., Moerner, W. E.
  1998; 291 (5-6): 553-561

- **Systematics of two-wave mixing in a photorefractive polymer** *JOURNAL OF THE OPTICAL SOCIETY OF AMERICA B-OPTICAL PHYSICS*
  Grunnet-Jepsen, A., Thompson, C. L., Moerner, W. E.
  1998; 15 (2): 905-913

- **Amplified scattering in a high-gain photorefractive polymer** *JOURNAL OF THE OPTICAL SOCIETY OF AMERICA B-OPTICAL PHYSICS*
  Grunnet-Jepsen, A., Thompson, C. L., TWIEG, R. J., Moerner, W. E.
  1998; 15 (2): 901-904

- **Gain enhancement by moving gratings in a photorefractive polymer** *OPTICS COMMUNICATIONS*
  Grunnet-Jepsen, A., Thompson, C. L., Moerner, W. E.
  1998; 145 (1-6): 145-149

- **Probing single molecules in polyacrylamide gels** *Conference on Laser Techniques for Condensed-Phase and Biological Systems*
  Kummer, S., Dickson, R. M., Moerner, W. E.
  SPIE-INT SOC OPTICAL ENGINEERING.1998: 165–173

- **Trapping studies on photorefractive polymers** *Conference on Xerographic Photoreceptors and Organic Photorefractive Materials IV*
  Wright, D., Grunnet-Jepsen, A., Diaz-Garcia, M. A., Casperson, J. D., Smith, B., Bratcher, M. S., DeClue, M. S., Siegel, J. S., Moerner, W. E., TWIEG, R. J.
  SPIE - INT SOC OPTICAL ENGINEERING.1998: 60–71

- **Single-molecule nanophotonics in solids** *6th NEC Symposium on Quantum Optical Phenomena in Spatially Confined Materials - Fundamental Approaches to New Material Phases*
  Moerner, W. E., Dickson, R. M., Norris, D. J.
  ELSEVIER SCIENCE SA LAUSANNE.1997: 169–74

- **Spontaneous oscillation and self-pumped phase conjugation in a photorefractive polymer optical amplifier** *SCIENCE*
  GRUNNETJEPSEN, A., Thompson, C. L., Moerner, W. E.
  1997; 277 (5325): 549-552

- **On/off blinking and switching behaviour of single molecules of green fluorescent protein** *NATURE*
  Dickson, R. M., Cubitt, A. B., Tsien, R. Y., Moerner, W. E.

1997; 388 (6640): 355-358

- **Excitation of a single molecule on the surface of a spherical microcavity** *APPLIED PHYSICS LETTERS*
  Norris, D. J., KUWATAGONOKAMI, M., Moerner, W. E.
  1997; 71 (3): 297-299

- **Measurement of the spatial phase shift in high-gain photorefractive materials** *OPTICS LETTERS*
  GRUNNETJEPSEN, A., Thompson, C. L., Moerner, W. E.
  1997; 22 (12): 874-876

- **High performance photorefractive polymer with improved stability** *APPLIED PHYSICS LETTERS*
  GRUNNETJEPSEN, A., Thompson, C. L., TWIEG, R. J., Moerner, W. E.
  1997; 70 (12): 1515-1517

- **Single-molecule spectroscopy and quantum optics in solids** *ADVANCES IN ATOMIC, MOLECULAR, AND OPTICAL PHYSICS*
  Moerner, W. E., Dickson, R. M., Norris, D. J.
  1997; 38: 193-236

- **Optical limiting in a photorefractive polymer** *Symposium on Materials for Optical Limiting II, at 1997 MRS Spring Meeting*
  Grunnet-Jepsen, A., Thompson, C. L., Moerner, W. E.
  MATERIALS RESEARCH SOCIETY.1997: 199–207

- **Recent advances in photorefractive polymer materials** *Conference on Nonlinear Optical Properties of Organic Materials X*
  Moerner, W. E., GRUNNETJEPSEN, A., Thompson, C. L., Bratcher, M. S., TWIEG, R. J.
  SPIE - INT SOC OPTICAL ENGINEERING.1997: 84–94

- **Large gain photorefractive polymers** *Conference on Xerographic Photoreceptors and Organic Photorefractive Materials II*
  GRUNNETJEPSEN, A., Thompson, C. L., TWIEG, R. J., Belfield, K., Bratcher, M. S., Moerner, W. E.
  SPIE - INT SOC OPTICAL ENGINEERING.1997: 216–226

- **Photorefractive polymers** *ANNUAL REVIEW OF MATERIALS SCIENCE*
  Moerner, W. E., GRUNNETJEPSEN, A., Thompson, C. L.
  1997; 27: 585-623

- **Three-dimensional imaging of single molecules solvated in pores of poly(acrylamide) gels** *SCIENCE*
  Dickson, R. M., Norris, D. J., Tzeng, Y. L., Moerner, W. E.
  1996; 274 (5289): 966-969

- **Holographic digital data storage in a photorefractive polymer** *OPTICS LETTERS*
  LUNDQUIST, P. M., Poga, C., DeVoe, R. G., Jia, Y., Moerner, W. E., Bernal, M. P., Coufal, H., Grygier, R. K., Hoffnagle, J. A., Jefferson, C. M., Macfarlane, R. M., Shelby, R. M., Sincerbox, et al
  1996; 21 (12): 890-892

- **Single molecules solvated in pores of polyacrylamide gels** *Proceedings of the Fifth International Meeting on Hole Burning and Related Spectroscopies (HBRS'96) - Science and Applications*
  Dickson, R. M., Norris, D. J., Tzeng, Y. L., Sakowicz, R., Goldstein, L. S., Moerner, W. E.
  GORDON BREACH PUBLISHING, TAYLOR & FRANCIS GROUP.1996: 31–39

- **Mechanisms of photorefractivity in polymer composites** *Conference on Organic Photorefractive Materials and Xerographic Photoreceptors*
  Moerner, W. E., GRUNNETJEPSEN, A., Thompson, C. L., TWIEG, R. J.
  SPIE - INT SOC OPTICAL ENGINEERING.1996: 2–13

- **PHOTOREFRACTIVE POLYMERS BASED ON DUAL-FUNCTION DOPANTS** *JOURNAL OF PHYSICAL CHEMISTRY*
  SILENCE, S. M., Scott, J. C., Stankus, J. J., Moerner, W. E., Moylan, C. R., Bjorklund, G. C., TWIEG, R. J.
  1995; 99 (12): 4096-4105

- **PHOTOREFRACTIVE POLYMERS - A STATUS-REPORT** *15th IUPAC Symposium on Photochemistry*
  BURLAND, D. M., Bjorklund, G. C., Moerner, W. E., SILENCE, S. M., Stankus, J. J.
  INT UNION PURE APPLIED CHEMISTRY.1995: 33–38

- **Photorefractivity in new organic polymeric materials** *Conference on Xerographic Photoreceptors and Photorefractive Polymers*

Poga, C., BURLAND, D. M., Hanemann, T., Jia, Y., Moylan, C. R., Stankus, J. J., TWIEG, R. J., Moerner, W. E.
SPIE - INT SOC OPTICAL ENGINEERING.1995: 82–93

- **OPTICAL TRAP ACTIVATION IN A PHOTOREFRACTIVE POLYMER** *OPTICS LETTERS*
  SILENCE, S. M., Bjorklund, G. C., Moerner, W. E.
  1994; 19 (22): 1822-1824

- **CASCADING OF 2ND-ORDER PROCESSES IN QUADRATIC MOLECULAR MEDIA AT THE ORIGIN OF VERY LARGE CUBIC EFFECTS** *Symposium D on Organic Materials for Electronics - Polymer Interfaces with Metals and Semiconductors, at the 1994 E-MRS Spring Conference*
  Vidakovic, P., Zyss, J., Kim, D., TORUELLAS, W., Stegeman, G., Moerner, W. E., Twieg, R., Bjorklund, G.
  ELSEVIER SCIENCE SA.1994: 303–7

- **QUASINONDESTRUCTIVE READOUT IN A PHOTOREFRACTIVE POLYMER** *PHYSICAL REVIEW LETTERS*
  SILENCE, S. M., TWIEG, R. J., Bjorklund, G. C., Moerner, W. E.
  1994; 73 (15): 2047-2050

- **ELECTRIC-FIELD-SWITCHABLE STRATIFIED VOLUME HOLOGRAMS IN PHOTOREFRACTIVE POLYMERS** *OPTICS LETTERS*
  Stankus, J. J., SILENCE, S. M., Moerner, W. E., Bjorklund, G. C.
  1994; 19 (18): 1480-1482

- **2ND-ORDER CASCADING AS THE ORIGIN OF LARGE 3RD-ORDER EFFECTS IN ORGANIC SINGLE-CRYSTAL-CORE FIBERS** *OPTICS LETTERS*
  Kim, D. Y., Torruellas, W. E., Kang, J., Bosshard, C., Stegeman, G. I., Vidakovic, P., Zyss, J., Moerner, W. E., Twieg, R., Bjorklund, G.
  1994; 19 (12): 868-870

- **OPTICAL-PROPERTIES OF POLY(N-VINYLCARBAZOLE)-BASED GUEST-HOST PHOTOREFRACTIVE POLYMER SYSTEMS** *APPLIED OPTICS*
  SILENCE, S. M., Donckers, M. C., Walsh, C. A., BURLAND, D. M., TWIEG, R. J., Moerner, W. E.
  1994; 33 (11): 2218-2222

- **ELECTRIC FIELD-DEPENDENT NONPHOTOREFRACTIVE GRATINGS IN A NONLINEAR PHOTOCONDUCTING POLYMER** *APPLIED PHYSICS LETTERS*
  SILENCE, S. M., Donckers, M. C., Walsh, C. A., BURLAND, D. M., Moerner, W. E., TWIEG, R. J.
  1994; 64 (6): 712-714

- **ORIENTATIONALLY ENHANCED PHOTOREFRACTIVE EFFECT IN POLYMERS** *JOURNAL OF THE OPTICAL SOCIETY OF AMERICA B-OPTICAL PHYSICS*
  Moerner, W. E., SILENCE, S. M., Hache, F., Bjorklund, G. C.
  1994; 11 (2): 320-330

- **POLYMERIC PHOTOREFRACTIVE MATERIALS** *CHEMICAL REVIEWS*
  Moerner, W. E., SILENCE, S. M.
  1994; 94 (1): 127-155

- **RECENT PROGRESS IN PHOTOREFRACTIVE POLYMERS - MATERIALS AND STRUCTURES** *Conference on Nonlinear Optical Properties of Organic Materials VII*
  Stankus, J. J., SILENCE, S. M., TWIEG, R. J., BURLAND, D. M., Miller, R. D., Scott, J. C., Moerner, W. E., Bjorklund, G. C.
  SPIE-INT SOC OPTICAL ENGINEERING.1994: 204–215

- **POLY(SILANE)-BASED HIGH-MOBILITY PHOTOREFRACTIVE POLYMERS** *JOURNAL OF THE OPTICAL SOCIETY OF AMERICA B-OPTICAL PHYSICS*
  SILENCE, S. M., Scott, J. C., Hache, F., Ginsburg, E. J., JENKNER, P. K., Miller, R. D., TWIEG, R. J., Moerner, W. E.
  1993; 10 (12): 2306-2312

- **NET 2-BEAM-COUPLING GAIN IN A POLYMERIC PHOTOREFRACTIVE MATERIAL** *OPTICS LETTERS*
  Donckers, M. C., SILENCE, S. M., Walsh, C. A., Hache, F., BURLAND, D. M., Moerner, W. E., TWIEG, R. J.
  1993; 18 (13): 1044-1046

- **MAGNETIC-RESONANCE OF A SINGLE MOLECULAR SPIN** *NATURE*
  Kohler, J., Disselhorst, J. A., Donckers, M. C., Groenen, E. J., Schmidt, J., Moerner, W. E.
  1993; 363 (6426): 242-244

- **OPTICAL SPECTROSCOPY OF SINGLE IMPURITY MOLECULES IN SOLIDS** *ANGEWANDTE CHEMIE-INTERNATIONAL EDITION*
  Moerner, W. E., Basche, T.
  1993; 32 (4): 457-476

- **PHOTOCONDUCTION AND PHOTOREFRACTION IN MOLECULARLY DOPED POLYMERS** *SYNTHETIC METALS*
  Scott, J. C., PAUTMEIER, L. T., Moerner, W. E.
  1993; 54 (1-3): 9-19

- **NONLINEAR-OPTICAL PROPERTIES OF PHOTOREFRACTIVE POLYMERS** *CONF ON NONLINEAR OPTICAL PROPERTIES OF ADVANCED MATERIALS*
  SILENCE, S. M., Hache, F., Donckers, M., Walsh, C. A., BURLAND, D. M., Bjorklund, G. C., TWIEG, R. J., Moerner, W. E.
  SPIE - INT SOC OPTICAL ENGINEERING.1993: 253–265

- **LIGHTWAVE TRANSMISSION OF MULTIPLE TELEVISION SIGNALS USING AN ORGANIC POLYMER ELECTROOPTIC PHASE MODULATOR** *Conference on Nonlinear Optical Properties of Organic Materials VI*
  SMITH, B. A., Jurich, M., Moerner, W. E., Volksen, W., Best, M. E., Fleming, W., Swalen, J. D., Bjorklund, G. C.
  SPIE - INT SOC OPTICAL ENGINEERING.1993: 499–506

- **C-60 SENSITIZATION OF A PHOTOREFRACTIVE POLYMER** *APPLIED PHYSICS LETTERS*
  SILENCE, S. M., Walsh, C. A., Scott, J. C., Moerner, W. E.
  1992; 61 (25): 2967-2969

- **PHOTOCONDUCTIVITY STUDIES OF PHOTOREFRACTIVE POLYMERS** *JOURNAL OF THE OPTICAL SOCIETY OF AMERICA B-OPTICAL PHYSICS*
  Scott, J. C., PAUTMEIER, L. T., Moerner, W. E.
  1992; 9 (11): 2059-2064

- **PHOTON ANTIBUNCHING IN THE FLUORESCENCE OF A SINGLE DYE MOLECULE TRAPPED IN A SOLID** *PHYSICAL REVIEW LETTERS*
  Basche, T., Moerner, W. E., Orrit, M., TALON, H.
  1992; 69 (10): 1516-1519

- **2-BEAM COUPLING MEASUREMENTS OF GRATING PHASE IN A PHOTOREFRACTIVE POLYMER** *JOURNAL OF THE OPTICAL SOCIETY OF AMERICA B-OPTICAL PHYSICS*
  Walsh, C. A., Moerner, W. E.
  1992; 9 (9): 1642-1647

- **SUBSECOND GRATING GROWTH IN A PHOTOREFRACTIVE POLYMER** *OPTICS LETTERS*
  SILENCE, S. M., Walsh, C. A., Scott, J. C., MATRAY, T. J., TWIEG, R. J., Hache, F., Bjorklund, G. C., Moerner, W. E.
  1992; 17 (16): 1107-1109

- **SINGLE MOLECULE SPECTRAL DIFFUSION IN A SOLID DETECTED VIA FLUORESCENCE SPECTROSCOPY** *8TH INTERNATIONAL CONF ON DYNAMICAL PROCESSES IN EXCITED STATES OF SOLIDS (DPC 91)*
  Ambrose, W. P., Basche, T., Moerner, W. E.
  ELSEVIER SCIENCE BV.1992: 62–67

- **OPTICAL-SPECTRA AND KINETICS OF SINGLE IMPURITY MOLECULES IN A POLYMER - SPECTRAL DIFFUSION AND PERSISTENT SPECTRAL HOLE BURNING** *TOPICAL MEETING ON PERSISTENT SPECTRAL HOLE-BURNING SCIENCE AND APPLICATIONS*
  Basche, T., Ambrose, W. P., Moerner, W. E.
  OPTICAL SOC AMER.1992: 829–36

- **OPTICAL MODIFICATION OF A SINGLE IMPURITY MOLECULE IN A SOLID** *NATURE*
  Basche, T., Moerner, W. E.
  1992; 355 (6358): 335-337

- **PHOTOCONDUCTIVITY OF PHOTOREFRACTIVE POLYMERS** *SYMP ON MACROMOLECULAR HOST-GUEST COMPLEXES : OPTICAL AND OPTOELECTRONIC PROPERTIES AND APPLICATIONS, AT THE 1992 SPRING MEETING OF THE MATERIALS RESEARCH SOC*
  Scott, J. C., PAUTMEIER, L. T., Moerner, W. E., Walsh, C. A., SILENCE, S. M., MATRAY, T. J., TWIEG, R. J.
  MATERIALS RESEARCH SOC.1992: 135–144

- **OPTICAL WAVE-GUIDING IN POLED NLO POLYMERS** *SYMP ON MATERIALS FOR OPTICAL INFORMATION PROCESSING*
  Swalen, J. D., Fleming, W., Jurich, M., Moerner, W. E., SMITH, B. A., Herminghaus, S., Bjorklund, G. C.

MATERIALS RESEARCH SOC.1992: 101–110

- **NONLINEAR OPTICAL-PROPERTIES OF ORGANIC PHOTOREFRACTIVE POLYMERS** *SYMP ON MACROMOLECULAR HOST-GUEST COMPLEXES : OPTICAL AND OPTOELECTRONIC PROPERTIES AND APPLICATIONS, AT THE 1992 SPRING MEETING OF THE MATERIALS RESEARCH SOC*

  Moerner, W. E., Walsh, C. A., SILENCE, S. M., TWIEG, R. J., MATRAY, T. J., Scott, J. C., Lee, V. Y., Miller, R. D., Hache, F., BURLAND, D. M., Bjorklund, G. C.

  MATERIALS RESEARCH SOC.1992: 121–133

- **NLO POLYMERIC WAVE-GUIDE ELECTROOPTIC PHASE MODULATOR** *5TH CONF ON NONLINEAR OPTICAL PROPERTIES OF ORGANIC MATERIALS*

  Swalen, J. D., Bjorklund, G. C., Fleming, W., Hung, R., Jurich, M., Lee, V. Y., Miller, R. D., Moerner, W. E., MORICHERE, D. Y., Skumanich, A., SMITH, B. A.

  SPIE - INT SOC OPTICAL ENGINEERING.1992: 369–378

- **DETECTION AND SPECTROSCOPY OF SINGLE PENTACENE MOLECULES IN A PARA-TERPHENYL CRYSTAL BY MEANS OF FLUORESCENCE EXCITATION** *JOURNAL OF CHEMICAL PHYSICS*

  Ambrose, W. P., Basche, T., Moerner, W. E.

  1991; 95 (10): 7150-7163

- **OBSERVATION OF THE PHOTOREFRACTIVE EFFECT IN A POLYMER** *PHYSICAL REVIEW LETTERS*

  Ducharme, S., Scott, J. C., TWIEG, R. J., Moerner, W. E.

  1991; 66 (14): 1846-1849

- **FLUORESCENCE SPECTROSCOPY AND SPECTRAL DIFFUSION OF SINGLE IMPURITY MOLECULES IN A CRYSTAL** *NATURE*

  Ambrose, W. P., Moerner, W. E.

  1991; 349 (6306): 225-227

- **PHASE-SENSITIVE OPTICAL-DETECTION OF BALLISTIC PHONON HEAT PULSES USING FREQUENCY-MODULATION SPECTROSCOPY AND PERSISTENT SPECTRAL HOLES** *PHYSICAL REVIEW B*

  Ambrose, W. P., Moerner, W. E.

  1991; 43 (2): 1743-1755

- **APPLICATIONS OF ORGANIC 2ND-ORDER NONLINEAR OPTICAL-MATERIALS** *ACS SYMPOSIUM SERIES*

  Bjorklund, G. C., Ducharme, S., Fleming, W., JUNGBAUER, D., Moerner, W. E., Swalen, J. D., TWIEG, R. J., WILLSON, C. G., Yoon, D. Y.

  1991; 455: 216-225

- **POLED EPOXY POLYMERS FOR OPTOELECTRONICS** *NATO ADVANCED RESEARCH WORKSHOP ON ORGANIC MOLECULAR FOR NONLINEAR OPTICS AND PHOTONICS*

  Swalen, J. D., Bjorklund, G. C., Fleming, W., Herminghaus, S., JUNGBAUER, D., Jurich, M., Moerner, W. E., Reck, B., SMITH, B. A., Twieg, R., WILLSON, C. G., Zentel, R.

  KLUWER ACADEMIC PUBL.1991: 433–445

- **FINDING A SINGLE MOLECULE IN A HAYSTACK - LASER SPECTROSCOPY OF SOLIDS FROM SQUARE-ROOT-N TO N=1** *CONF ON OPTICAL METHODS FOR ULTRASENSITIVE DETECTION AND ANALYSIS : TECHNIQUES AND APPLICATIONS*

  Moerner, W. E., Ambrose, W. P.

  SPIE - INT SOC OPTICAL ENGINEERING.1991: 244–251

- **PHOTOREFRACTIVITY IN DOPED NONLINEAR ORGANIC POLYMERS** *CONF ON NONLINEAR OPTICAL PROPERTIES OF ORGANIC MATERIALS 4*

  Moerner, W. E., Walsh, C., Scott, J. C., Ducharme, S., BURLAND, D. M., Bjorklund, G. C., TWIEG, R. J.

  SPIE - INT SOC OPTICAL ENGINEERING.1991: 278–289

- **INTRACAVITY FREQUENCY DOUBLING OF A ND-YAG LASER WITH AN ORGANIC NONLINEAR OPTICAL-CRYSTAL** *APPLIED PHYSICS LETTERS*

  Ducharme, S., Risk, W. P., Moerner, W. E., Lee, V. Y., TWIEG, R. J., Bjorklund, G. C.

  1990; 57 (6): 537-539

- **TEMPERATURE-DEPENDENCE OF PHOTON-GATED PERSISTENT SPECTRAL HOLE-BURNING FOR THE MESO-TETRA-PARA-TOLYL-ZN-TETRABENZOPORPHYRIN CHLOROFORM SYSTEM IN POLY(METHYLMETHACRYLATE)** *CHEMICAL PHYSICS*

  Ambrose, W. P., Moerner, W. E.

  1990; 144 (1): 71-79

- **OPTICAL-DETECTION AND PROBING OF SINGLE DOPANT MOLECULES OF PENTACENE IN A P-TERPHENYL HOST CRYSTAL BY MEANS OF ABSORPTION-SPECTROSCOPY** *JOURNAL OF PHYSICAL CHEMISTRY*
  Kador, L., HORNE, D. E., Moerner, W. E.
  1990; 94 (4): 1237-1248

- **ORGANIC NONLINEAR OPTICAL-MATERIALS AND THEIR DEVICE APPLICATIONS FOR FREQUENCY DOUBLING, MODULATION, AND SWITCHING** *CONF ON NONLINEAR OPTICAL PROPERTIES OF ORGANIC MATERIALS 3*
  Swalen, J. D., Bjorklund, G. C., Ducharme, S., Fleming, W., Herminghaus, S., JUNGBAUER, D., Moerner, W. E., SMITH, B. A., Twieg, R., Yoon, D., Willson, G.
  SPIE - INT SOC OPTICAL ENGINEERING.1990: 2–11

- **ULTRASENSITIVE LASER SPECTROSCOPY IN SOLIDS - SINGLE-MOLECULE DETECTION** *4TH INTERNATIONAL CONF ON UNCONVENTIONAL PHOTOACTIVE SOLIDS (4TH UPS)*
  Moerner, W. E., Kador, L., Ambrose, W. P.
  GORDON BREACH SCI PUBL LTD.1990: 47–57

- **FINDING A SINGLE MOLECULE IN A HAYSTACK - OPTICAL-DETECTION AND SPECTROSCOPY OF SINGLE ABSORBERS IN SOLIDS** *ANALYTICAL CHEMISTRY*
  Moerner, W. E., Kador, L.
  1989; 61 (21): A1217-A1223

- **OPTICAL-DETECTION AND SPECTROSCOPY OF SINGLE MOLECULES IN A SOLID** *PHYSICAL REVIEW LETTERS*
  Moerner, W. E., Kador, L.
  1989; 62 (21): 2535-2538

- **PSEUDO-STARK EFFECT AND FM/STARK DOUBLE-MODULATION SPECTROSCOPY FOR THE DETECTION OF STATISTICAL FINE-STRUCTURE IN ALEXANDRITE** *CHEMICAL PHYSICS LETTERS*
  Carter, T. P., HORNE, D. E., Moerner, W. E.
  1988; 151 (1-2): 102-108

- **STATISTICAL FINE-STRUCTURE IN THE INHOMOGENEOUSLY BROADENED ELECTRONIC ORIGIN OF PENTACENE IN P-TERPHENYL** *JOURNAL OF CHEMICAL PHYSICS*
  Carter, T. P., MANAVI, M., Moerner, W. E.
  1988; 89 (4): 1768-1779

- **STATISTICAL FINE-STRUCTURE OF INHOMOGENEOUSLY BROADENED ABSORPTION-LINES** *PHYSICAL REVIEW LETTERS*
  Moerner, W. E., Carter, T. P.
  1987; 59 (23): 2705-2708

- **MECHANISM OF PHOTON-GATED PERSISTENT SPECTRAL HOLE BURNING IN METAL TETRABENZOPORPHYRIN HALOMETHANE SYSTEMS - DONOR-ACCEPTOR ELECTRON-TRANSFER** *JOURNAL OF PHYSICAL CHEMISTRY*
  Carter, T. P., Brauchle, C., Lee, V. Y., MANAVI, M., Moerner, W. E.
  1987; 91 (15): 3998-4004

- **PHOTON-GATED SPECTRAL HOLE BURNING BY DONOR-ACCEPTOR ELECTRON-TRANSFER** *OPTICS LETTERS*
  Carter, T. P., Brauchle, C., Lee, V. Y., MANAVI, M., Moerner, W. E.
  1987; 12 (5): 370-372

- **FAST BURNING OF PERSISTENT SPECTRAL HOLES IN SMALL LASER SPOTS USING PHOTONGATED MATERIALS** *APPLIED PHYSICS LETTERS*
  Moerner, W. E., Carter, T. P., Brauchle, C.
  1987; 50 (8): 430-432

- **PHASE SENSITIVE DETECTION OF PERSISTENT SPECTRAL HOLES USING SYNCHRONOUS ULTRASONIC MODULATION** *APPLIED PHYSICS LETTERS*
  Moerner, W. E., Huston, A. L.
  1986; 48 (18): 1181-1183

- **PERSISTENT SPECTRAL HOLE BURNING FOR R' COLOR-CENTERS IN LIF CRYSTALS - STATICS, DYNAMICS, AND EXTERNAL-FIELD EFFECTS** *PHYSICAL REVIEW B*
  Moerner, W. E., POKROWSKY, P., Schellenberg, F. M., Bjorklund, G. C.
  1986; 33 (8): 5702-5716

- **PHOTOCHEMICAL HOLE-BURNING IN A PROTONATED PHTHALOCYANINE WITH GAALAS DIODE-LASERS** *CHEMICAL PHYSICS LETTERS*
  Lee, H. W., Huston, A. L., GEHRTZ, M., Moerner, W. E.
  1985; 114 (5-6): 491-496
- **CAN SINGLE-PHOTON PROCESSES PROVIDE USEFUL MATERIALS FOR FREQUENCY-DOMAIN OPTICAL STORAGE** *JOURNAL OF THE OPTICAL SOCIETY OF AMERICA B-OPTICAL PHYSICS*
  Moerner, W. E., Levenson, M. D.
  1985; 2 (6): 915-924
- **2-COLOR, PHOTON-GATED SPECTRAL HOLE-BURNING IN AN ORGANIC MATERIAL** *CHEMICAL PHYSICS LETTERS*
  Lee, H. W., GEHRTZ, M., Marinero, E. E., Moerner, W. E.
  1985; 118 (6): 611-616
- **HIGH-EFFICIENCY PHOTOCHEMICAL HOLE BURNING FOR AN INFRARED COLOR CENTER** *PHYSICAL REVIEW B*
  Moerner, W. E., Schellenberg, F. M., Bjorklund, G. C., Kaipa, P., Luty, F.
  1985; 32 (2): 1270-1277
- **BEYOND THE BOTTLENECK - SUBMICROSECOND HOLE BURNING IN PHTHALOCYANINE** *JOURNAL OF THE OPTICAL SOCIETY OF AMERICA B-OPTICAL PHYSICS*
  Romagnoli, M., Moerner, W. E., Schellenberg, F. M., Levenson, M. D., Bjorklund, G. C.
  1984; 1 (3): 341-348
- **DETECTION OF PERSISTENT SPECTRAL HOLES USING ULTRASONIC MODULATION** *JOURNAL OF THE OPTICAL SOCIETY OF AMERICA B-OPTICAL PHYSICS*
  Huston, A. L., Moerner, W. E.
  1984; 1 (3): 349-353
- **READING AND WRITING OF PHOTOCHEMICAL HOLES USING GAALAS-DIODE LASERS** *OPTICS LETTERS*
  POKROWSKY, P., Moerner, W. E., Chu, F., Bjorklund, G. C.
  1983; 8 (5): 280-282
- **FM SPECTROSCOPY DETECTION OF STIMULATED RAMAN GAIN** *OPTICS LETTERS*
  Levenson, M. D., Moerner, W. E., HORNE, D. E.
  1983; 8 (2): 108-110

PRESENTATIONS

- 2014 Nobel Prize Interview - Nobel Prize Foundation (December 6, 2014)
- What Can You Do With Single Molecules? (student talk 2017) - Physics/Astronomy Colloquium, University of New Mexico
- Kavli Symposium APS March Meeting 2015: Light & Single-Molecule Spectroscopy, Imaging, & Photocontrol - Foundations for Super-Resolution Microscopy - American Physical Society March Meeting (3/1/2015)
- AAAS Science technology webinar 2013: Fluorescent Probes and Digital Imaging - AAAS Science (June 12, 2013)
- Moerner Presentations - full list - Various locations
- SPIE interview 2012: Super-Resolution and the Double-Helix Point Spread Function - SPIE (June 4, 2012)