Stanford



Steven Chu

William R. Kenan Jr. Professor, Professor of Molecular and Cellular Physiology and of Energy Science and Engineering

Physics

CONTACT INFORMATION

- **Administrative Contact**

  Lisa Lee - Administrative Specialist

  Email llee888@stanford.edu

  Tel (650) 497-9039

Bio

BIO

Steven Chu is the William R. Kenan, Jr. Professor of Physics, of Molecular and Cellular Physiology, and of Energy Science and Engineering at Stanford University. He received an A.B. degree in mathematics and a B.S. degree in physics from the University of Rochester, and a Ph.D. in physics from the University of California, Berkeley. After a postdoctoral fellowship at Berkeley, he was at Bell Labs as a member of the technical staff in 1978 and then department head in 1983.

From January 2009 to April, 2013, Dr. Chu served as U.S. Secretary of Energy under President Barack Obama. During his tenure, he began several initiatives, including ARPA-E (Advanced Research Projects Agency – Energy), the Energy Innovation Hubs, and the Clean Energy Ministerial meetings. As the first scientist Cabinet member, Chu recruited dozens outstanding scientists and engineers to the Department of Energy, and was personally tasked by President Obama to help stop the BP Oil leak.
From 2004-2009, he was the director of the Lawrence Berkeley National Laboratory and Professor of Physics and of Molecular and Cell Biology at the University of California Berkeley. Prior to those positions, he was the Theodore and Francis Geballe Professor of Physics and Applied Physics at Stanford University. During this time, he helped start Bio-X, a multi-disciplinary initiative combining the physical and biological sciences with engineering and medicine.

His contributions include the introduction of laser cooling and optical trapping of atoms and particles, atomic fountain clocks and atom interferometers, the optical tweezers of biomolecules, and single molecule FRET of biomolecules tethered to surfaces. His current research is in biophysics, molecular and cellular physiology, medical imaging, nanoparticle synthesis, battery research and carbon capture. He has received many awards, including the 1997 Nobel Prize for laser cooling and optical trapping of atoms. He is a member of the National Academy of Sciences, the American Philosophical Society, the American Academy of Arts and Sciences, National Academy of Inventors, and a foreign member of the Royal Society, the Royal Academy of Engineering, the Chinese Academy of Sciences, the Academia Sinica, the Korean Academy of Sciences and Technology, the Pontifical Academy of Sciences, and , and 3 other foreign academies of sciences.

He received an A.B. degree in mathematics, and a B.S. degree in physics from the University of Rochester, and a Ph.D. in physics from the University of California, Berkeley, and 35 honorary degrees.

ACADEMIC APPOINTMENTS

- Professor, Physics
- Professor, Molecular and Cellular Physiology
- Professor, Energy Science & Engineering
- Member, Bio-X
- Member, Wu Tsai Neurosciences Institute

HONORS AND AWARDS

- Co-winner in Physics, Nobel Prize (1997)
- California Hall of Fame, . (2022)
- Inagural Richard J. Goldstein Energy Lecture Award, Am. Soc. of Mechanical Engineers (2019)
- Gordon Moore Lifetime Innovation Award, . (2019)
- Academician, Pontifical Academy of Sciences (2018)
- ARISE Hall of Fame, 2018, Texas A&M University (2018)
- Pioneer Award, Fitzpatrick Institute for Photonics, Duke Univ. (2018)
- Foreign Member, National Academy of Sciences of Belarus (2017)
- Richard Ernst Medal, ETH Zurich (2015)
- Robert Fletcher Award, Thayer School of Engineering, Dartmouth (2015)
- Fellow, National Academy of Inventors (2014)
- Foreign Member, Royal Society (2013)
- George Eastman Medal, University of Rochester (2013)
- Franklin Founder Award, - (2012)
- Alumnus of the Year, University of California-Berkeley (2011)
- Foreign Member, Royal Academy of Engineering (2011)
- Hans Bethe Award, Federation of American Scientists (2011)
- Harold Berger Award, Penn School of Engineering and Applied Science (2011)
- Arthur L. Schawlow Award, Laser Institute of America (2010)
- Honorary Fellow, Institute of Physics (2009)
- Hutchinson Medal for Distinguished Public Service, University of Rochester (2009)
- Honorary Lifetime Member, Optical Society of America (2004)
- Foreign Member, Korean Academy of Sciences and Technology (1998)
- Foreign Member, Chinese Academy of Sciences (1998)
- Member, American Philosophical Society (1998)
- Science for Art Prize, Moët Hennessey-Louis Vuitton (LVMH) (1995)
- Senior Scientist Award, Humboldt Foundation (1995)
- Distinguished Traveling Lecturer, Am. Phys. Soc. Division of Laser Science (1994-1996)
- Academician, Academia Sinica (1994)

- Arthur Schawlow Prize for Laser Science, American Physical Society (1994)
- William Meggers Award for Spectroscopy, Optical Society of America (1994)
- Co-winner, King Faisal International Prize for Science (1993)
- Member, National Academy of Sciences (1993)
- Member, American Academy of Arts and Sciences (1992)
- Fellow, Optical Society of America (1990)
- Richtmyer Memorial Prize Lecturer, Am. Phys. Soc./Am Assoc. Physics Teachers (1990)
- Broida Prize for Laser Spectroscopy, American Physical Society (1987)
- Fellow, American Physical Society (1987)
- Guggenheim Fellowship, John Simon Guggenheim Foundation (1996)
- 35 Honorary Degrees, Various universities, colleges and institutions. (till present time)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Member, Siemens Science Innovation and Technology Council (2015 - present)

PROFESSIONAL EDUCATION

- Ph.D., University of California, Berkeley , Physics (1976)
- B.S., University of Rochester , Physics (1970)
- A.B., University of Rochester , Mathematics (1970)

LINKS

- American institute of Physics Oral history of Steven Chu: https://www.aip.org/history-programs/niels-bohr-library/oral-histories/47519
- Short documentary of Steven Chu "Citizen Scientist": https://kikim.com/project/the-citizen-scientist/
- Chu Lab Web site: https://www.stevechulab.com

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Synthesis, functionalization and applications of nanoparticle bioprobes for molecular cellular in vivo imaging in biology and biomedicine. Linear and nonlinear difference frequency mixing ultrasound imaging. Lithium metal-sulfur batteries, new approaches to electrochemical splitting of water. CO2 reduction, lithium extraction from salt water

Teaching

COURSES

2024-25

- Energy Systems Fundamentals: ENERGY 201A (Aut)

2023-24

- Energy Systems Fundamentals: ENERGY 201A (Aut)

STANFORD ADVISEES

Postdoctoral Faculty Sponsor

Jeremy Axelrod, Bo Liu, Weilu Shen, Yecun Wu

Doctoral Dissertation Advisor (AC)

Joey Huang, Kaitlyn Liang, Sreya Vangara

Doctoral Dissertation Co-Advisor (AC)

Yi-Shiou Duh

Master's Program Advisor

Howard Qin

Doctoral (Program)

Kutay Akin, Tony He, Anna Janni, Healey Kogan, Da-Yeon Koh, Andrew Land, Megan Loh, Rudolf Popper

Publications

PUBLICATIONS

- **Dynamics of Radiation Damage Buildup in Ultrathin Hexagonal Boron Nitride Films under Ion Bombardment.** *ACS applied materials & interfaces*
  Seo, M., Bayu Aji, L. B., Zepeda-Ruiz, L. A., Kim, S. C., Tzeng, Y. K., Chu, S., Kucheyev, S. O.
  2026
- **Observing intracellular transport with 1 angstrom and 1 microsecond resolution**
  Axelrod, J. J., Chu, S.
  CELL PRESS.2026: 91a
- **Epitaxial Electrodeposition of Fe with Controlled In-Plane Variants for a Reversible Metal Anode in an Aqueous Electrolyte.** *Nano letters*
  Sui, C., Fu, C. T., Feng, G., Li, Y., Li, J., Yan, G., Hsu, P. C., Chu, S., Cui, Y.
  2026
- **Ligand-dependent G protein dynamics underlying opioid signaling efficacy.** *bioRxiv : the preprint server for biology*
  Deutsch, J., Hilger, D., Janetzko, J., Schroeder, C. M., Chu, S., Kobilka, B. K., Shivnaraine, R. V.
  2025
- **Membrane phosphoinositides allosterically tune β-arrestin dynamics to facilitate GPCR core engagement.** *bioRxiv : the preprint server for biology*
  Janetzko, J., Deutsch, J., Shi, Y., Siepe, D. H., Masureel, M., Liu, W., Viner, R., Inoue, A., Kobilka, B. K., Shivnaraine, R. V.
  2025
- **A Microscope for Observing Intracellular Transport with Molecular Resolution on Molecular Timescales**
  Axelrod, J., Marti, G., Chu, S.
  SPRINGER.2025: S258
- **Damage buildup in multilayer hexagonal boron nitride films under Ar ion bombardment** *SCRIPTA MATERIALIA*
  Seo, M., Aji, L., Kim, S. C., Tzeng, Y. K., Baker, A. A., O'Neill, F. M., Chu, S., Kucheyev, S. O.
  2025; 265
- **Climate change and innovative paths to a more sustainable future** *FRONTIERS IN ENERGY*
  Chu, S., Wang, Q.
  2024
- **Improving the creation of SiV centers in diamond via sub-μs pulsed annealing treatment.** *Nature communications*
  Tzeng, Y. K., Ke, F., Jia, C., Liu, Y., Park, S., Han, M., Frost, M., Cai, X., Mao, W. L., Ewing, R. C., Cui, Y., Devereaux, T. P., Lin, et al
  2024; 15 (1): 7251
- **Nanometer-resolution tracking of single cargo reveals dynein motor mechanisms.** *Nature chemical biology*
  Peng, C. S., Zhang, Y., Liu, Q., Marti, G. E., Huang, Y. A., Sudhof, T. C., Cui, B., Chu, S.
  2024

- **Noninvasive virtual biopsy using micro-registered optical coherence tomography (OCT) in human subjects.** *Science advances*
  Winetraub, Y., Van Vleck, A., Yuan, E., Terem, I., Zhao, J., Yu, C., Chan, W., Do, H., Shevidi, S., Mao, M., Yu, J., Hong, M., Blankenberg, et al
  2024; 10 (15): eadi5794

- **Trends of extreme US weather events in the changing climate.** *Proceedings of the National Academy of Sciences of the United States of America*
  Shenoy, S., Gorinevsky, D., Trenberth, K. E., Chu, S.
  2022; 119 (47): e2207536119

- **Reversibly Photoswitching Upconversion Nanoparticles for Super-sensitive Photoacoustic Molecular Imaging.** *Angewandte Chemie (International ed. in English)*
  Rao, J., Liu, C., Zheng, X., Dai, T., Wang, H., Chen, X., Chen, B., Sun, T., Wang, F., Chu, S.
  2022

- **Engineering Bright and Mechanosensitive Alkaline-Earth Rare-Earth Upconverting Nanoparticles.** *The journal of physical chemistry letters*
  McLellan, C. A., Siefe, C., Casar, J. R., Peng, C. S., Fischer, S., Lay, A., Parakh, A., Ke, F., Gu, X. W., Mao, W., Chu, S., Goodman, M. B., Dionne, et al
  2022: 1547-1553

- **PERSONAL PROTECTIVE EQUIPMENT (PPE) SEES THE LIGHT: LOW-COST METHYLENE BLUE PLUS LIGHT INACTIVATES SARS-COV-2 ON PPE INCLUDING MASKS AND RESPIRATORS**
  Lendvay, T. S., Chen, J., Harcourt, B. H., Scholte, F. E., Kilinc-Balci, F., Lin, Y., Lamb, M. M., Chu, L. C., Evans, D., Price, A., Lin, Y., Mores, C. N., Sahni, et al
  AMER SOC TROP MED & HYGIENE.2021: 8

- **Single Particle Cathodoluminescence Spectroscopy with Sub-20 nm, Electron-Stable Phosphors** *ACS PHOTONICS*
  Swearer, D. F., Fischer, S., Angell, D. K., Siefe, C., Alivisatos, A., Chu, S., Dionne, J. A.
  2021; 8 (6): 1539-1547

- **Addressing Personal Protective Equipment (PPE) Decontamination: Methylene Blue and Light Inactivates SARS-CoV-2 on N95 Respirators and Medical Masks with Maintenance of Integrity and Fit.** *Infection control and hospital epidemiology*
  Lendvay, T. S., Chen, J., Harcourt, B. H., Scholte, F. E., Lin, Y. L., Kilinc-Balci, F. S., Lamb, M. M., Homdayjanakul, K., Cui, Y., Price, A., Heyne, B., Sahni, J., Kabra, et al
  2021: 1-83

- **Three-Dimensional Analysis of Particle Distribution on Filter Layers inside N95 Respirators by Deep Learning.** *Nano letters*
  Lee, H. R., Liao, L., Xiao, W., Vailionis, A., Ricco, A. J., White, R., Nishi, Y., Chiu, W., Chu, S., Cui, Y.
  2020

- **Obituary Arthur Ashkin (1922-2020)** *NATURE*
  Chu, S.
  2020; 588 (7836): 29

- **Lithium Extraction from Seawater through Pulsed Electrochemical Intercalation** *JOULE*
  Liu, C., Li, Y., Lin, D., Hsu, P., Liu, B., Yan, G., Wu, T., Cui, Y., Chu, S.
  2020; 4 (7): 1459–69

- **Household Materials Selection for Homemade Cloth Face Coverings and Their Filtration Efficiency Enhancement with Triboelectric Charging.** *Nano letters*
  Zhao, M., Liao, L., Xiao, W., Yu, X., Wang, H., Wang, Q., Lin, Y. L., Kilinc-Balci, F. S., Price, A., Chu, L., Chu, M. C., Chu, S., Cui, et al
  2020

- **Can N95 Respirators Be Reused after Disinfection? How Many Times?** *ACS nano*
  Liao, L., Xiao, W., Zhao, M., Yu, X., Wang, H., Wang, Q., Chu, S., Cui, Y.
  2020

- **Difference-Frequency Ultrasound Imaging With Non-Linear Contrast** *IEEE TRANSACTIONS ON MEDICAL IMAGING*
  Li, Y., Polyak, D., Johnson, E., Yecies, D., Shevidi, S., de la Zerda, A., Gephart, M., Chu, S.
  2020; 39 (5): 1759–66

- **Tackling the grand challenges** *PHYSICS WORLD*

Chu, S., Blaustein, R.
2020; 33 (3): 13

- **Single-particle spectroscopy for functional nanomaterials.** *Nature*
  Zhou, J., Chizhik, A. I., Chu, S., Jin, D.
  2020; 579 (7797): 41–50
- **Synergistic enhancement of electrocatalytic CO2 reduction to C2 oxygenates at nitrogen-doped nanodiamonds/Cu interface.** *Nature nanotechnology*
  Wang, H., Tzeng, Y., Ji, Y., Li, Y., Li, J., Zheng, X., Yang, A., Liu, Y., Gong, Y., Cai, L., Li, Y., Zhang, X., Chen, et al
  2020
- **Electrochemical generation of liquid and solid sulfur on two-dimensional layered materials with distinct areal capacities.** *Nature nanotechnology*
  Yang, A. n., Zhou, G. n., Kong, X. n., Vilá, R. A., Pei, A. n., Wu, Y. n., Yu, X. n., Zheng, X. n., Wu, C. L., Liu, B. n., Chen, H. n., Xu, Y. n., Chen, et al
  2020
- **A Single-Molecule Surface-Based Platform to Detect the Assembly and Function of the Human RNA Polymerase II Transcription Machinery.** *Structure (London, England : 1993)*
  Park, S. R., Hauver, J. n., Zhang, Y. n., Revyakin, A. n., Coleman, R. A., Tjian, R. n., Chu, S. n., Pertsinidis, A. n.
  2020
- **A scalable method of applying heat and humidity for decontamination of N95 respirators during the COVID-19 crisis.** *PloS one*
  Anderegg, L., Meisenhelder, C., Ngooi, C. O., Liao, L., Xiao, W., Chu, S., Cui, Y., Doyle, J. M.
  2020; 15 (7): e0234851
- **A Core-Shell-Shell Nanoparticle Architecture Towards Bright Upconversion and Improved Forster Resonant Energy Transfer**
  Siefe, C., Mehlenbacher, R. D., Peng, C., Zhang, Y., Fischer, S., Lay, A., McLellan, C. A., Alivisatos, A., Chu, S., Dionne, J. A., IEEE
  IEEE.2020
- **Electrochemical generation of liquid and solid sulfur on two-dimensional layered materials with distinct areal capacities** *Nature Nanotechnology*
  Yang, A., Zhou, G., et al
  2020
- **Decontamination of SARS-CoV-2 and Other RNA Viruses from N95 Level Meltblown Polypropylene Fabric Using Heat under Different Humidities.** *ACS nano*
  Campos, R. K., Jin, J. n., Rafael, G. H., Zhao, M. n., Liao, L. n., Simmons, G. n., Chu, S. n., Weaver, S. C., Chiu, W. n., Cui, Y. n.
  2020
- **Electrotunable liquid sulfur microdroplets.** *Nature communications*
  Zhou, G. n., Yang, A. n., Wang, Y. n., Gao, G. n., Pei, A. n., Yu, X. n., Zhu, Y. n., Zong, L. n., Liu, B. n., Xu, J. n., Liu, N. n., Zhang, J. n., Li, et al
  2020; 11 (1): 606
- **Sub-20 nm Core-Shell-Shell Nanoparticles for Bright Upconversion and Enhanced Forster Resonant Energy Transfer.** *Journal of the American Chemical Society*
  Siefe, C., Mehlenbacher, R. D., Peng, C. S., Zhang, Y., Fischer, S., Lay, A., McLellan, C. A., Alivisatos, A. P., Chu, S., Dionne, J. A.
  2019
- **Nanodiamond Integration with Photonic Devices** *LASER & PHOTONICS REVIEWS*
  Rodulaski, M., Zhang, J., Tzeng, Y., Lagoudakis, K. G., Ishiwata, H., Dory, C., Fischer, K. A., Kelaita, Y. A., Sun, S., Maurer, P. C., Alassaad, K., Ferro, G., Shen, et al
  2019
- **A Magneto-Optical Nanoplatform for Multimodality Imaging of Tumors in Mice.** *ACS nano*
  Song, G., Zheng, X., Wang, Y., Xia, X., Chu, S., Rao, J.
  2019
- **Upper limit for angular compounding speckle reduction** *APPLIED PHYSICS LETTERS*
  Winetraub, Y., Wu, C., Collins, G. P., Chu, S., de la Zerda, A.
  2019; 114 (21)

- **Bright sub-20-nm cathodoluminescent nanoprobes for electron microscopy** *NATURE NANOTECHNOLOGY*
  Prigozhin, M. B., Maurer, P. C., Courtis, A. M., Liu, N., Wisser, M. D., Siefe, C., Tian, B., Chan, E., Song, G., Fischer, S., Aloni, S., Ogletree, D., Barnard, et al
  2019; 14 (5): 420-+
- **Bright sub-20-nm cathodoluminescent nanoprobes for electron microscopy.** *Nature nanotechnology*
  Prigozhin, M. B., Maurer, P. C., Courtis, A. M., Liu, N., Wisser, M. D., Siefe, C., Tian, B., Chan, E., Song, G., Fischer, S., Aloni, S., Ogletree, D. F., Barnard, et al
  2019
- **Breathing-Mimicking Electrocatalysis for Oxygen Evolution and Reduction** *JOULE*
  Li, J., Zhu, Y., Chen, W., Lu, Z., Xu, J., Pei, A., Peng, Y., Zheng, X., Zhang, Z., Chu, S., Cui, Y.
  2019; 3 (2): 557–69
- **Direct electrochemical generation of supercooled sulfur microdroplets well below their melting temperature.** *Proceedings of the National Academy of Sciences of the United States of America*
  Liu, N., Zhou, G., Yang, A., Yu, X., Shi, F., Sun, J., Zhang, J., Liu, B., Wu, C., Tao, X., Sun, Y., Cui, Y., Chu, et al
  2019
- **Upper limit for angular compounding speckle reduction**
  Winetraub, Y., Wu, C., Chu, S., de la Zerda, A.
  edited by Fujimoto, J. G., Izatt, J. A.
  SPIE-INT SOC OPTICAL ENGINEERING.2019
- **Frequency Tunable Single-Photon Emission From a Single Atomic Defect in a Solid**
  Sun, S., Zhang, J., Fischer, K. A., Burek, M. J., Dory, C., Lagoudakis, K. G., Tzeng, Y., Radulaski, M., Kelaita, Y., Safavi-Naeini, A., Shen, Z., Melosh, N. A., Chu, et al
  IEEE.2019
- **Optimization of the Trade-Off Between Speckle Reduction and Axial Resolution in Frequency Compounding** *IEEE TRANSACTIONS ON MEDICAL IMAGING*
  Li, Y., Winetraub, Y., Liba, O., de la Zerda, A., Chu, S.
  2019; 38 (1): 107–12
- **Address harassment now** *SCIENCE*
  Hamburg, M., Hockfield, S., Chu, S.
  2018; 361 (6408): 1167
- **Single upconversion nanoparticle imaging at sub-10 W cm(-2) irradiance** *NATURE PHOTONICS*
  Liu, Q., Zhang, Y., Peng, C., Yang, T., Joubert, L., Chu, S.
  2018; 12 (9): 548–53
- **Single upconversion nanoparticle imaging at sub-10 W cm-2 irradiance.** *Nature photonics*
  Liu, Q., Zhang, Y., Peng, C. S., Yang, T., Joubert, L. M., Chu, S.
  2018; 12 (9): 548-553
- **Cavity-Enhanced Raman Emission from a Single Color Center in a Solid.** *Physical review letters*
  Sun, S., Zhang, J. L., Fischer, K. A., Burek, M. J., Dory, C., Lagoudakis, K. G., Tzeng, Y., Radulaski, M., Kelaita, Y., Safavi-Naeini, A., Shen, Z., Melosh, N. A., Chu, et al
  2018; 121 (8): 083601
- **An Ultrastrong Double-Layer Nanodiamond Interface for Stable Lithium Metal Anodes** *JOULE*
  Liu, Y., Tzeng, Y., Lin, D., Pei, A., Lu, H., Melosh, N. A., Shen, Z., Chu, S., Cui, Y.
  2018; 2 (8): 1595–1609
- **Efficient electrocatalytic CO2 reduction on a three-phase interface** *NATURE CATALYSIS*
  Li, J., Chen, G., Zhu, Y., Liang, Z., Pei, A., Wu, C., Wang, H., Lee, H., Liu, K., Chu, S., Cui, Y.
  2018; 1 (8): 592–600
- **Strongly Cavity-Enhanced Spontaneous Emission from Silicon-Vacancy Centers in Diamond** *NANO LETTERS*

Zhang, J., Sun, S., Burek, M. J., Dory, C., Tzeng, Y., Fischer, K. A., Kelaita, Y., Lardakis, K. G., Radulaski, M., Shen, Z., Melosh, N. A., Chu, S., Loncar, et al
2018; 18 (2): 1360–65

- **Strongly Cavity-Enhanced Spontaneous Emission from Silicon-Vacancy Centers in Diamond** *NANO LETTERS*
  Zhang, J. L., Sun, S., Burek, M. J., Dory, C., Tzeng, Y., Fischer, K. A., Kelaita, Y., Lagoudakis, K. G., Radulaski, M., Shen, Z., Melosh, N. A., Chu, S., Lončar, et al
  2018; 18: 1360 -1365

- **Speckle-Modulation for Speckle Reduction in Optical Coherence Tomography**
  Liba, O., Lew, M. D., SoRelle, E. D., Dutta, R., Sen, D., Moshfeghi, D. M., Chu, S., de la Zerda, A.
  edited by Izatt, J. A., Fujimoto, J. G., Tuchin, V. V.
  SPIE-INT SOC OPTICAL ENGINEERING.2018

- **Atomic structure of sensitive battery materials and Interfaces revealed by cryo-electron microscopy** *SCIENCE*
  Li, Y., Li, Y., Pei, A., Yan, K., Sun, Y., Wu, C., Joubert, L., Chin, R., Koh, A., Yu, Y., Perrino, J., Butz, B., Chu, et al
  2017; 358 (6362): 506–10

- **STEVEN CHU** *NATURE*
  Chu, S.
  2017; 550 (7675): S64

- **THE REAL CLIMATE DEBATE** *NATURE*
  Hodson, R., Agre, P.
  2017; 550 (7675): S62

- **Speckle-modulating optical coherence tomography in living mice and humans.** *Nature communications*
  Liba, O., Lew, M. D., SoRelle, E. D., Dutta, R., Sen, D., Moshfeghi, D. M., Chu, S., de la Zerda, A.
  2017; 8: 15845

- **A half-wave rectified alternating current electrochemical method for uranium extraction from seawater** *NATURE ENERGY*
  Liu, C., Hsu, P., Xie, J., Zhao, J., Wu, T., Wang, H., Liu, W., Zhang, J., Chu, S., Cui, Y.
  2017; 2 (4)

- **Vertical-Substrate MPCVD Epitaxial Nanodiamond Growth.** *Nano letters*
  Tzeng, Y., Zhang, J. L., Lu, H., Ishiwata, H., Dahl, J., Carlson, R. M., Yan, H., Schreiner, P. R., Vuckovic, J., Shen, Z., Melosh, N., Chu, S.
  2017

- **The path towards sustainable energy** *NATURE MATERIALS*
  Chu, S., Cui, Y., Liu, N.
  2017; 16 (1): 16-22

- **Complete coherent control of silicon vacancies in diamond nanopillars containing single defect centers** *OPTICA*
  Zhang, J. L., Lagoudakis, K. G., Tzeng, Y., Dory, C., Radulaski, M., Kelaita, Y., Fischer, K. A., Sun, S., Shen, Z., Melosh, N., Chu, S., Vuckovic, J.
  2017; 4 (11): 1317-1321

- **Complete Coherent Control of Silicon-Vacancies in Diamond Nanopillars Containing Single Defect Centers**
  Zhang, J., Lagoudakis, K. G., Tzeng, Y., Dory, C., Radulaski, M., Kelaita, Y., Fischer, K. A., Shen, Z., Melosh, N. A., Chu, S., Vuckovic, J., IEEE
  IEEE.2017

- **Atomic structure of sensitive battery materials and interfaces revealed by cryo–electron microscopy** *SCIENCE*
  Li, Y., Li, Y., Pei, A., Yan, K., Sun, Y., Wu, C., Joubert, L. M., Chin, R., Koh, A. L., Yu, Y., Perrino, J., Butz, B., Chu, et al
  2017; 358: 506–510

- **Complete Coherent Control of Silicon-Vacancies in Diamond Nanopillars Containing Single Defect Centers** *OPTICA*
  Zhang, J. L., Lagoudakis, K. G., Tzeng, Y., Dory, C., Radulaski, M., Kelaita, Y., Fischer, K. A., Shen, Z., Melosh, N. A., Chu, S., Vučković, J.
  2017; 4: 1317-1321

- **A half-wave rectified alternating current electrochemical method for uranium extraction from seawater** *NATURE ENERGY*
  Liu, C., Hsu, P., Xie, J., Zhao, J., Wu, T., Wang, H., Liu, W., Zhang, J., Chu, S., Cui, Y.

2017; 2: 17007

- **Speckle-modulating optical coherence tomography in living mice and humans** *NATURE COMMUNICATIONS*
  Liba, O., Lew, M. D., SoRelle, E. D., Dutta, R., Sen, D., Moshfeghi, D. M., Chu, S., de la Zerda, A.
  2017; 8: 15845
- **The path towards sustainable energy.** *Nature materials*
  Chu, S., Cui, Y., Liu, N.
  2016; 16 (1): 16-22
- **High-Performance Lithium Metal Negative Electrode with a Soft and Flowable Polymer Coating** *ACS ENERGY LETTERS*
  Zheng, G., Wang, C., Pei, A., Lopez, J., Shi, F., Chen, Z., Sendek, A. D., Lee, H., Lu, Z., Schneider, H., Safont-Sempere, M. M., Chu, S., Bao, et al
  2016; 1 (6): 1247-1255
- **Sr Betavoltaic Power Source.** *Scientific reports*
  Dixon, J., Rajan, A., Bohlemann, S., Coso, D., Upadhyaya, A. D., Rohatgi, A., Chu, S., Majumdar, A., Yee, S.
  2016; 6: 38182-?
- **Evaluation of a Silicon Sr-90 Betavoltaic Power Source** *SCIENTIFIC REPORTS*
  Dixon, J., Rajan, A., Bohlemann, S., Coso, D., Upadhyaya, A. D., Rohatgi, A., Chu, S., Majumdar, A., Yee, S.
  2016; 6
- **Super-resolution molecular imaging with photostable nanoprobes**
  Prigozhin, M., Maurer, P., Courtis, A., Zheng, X., Liu, N., Collins, J., Aloni, S., Ogletree, F., Macfarlane, R., Cui, Y., Rao, J., Alivisatos, P., Chu, et al
  AMER CHEMICAL SOC.2016
- **Wafer-Size and Single-Crystal MoSe2 Atomically Thin Films Grown on GaN Substrate for Light Emission and Harvesting** *ACS APPLIED MATERIALS & INTERFACES*
  Chen, Z., Liu, H., Chen, X., Chu, G., Chu, S., Zhang, H.
  2016; 8 (31): 20267-20273
- **Enhancing Quantum Yield via Local Symmetry Distortion in Lanthanide-Based Upconverting Nanoparticles** *ACS PHOTONICS*
  Wisser, M. D., Fischer, S., Maurer, P. C., Bronstein, N. D., Chu, S., Alivisatos, A. P., Salleo, A., Dionne, J. A.
  2016; 3 (8): 1523-1530
- **Nanofiber Air Filters with High-Temperature Stability for Efficient PM2.5 Removal from the Pollution Sources** *NANO LETTERS*
  Zhang, R., Liu, C., Hsu, P., Zhang, C., Liu, N., Zhang, J., Lee, H. R., Lu, Y., Qiu, Y., Chu, S., Cui, Y.
  2016; 16 (6): 3642-3649
- **Selective deposition and stable encapsulation of lithium through heterogeneous seeded growth** *NATURE ENERGY*
  Yan, K., Lu, Z., Lee, H., Xiong, F., Hsu, P., Li, Y., Zhao, J., Chu, S., Cui, Y.
  2016; 1
- **Super-Resolution Molecular Imaging with Photostable Nanoprobes**
  Prigozhin, M. B., Maurer, P. C., Liu, N., Courtis, A. M., Aloni, S., Ogletree, F. D., MacFarlane, R. M., Cui, Y., Alivisatos, P. A., Chu, S.
  CELL PRESS.2016: 161A
- **Shelterin Protects Chromosome Ends by Compacting Telomeric Chromatin** *CELL*
  Bandaria, J. N., Qin, P., Berk, V., Chu, S., Yildiz, A.
  2016; 164 (4): 735-746
- **DOI: 10.1038/srep38182** *Evaluation of a Silicon 90Sr Betavoltaic Power Source*
  Dixon, J., et al
  2016; 6
- **Emitter-Cavity Coupling in Hybrid Silicon Carbide-Nanodiamond Microdisk Resonators**
  Radulaski, M., Tzeng, Y., Zhang, J., Ishiwata, H., Lagoudakis, K. G., Souliere, V., Ferro, G., Shen, Z., Melosh, N. A., Chu, S., Vuckovic, J., IEEE
  IEEE.2016
- **THE NAI FELLOW PROFILE: AN INTERVIEW WITH DR. STEVEN CHU** *TECHNOLOGY AND INNOVATION*
  Chu, S., Macuare, K. A.

2016; 17 (4): 187–92

- **Powernet for Distributed Energy Resource Networks**
  Radovanovic, A., Ramesh, A., Koningstein, R., Fork, D., Weber, W., Kim, S., Schmalzried, J., Sastry, J., Dikovsky, M., Bozhkov, K., Pinheiro, E., Lebsack, C., Collyer, et al
  IEEE.2016

- **Ras-GTP dimers activate the Mitogen-Activated Protein Kinase (MAPK) pathway** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Nan, X., Tamgueney, T. M., Collisson, E. A., Lin, L., Pitt, C., Galeas, J., Lewis, S., Gray, J. W., McCormick, F., Chu, S.
  2015; 112 (26): 7996-8001

- **Polymer Nanofiber-Guided Uniform Lithium Deposition for Battery Electrodes** *NANO LETTERS*
  Liang, Z., Zheng, G., Liu, C., Liu, N., Li, W., Yan, K., Yao, H., Hsu, P., Chu, S., Cui, Y.
  2015; 15 (5): 2910-2916

- **Microscopy 2.0**
  Chu, S., IEEE
  IEEE.2015

- **Artificial Graphene and Related Photonic Lattices Generated With a Simple Method** *IEEE PHOTONICS JOURNAL*
  Gao, Y., Song, D., Chu, S., Chen, Z.
  2014; 6 (6)

- **Ultrathin two-dimensional atomic crystals as stable interfacial layer for improvement of lithium metal anode.** *Nano letters*
  Yan, K., Lee, H., Gao, T., Zheng, G., Yao, H., Wang, H., Lu, Z., Zhou, Y., Liang, Z., Liu, Z., Chu, S., Cui, Y.
  2014; 14 (10): 6016-6022

- **Ultrathin Two-Dimensional Atomic Crystals as Stable Interfacial Layer for Improvement of Lithium Metal Anode** *NANO LETTERS*
  Yan, K., Lee, H., Gao, T., Zheng, G., Yao, H., Wang, H., Lu, Z., Zhou, Y., Liang, Z., Liu, Z., Chu, S., Cui, Y.
  2014; 14 (10): 6016-6022

- **Interconnected hollow carbon nanospheres for stable lithium metal anodes.** *Nature nanotechnology*
  Zheng, G., Lee, S. W., Liang, Z., Lee, H., Yan, K., Yao, H., Wang, H., Li, W., Chu, S., Cui, Y.
  2014; 9 (8): 618-623

- **In vitro and in vivo radiosensitization of human glioma U251 cells induced by upregulated expression of SLC22A18** *CANCER GENE THERAPY*
  Chu, S., Zhou, Z., Karri, S., Li, Z., Zhao, J.
  2014; 21 (3): 103-109

- **Super-Resolution Imaging of Telomeres Reveals that Compaction of Telomeric DNA by Shelterin Protects Chromosome Terminii**
  Bandaria, J. N., Berk, V., Chu, S., Yildiz, A.
  CELL PRESS.2014: 435A

- **Single-molecule superresolution imaging allows quantitative analysis of RAF multimer formation and signaling** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Nan, X., Collisson, E. A., Lewis, S., Huang, J., Tamgueney, T. M., Liphardt, J. T., McCormick, F., Gray, J. W., Chu, S.
  2013; 110 (46): 18519-18524

- **Ultrahigh-resolution imaging reveals formation of neuronal SNARE/Munc18 complexes in situ.** *Proceedings of the National Academy of Sciences of the United States of America*
  Pertsinidis, A., Mukherjee, K., Sharma, M., Pang, Z. P., Park, S. R., Zhang, Y., Brunger, A. T., Südhof, T. C., Chu, S.
  2013; 110 (30): E2812-20

- **Ultrahigh-resolution imaging reveals formation of neuronal SNARE/Munc18 complexes in situ** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Pertsinidis, A., Mukherjee, K., Sharma, M., Pang, Z. P., Park, S. R., Zhang, Y., Brunger, A. T., Suedhof, T. C., Chu, S.
  2013; 110 (30): E2812-E2820

- **Studying calcium-triggered vesicle fusion in a single vesicle-vesicle content and lipid-mixing system.** *Nature protocols*

Kyoung, M., Zhang, Y., Diao, J., Chu, S., Brunger, A. T.
2013; 8 (1): 1-16

- **Studying calcium-triggered vesicle fusion in a single vesicle-vesicle content and lipid-mixing system** *NATURE PROTOCOLS*
  Kyoung, M., Zhang, Y., Diao, J., Chu, S., Brunger, A. T.
  2013; 8 (1): 1-16
- **Synaptic proteins promote calcium-triggered fast transition from point contact to full fusion** *ELIFE*
  Diao, J., Grob, P., Cipriano, D. J., Kyoung, M., Zhang, Y., Shah, S., Amie Nguyen, A., Padolina, M., Srivastava, A., Vrljic, M., Shah, A., Nogales, E., Chu, et al
  2012; 1
- **Opportunities and challenges for a sustainable energy future** *NATURE*
  Chu, S., Majumdar, A.
  2012; 488 (7411): 294-303
- **Transcription initiation by human RNA polymerase II visualized at single-molecule resolution** *GENES & DEVELOPMENT*
  Revyakin, A., Zhang, Z., Coleman, R. A., Li, Y., Inouye, C., Lucas, J. K., Park, S., Chu, S., Tjian, R.
  2012; 26 (15): 1691-1702
- **Molecular Architecture and Assembly Principles of Vibrio cholerae Biofilms** *SCIENCE*
  Berk, V., Fong, J. C., Dempsey, G. T., Develioglu, O. N., Zhuang, X., Liphardt, J., Yildiz, F. H., Chu, S.
  2012; 337 (6091): 236-239
- **Synchrotron Infrared Measurements of Protein Phosphorylation in Living Single PC12 Cells during Neuronal Differentiation** *ANALYTICAL CHEMISTRY*
  Chen, L., Holman, H. N., Hao, Z., Bechtel, H. A., Martin, M. C., Wu, C., Chu, S.
  2012; 84 (9): 4118-4125
- **Synaptic proteins promote calcium-triggered fast transition from point contact to full fusion.** *eLife*
  Diao, J., Grob, P., Cipriano, D. J., Kyoung, M., Zhang, Y., Shah, S., Nguyen, A., Padolina, M., Srivastava, A., Vrljic, M., Shah, A., Nogales, E., Chu, et al
  2012; 1
- **Post-Translational Modifications and Lipid Binding Profile of Insect Cell-Expressed Full-Length Mammalian Synaptotagmin 1** *BIOCHEMISTRY*
  Vrljic, M., Strop, P., Hill, R. C., Hansen, K. C., Chu, S., Brunger, A. T.
  2011; 50 (46): 9998-10012
- **In vitro system capable of differentiating fast Ca2+-triggered content mixing from lipid exchange for mechanistic studies of neurotransmitter release** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Kyoung, M., Srivastava, A., Zhang, Y., Diao, J., Vrljic, M., Grob, P., Nogales, E., Chu, S., Brunger, A. T.
  2011; 108 (29): E304-E313
- **Equivalence Principle and Gravitational Redshift** *PHYSICAL REVIEW LETTERS*
  Hohensee, M. A., Chu, S., Peters, A., Mueller, H.
  2011; 106 (15)
- **Towards Structural Biology with Single Molecules** *Experimental Biology Meeting 2011*
  Brunger, A., Strop, P., Vrljic, M., Chu, S., Weninger, K.
  FEDERATION AMER SOC EXP BIOL.2011
- **Three-dimensional molecular modeling with single molecule FRET** *JOURNAL OF STRUCTURAL BIOLOGY*
  Brunger, A. T., Strop, P., Vrljic, M., Chu, S., Weninger, K. R.
  2011; 173 (3): 497-505
- **Subnanometre single-molecule localization, registration and distance measurements** *NATURE*
  Pertsinidis, A., Zhang, Y., Chu, S.
  2010; 466 (7306): 647-U11

- **Molecular mechanism of the synaptotagmin-SNARE interaction in Ca2+-triggered vesicle fusion** *NATURE STRUCTURAL & MOLECULAR BIOLOGY*
  Vrljic, M., Strop, P., Ernst, J. A., Sutton, R. B., Chu, S., Brunger, A. T.
  2010; 17 (3): 325-U92
- **Single-molecule FRET-derived model of the synaptotagmin 1-SNARE fusion complex** *NATURE STRUCTURAL & MOLECULAR BIOLOGY*
  Choi, U. B., Strop, P., Vrljic, M., Chu, S., Brunger, A. T., Weninger, K. R.
  2010; 17 (3): 318-U84
- **A precision measurement of the gravitational redshift by the interference of matter waves** *NATURE*
  Mueller, H., Peters, A., Chu, S.
  2010; 463 (7283): 926-U96
- **DNA Methylation Increases Nucleosome Compaction and Rigidity** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
  Choy, J. S., Wei, S., Lee, J. Y., Tan, S., Chu, S., Lee, T.
  2010; 132 (6): 1782-?
- **Multiple native states reveal persistent ruggedness of an RNA folding landscape** *NATURE*
  Solomatin, S. V., Greenfeld, M., Chu, S., Herschlag, D.
  2010; 463 (7281): 681-U117
- **A NEW PLATFORM FOR PROFILING ACTIVE PROTEASES WITH SINGLE-MOLECULE SENSITIVITY** *ASME 1st Global Congress on NanoEngineering for Medicine and Biology*
  Dogan, M. Y., Revyakin, A., Park, S., Pertsinidis, A., Brown, C., Chu, S., Craik, C. S., Majumdar, A.
  AMER SOC MECHANICAL ENGINEERS.2010: 77–78
- **Molecular Mechanism of the Synaptotagmin-Snare Interaction in Ca2+-Triggered Vesicle Fusion**
  Vrljic, M., Strop, P., Ernst, J. A., Sutton, R., Chu, S., Brunger, A. T.
  CELL PRESS.2010: 439A
- **Single Molecule Study of Disassembly of SNARE Complex by NSF/alpha-SNAP**
  Jung, J., Fenn, T. D., Chu, S., Brunger, A. T.
  CELL PRESS.2010: 670A
- **Characterizing the Initial Encounter Complex in Cadherin Adhesion** *STRUCTURE*
  Sivasankar, S., Zhang, Y., Nelson, W. J., Chu, S.
  2009; 17 (8): 1075-1081
- **Noise-Immune Conjugate Large-Area Atom Interferometers** *PHYSICAL REVIEW LETTERS*
  Chiow, S., Herrmann, S., Chu, S., Mueller, H.
  2009; 103 (5)
- **Atom interferometry tests of local Lorentz invariance in gravity and electrodynamics** *PHYSICAL REVIEW D*
  Chung, K., Chiow, S., Herrmann, S., Chu, S., Mueller, H.
  2009; 80 (1)
- **Atom Interferometers with Scalable Enclosed Area** *PHYSICAL REVIEW LETTERS*
  Mueller, H., Chiow, S., Herrmann, S., Chu, S.
  2009; 102 (24)
- **Nanoparticle-Mediated Nonfluorescent Bonding of Microspheres to Atomic Force Microscope Cantilevers and Imaging Fluorescence from Bonded Cantilevers with Single Molecule Sensitivity** *NANO LETTERS*
  Sivasankar, S., Chu, S.
  2009; 9 (5): 2120-2124
- **6 W, 1 kHz linewidth, tunable continuous-wave near-infrared laser** *OPTICS EXPRESS*
  Chiow, S., Herrmann, S., Mueller, H., Chu, S.
  2009; 17 (7): 5246-5250
- **SINGLE MOLECULE STUDIES OF THE SYNAPTIC VESICLE FUSION MACHINERY** *40th Annual Meeting of the American-Society-for-Neurochemistry*

Brunger, A. T., Weninger, K., Vrljic, M., Choi, U. B., Bowen, M. A., Chu, S.
WILEY-BLACKWELL.2009: 55–55

- **Single Molecule Analysis of Group I Ribozyme Folding Reveals Pronounced Ruggedness Throughout Its Folding Landscape**
  Solomatin, S., Greenfeld, M., Chu, S., Herschlag, D.
  CELL PRESS.2009: 9A
- **Relative Rearrangements Of Synaptotagmin3 C2A And C2B Domains Are Influenced ay Calcium, Lipids And SNARE Proteins**
  Vrljic, M., Strop, P., Ernst, J., Sutton, R., Chu, S., Brunger, A. T.
  CELL PRESS.2009: 358A–359A
- **Resolving Cadherin Interactions at the Single Molecule Level**
  Sivasankar, S., Zhang, Y., Nelson, W., Chu, S.
  CELL PRESS.2009: 383A
- **Resolving cadherin interactions and binding cooperativity at the single-molecule level** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Zhang, Y., Sivasankar, S., Nelson, W. J., Chu, S.
  2009; 106 (1): 109-114
- **Single-Molecule Studies of the Neuronal SNARE Fusion Machinery** *ANNUAL REVIEW OF BIOCHEMISTRY*
  Brunger, A. T., Weninger, K., Bowen, M., Chu, S.
  2009; 78: 903-928
- **ATOM INTERFEROMETRY EXPERIMENTS IN FUNDAMENTAL PHYSICS** *7th Symposium on Frequency Standards and Metrology*
  Chiow, S. W., Herrmann, S., Chu, S., Mueller, H.
  WORLD SCIENTIFIC PUBL CO PTE LTD.2009: 53–61
- **Direct measurement of tertiary contact cooperativity in RNA folding** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
  Sattint, B. D., Zhao, W., Travers, K., Chut, S., Herschlag, D.
  2008; 130 (19): 6085-?
- **Atom interferometry with up to 24-photon-momentum-transfer beam splitters** *PHYSICAL REVIEW LETTERS*
  Mueller, H., Chiow, S., Long, Q., Herrmann, S., Chu, S.
  2008; 100 (18)
- **Atom-wave diffraction between the Raman-Nath and the Bragg regime: Effective Rabi frequency, losses, and phase shifts** *PHYSICAL REVIEW A*
  Mueller, H., Chiow, S., Chu, S.
  2008; 77 (2)
- **Accessory proteins stabilize the acceptor complex for synaptobrevin, the 1 : 1 syntaxin/SNAP-25 complex** *STRUCTURE*
  Weninger, K., Bowen, M. E., Choi, U. B., Chu, S., Brunger, A. T.
  2008; 16 (2): 308-320
- **Atom-interferometry tests of the isotropy of post-Newtonian gravity** *PHYSICAL REVIEW LETTERS*
  Mueller, H., Chiow, S., Herrmann, S., Chu, S., Chung, K.
  2008; 100 (3)
- **Multiphoton- and simultaneous conjugate Ramsey-Borde atom interferometers** *3rd Mexican Meeting on Mathematical and Experimental Physics*
  Mueller, H., Chiow, S., Herrmann, S., Chu, S.
  AMER INST PHYSICS.2008: 291–301
- **Nanosecond electro-optical switching with a repetition rate above 20 MHz** *REVIEW OF SCIENTIFIC INSTRUMENTS*
  Mueller, H., Chiow, S., Herrmann, S., Chu, S.
  2007; 78 (12)
- **Thiostrepton inhibition of tRNA delivery to the ribosome** *RNA-A PUBLICATION OF THE RNA SOCIETY*
  Gonzalez, R. L., Chu, S., Puglisi, J. D.
  2007; 13 (12): 2091-2097

- **Extended-cavity diode lasers with tracked resonances** *APPLIED OPTICS*
  Chiow, S., Long, Q., Vo, C., Mueller, H., Chu, S.
  2007; 46 (33): 7997-8001
- **Fluctuations of transfer RNAs between classical and hybrid states** *BIOPHYSICAL JOURNAL*
  Kim, H. D., Puglisi, J. D., Chu, S.
  2007; 93 (10): 3575-3582
- **A functional dynein-microtubule network is required for NGF signaling through the Rap1/MAPK pathway** *TRAFFIC*
  Wu, C., Ramirez, A., Cui, B., Ding, J., Delcroix, J. M., Valletta, J. S., Liu, J., Yang, Y., Chu, S., Mobley, W. C.
  2007; 8 (11): 1503-1520
- **Optical bonding using silica nanoparticle sol-gel chemistry** *NANO LETTERS*
  Sivasankar, S., Chu, S.
  2007; 7 (10): 3031-3034
- **One at a time, live tracking of NGF axonal transport using quantum dots** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Cui, B., Wu, C., Chen, L., Ramirez, A., Bearer, E. L., Li, W., Mobley, W. C., Chu, S.
  2007; 104 (34): 13666-13671
- **The role of fluctuations in tRNA selection by the ribosome** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Lee, T., Blanchard, S. C., Kim, H. D., Puglisi, J. D., Chu, S.
  2007; 104 (34): 13661-13665
- **Measuring the folding transition time of single RNA molecules** *BIOPHYSICAL JOURNAL*
  Lee, T., Lapidus, L. J., Zhao, W., Travers, K. J., Herschlag, D., Chu, S.
  2007; 92 (9): 3275-3283
- **The individualistic dynamics of entangled DNA in solution** *MACROMOLECULES*
  Teixeira, R. E., Dambal, A. K., Richter, D. H., Shaqfeh, E. S., Chu, S.
  2007; 40 (7): 2461-2476
- **Peptide bond formation destabilizes Shine-Dalgarno interaction on the ribosome** *NATURE*
  Uemura, S., Dorywalska, M., Lee, T., Kim, H. D., Puglisi, J. D., Chu, S.
  2007; 446 (7134): 454-457
- **Retrolinkin, a membrane protein, plays an important role in retrograde axonal transport** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Liu, J., Ding, J., Wu, C., Bhagavatula, P., Cui, B., Chu, S., Mobley, W. C., Yang, Y.
  2007; 104 (7): 2223-2228
- **Single molecule studies of SNARE-dependent fusion** *51st Annual Meeting of the Biophysical-Society*
  Brunger, A., Chu, S., Bowen, M., Weninger, K., Vrljic, M.
  CELL PRESS.2007: 375A–375A
- **PHYS 70-Optomechanical measurements of DNA interaction at the single molecule level**
  Sivasankar, S., Chu, S.
  AMER CHEMICAL SOC.2006
- **PHYS 502-Structural and kinetics fluctuations of the ribosome**
  Mohanty, U., Spasic, A., Mohanty, S., Sanyasi, S., Chu, S.
  AMER CHEMICAL SOC.2006
- **Gene targeting of GAN in mouse causes a toxic accumulation of microtubule-associated protein 8 and impaired retrograde axonal transport** *HUMAN MOLECULAR GENETICS*
  Ding, J. Q., Allen, E., Wang, W., Valle, A., Wu, C. B., Nardine, T., Cui, B. X., Yi, J., Taylor, A., Jeon, N. L., Chu, S., So, Y., Vogel, et al
  2006; 15 (9): 1451-1463

- **Phase-locked, low-noise, frequency agile titanium: sapphire lasers for simultaneous atom interferometers** *OPTICS LETTERS*
  Muller, H., Chiow, S. W., Long, Q., Chu, S.
  2006; 31 (2): 202-204
- **Active sub-Rayleigh alignment of parallel or antiparallel laser beams** *OPTICS LETTERS*
  Muller, H., Chiow, S. W., Long, Q., Vo, C., Chu, S.
  2005; 30 (24): 3323-3325
- **Ion atmosphere around nucleic acid** *JOURNAL OF PHYSICAL CHEMISTRY B*
  Taubes, C. H., Mohanty, U., Chu, S.
  2005; 109 (45): 21267–72
- **Parametric amplification of matter waves in periodically translated optical lattices** *PHYSICAL REVIEW LETTERS*
  Gemelke, N., Sarajlic, E., Bidel, Y., Hong, S., Chu, S.
  2005; 95 (17)
- **Ion atmosphere of three-way junction nucleic acid**
  Mohanty, U., Mohanty, U., Kim, H. D., Chu, S.
  AMER CHEMICAL SOC.2005: U1224–U1225
- **Phase shifts in precision atom interferometry due to the localization of atoms and optical fields** *PHYSICAL REVIEW A*
  Wicht, A., Sarajlic, E., Hensley, J. M., Chu, S.
  2005; 72 (2)
- **Characteristic periodic motion of polymers in shear flow** *PHYSICAL REVIEW LETTERS*
  Schroeder, C. M., Teixeira, R. E., Shaqfeh, E. S., Chu, S.
  2005; 95 (1)
- **Single-molecule studies of synaptotagmin and complexin binding to the SNARE complex** *BIOPHYSICAL JOURNAL*
  Bowen, M. E., Weninger, K., Ernst, J., Chu, S., Brunger, A. T.
  2005; 89 (1): 690-702
- **Dynamics of DNA in the flow-gradient plane of steady shear flow: Observations and simulations** *MACROMOLECULES*
  Schroeder, C. M., Teixeira, R. E., Shaqfeh, E. S., Chu, S.
  2005; 38 (5): 1967-1978
- **Shear thinning and tumbling dynamics of single polymers in the flow-gradient plane** *MACROMOLECULES*
  Teixeira, R. E., Babcock, H. P., Shaqfeh, E. S., Chu, S.
  2005; 38 (2): 581-592
- **Site-specific labeling of the ribosome for single-molecule spectroscopy** *NUCLEIC ACIDS RESEARCH*
  Dorywalska, M., Blanchard, S. C., Gonzalez, R. L., Kim, H. D., Chu, S., Puglisi, J. D.
  2005; 33 (1): 182-189
- **Effect of hydrodynamic interactions on DNA dynamics in extensional flow: Simulation and single molecule experiment** *MACROMOLECULES*
  Schroeder, C. M., Shaqfeh, E. S., Chu, S.
  2004; 37 (24): 9242-9256
- **Single molecule observation of liposome-bilayer fusion thermally induced by soluble N-ethyl maleimide sensitive-factor attachment protein receptors (SNAREs)** *BIOPHYSICAL JOURNAL*
  Bowen, M. E., Weninger, K., Brunger, A. T., Chu, S.
  2004; 87 (5): 3569-3584
- **tRNA selection and kinetic proofreading in translation** *NATURE STRUCTURAL & MOLECULAR BIOLOGY*
  Blanchard, S. C., Gonzalez, R. L., Kim, H. D., Chu, S., Puglisi, J. D.
  2004; 11 (10): 1008-1014
- **Precision Feshbach spectroscopy of ultracold Cs-2** *PHYSICAL REVIEW A*
  Chin, C., Vuletic, V., Kerman, A. J., Chu, S., Tiesinga, E., Leo, P. J., Williams, C. J.

2004; 70 (3)

- **tRNA dynamics on the ribosome during translation** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Blanchard, S. C., Kim, H. D., Gonzalez, R. L., Puglisi, J. D., Chu, S.
  2004; 101 (35): 12893-12898
- **Risk factors for proximal humerus fracture** *AMERICAN JOURNAL OF EPIDEMIOLOGY*
  Chu, S. P., Kelsey, J. L., Keegan, T. H., Sternfeld, B., Prill, M., Quesenberry, C. P., Sidney, S.
  2004; 160 (4): 360-367
- **Magnetic properties of Sm(CobalFe0.31Zr0.05Cu0.04Bx)(z) alloys and their melt-spun materials (x=0.02-0.04, z=7.5-12)** *IEEE TRANSACTIONS ON MAGNETICS*
  Huang, M. Q., Turgut, Z., Smith, B. R., Chen, Z. M., Ma, B. M., Chu, S. Y., Laughlin, D. E., Horwath, J. C., Fingers, R. T.
  2004; 40 (4): 2934-2936
- **Single-molecule studies of SNARE complex assembly reveal parallel and antiparallel configurations** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Weninger, K., Bowen, M. E., Chu, S., Brunger, A. T.
  2003; 100 (25): 14800-14805
- **Observation of polymer conformation hysteresis in extensional flow** *SCIENCE*
  Schroeder, C. M., Babcock, H. P., Shaqfeh, E. S., Chu, S.
  2003; 301 (5639): 1515-1519
- **Visualization of molecular fluctuations near the critical point of the coil-stretch transition in polymer elongation** *MACROMOLECULES*
  Babcock, H. P., Teixeira, R. E., Hur, J. S., Shaqfeh, E. S., Chu, S.
  2003; 36 (12): 4544-4548
- **Exploration of the transition state for tertiary structure formation between an RNA helix and a large structured RNA** *JOURNAL OF MOLECULAR BIOLOGY*
  Bartley, L. E., Zhuang, X. W., Das, R., Chu, S., Herschlag, D.
  2003; 328 (5): 1011-1026
- **Biology and polymer physics at the single-molecule level** *Meeting on Slow Dynamics in Soft Matter*
  Chu, S.
  ROYAL SOC.2003: 689–98
- **Sensitive detection of cold cesium molecules formed on Feshbach resonances** *PHYSICAL REVIEW LETTERS*
  Chin, C., Kerman, A. J., Vuletic, V., Chu, S.
  2003; 90 (3)
- **Early steps of supported bilayer formation probed by single vesicle fluorescence assays** *BIOPHYSICAL JOURNAL*
  Johnson, J. M., Ha, T., Chu, S., Boxer, S. G.
  2002; 83 (6): 3371-3379
- **Dynamics and configurational fluctuations of single DNA molecules in linear mixed flows** *PHYSICAL REVIEW E*
  Hur, J. S., Shaqfeh, E. S., Babcock, H. P., Chu, S.
  2002; 66 (1)
- **Correlating structural dynamics and function in single ribozyme molecules** *SCIENCE*
  Zhuang, X. W., Kim, H., Pereira, M. J., Babcock, H. P., Walter, N. G., Chu, S.
  2002; 296 (5572): 1473-1476
- **Mg2+-dependent conformational change of RNA studied by fluorescence correlation and FRET on immobilized single molecules** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Kim, H. D., Nienhaus, G. U., Ha, T., Orr, J. W., Williamson, J. R., Chu, S.
  2002; 99 (7): 4284-4289
- **Cold atoms and quantum control** *NATURE*
  Chu, S.

2002; 416 (6877): 206-210

- **Exploring the folding landscape of a structured RNA** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Russell, R., Zhuang, X. W., Babcock, H. P., Millett, I. S., Doniach, S., Chu, S., Herschlag, D.
  2002; 99 (1): 155-160
- **Measurement of an electron's electric dipole moment using Cs atoms trapped in optical lattices** *PHYSICAL REVIEW A*
  Chin, C., Leiber, V., Vuletic, V., Kerman, A. J., Chu, S.
  2001; 63 (3)
- **Dynamics of dilute and semidilute DNA solutions in the start-up of shear flow** *JOURNAL OF RHEOLOGY*
  Hur, J. S., Shaqfeh, E. S., Babcock, H. P., Smith, D. E., Chu, S.
  2001; 45 (2): 421-450
- **A single molecule study of a multiple-step RNA enzymatic reaction**
  Zhuang, X. W., Kim, H., Walter, N., Babcock, H., Chu, S.
  BIOPHYSICAL SOCIETY.2001: 157A
- **Initial steps of bilayer formation investigated using single vesicle fluorescence.**
  Johnson, J. M., Ha, T. J., Chu, S., Boxer, S. G.
  BIOPHYSICAL SOCIETY.2001: 417A
- **Fluorescence quenching: A tool for single-molecule protein-folding study** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Zhuang, X. W., Ha, T., Kim, H. D., Centner, T., Labeit, S., Chu, S.
  2000; 97 (26): 14241-14244
- **High resolution feshbach spectroscopy of cesium** *Physical review letters*
  Chin, C., Vuletic, V., Kerman, A. J., Chu, S.
  2000; 85 (13): 2717-20
- **High resolution Feshbach spectroscopy of cesium** *PHYSICAL REVIEW LETTERS*
  Chin, C., Vuletic, V., Kerman, A. J., Chu, S.
  2000; 85 (13): 2717-2720
- **Relating the microscopic and macroscopic response of a polymeric fluid in a shearing flow** *PHYSICAL REVIEW LETTERS*
  Babcock, H. P., Smith, D. E., Hur, J. S., Shaqfeh, E. S., Chu, S.
  2000; 85 (9): 2018-2021
- **A single-molecule study of RNA catalysis and folding** *SCIENCE*
  Zhuang, X. W., Bartley, L. E., Babcock, H. P., Russell, R., Ha, T. J., Herschlag, D., Chu, S.
  2000; 288 (5473): 2048-?
- **Laser cooling of atoms, ions, or molecules by coherent scattering** *Physical review letters*
  Vuletic, V., Chu, S.
  2000; 84 (17): 3787-90
- **Laser cooling of atoms, ions, or molecules by coherent scattering** *PHYSICAL REVIEW LETTERS*
  Vuletic, V., Chu, S.
  2000; 84 (17): 3787-3790
- **Beyond optical molasses: 3D raman sideband cooling of atomic cesium to high phase-space density** *Physical review letters*
  Kerman, A. J., Vuletic, V., Chin, C., Chu, S.
  2000; 84 (3): 439-42
- **Beyond optical molasses: 3D Raman sideband cooling of atomic cesium to high phase-space density** *PHYSICAL REVIEW LETTERS*
  Kerman, A. J., Vuletic, V., Chin, C., Chu, S.
  2000; 84 (3): 439-442

- **Ligand-induced conformational changes observed in single RNA molecules** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Ha, T., Zhuang, X. W., Kim, H. D., Orr, J. W., Williamson, J. R., Chu, S.
  1999; 96 (16): 9077-9082
- **Suppression of atomic radiative collisions by tuning the ground state scattering length** *PHYSICAL REVIEW LETTERS*
  Vuletic, V., Chin, C., Kerman, A. J., Chu, S.
  1999; 83 (5): 943-946
- **Active low frequency vertical vibration isolation** *REVIEW OF SCIENTIFIC INSTRUMENTS*
  Hensley, J. M., Peters, A., Chu, S.
  1999; 70 (6): 2735-2741
- **Single-polymer dynamics in steady shear flow** *SCIENCE*
  Smith, D. E., Babcock, H. P., Chu, S.
  1999; 283 (5408): 1724-1727
- **Brownian dynamics simulations of a DNA molecule in an extensional flow field** *JOURNAL OF RHEOLOGY*
  Larson, R. G., Hu, H., Smith, D. E., Chu, S.
  1999; 43 (2): 267-304
- **Observation of low-field Feshbach resonances in collisions of cesium atoms** *PHYSICAL REVIEW LETTERS*
  Vuletic, V., Kerman, A. J., Chin, C., Chu, S.
  1999; 82 (7): 1406-1409
- **Degenerate Raman sideband cooling of trapped cesium atoms at very high atomic densities** *PHYSICAL REVIEW LETTERS*
  Vuletic, V., Chin, C., Kerman, A. J., Chu, S.
  1998; 81 (26): 5768-5771
- **Response of flexible polymers to a sudden elongational flow** *Science (New York, N.Y.)*
  Smith, D. E., Chu, S.
  1998; 281 (5381): 1335-40
- **The dynamics of partially extended single molecules of DNA** *NATURE*
  Quake, S. R., Babcock, H., Chu, S.
  1997; 388 (6638): 151-154
- **Single polymer dynamics in an elongational flow** *SCIENCE*
  Perkins, T. T., Smith, D. E., Chu, S.
  1997; 276 (5321): 2016-2021
- **Bioreactive self-assembled monolayers on hydrogen-passivated Si(111) as a new class of atomically flat substrates for biological scanning probe microscopy** *JOURNAL OF STRUCTURAL BIOLOGY*
  Wagner, P., Nock, S., Spudich, J. A., VOLKMUTH, W. D., Chu, S., Cicero, R. L., Wade, C. P., Linford, M. R., Chidsey, C. E.
  1997; 119 (2): 189-201
- **Raman cooling of atoms in an optical dipole trap** *PHYSICAL REVIEW LETTERS*
  Lee, H. J., Adams, C. S., Kasevich, M., Chu, S.
  1996; 76 (15): 2658-2661
- **Quantitative measurements of force and displacement using an optical trap** *BIOPHYSICAL JOURNAL*
  Simmons, R. M., Finer, J. T., Chu, S., Spudich, J. A.
  1996; 70 (4): 1813-1822
- **Dynamical scaling of DNA diffusion coefficients** *MACROMOLECULES*
  Smith, D. E., Perkins, T. T., Chu, S.
  1996; 29 (4): 1372-1373
- **EVAPORATIVE COOLING IN A CROSSED DIPOLE TRAP** *PHYSICAL REVIEW LETTERS*
  Adams, C. S., Lee, H. J., Davidson, N., Kasevich, M., Chu, S.

1995; 74 (18): 3577-3580

- **STRETCHING OF A SINGLE TETHERED POLYMER IN A UNIFORM-FLOW** *SCIENCE*
  Perkins, T. T., Smith, D. E., Larson, R. G., Chu, S.
  1995; 268 (5207): 83-87
- **LONG ATOMIC COHERENCE TIMES IN AN OPTICAL DIPOLE TRAP** *PHYSICAL REVIEW LETTERS*
  Davidson, N., Lee, H. J., Adams, C. S., Kasevich, M., Chu, S.
  1995; 74 (8): 1311-1314
- **RAMAN COOLING OF ATOMS IN 2-DIMENSIONS AND 3-DIMENSIONS** *PHYSICAL REVIEW LETTERS*
  Davidson, N., Lee, H. J., Kasevich, M., Chu, S.
  1994; 72 (20): 3158-3161
- **RELAXATION OF A SINGLE DNA MOLECULE OBSERVED BY OPTICAL MICROSCOPY** *SCIENCE*
  Perkins, T. T., Quake, S. R., Smith, D. E., Chu, S.
  1994; 264 (5160): 822-826
- **DIRECT OBSERVATION OF TUBE-LIKE MOTION OF A SINGLE POLYMER-CHAIN** *SCIENCE*
  Perkins, T. T., Smith, D. E., Chu, S.
  1994; 264 (5160): 819-822
- **PRECISION ATOM INTERFEROMETRY AND AN IMPROVED MEASUREMENT OF THE 13S1-23S1 TRANSITION IN POSITRONIUM** *International School of Physics - Enrico Fermi*
  Chu, S.
  ELSEVIER SCIENCE PUBL B V.1994: 317–355
- **PRECISION-MEASUREMENTS WITH COLD ATOMS** *11th International Conference on Laser Spectroscopy*
  Weiss, D. S., Gibble, K., Young, B., Peters, A., Chu, S.
  AIP PRESS.1994: 23–28
- **LASER-COOLED CS FREQUENCY STANDARD AND A MEASUREMENT OF THE FREQUENCY-SHIFT DUE TO ULTRACOLD COLLISIONS** *PHYSICAL REVIEW LETTERS*
  Gibble, K., Chu, S.
  1993; 70 (12): 1771-1774
- **IN-VITRO METHODS FOR MEASURING FORCE AND VELOCITY OF THE ACTIN-MYOSIN INTERACTION USING PURIFIED PROTEINS** *METHODS IN CELL BIOLOGY, VOL 39*
  Warrick, H. M., Simmons, R. M., Finer, J. T., Uyeda, T. Q., Chu, S., Spudich, J. A.
  1993; 39: 1-21
- **LASER COOLING BELOW A PHOTON RECOIL WITH 3-LEVEL ATOMS** *PHYSICAL REVIEW LETTERS*
  Kasevich, M., Chu, S.
  1992; 69 (12): 1741-1744
- **MEASUREMENT OF THE GRAVITATIONAL ACCELERATION OF AN ATOM WITH A LIGHT-PULSE ATOM INTERFEROMETER** *APPLIED PHYSICS B-PHOTOPHYSICS AND LASER CHEMISTRY*
  Kasevich, M., Chu, S.
  1992; 54 (5): 321-332
- **FUTURE SLOW-ATOM FREQUENCY STANDARDS** *METROLOGIA*
  Gibble, K., Chu, S.
  1992; 29 (2): 201-212
- **IMPROVED MAGNETOOPTIC TRAPPING IN A VAPOR CELL** *OPTICS LETTERS*
  GIBBLE, K. E., Kasapi, S., Chu, S.
  1992; 17 (7): 526-528
- **LASER TRAPPING OF NEUTRAL PARTICLES** *SCIENTIFIC AMERICAN*
  Chu, S.
  1992; 266 (2): 70-76

- **MEASUREMENT OF THE ACCELERATION DUE TO GRAVITY WITH AN ATOMIC INTERFEROMETER** *WORKSHOP ON THE FOUNDATIONS OF QUANTUM MECHANICS*
  Kasevich, M., Chu, S.
  WORLD SCIENTIFIC PUBL CO PTE LTD.1992: 47–54
- **THEORETICAL-ANALYSIS OF VELOCITY-SELECTIVE RAMAN TRANSITIONS** *PHYSICAL REVIEW A*
  Moler, K., Weiss, D. S., Kasevich, M., Chu, S.
  1992; 45 (1): 342-348
- **ATOMIC INTERFEROMETRY USING STIMULATED RAMAN TRANSITIONS** *PHYSICAL REVIEW LETTERS*
  Kasevich, M., Chu, S.
  1991; 67 (2): 181-184
- **ATOMIC VELOCITY SELECTION USING STIMULATED RAMAN TRANSITIONS** *PHYSICAL REVIEW LETTERS*
  Kasevich, M., Weiss, D. S., Riis, E., Moler, K., Kasapi, S., Chu, S.
  1991; 66 (18): 2297-2300
- **NORMAL-INCIDENCE REFLECTION OF SLOW ATOMS FROM AN OPTICAL EVANESCENT WAVE** *OPTICS LETTERS*
  Kasevich, M. A., Weiss, D. S., Chu, S.
  1990; 15 (11): 607-609
- **ATOM FUNNEL FOR THE PRODUCTION OF A SLOW, HIGH-DENSITY ATOMIC-BEAM** *PHYSICAL REVIEW LETTERS*
  Riis, E., Weiss, D. S., Moler, K. A., Chu, S.
  1990; 64 (14): 1658-1661
- **OPTICAL MOLASSES AND MULTILEVEL ATOMS - THEORY** *JOURNAL OF THE OPTICAL SOCIETY OF AMERICA B-OPTICAL PHYSICS*
  UNGAR, P. J., Weiss, D. S., Riis, E., Chu, S.
  1989; 6 (11): 2058-2071
- **OPTICAL MOLASSES AND MULTILEVEL ATOMS - EXPERIMENT** *JOURNAL OF THE OPTICAL SOCIETY OF AMERICA B-OPTICAL PHYSICS*
  Weiss, D. S., Riis, E., Shevy, Y., UNGAR, P. J., Chu, S.
  1989; 6 (11): 2072-2083
- **RF SPECTROSCOPY IN AN ATOMIC FOUNTAIN** *PHYSICAL REVIEW LETTERS*
  Kasevich, M. A., Riis, E., Chu, S., DeVoe, R. G.
  1989; 63 (6): 612-616
- **BIMODAL SPEED DISTRIBUTIONS IN LASER-COOLED ATOMS** *PHYSICAL REVIEW LETTERS*
  Shevy, Y., Weiss, D. S., UNGAR, P. J., Chu, S.
  1989; 62 (10): 1118-1121