

Curriculum Vitae: Xiaowei Zhuang

Howard Hughes Medical Institute Investigator

David B. Arnold Professor of Science
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Education

1987-1991 B.S., Physics, University of Science and Technology of China
1991-1996 Ph.D., Physics, University of California, Berkeley
1997-2001 Chodorow Postdoctoral Fellow, Stanford University

Positions

2015- Director, Center for Advanced Imaging at Harvard University
2014- David B. Arnold Professor of Science, Harvard University
2006- Professor, Department of Chemistry and Chemical Biology,
Department of Physics, Harvard University
2005- Investigator, Howard Hughes Medical Institute
2005-2006 Associate Professor, Department of Chemistry and Chemical Biology,
Department of Physics, Harvard University
2001-2005 Assistant Professor, Department of Chemistry and Chemical Biology,
Department of Physics, Harvard University

Elected membership

Member, US National Academy of Sciences
Member, American Academy of Arts and Sciences
Foreign member, Chinese Academy of Sciences
Foreign member, European Molecular Biology Organization (EMBO)
Fellow, American Association of the Advancement of Science
Fellow, American Physical Society
Honorary fellow, Royal Microscopical Society

Award committee positions

2016- Lasker Award Jury
2014- Welch Award Committee, Scientific Advisory Board, The Welch Foundation
2015 National Academy of Sciences Alexander Hollaender Biophysics Award Committee
2014 National Academy of Sciences Scientific Discovery Award Committee
2013 National Academy of Sciences Initiatives in Research Award Committee
2011- Pew Scholars National Advisory Committee, The Pew Foundation

Editorial board positions

2009- *Cell*
2009- *Annual Review on Biophysics*
2014- *ACS Central Science*
2014- *ACS Photonics*
2016- *Neurophotonics*
2012-2016 *eLife*
2012-2016 *Optical nanoscopy*
2010-2015 *Chemical Physics Letter*
2009-2012 *Biophysical Journal*

Scientific advisory board positions

- 2017- Scientific Advisory Board, Stowers Institute for Medical Research
- 2014- Scientific Advisory Board, The Welch Foundation
- 2013- Scientific Advisory Board, ICFO – Institute of Photonics Science, Barcelona, Spain
- 2011- Scientific Advisory Board, School of Life Sciences, University of Science of Technology of China
- 2011- External advisory Board, NSF Center for the Physics of Living Cells (CPLC), UIUC
- 2011-2015 Scientific Advisory Board, Biodynamic Optical Imaging Center, Peking University, China

Awards and honors

- 2017 Honorary doctorate, Delft University of Technology
- 2017 Lennart Nilsson Award, Karolinska Institute, Sweden
- 2017 Pittsburgh Analytical Chemistry Award
- 2016 Doctor of Philosophy *Honoris Causa*, Stockholm University
- 2015 National Academy of Sciences Award in Molecular Biology
- 2015 Pearse Prize, Royal Microscopical Society
- 2015 Research Excellence Award, Univ. of Pennsylvania Nano/Bio Interface Center
- 2014 World Technology Award for Biotechnology
- 2011 Raymond & Beverly Sackler International Prize in Biophysics
- 2010 Max Delbruck Prize in Biological Physics, American Physical Society
- 2008 Coblentz Award
- 2006 Pure Chemistry Award, American Chemical Society
- 2005 Camille Dreyfus Teacher-Scholar Award
- 2004 Sloan Research Fellowship
- 2004 Technology Review Worlds Top 100 Young Innovators Award
- 2003 MacArthur Fellowship
- 2003 Packard Fellowship for Science and Engineering
- 2003 Searle Scholar
- 2003 CAREER award, National Science Foundation
- 2003 Beckman Young Investigator Award
- 2002 Young Investigator Award, Office of Naval Research

Distinguished lectureship

- 2017 Keynote Lecture, Frontiers in Neurophotonics, Bordeaux, France
- 2017 Keynote Lecture, EMBO/EMBL Symposium on Seeing is Believing
- 2017 Keynote Lecture, ChinaNANO 2017 Conference, Beijing, China
- 2017 Svedberg Lecture, Uppsala University, Sweden
- 2017 Hooke Lecture, CYTO2017 conference
- 2017 Keynote Lecture, Gordon Research Conference on Chromosome Dynamics
- 2017 Keynote Lecture, EMBO Symposium on Chromatin and Epigenetics
- 2017 Keynote Lecture, British Society of Cell Biology, Development Biology and Genetics Meeting
- 2017 Keynote Lecture, Cold Spring Harbor Meeting on System Biology: Global gene regulation
- 2017 Sigman Lecture, University of California at Los Angeles
- 2016 Alexander M. Cruickshank Keynote Lecture, Gordon Research Conference on Synaptic Transmission
- 2016 Keynote Lecture, Gordon Research Conference on Single-molecule approaches to biology
- 2016 Herbert Lecture, Vollum Institute
- 2016 Commencement speech, Departments of Physics and Astronomy, University of California at Berkeley
- 2016 Kavli Lecture, American Physical Society Annual Meeting
- 2016 Keynote Lecture, ASBMB Annual Meeting
- 2016 University Lecture, UT Southwestern Medical Center
- 2016 Honors Lecture, New York University School of Medicine

- 2015 Andrew Huxley Lecture, Cambridge Neuroscience Symposium, University of Cambridge
- 2015 IUBMB Lecture, FEBS Congress
- 2015 Astbury Lecture, Astbury Center for Structural Molecular Biology, University of Leeds
- 2015 Pearse Prize Lecture, Microsciences Microscopy Conference
- 2015 Ferry Lecture, University of Wisconsin, Madison
- 2015 Keynote Lecture, Gordon Research Conference on Three Dimensional Electron Microscopy
- 2015 Keynote Lecture, Gordon Research Conference on Proteins
- 2014 Harvey Lecture, Harvey Society
- 2014 President's Plenary Lecture, American College of Neuropsychopharmacology Meeting
- 2014 Krimm Lecture, University of Michigan
- 2014 Huck Distinguished Lecture, Penn State University
- 2014 Laureate Lecture, University of Pittsburg
- 2014 McLean Lecture, Baylor College
- 2014 Caspar Lecture, Florida State University
- 2014 Keynote Lecture, Conference on Labeling and Nanoscopy
- 2013 Dow Lecture, University of British Columbia
- 2013 Global Lecture, Peking University
- 2013 Keynote Lecture, American Society of Virology Annual Meeting
- 2012 Danny Thomas Lecture, St Jude Research Hospital
- 2012 Sproul Lecture, Cornell University
- 2012 Wang Ying-Lai Lecture, University of Texas Medical Branch
- 2012 Leica Scientific Forum Lectures, California (UCSF, UCLA, UCSD)
- 2011 Leica Scientific Forum Lectures, Germany (Munich, Heidelberg, Berlin)
- 2011 Greenfield Lecture, Case Western University
- 2011 Fredric Fay Lecture, University of Massachusetts School of Medicine
- 2011 Closs Lecture, University of Chicago
- 2011 Max Delbruck Prize Lecture, American Physical Society Annual Meeting
- 2011 Maggie & Nick DeWolf Public Lecture, Aspen Center for Physics
- 2010 Director's WALs Lecture, National Institutes of Health
- 2010 Magomedov-Shcherbinina Memorial Prize Lecture, University of Rochester
- 2009 Keynote Lecture, Annual Dutch Meeting on Molecular & Cellular Biophysics
- 2009 Keynote Lecture, Cold Spring Harbor Conference on Single Cell Analysis
- 2008 ST Huang Memorial Lecture, Hong Kong University
- 2008 Brockman Lecture, University of Michigan
- 2008 Morrison Lecture, Cornell University
- 2008 Coblenz Award Lecture, International Symposium on Molecular Spectroscopy
- 2006 Seymour Rothchild Lecture, University of Rochester
- 2004 Gunnar and Gunnel Kallén Memorial Lecture, Lund University, Sweden
- 2004 Jean-Francois Lefèvre Lecture, Ecole Supérieure de Biotechnologie de Strasbourg, France

Partial List of other profession services

- Co-Chair, Cold Spring Harbor Conference on "New Advances in Optical Imaging of Live Cells and Organisms" (2011, 2013)
- Chair, American Society of Cell Biology Meeting, Symposium on "Breaking the diffraction barrier" (2009)
- Co-Chair, 355th Xiangshan Science Conference, "Single-Molecule Imaging, Spectroscopy and Manipulation of Biological Systems," Beijing, 2009
- Co-chair, Gordon Research Conference on "Single Molecule Approaches to Biology" (2008)
- Co-chair, American Chemical Society National Meeting, Symposium on "Single-molecule imaging, spectroscopy, and manipulation of biomolecular systems" (2007)
- Co-vice chair, Gordon Research Conference on "Single Molecule Approaches to Biology" (2006)
- Member, NIH College of CSR Reviewers (2010-)

NIH Study Sections: Review Panel for the NIH Director's Pioneer Award (2007, 2012, 2014), Review panel for the Nanomedicine Development Centers for the NIH Roadmap (2005, 2008), Study sections on Molecular Structure and Function C (2007), Cell Structure and Function (2006), Bioanalytical, Engineering, and Chemistry Emphasis (2003)

Publications

1. G. Emanuel, J. R. Moffitt, X. Zhuang. High-throughput, image-based screening of pooled genetic variant libraries. *Nature Methods* (in press), bioRxiv doi:10.1101/143966
2. B. Han, R. Zhou, C. Xia, X. Zhuang. Structural Organization of the Actin-spectrin-based Membrane Skeleton in Dendrites and Soma of Neurons. *PNAS* **114**, E6678–E6685 (2017).
3. J. -J. Chung, K. Miki, D. Kim, S. -H. Shim, H. Shi, J. Y. Hwang, X. Cai, Y. Iseri, X. Zhuang, D. E. Clapham. CatSper ζ Regulates the Structural Continuity of Sperm Ca²⁺ Signaling Domains and is Required for Normal Fertility. *eLife* **6**, e23082 (2017).
4. L. A. Timashev, H. P. Babcock, X. Zhuang, and T. de Lange. The DDR at telomeres lacking intact shelterin does not require substantial chromatin decompaction. *Genes & Dev.* **31**, 578–589 (2017)
5. E. GropPELLI, H. C. Levy, E. Sun, M. Strauss, C. Nicol, S. Gold, X. Zhuang, T. J. Tuthill, J. M. Hogle, D. J. Rowlands. Picornavirus RNA is protected from cleavage by ribonuclease during virion uncoating and transfer across cellular and model membranes. *PLoS Pathogen* DOI: 10.1371/journal.ppat.1006197 (2017)
6. S. Wang, J. -H. Su, B. J. Beliveau, B. Bintu, J. R. Moffitt, C. -t. Wu, X. Zhuang. Spatial organization of chromatin domains and compartments in single chromosomes. *Science* **353**, 598-602 (2016).
7. J. R. Moffitt, J. Hao, D. Bambah-Mukku, T. Lu, C. Dulac, X. Zhuang. High-performance multiplexed fluorescence in situ hybridization in culture and tissue with matrix imprinting and clearing. *PNAS* **113**, 14456–14461 (2016)
8. C. Wang, B. Han, R. Zhou, X. Zhuang. Real-time imaging of translation on single mRNA transcripts in live cells. *Cell* **165**, 990-1001 (2016).
9. J. R. Moffitt, J. Hao, G. Wang, K. H. Chen, H. P. Babcock, X. Zhuang. High-throughput single-cell gene expression profiling with multiplexed error-robust fluorescence in situ hybridization (MERFISH). *PNAS* **113**, 11046–11051 (2016).
10. A. N. Boettiger, B. Bintu, J. R. Moffitt, S. Wang, B. J. Beliveau, G. Fudenberg, M. Imakaev, L. A. Mirny, C. -t. Wu, X. Zhuang. Super-resolution imaging reveals distinct chromatin folding for different epigenetic states. *Nature* **529**, 418-422 (2016).
11. J. B. French, S. A. Jones, H. Deng, A. M. Pedley, D. Kim, C. Y. Chan, H. Hu, R. J. Pugh, H. Zhao, Y. Zhang, T. J. Huang, Y. Fang, X. Zhuang, S. J. Benkovic. Spatial colocalization and functional link of purinosomes with mitochondria. *Science* **529**, 733-737 (2016).
12. J. He, R. Zhou, Z. Wu, M. Carrasco, P. Kurshan, J. Farley, D. Simon, G. Wang, B. Han, J. Hao, E. Heller, M. R. Freeman, K. Shen, T. Maniatis, M. Tessier-Lavigne, X. Zhuang. Prevalent presence of periodic actin-spectrin-based membrane skeleton in a broad range of neuronal cell types and animal species. *PNAS* **113**, 6029-6034 (2016).
13. J. R. Moffitt, S. Pandey, A. N. Boettiger, S. Wang, X. Zhuang. Spatial organization shapes the turnover of a bacterial transcriptome. *eLife*, e13065 (2016). DOI: 10.7554/eLife.13065
14. B. T. Harada, W. L. Hwang, S. Deindl, N. Chatterjee, B. Bartholomew, X. Zhuang. Stepwise nucleosome translocation by RSC remodeling complexes. *eLife* e10051 (2016) DOI: 10.7554/elife.10051

15. J. R. Moffitt, X. Zhuang. RNA Imaging with Multiplexed Error-Robust Fluorescence In Situ Hybridization (MERFISH). *Methods in Enzymology* **572**, 1 – 49 (2016)
16. S. Wang, J.H. Su, F. Zhang, X. Zhuang. An RNA-aptamer-based two-color CRISPR labeling system. *Sci. Rep.* **6**, 26857 (2016)
17. A. Wani, A. N. Boettiger, P. Schorderet, A. Ergun, C. Munger, R. Sadreyev, X. Zhuang, R. Kingston, N. Francis. Chromatin topology is coupled to Polycomb group protein subnuclear organization. *Nat. Communications* **7**: 10291(2016) DOI:10.1038/ncomms10291
18. Y. M. Sigal, C. M. Speer, H. P. Babcock, X. Zhuang. Mapping synaptic input fields of neurons with super-resolution imaging. *Cell* **163**, 493-505 (2015)
19. K. H. Chen, A. N. Boettiger, J. R. Moffitt, S. Wang, X. Zhuang. Spatially resolved, highly multiplexed RNA profiling in single cells. *Science* **348**, 412, aaa6090 (2015) DOI: 10.1126/science.aaa6090.
20. S. Viswanathan, M. E. Williams, E. B. Bloss, T. J. Stasevich, C. M. Speer, A. Nern, B. D. Pfeiffer, B. M. Hooks, W. -P. Li, B. P. English, T. Tian, G. L. Henry, J. J. Macklin, R. Patel, C. R. Gerfen, X. Zhuang, Y. Wang, G. M. Rubin, L. L. Looger. High-performance probes for light and electron microscopy. *Nat. Methods* **12**, 568-576 (2015).
21. B. Beliveau, A. Boettiger, M. Avendaño, R. Jungmann, R. McCole, E. Joyce, C. Kim-Kiselak, F. Bantignies, C. Fonseka, J. Erceg, M. Hannan, H. Hoang, D. Colognori, J. Lee, W. Shih, P. Yin, X. Zhuang, C. -t. Wu. Single-molecule super-resolution imaging of chromosomes and in situ haplotype visualization using Oligopaint FISH probes. *Nat. Communications* **6**, 7147 (2015) DOI: 10.1038/ncomms8147.
22. D. Kim, T. J. Deerinck, Y. M. Sigal, H. P. Babcock, M. H. Ellisman, X. Zhuang. Correlative Stochastic Optical Reconstruction Microscopy and Electron Microscopy. *PLoS ONE* **10**: e0124581 (2015). DOI: 10.1371/journal.pone.0124581
23. C. Y. Chan, H. Zhao, R. J. Pugh, A. M. Pedley, J. French, S. A. Jones, X. Zhuang, H. Jinnah, T. J. Huang, S. J. Benkovic. Purinosome formation as a function of the cell cycle. *PNAS* **112**, 1368-1373 (2015).
24. G. Zhong, J. He, R. Zhou, D. Lorenzo, H. P. Babcock, V. Bennett, X. Zhuang. Developmental mechanism of the periodic membrane skeleton in axons. *eLife* e04581 (2014) DOI: 10.7554/eLife.04581
25. T. Shemesh, R. W. Klemm, F. B. Romano, S. Wang, J. C. Vaughan, X. Zhuang, H. Tukachinsky, M. M. Kozlov, T. A. Rapoport. A model for the generation and interconversion of ER morphologies. *PNAS* **111**, E5243-E5251 (2014)
26. D. N. Lorenzo, A. Badea, J. Q. Davis, J. Hostettler, J. He, G. Zhong, X. Zhuang, V. Bennett. A PIK3C3–Ankyrin-B–Dynactin pathway promotes axonal growth and multiorganelle transport. *J. Cell Biol* **207**, 735-752 (2014).
27. W. L. Hwang, S. Deindl, B. T. Harada, X. Zhuang. Histone H4 tail mediates allosteric regulation of nucleosome remodelling by linker DNA. *Nature* **512**, 213-217 (2014).
28. A D. Blunk, Y. Akbergenova, R. W. Cho, J. Lee, U. Walldorf, K. Xu, G. Zhong, X. Zhuang and J. T. Littleton. Postsynaptic actin regulates active zone spacing and glutamate receptor apposition at the Drosophila neuromuscular junction. *Mol. Cell. Neurosci* **61**, 241-254 (2014).
29. S. Wang, J. R. Moffitt, G. T. Dempsey, X. S. Xie, X. Zhuang. Characterization and development of photoactivatable fluorescent proteins for single-molecule-based superresolution imaging. *PNAS* **111**, 8452-8457 (2014).
30. J. -J. Chung, S. -H. Shim, R. A. Everley, S. P. Gygi, X. Zhuang, D. E. Clapham. Structurally Distinct Ca²⁺ Signaling Domains of Sperm Flagella Orchestrate Tyrosine Phosphorylation and Motility. *Cell* **157**, 808-822 (2014)

31. S. Jia, J. C. Vaughan, X. Zhuang. Isotropic 3D super-resolution imaging with a self-bending point-spread function. *Nat. Photonics* **8**, 302-306 (2014)
32. A. M. Avalos, A. M. Bilate, M.D. Witte, A. K. Tai, J. He, M. P. Frushicheva, P. D. Thill, F. Meyer-Wentrup, C. S. Theile, A. K. Chakraborty, X. Zhuang, H. L. Ploegh. Monovalent engagement of the BCR activates ovalbumin-specific transnuclear B cells. *J. Exp. Med.* **211**, 365-79 (2014)
33. K. Xu, G. Zhong, X. Zhuang. Actin, spectrin and associated proteins form a periodic cytoskeleton structure in axons. *Science* **339**, 452-456 (2013).
34. Y. Doksani, J. Wu, T. de Lange, X. Zhuang. Super-resolution fluorescence imaging of telomeres reveals TRF2-dependent t-loop formation. *Cell* **155**, 345-356 (2013).
35. S. Deindl, W. L. Hwang, S. K. Hota, T. R. Blosser, P. Prasad, B. Bartholomew, X. Zhuang. ISWI remodelers slide nucleosomes with coordinated multi-base-pair entry steps and single-base-pair exit steps. *Cell* **152**, 442-452 (2013).
36. H. Babcock, J. Moffitt, Y. Zhao, X. Zhuang. Fast compressed sensing analysis for super-resolution imaging using L1-homotopy. *Optics Express* **21**, 28583-28596 (2013).
37. J. He, E. Sun, M. B. Bujny, D. Kim, M. W. Davidson, X. Zhuang. Dual function of CD81 in influenza uncoating and budding. *PLoS Pathogen* **9**, e1003701 (2013).
38. S. K. Hota, S. K. Bhardwaj, S. Deindl, Y. C. Lin, X. Zhuang, B. Bartholomew. Nucleosome mobilization by ISW2 requires the concerted action of the ATPase and SLIDE domains. *Nat. Struct. Mol. Biol.* **152**, 442-452 (2013).
39. J.C. Vaughan, G.T. Dempsey, E. Sun, X. Zhuang. Phospine Quenching of Cyanine Dyes as a Versatile Tool for Fluorescence Microscopy. *J. Am. Chem. Soc.* **135**, 1197-1200 (2013).
40. E. Sun, J. He, X. Zhuang, Live cell imaging of viral entry. *Curr Opin Virol.* **3**, 34-43 (2013).
41. A. P. Alivisatos, A. M. Andrews, E. S. Boyden, M. Chun, G. M. Church, K. Deisseroth, J. P. Donoghue, S. E. Fraser, J. Lippincott-Schwartz, L. L. Looger, S. Masmanidis, P. L. McEuen, A. V. Nurmikko, H. Park, D. S. Peterka, C. Reid, M. L. Roukes, A. Scherer, M. Schnitzer, T. J. Sejnowski, K. L. Shepard, D. Tsao, G. Turrigiano, P. S Weiss, C. Xu, R. Yuste, X. Zhuang. Nanotools for neuroscience and brain activity mapping. *ACS nano* **7**, 1850-1866 (2013)
42. E. Sun, J. He, X. Zhuang. Dissecting the role of COPI complexes on influenza virus infection. *J. Virol.* **87**, 2673-2685(2013)
43. Kim, W. Pan, S. A. Jones, Y. Zhang, X. Zhuang, D. Wu. Clathrin and AP2 are required for PtdIns(4,5)P₂-mediated formation of LRP6 signalosomes. *J. Cell Biol.* **200**, 419-428 (2013).
44. J. Vaughan, S. Jia, X. Zhuang. Ultra-bright Photoactivatable Fluorophores Created by Reductive Caging. *Nat. Methods* **9**, 1181-1184 (2012).
45. V. Berk, J. C. N. Fong, G. T. Dempsey, O. N. Develioglu, X. Zhuang, J. Liphardt, F. H. Yildiz, S. Chu. Molecular architecture and assembly principles of Vibrio Cholerae biofilms. *Science* **337**, 236-239 (2012).
46. S. -H. Shim, C. Xia, G. Zhong, H. P. Babcock, J. C. Vaughan, B. Huang, X. Wang, C. Xu G.-Q. Bi, X. Zhuang. Super-resolution fluorescence imaging of organelles in live cells with photoswitchable membrane probes. *PNAS* **109**, 13978–13983 (2012).
47. S. Deindl, X. Zhuang. Monitoring conformational dynamics with single-molecule fluorescence resonance energy transfer: Application in Nucleosome Remodeling. *Methods Enzymol* **513**, 59–86 (2012)
48. H. Babcock, Y. Sigal, X. Zhuang. A high-density 3D localization algorithm for stochastic optical reconstruction microscopy. *Nanoscopy* **1**: 6 (2012).

49. E. A. Mukamel, H. P. Babcock, X. Zhuang. Statistical deconvolution for super-resolution fluorescence Microscopy. *Biophys. J.* **102**, 2391-2400 (2012)
50. K. Xu, H. P. Babcock, X. Zhuang. Dual-objective STORM reveals three-dimensional filament organization in the actin cytoskeleton. *Nat. Methods* **9**, 185-188 (2012).
51. M. Lakadamyali, H. Babcock, M. Bates, X. Zhuang, J. Lichtman. 3D Multicolor Super-Resolution Imaging Offers Improved Accuracy in Neuron Tracing. *PLoS One* **7**: e30826 (2012)
52. M. Bates, G. T. Dempsey, K. H. Chen, X. Zhuang. Multicolor super-resolution fluorescence imaging through via multi-parameter fluorophore detection. *Chemphyschem* **13**, 99-107 (2012)
53. G. T. Dempsey, J. C. Vaughan, K. H. Chen, M. Bates, X. Zhuang. Evaluation of fluorophores for optimal performance in localization-based super-resolution imaging. *Nat. Methods* **8**, 1027-1036 (2011).
54. J. C. Vaughan, X. Zhuang. New fluorescent probes for super-resolution imaging. *Nat. Biotechnol.* **29**, 880-881 (2011)
55. W. Wang, G.W. Li, C. Chen, X. S. Xie, X. Zhuang. Chromosome organization by a nucleoid associated protein. *Science* **333**, 1445-1449 (2011).
56. E. C. Garner, R. Bernard, W. Wang, X. Zhuang, D. Z. Rudner, T. Mitchison. Circumferential motions of the cell wall synthesis machinery drive cytoskeletal dynamics in *B. subtilis*. *Science* **333**, 222-225 (2011).
57. S. Jones, S.-H. Shim, J. He, X. Zhuang. Fast three-dimensional super-resolution imaging of live cells. *Nat. Methods* **8**, 499-505 (2011).
58. M. Mihalusova, J. Y. Wu, X. Zhuang. Functional importance of telomerase pseudoknot revealed by single-molecule analysis. *PNAS* **108**, 20339-20344 (2011).
59. B. Huang, H. Babcock, X. Zhuang, Breaking the diffraction barrier: Super-resolution imaging of cells. *Cell* **143**, 1047-1058 (2010).
60. S. Liu, B. T. Harada, J. T. Miller, S. F. J. Le Grice, X. Zhuang. Initiation complex dynamics direct the transitions between distinct phases of early HIV reverse transcription. *Nat. Struct. Mol. Biol.* **17**, 1453-1460 (2010).
61. A. Dani, B. Huang, J. Bergan, C. Dulac, X. Zhuang. Super-resolution imaging of chemical synapses in the brain. *Neuron* **68**, 843-856 (2010).
62. M. Wu, B. Huang, M. Graham, A. Raimondi, J. E. Heuser, X. Zhuang, P. De Camilli. Coupling between clathrin-dependent endocytic budding and F-BAR-dependent tubulation in a cell-free system. *Nat. Cell Biol.* **12**, 902-908 (2010).
63. S. Chung, M. Wendeler, J. W. Rausch, G. Beilhartz, M. Gotte, B. R. O'Keefe, A. Bermingham, J. A. Beutler, S. Liu, X. Zhuang, S. F.J. Le Grice. Structure-Activity Analysis of Vinylogous Urea Inhibitors of Human Immunodeficiency Virus-Encoded Ribonuclease H. *Antimicrob Agents Chemother* **54**, 3913-3921 (2010).
64. E. Schuman, X. Zhuang. New technologies, Editorial overview. *Curr Opin Neurobiology* **20**, 608-690 (2010).
65. M. Bates, S. A. Jones, X. Zhuang. Stochastic Optical Reconstruction Microscopy (STORM) - A Method for Superresolution Fluorescence Imaging. Chapter 35 in *Imaging: A Laboratory Manual*. Ed. Rafael Yuste. Cold Spring Harbor Laboratory Press (2010).
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69. M. Bates, B. Huang, M. Rust, G. Dempsey, W. Wang, X. Zhuang. Sub-diffraction-limit Imaging with Stochastic Optical Reconstruction Microscopy (STORM). **Nobel Volume on Single Molecule Spectroscopy in Chemistry**, Springer Publishing (2009).
70. J. Wu, M. Stone, X. Zhuang. A Single-molecule assay for telomerase structural-function analysis. **Nucleic Acid Res.** doi:10.1093/nar/gkp1033 (2009)
71. J. Vaughan, B. Brandenburg, J. Hogle, X. Zhuang. Rapid actin-dependent viral motility in live cells. **Biophysical Journal** **97**, 1647-1656 (2009)
72. X. Zhuang. Nano-imaging with STORM. **Nat. Photonics** **3**, 365-367 (2009)
73. Huang, M. Bates, X. Zhuang. Super-resolution fluorescence microscopy. **Annu. Rev. Biochem.** **78**, 993 – 1016 (2009)
74. E. Abbondanzieri, X. Zhuang. Concealed enzyme coordination. **Nature** **457**, 392-393 (2009).
75. H. M. van der Schaar, M. J. Rust, C. Chen, H. van der Ende-Metselaar, J. Wilschut, X. Zhuang, J. M. Smit. Dissecting the cell entry pathway of single Dengue virus particles in living cells. **PLoS Pathogen** **4**, e1000244 (2009)
76. S. Liu, E. Abbondanzieri, J. W. Rausch, S. F. J. Le Grice, X. Zhuang. Slide into action: dynamic shuttling of HIV reverse transcriptase on nucleic acid substrate. **Science** **322**, 1092-1097 (2008).
77. B. Huang, S. Jones, B. Brandenburg, X. Zhuang. Whole cell 3D STORM reveals interactions between cellular structures with nanometer-scale resolution. **Nat. Methods** **5**, 1047 - 1052 (2008).
78. M. Bates, B. Huang, X. Zhuang. Super-resolution microscopy by nanoscale localization of photo-switchable fluorescent probes. **Curr. Opin. Chem. Biol.** **208**, 505-514 (2008)
79. C. Chen, X. Zhuang. Epsin1 is a cargo specific adaptor for the clathrin-mediated endocytosis of influenza virus. **PNAS** **105**, 11790-11795 (2008)
80. J. Zheng, X. Zhuang. Luminescent and Raman active silver nanoparticles with polycrystalline structure. **J. Am. Chem. Soc.** **130**, 10472-10473 (2008)
81. E. Abbondanzieri, G. Bokinsky, J. W. Rausch, J. X. Zhang, S. F. J. Le Grice, X. Zhuang. Dynamic binding orientations direct activity of HIV reverse transcriptase. **Nature** **453**, 184-189 (2008).
82. B. Huang, W. Wang, M. Bates, X. Zhuang. Three-dimensional super-resolution imaging by stochastic optical reconstruction microscopy. **Science** **319**, 810-813 (2008).
83. M. Bates, B. Huang, G. Dempsey, X. Zhuang. Multicolor super-resolution imaging with photo-switchable fluorescent probes. **Science** **317**, 1749-1753 (2007).
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