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Education

Ph.D. Chemistry University of California at San Diego, 1990
B.S. Chemistry Peking University, Beijing, P. R. China, 1984

Professional Appointments

2009 - present Mallinckrodt Professor of Chemistry and Chemical Biology, Harvard University
2009 - present Cheung Kong Visiting Professor, Peking University, College of Life Sciences
1999 - 2009 Professor of Chemistry, Harvard University, Department of Chemistry and Chemical Biology
1995 - 1999 Adjunct Associate Professor to Professor of Physics, Portland State University, Oregon
1992 - 1999 Senior Research Scientist to Chief Scientist, Environmental Molecular Sciences Laboratory, Pacific Northwest National Laboratory
1990 - 1992 Postdoctoral Fellow, University of Chicago

Honors

2009 E.O. Lawrence Award, U.S. Department of Energy
2008 Fellow, American Physical Society
2008 Berthold Leibinger Innovation Prize
2008 Fellow, American Academy of Arts & Sciences
2007 Willis E. Lamb Award for Laser Science and Quantum Optics
2006 Fellow, American Association for the Advancement of Science
2006 Fellow, Biophysical Society
2004 NIH Director's Pioneer Award Recipient
2003 Raymond and Beverly Sackler Prize in the Physical Sciences, Israel
1996 Coblentz Award, Coblentz Society
1988 Jane Hart Memorial Award, University of California at San Diego

Society Memberships

American Chemical Society, American Physical Society, Biophysical Society, Optical Society of America, SPIE

Current Research Interests

Single molecule spectroscopy, enzymology, and biophysics
Probing single molecule behaviors in live cells, gene expression in particular
Nonlinear optical imaging of living cells and tissues by coherent Raman scattering microscopy

Professional Services

Member, Committee on Revealing Chemistry through Advanced Chemical Imaging, National Academy of Science, 2005-2006
Member, Rowland Institute Advisory Board, Harvard University, since 2002

Member, Council for Department of Energy, Office of Science, Basic Energy Sciences, 2002-2005
Member, Advisory Board for Biological Sciences, Pacific Northwest National Laboratory, 2001-2004
Member of Editorial Boards: *Science*, 2009-; *Ann. Rev. Phys. Chem.* 2002-; *Acc. Chem. Res.* 2001-; *Chem. Phys.* 2001-; *Chem. Phys. Lett.* 2001-; *ChemPhysChem* 2000-; *J. Phys. Chem.* 2000-; *J. Microscopy* 1999-; *Single Molecules* 1999-2002; *Biophysical J.* 2000-2001
Organizer, Symposium on "Single Molecules Meet System Biology," 54th Biophysical Meeting, San Francisco, 2010.

Co-organizer, 355th Xiangshan Science Conference, “Single-Molecule Imaging, Spectroscopy and Manipulation of Biological Systems,” Beijing, 2009.

Founding co-chair, Gordon Conference on “Single Molecule Approaches to Biology,” 2006.

Organizer, Annual Coherent Raman Microscopy Workshop, Harvard University, Cambridge, 2004–2010.

Co-organizer, Symposium on “Single Molecules and Single Cells,” Peking University, Beijing, 2004.

Co-organizer, Symposium on “Biophysical Chemistry and Novel Imaging of Single Molecules and Single Cells,” 228th ACS Meeting, Philadelphia, 2004.

Organizer, Symposium on “Sizing up Single Molecules,” 45th Biophysical Meeting, Boston, 2001.

Co-organizer, Symposium on “Chemistry of Single Molecules,” 213th ACS Meeting, San Francisco, 1997.

Key Publications

Min, Wei; Lu, Sijia; Chong, Shasha; Roy, Rahul; Holtom, Gary R.; Xie, X. Sunney “Imaging Chromophores with undetectable fluorescence by stimulated emission microscopy,” *Nature*, **461**, 1105-1109 (2009).

Freudiger, Christian W.; Min, Wei; Saar, Brian G.; Lu, Sijia; Holtom, Gary R.; He, Chengwei; Tsai, Jason C.; Kang, Jing X.; Xie, X. Sunney “Label-Free Biomedical Imaging with High Sensitivity by Stimulated Raman Scattering Microscopy,” *Science*, **322**, 1857-1860 (2008).

Choi, Paul J.; Cai, Long; Frieda, Kirsten; Xie, X. Sunney “A Stochastic Single-Molecule Event Triggers Phenotype Switching in a Bacterial Cell,” *Science*, **322**, 422-446 (2008).

Elf, Johan; Li, Gene-Wei; Xie, X. Sunney “Probing Transcription Factor Dynamics at the Single-Molecule Level in a Living Cell,” *Science* **316**, 1191-1194 (2007).

Yu, Ji; Xiao, Jie; Ren, Xiaojia; Lao, Kaiqin; Xie, X. Sunney “Probing Gene Expression in Live Cells, One Protein Molecule at a Time,” *Science* **311**, 1600 (2006).

Cai, Long; Friedman, Nir; Xie, X. Sunney “Stochastic protein expression in individual cells at the single molecule level,” *Nature* **440**, 358 (2006).

English, Brian P.; Min, Wei; van Oijen, Antoine M.; Lee, Kang Taek; Luo, Guobin; Sun, Hongye; Cherayil, Binny J.; Kou, S.C.; Xie, X. Sunney “Ever-fluctuating single enzyme molecules: Michaelis-Menten equation revisited,” *Nat. Chem. Bio.* **2**, 87 (2006).

Evans, Conor L.; Potma, Eric O.; Puoris'haag, Mehron; Côté, Daniel; Lin, Charles P.; Xie, X. Sunney “Chemical imaging of tissue *in vivo* with video-rate coherent anti-Stokes Raman scattering microscopy,” *Proc. Natl. Aca. Sci.* **102**, 16807 (2005).

Yang, Haw; Luo, Guobin; Karnchanaphanurach, Pallop; Louie, Tai-Man; Rech, Ivan; Cova, Sergio; Xun, Luying; Xie, X. Sunney “Protein Conformational Dynamics Probed by Single-Molecule Electron Transfer,” *Science* **302**, 262 (2003).

Zumbusch, Andreas; Holtom, Gary R.; Xie, X. Sunney “Vibrational Microscopy Using Coherent Anti-Stokes Raman Scattering,” *Phys. Rev. Lett.* **82**, 4142 (1999).

Lu, H. Peter; Xun, Luying; Xie, X. Sunney “Single-Molecule Enzymatic Dynamics,” *Science* **282**, 1877 (1998).

Xie, X. Sunney; Dunn, Robert C. “Probing Single Molecule Dynamics,” *Science* **265**, 361 (1994).

Key Review Articles

Evans, Conor; Xie, X. Sunney “Coherent Anti-Stokes Raman Scattering Microscopy: Chemical Imaging for Biology and Medicine,” *Annu. Rev. Analy. Chem.* **1**, 883-909 (2008).

Xie, X. Sunney; Choi, Paul J.; Li, Gene-Wei; Lee, Nam Ki; Lia, Giuseppe “Single-Molecule Approach to Molecular Biology in Living Bacterial Cells,” *Annu. Rev. Biophys.* **37**, 417-444 (2008).

Xiao, Jie; Elf, Johan; Li, Gene-Wei; Yu, Ji; Xie, X. Sunney “*Imaging Gene Expression in Living Cells at the Single-Molecule Level*” in Single Molecule Techniques A Laboratory Manual Edited by Paul R. Selvin and Taekjip Ha, p 149-170, Cold Spring Harbor Laboratory Press, Cold Spring Harbor (2008).

Schroeder, Charles M.; Blainey, Paul C.; Kim, Sangjin; Xie, X. Sunney “*Hydrodynamic Flow-stretching Assay for Single-Molecule Studies of Nucleic Acid-Protein Interactions*” in Single Molecule Techniques A Laboratory Manual Edited by Paul R. Selvin and Taekjip Ha, p 461-492, Cold Spring Harbor Laboratory Press, Cold Spring Harbor (2008).

Xie, X. Sunney; Cheng, Ji-Xin; Potma, Eric O. “*Coherent Anti-Stokes Raman Scattering Microscopy*” in Handbook of Biological Confocal Microscopy 3rd ed. Edited by James Pawley, p 595-606, Springer Science, New York (2006).

Xie, X. Sunney; Yu, Ji; Yang, Wei Yuan “Living Cells as Test Tubes,” *Science* **312**, 228 (2006).

Min, Wei; English, Brian P.; Luo, Guobin; Cherayil, Binny J.; Kou, S.C.; Xie, X. Sunney “Fluctuating Enzymes: Lessons from Single-Molecule Studies,” *Acc. Chem. Res.* **38**, 923-931 (2005).

Potma, Eric O.; Xie, X. Sunney “Cars Microscopy for Biology and Medicine,” *Optics & Photonic News* **15**, 40 (2004).

Cheng, Ji-Xin; and Xie, X. Sunney “Coherent anti-Stokes Raman scattering microscopy: instrumentation, theory and applications,” *J. Phys. Chem. B* **108**, 827 (2004).

Xie, X. Sunney “Single-molecule approach to dispersed kinetics and dynamic disorder: Probing conformational fluctuation and enzymatic dynamics,” *J. Chem. Phys.* **117**, 11024 (2002).

Xie, X. Sunney “Single-Molecule Approach to Enzymology,” *Single Molecule* **4**, 229 (2001).

Xie, X. Sunney; Trautman, Jay K. “Single-Molecule Optical Studies at Room Temperature,” *Ann. Rev. Phys. Chem.* **49**, 441 (1998).

Xie, X. Sunney “Single-Molecule Spectroscopy and Dynamics at Room Temperature,” *Acc. Chem. Res.* **29**, 598 (1996).

Other Publications

137 papers

http://bernstein.harvard.edu/pages/prof_xie/full_pubs_list.html

6 patents

http://bernstein.harvard.edu/pages/prof_xie/patents.html

Notable Lectures

2010	Kendrick Lecture, Ohio State University, Columbus, Ohio
2010	Dolan Pritchett Memorial Lecture, University of Pennsylvania, Philadelphia
2009	Einstein Professorship of the Chinese Academy of Science
2009	McElvain Lecture in Physical Chemistry, University of Wisconsin-Madison
2008	Lawrence Bragg Lecture, Cambridge University, Cavendish Laboratory, UK
2008	Mueller Lecturer, Purdue University, West Lafayette, Indiana
2008	Gordon Lecture, University of Washington, Seattle
2008	Leica Scientific Forum UK, Cambridge, Liverpool, Oxford, London
2008	Francis Clifford Phillips Lecturer, University of Pittsburgh
2007	Joseph Coleman Memorial Lecture, Yale University, New Haven
2007	Davidson Lecturer, University of Kansas, Lawrence
2007	Noyes Distinguished Lecturer, University of Texas at Austin
2007	Georges Smets Chair, Katholieke Universiteit Leuven, Universite catholique de Louvain
2007	Chan Lecturer, University of California, Berkeley
2007	Larry V. McIntire Lecturer, Rice University
2007	Dow Lecture in Analytical Chemistry, University of British Columbia

2007 Powell Lecturer, University of Richmond

2006 Keynote speaker in Whitehead Symposium XXIV on BIOImaging: Capturing Cell Dynamics, MIT

2006 Russell Marker Lecturer in the Chemical Sciences, Pennsylvania State University

2006 Nikon-Oxford Molecular Imaging Centre Opening Ceremony, Inaugural Lecture, Oxford University

2006 Frontiers in Chemical Research Lecturer, Texas A&M University

2005 Town Talk in Telluride, Colorado

2005 Meyerhof Lecturer, Max Planck Institute for Medical Research, Heidelberg

2005 Invited Lecture at the Nobel Symposium on “Controlled Nanoscale Motion in Biological and Artificial Systems,” Sweden

2005 PC Cross Lecturer, University of Washington

2004 Nieuwland Lecturer, University of Notre Dame, South Bend, Indiana

2003 Sackler Prize presentation, Tel Aviv University, Israel.

2003 Clarence Karcher Lecture, University of Oklahoma, Norman, Oklahoma

2002 Bryce Crawford Lecture, University of Minnesota, St. Paul, Minnesota.

2002 Noyes Distinguished Lecture, University of Rochester, Rochester, New York.

2001 William Pyle Philips Distinguished Lecture at Haverford College, Haverford, Pennsylvania

2000 Plenary Lecture, Symposium of “*Physical Chemistry in the 21st Century*” at the 219th ACS meeting, San Francisco, California

1999 Plenary Lecture at the Nobel Conference on Single-Molecule Spectroscopy in Physics, Chemistry and Biology, Stockholm, Sweden

1998 Topical Lecture at the Annual Symposium on Frontier of Sciences, National Academy of Sciences, Irvine, California

1997 Topical Lecture at AAAS Annual Meeting and Science Innovation Exposition '97, Seattle, Washington

1996 Coblentz Award Plenary Lecture at the 51st Ohio State University International Symposium on Molecular Spectroscopy, Columbus, Ohio