

WILSON HO

*Department of Physics & Astronomy
and Department of Chemistry
University of California, Irvine
Irvine, CA 92697-4575*

*Voice: 1(949)345-0313
Fax: 1(949)824-2174
e-mail: wilsonho@uci.edu*

web: <http://www.physics.uci.edu/~wilsonho/wilsonho.html>

PERSONAL

Born February 5, 1953, in Changhua City, Taiwan; Naturalized U.S. Citizen, 1978

EDUCATION

B.S. in Chemistry, California Institute of Technology, 1971-1975

M.S. in Chemistry, California Institute of Technology, 1974-1975

Thesis Advisor: W. Henry Weinberg

Ph.D. in Physics, University of Pennsylvania, 1975-1979

Thesis Advisor: E. Ward Plummer

PROFESSIONAL EXPERIENCE

Member of Technical Staff, AT&T Bell Laboratories, Murray Hill, NJ, 1979-1980

Assistant Professor of Physics, Cornell University, Ithaca, NY, 1980-1985

Associate Professor of Physics, Cornell University, Ithaca, NY, 1985-1991

Professor of Physics, Cornell University, Ithaca, NY, 1991-2000

Donald Bren Professor of Physics & Astronomy and of Chemistry, University of California,
Irvine, CA, 2000-present

Distinguished Professor of Physics & Astronomy and of Chemistry, University of California,
Irvine, CA, 2018-present

PROFESSIONAL AFFILIATIONS

American Chemical Society

American Physical Society

HONORS AND AWARDS

Sigma Xi Awards, 1975, 1979

W. Nottingham Prize, Physical Electronics Conference, APS, 1979

Victor K. LaMer Prize, Division of Colloid and Surface Chemistry, ACS, 1980

Alfred P. Sloan Foundation Fellowship, 1981

Fellow of the American Physical Society, 1995

Alexander von Humboldt Research Award for Senior US Scientists, 1997

Bonn Chemistry Prize, Germany, 2000

UCI Academic Senate Distinguished Faculty Award for Research, 2005

Fellow of the American Association for the Advancement of Science, 2009

Medard W. Welch Award, American Vacuum Society, 2011
150th Anniversary Jubilee Visiting Professor, Chalmers University, Sweden, 2013
Irving Langmuir Prize, American Physical Society, 2013
Member of the U.S. National Academy of Sciences, 2013
Academician, Academia Sinica, Taiwan, Republic of China, 2014
Distinguished Alumni, Changhua Junior High School, Taiwan, 2016
Chinese American Engineers and Scientists Association of Southern California (CESASC)
Achievement Award, 2017
Joseph F. Keithley Award, American Physical Society, 2018
Heinrich Rohrer Medal, Grand Medal, 2024
International Fellow of the Japan Society of Vacuum and Surface Science, 2024

NAMED LECTURES

AT&T Lecture, University of Wisconsin, Madison, 1997
William Draper Harkins Lecture, University of Chicago, 2000
Ångström Lecture, University of Uppsala, Sweden, 2000
Distinguished Lecture, Ford Research Laboratory, 2000
Bren Lecture, UC Irvine, 2001
Nortel Lecture, University of Toronto, Canada, 2002
Malcolm Dole Distinguished Lectures, Northwestern University, 2002
George C. Pimentel Lecture, University of California, Berkeley, 2003
Manuel G. Menendez Lecture, University of Georgia, Athens, 2005
Kaufman Lectures, University of Pittsburgh, 2005
W. Albert Noyes, Jr. Lectures, University of Rochester, 2006
Laird Lecture, University of British Columbia, 2006
Einstein Professor Lectures, Chinese Academy of Sciences, China, 2007
The Croucher Foundation Lectures, Hong Kong, 2008
Basic Energy Sciences Distinguished Lecture, Brookhaven National Laboratory, 2009
A.D. Little Lectures, Massachusetts Institute of Technology, 2009
Pratt Lecture, University of Virginia, 2010
W. Heinlen Hall Lectures, Bowling Green State University, 2013
W.E. Palke Memorial Lecture, University of California, Santa Barbara, 2014
Jortner Lectures, University of Tel Aviv, Israel, 2015
Arnold C. Ott Lectureship, Grand Valley State University, 2015
Academic Master Lectures at Chien-Shiung Wu Science Camp, Taiwan, 2015, 2017, 2023
William A. Chupka Lecture, Yale University, 2017
Morino Lecture, University of Tokyo, RIKEN, IMS, 2017
Chemical Frontiers Lectures, Ohio State University, 2018
Centennial Physics Lectures, Peking University, 2018
Frontier Sciences Colloquium, Beijing Computational Science Research Center, 2018
Kent R. Wilson Lecture, University of California, San Diego, 2024

SELECTED PROFESSIONAL ACTIVITIES

American Vacuum Society Surface Science Division
Executive Committee and Program Committee, 1989-1991
General Committee of the Physical Electronics Conference, 1991-1994
Co-organizer of SPIE Conference on Laser Techniques for Surface Science II, 1995
Organizer of DCP Symposia at APS Meeting, 1996
Fellowship Committee of DCP Division of APS, 1996-1999
NSF Site Visit Team to Caltech, 1999
DOE Site Visit Team to UC Berkeley, 2000
Associate Editor, Surface Science Report, 2000-2003
Scientific Advisory Committee of the Institute of Atomic and Molecular Sciences, Academia Sinica, Taiwan, 2001-2004
Scientific Advisory Board at Zyvex Corporation, Texas, 2001-2003
Editorial Board of The Journal of Chemical Physics, 2003-2005
Selection Committee for the APS Davisson-Germer Prize, 2004; Chair of Committee, 2006
Boulder School on Condensed Matter Physics Advisory Board, 2004-2020
Scientific Advisory Board at the Fritz-Haber Institut der Max-Planck-Gesellschaft in Berlin, 1999-2009
International Academic Advisory Committee for the Hefei National Laboratory for Physical Sciences at the Microscale, Heifei, China, 2005-2009
International Advisory Board of the National Center for Nanoscience and Technology, Beijing, China, 2006
Department of Energy Panel Reviews, 2009
NSF Panel Review, 2011
DOE Review Panel of the Division of Materials Science at Stanford-SLAC, 2012
Selection Committee, APS Irving Langmuir Prize in Chemical Physics, 2004, 2006, 2014
Stanford-SLAC Linac Coherent Light Source Scientific Advisory Committee, 2013-15
Advisory Boards on International Conferences

EDUCATION OUTREACH AND TECHNOLOGY TRANSFER

STM results and figures appearing in textbooks: “Principles of Modern Chemistry”, D.W. Oxtoby, H.P. Gillis, and A. Campion, 7th edition (Thomson Brook/Cole, Belmont, VA, 2008); “Chemistry The Molecular Science”, J.W. Moore and C.L. Stanitski, 5th Edition (Cengage Learning, Stamford, CT, 2015); and other college textbooks; California Elementary School Science Textbook; High School Chemistry Textbook in Taiwan.
Transfer of homemade STM instrumentation (microscope, electronics, software): Princeton University; University of Tennessee; North Carolina State University; EPFL in Lauzanne, Switzerland; University of Bonn, Germany; Wroclaw University, Poland; Fudan University, China; Peking University, China; Tsinghua University, China; Institute of Physics, Chinese Academy of Sciences, China; University of Tokyo, Japan; Chonbuk National University, Korea; Inha University, Korea; POSTECH, Korea; Columbia University, and others.
Transfer of homemade helium recycling system (capture, purification, liquefaction)

RESEARCH AND EDUCATION STATISTICS

Refereed Publications: 288
Students Received Ph.D.: 48
Postdocs Supervised: 30
Visiting Faculty and Scientists: 11
Exchange Graduate Students from Abroad: 10
Undergraduate Research Interns (since 2014): 41

RESEARCH DIRECTIONS AND RESULTS

Precision Measurements in Space-Time with the Scanning Tunneling Microscope (STM)

- Development and Application of New Techniques and Instrumentation
Low Temperature STM, Inelastic Electron Tunneling, Inelastic Tunneling Probe (itProbe), Rectification Spectroscopy and Microscopy, Near-IR and THz Femtosecond and cw Laser-STM
- Inelastic Electron Tunneling Spectroscopy (IETS), Microscopy, and Processes
Single-Molecule Chemistry: Molecular Transformation and Changes in its Electronic, Vibrational, Rotational, Charge, and Spin States; Diffusion, Rotation, Vibration, Conformation and Chirality Changes; Energy, Charge, and Spin Transfers; Single Bond Breaking and Formation; Mechanochemistry
- Atomic Scale Synthesis and Characterization of Novel, Artificial Nanostructures
Metallic Chains and 2-D Islands, Molecular Bridges, Atomic and Molecular Assembly – Intermolecular Interactions and Correlated Effects
- Spatially Resolved Light-Matter Interaction: Diffraction Unlimited Å-fs Resolution
Atomic-Scale and Temporally Resolved Measurements of Single Molecules; Atomic-Scale Resolved Imaging of Light Emission and Photo-induced Electron Transfer in a Single Molecule; Coherent Vibration Driven Structural Transitions in Space and Time; Quantum Sensing Based on Superposition and Coherence of Two Levels in a Single Molecule
- Spin Excitations in Single Atoms, Molecules, and Artificial Nanostructures
600 mK and 9 Tesla STM for Probing Single Electron Spin Excitations; Observed Spin Splitting of Vibronic States in Molecules without Unpaired Electrons; Spin Sensing with Magnetic Molecule-Tip; Spin-Vibration Coupling in Single Magnetic Molecules
- Molecule-Tip Quantum Sensors and Inelastic Tunneling Probe (itProbe)
Imaging Molecular Skeletal Structure, Chemical Bonds, Intermolecular Interactions, and Exchange Interactions between Two Magnetic Molecules
- STM Visualization of Quantum Phenomena in Textbooks and Technology Transfer
Inclusion of STM Results in Primary School, High School, and College Textbooks; Technology Transfers of Our Homemade STM Instrument to More Than a Dozen Research Institutions Worldwide and our Homemade Helium Recycling System

SPECIAL PUBLICATIONS

Co-Edited and Contributed to Two Volumes on "Laser Spectroscopy and Photochemistry On Metal Surfaces", World Scientific, Singapore, 1995

Co-Edited and Contributed in SPIE Conference Proceedings on "Laser Techniques for Surface Science II", SPIE, Bellingham, 1995

Invited Paper in Surface Science: The First Thirty Years, 1994

Invited Paper in the Centennial Issue of the Journal of Physical Chemistry, 1996

Invited Paper in the Journal of Chemical Physics on *Single Molecule Chemistry*, 2002

SELECTED PUBLICATIONS

1. "Observation of Non-Dipole Electron Impact Vibrational Excitation: H on W(100)", W. Ho, R.F. Willis, and E.W. Plummer, Phys. Rev. Lett. **40**, 1463-1466 (1978).
2. "High Resolution Electron Energy Loss Spectroscopy", W. Ho, Physical Methods of Chemistry Series, Vol. IXA, ed. B.W. Rossiter and R.C. Baetzold, Ch. 4, pp. 209-320 (1993).
3. "Surface Photochemistry", W. Ho, Advanced Series in Physical Chemistry, Vol. 5, Part II, ed. H.L. Dai and W. Ho, Ch. 24, pp. 1047-1140 (1995).
4. "Reactions at Metal Surfaces Induced by Femtosecond Laser, Tunneling Electrons, and Heating", W. Ho, J. Phys. Chem. **100**, 13050-13060 (1996).
5. "Single Molecule Chemistry by Tunneling Electrons", B.C. Stipe, M.A. Rezaei, W. Ho, S. Gao, M. Persson, and B.I. Lundqvist, Phys. Rev. Lett. **78**, 4410-4413 (1997).
6. "Inducing and Viewing the Rotational Motion of a Single Molecule", B.C. Stipe, M.A. Rezaei, and W. Ho, Science **279**, 1907-1909 (1998).
7. "Single-Molecule Vibrational Spectroscopy and Microscopy", B.C. Stipe, M.A. Rezaei, and W. Ho, Science **280**, 1732-1735 (1998).
8. "Coupling of Vibrational Excitation to the Rotational Motion of a Single Adsorbed Molecule", B.C. Stipe, M.A. Rezaei, and W. Ho, Phys. Rev. Lett. **81**, 1263-1266 (1998).
9. "Localization of Inelastic Tunneling and the Determination of Atomic-Scale Structure with Chemical Sensitivity", B.C. Stipe, M.A. Rezaei, and W. Ho, Phys. Rev. Lett. **82**, 1724-1727 (1999).
10. "Single Bond Formation and Characterization with a Scanning Tunneling Microscope", H.J. Lee and W. Ho, Science **286**, 1719-1722 (1999).
11. "Direct Observation of the Quantum Tunneling of Single Hydrogen Atoms with a Scanning Tunneling Microscope", L.J. Lauhon and W. Ho, Phys. Rev. Lett. **85**, 4566-4569 (2000).
12. "Oxidation of a Single Carbon Monoxide Molecule Manipulated and Induced with a Scanning Tunneling Microscope", J.R. Hahn and W. Ho, Phys. Rev. Lett. **87**, 166102 (2001).
13. "Development of One-Dimensional Band Structure in Artificial Gold Chains", N. Niluis, T.M. Wallis, and W. Ho, Science **297**, 1853-1856 (2002).
14. "Single Molecule Chemistry", W. Ho, J. Chem. Phys. **117**, 11033-11061 (2002).
15. "Vibrationally Resolved Fluorescence Excited with Submolecular Precision", X.H. Qiu, G.V. Nazin, and W. Ho, Science **299**, 542-546 (2003).
16. "Visualization and Spectroscopy of a Metal-Molecule-Metal Bridge", G.V. Nazin, X.H. Qiu, and W. Ho, Science **302**, 77-81 (2003).

17. “*Vibronic States in Single Molecule Electron Transport*”, X.H. Qiu, G.V. Nazin, and W. Ho, Phys. Rev. Lett. **92**, 206102 (2004).
18. “*Atomic-Scale Coupling of Photons to Single-Molecule Junctions*”, S.W. Wu, N. Ogawa, and W. Ho, Science **312**, 1362-1365 (2006).
19. “*Visualization of Fermi’s Golden Rule Through Imaging of Light Emission From Atomic Silver Chains*”, C. Chen, C.A. Bobisch, and W. Ho, Science **325**, 981-985 (2009).
20. “*Viewing the Interior of a Single Molecule: Vibronically Resolved Photon Imaging at Submolecular Resolution*”, C. Chen, P. Chu, C.A. Bobisch, D.L. Mills, and W. Ho, Phys. Rev. Lett. **105**, 217402 (2010).
21. “*Spin Splitting Unconstrained by Electron Pairing: The Spin-Vibronic States*”, Ungdon Ham and W. Ho, Phys. Rev. Lett. **108**, 106803 (2012).
22. “*Rotational and Vibrational Excitations of a Hydrogen Molecule Trapped within a Nanocavity of Tunable Dimension*”, S. Li, A. Yu, F. Toledo, Z. Han, H. Wang, H.Y. He, R. Wu, and W. Ho, Phys. Rev. Lett. **111**, 146102 (2013).
23. “*Real-Space Imaging of Molecular Structure and Chemical Bonding by Single-Molecule Inelastic Tunneling Probe*”, C. Chiang, C. Xu, Z. Han and W. Ho, Science **344**, 885-888 (2014).
24. “*Probing Intermolecular Coupled Vibrations between Two Molecules*”, Z. Han, G. Czap, C. Xu, C.-L. Chiang, D. Yuan, R. Wu, and W. Ho, Phys. Rev. Lett. **118**, 036801-1-5 (2017).
25. “*Imaging the Halogen Bond in Self-assembled Halogenbenzenes on Silver*”, Z. Han, G. Czap, C.-L. Chiang, C. Xu, P.J. Wagner, X. Wei, Y. Zhang, R. Wu, and W. Ho, Science **358**, 206-210 (2017).
26. “*Joint Space-Time Coherent Vibration Driven Conformational Transitions in a Single Molecule*”, S. Li, S. Chen, J. Li, R. Wu, and W. Ho, Phys. Rev. Lett. **119**, 176002-1-5 (2017).
27. “*Probing and Imaging Spin Interactions with a Magnetic Single-Molecule Sensor*”, G. Czap, P.J. Wagner, F. Xue, L. Gu, J. Li, J. Yao, R. Wu, and W. Ho, Science **364**, 670-673 (2019).
28. “*Detection of Spin-Vibration States in Single Magnetic Molecules*”, G. Czap, P.J. Wagner, J. Li, F. Xue, J. Yao, R. Wu, and W. Ho, Phys. Rev. Lett. **123**, 106803-1-6 (2019).
29. “*Atomic-Scale Quantum Sensing Based on the Ultrafast Coherence of an H₂ Molecule in an STM Cavity*”, L. Wang, Y. Xia, and W. Ho, Science **376**, 401-405 (2022).
30. “*Electrical Manipulation of Quantum Coherence in a Two-Level Molecular System*”, L. Wang, D. Bai, Y. Xia, and W. Ho, Phys. Rev. Lett. **130**, 096201 (2023).
31. “*Single-Molecule Continuous-Wave Terahertz Rectification Spectroscopy and Microscopy*”, S. Chen, W. Shi, and W. Ho, Nano Lett. **23**, 2915-2920 (2023).
32. “*Avoided level Crossing and Entangled States of Interacting Hydrogen Molecules Detected by the Quantum Superposition Microscope*”, Y. Xia, L. Wang, D. Bai, and W. Ho, ACS Nano **17**, 23144-23151 (2023).
33. “*Origin of Photoinduced DC Current and Two-level Population Dynamics in a Single Molecule*”, J. Yao, Y. Park, W. Shi, S. Chen, and W. Ho, Sci. Adv. **10**, eadk9211 (2024).
34. “*Mechanisms Underlying a Quantum Superposition Microscope Based on THz-Driven Coherent Oscillations in a Two-Level Molecular Sensor*”, Y. Xia, L. Wang, and W. Ho, Phys. Rev. Lett. **132**, 076903 (2024).

PH.D. THESES SUPERVISED

1. Harold T. Coderre – M.S., January 1982
Technical Staff, Industrial Firm
A Versatile Data Acquisition and Control System for a Time Resolved Electron Energy Loss Spectroscopy
2. Joseph A. Stroscio – Ph.D., January 1986
Postdoc, IBM; Scientific Staff, Fellow, NIST
High Resolution Electron Energy Loss Spectroscopy of Surface Excitations
3. Natalie S. Gluck – Ph.D., January 1987; co-supervisor Prof. George Wolga
Scientific Staff, Rockwell International
Mechanisms of Carbon and Oxygen Incorporation into Thin Metal Films Grown by Laser Photolysis of Carbonyls
4. John S. Villarrubia – Ph.D., May 1987
Postdoc, IBM; Scientific Staff, NIST
Time Resolved Electron Spectroscopies for the Study of Adsorption, Desorption, and Reaction on Surfaces
5. Bruce A. Gurney – Ph.D., August 1987
Scientific Staff, IBM
Kinetics of Structural and Chemical Transformations of Adsorbates Obtained with a Time-Resolved Electron Energy Loss Spectrometer
6. Lee J. Richter – Ph.D., May 1988
Postdoc, NIST; Scientific Staff, NIST
High Resolution and Time Resolved Electron Energy Loss Spectroscopy Studies of Adsorbate Bonding and Reactivity
7. Lloyd J. Whitman – Ph.D., August 1988
Postdoc, NIST; Scientific Staff, NRL; Associate Director, NIST Nanocenter;
Assistant Director for Nanotechnology and Advanced Materials, White House Office
of Science and Technology Policy
The Kinetics and Mechanisms of Alkali Metal-Promoted Surface Reactions
8. Z. Charles Ying – Ph.D., May 1990
Postdoc, Univ. of Penn.; Scientific Staff, ORNL; Faculty, New Mexico State Univ.;
Scientific Staff, NIST; Program Officer, NSF
The Physical Mechanisms of Surface Photoreactions
9. Shu K. So – Ph.D., January 1991
Postdoc, University of Toronto; Faculty, Baptist University, Hong Kong
Photoreactions of Molybdenum Hexacarbonyl and Nitric Oxide on Solid Surfaces

10. Peter W. Lorraine – Ph.D., August 1991
Scientific Staff, GE
Time Resolved Studies and Activated Reactions on Semiconductor Surfaces with a Differentially Pumped Multichannel Electron energy Loss Spectrometer
11. Brian D. Thoms – Ph.D., January 1992
Postdoc, NRL; Faculty, Georgia State University
Studies of Adsorption Dynamics on Silicon(111)7x7 with Molecular Beam Techniques and Electron Energy Loss Spectroscopy
12. Walter D. Mieher – Ph.D., January 1992
Postdoc, Harvard University; Technical Staff, Intel; KLA-Tencor
Mechanisms of Bimolecular Surface Photoreactions
13. Thomas A. Germer – Ph.D., May 1992
Postdoc, NIST; Scientific Staff, NIST
Experimental Studies of Dynamics at Solid Surfaces
14. Fu-Jen Kao – Ph.D., August 1993
Faculty, Sun Yat Sun University, Taiwan; National Yang-Ming University, Taiwan
Femtosecond Surface Photochemistry: O₂ and O₂+CO on Pt(111)
15. Kyle A. Brown – Ph.D., August 1995
Technical Staff, Applied Materials; Technical Staff, KLA-Tencor
Molecular Beam Induced Surface Reactions and Film Growth
16. Frank M. Zimmermann – Ph.D., August 1995
Faculty, Rutgers University
Quantum State Resolved Studies of Photodesorption Dynamics
17. Robert A. Pelak – Ph.D., December 1997
Postdoc, Los Alamos National Laboratory; Technical Staff, LANL
Photodesorption Dynamics of Nitric Oxide on Pt(111) Induced With Nanosecond and Femtosecond Pulsed Laser
18. Barry C. Stipe – Ph.D., August 1998
Postdoc, IBM Almaden Laboratory; Technical Staff, IBM Almaden Laboratory;
Director, Hitachi Global Storage Technologies
Single-Molecule Vibrational Excitation and Chemistry Induced by Inelastic Tunneling Electrons
19. Mohammad A. Rezaei – Ph.D., August 1998
Technical Staff, Transaction Information Systems; Vice President and Technical Architect, Technology Fellow in Enterprise Platform Business Unit, Goldman Sachs
Atomic Scale Chemistry on Silicon Surfaces Studied with a Variable Temperature Scanning Tunneling Microscope

20. Scott A. Ustin – Ph.D., September 1999
 Technical Staff, Lucent Technology; Staff Scientist, Cree
Non-Equilibrium Growth of Wide Band Gap Semiconductors

21. Lincoln J. Lauhon – Ph.D., August 2000
 Postdoc, Harvard University; Faculty, Northwestern University
The Initiation and Characterization of Single Molecule Excitations With a Scanning Tunneling Microscope

22. Chunping Long – Ph.D., August 2000
 Technical Staff, Applied Materials
Supersonic Jet Epitaxy of Wide Band Gap Semiconductors

23. Thomas M. Wallis – Ph.D., August 2003
 Postdoc, Technical Staff, National Institute of Standards and Technology, Boulder
Single Molecules and Metallic Nanostructures Manipulated and Characterized with a Scanning Tunneling Microscope

24. Hyojune Lee – Ph.D., August 2004
 Postdoc, University of California, Los Angeles; Principal Engineer, Western Digital
Fabrication and Characterization of Artificial Nanostructures with a Scanning Tunneling Microscope

25. Nilay A. Pradhan – Ph.D., August 2004
 Postdoc, Yale University; Yield Engineer, Intel
Vibronic Spectroscopy and Atomic Scale Transistor Action Observed with a Scanning Tunneling Microscope

26. Xi Chen – Ph.D., August 2004
 Postdoc, University of California, Irvine; Faculty, Tsinghua University, Beijing, China
Construction of a Sub-Kelvin Scanning Tunneling Microscope in High Magnetic Field

27. Ning Liu – Ph.D., September 2005
 Postdoc, University of Liverpool, England; Postdoc, University of Alberta, Canada;
 Lecturer, University of Limerick, Ireland
Atomic Scale Understanding of Nanostructures in a Double Barrier Tunneling Junction: Scanning Tunneling Microscopy of Alkali Doped Buckminsterfullerenes on Partially Oxidized NiAl(110)

28. Joonhee Lee – Ph.D., December 2005; co-supervisor with Prof. In-Whan Lyo, Yonsei University, Korea
 Postdoc, University of California, Irvine; Faculty, University of Nevada, Reno
Characterization of Nanoscale Systems with Microwave Rectification Current

29. Gareguin R. Mikaelian – Ph.D., September 2006
Staff Scientist, Opto-Knowledge Systems, Inc., Torrance, CA
Scanning Tunneling Microscopy and Spectroscopy of Single Molecules and Nanocrystals in Double-Barrier Tunnel Junctions
30. Shiwei Wu – Ph.D., September 2007
Postdoctoral Associate – Lawrence Berkeley Laboratory, CA; Faculty, Fudan University, China
Combination of a Scanning Tunneling Microscope with Optical Excitation
31. Ungdon Ham – Ph.D., September 2007
Postdoctoral Associate – University of California, Irvine, CA; Research Fellow, POSTECH, Korea
Construction of a Sub-Kelvin Ultrahigh Vacuum Scanning Tunneling Microscope in High Magnetic Field
32. George Nazin – Ph.D., September 2007
Postdoctoral Associate – Brookhaven National Laboratory, NY; Faculty, University of Oregon
Single Molecule Studies with a Scanning Tunneling Microscope
33. Xiuwen Tu – Ph.D., September 2008
Staff Scientist – Sunpower Corporation, San Jose, CA
Nonlinearity, Resonance, Charging, and Motion at the Atomic Scale Studied with Scanning Tunneling microscopes
34. Chi Chen – Ph.D., August 2009
Postdoctoral Associate – RIKEN, Japan; Assistant Research Fellow, Academia Sinica, Taiwan
Optical and Tunneling Microscopy and Spectroscopy at the Ultimate Spatial Limit
35. Freddy Toledo – Ph.D., September 2013
Process Engineer – Intel, Portland
Single Spin Detection and H₂ Chemical Sensitivity with Scanning Tunneling Microscope
36. Chi-Lun Jiang – Ph.D., July 2015
Process Engineer – Intel, Portland
Vibrational Inelastic Electron Tunneling Spectroscopy of Surface Adsorbed Single Molecules at Sub-Kelvin Temperature
37. Weicai Cao – Ph.D., December 2015
Process Engineer – Intel, Portland
Probing Single Molecules with a Tunable Femtosecond Laser Coupled RF-STM

38. Chen Xu – Ph.D., March 2016
Postdoctoral Associate – UC Irvine, Aalto University, Finland
Probing the Inelastic Interactions in Molecular Junctions by Scanning Tunneling Microscope
39. Arthur Yu – Ph.D., July 2016
Self-employed, New York, NY
Extending the Chemical and Optical Sensitivity of the Scanning Tunneling Microscope
40. Zhumin Han – Ph.D., September 2016
Lam Research Corporation, Fremont, CA
Exploring Intermolecular Interactions with the Scanning Tunneling Microscope
41. Shaowei Li – Ph.D., September 2017
Postdoctoral Associate – Northwestern University, Kavli ENSI Heising-Simons Fellow – UC Berkeley, Faculty, UC San Diego
Probing Single Molecule Chemistry With a Femtosecond Laser Scanning Tunneling Microscope
42. Calvin J. Patel – Ph.D., September 2017
Goldman Sachs, Financial Consultant
Investigating Single Molecule Physics With the Scanning Tunneling Microscope
43. Gregory A. Czap – Ph.D., September 2018
Research Specialist, UC Irvine, Postdoctoral Associate – IBM Almaden
Probing and Visualizing Quantum State Coupling Between Single Molecules
44. Peter J. Wagner – Ph.D., September 2021
Process Engineer, Intel, Portland, OR
Using Molecular States to Probe Spin and Self-Assembly Properties of Single Molecules
45. Siyu Chen – Ph.D., June 2022
Senior System Engineer, Onto Innovation, Hillsboro, OR
Energy-Resolved Probing and Rectification Spectroscopy of Single Molecules
46. Jiang Yao – Ph.D., September 2022
Postdoctoral Associate, University of Washington, WA
Quantum Stochastic Dynamics and Single Molecule Rectification
47. Likun Wang – Ph.D., September 2022
Postdoctoral Associate, ICFO-The Institute of Photonic Sciences, Barcelona, Spain
Single Molecule Coherence with Femtosecond THz-STM

48. Yunpeng Xia – Ph.D., September 2024
Postdoctoral Associate. Kavli ENSI Heising-Simons Fellow – UC Berkeley
Atomic-Scale Sensing of the Electric and Magnetic field With a Molecular Sensor

POSTDOCTORAL ASSOCIATES SUPERVISED

1. Simon R. Bare, 1982 – 1984
Postdoc, U.C. Berkeley; Research Leader, Dow Chemical; Technical Staff, UOP;
Scientific Staff, SLAC, Stanford University
2. Brian P. Tonner, 1982 – 1983
Faculty, University of Wisconsin, Milwaukee; Faculty, University of Florida
3. Dinko Chakarov, 1990 – 1991
Faculty, Chalmers University, Sweden
4. Akihide Wada, 1993 – 1994
Faculty, Tokyo Institute of Technology, Japan
5. Deqing Hu, 1994 – 1996
Technical Staff, Hewlett-Packard
6. Jin-Hyo Boo, 1996 – 1997
Faculty, Sung Kyun Kwan University, South Korea
7. Toshiro Yamanaka, 1996 – 1997
Research Associate, Hokkaido University, Japan
8. Yu-Ming Chang, 1996 – 1998
Faculty, National Dong-Hwa Univ., Taiwan; Assist. Res., National Taiwan
University
9. Li Yang, 1995 – 1999
Test Engineer, Bear Stearns, Whippany, NJ; Mathworks, MA
10. Jae-Ryang Hahn, 1999 – 2000
Research Associate, Seoul National Univ.; Faculty, Chonbuk University, Korea
11. Arthur Hotzel, 2000 – 2001
Research Associate, Free University, Berlin, Germany
12. Joung-Real Ahn, 2000 – 2001
Beamline Scientist, Pohang Accelerator Laboratory, Pohang, Korea; Faculty,
Sung Kyun Kwan University, Korea

13. Niklas Nilius, 2001 – 2003
Research Staff, Fritz-Haber Institut der MPG, Berlin, Germany; Faculty, Carl von Ossietzky University Oldenburg, Germany
14. Xiaohui Qiu, 2000 – 2003
Postdoctoral Associate, IBM, Yorktown Heights; Postdoctoral Associate, Ohio State University; Faculty, National Center for Nanoscience and Technology, Beijing, China
15. Christophe Silien, 2004 – 2005
Scientific Collaborator, Facultés Universitaires Notre-Dame de la Paix, Namur, Belgique; Postdoctoral Associate, University of St. Andrews; Lecturer, University of Limerick, Ireland
16. Naoki Ogawa, 2004 – 2006
Research Staff, University of Tokyo; Research Staff, RIKEN, Japan
17. Markus Lackinger, 2005 – 2006
Postdoctoral Associate, Ludwig Maximilian University, Munich
18. Kiyeo Kim, 2005 – 2007
Technical Staff, Samsung Corp., Korea
19. Christian Bobisch, 2007 – 2008
Staff Scientist, University of Duisburg-Essen, Germany
20. Ying Jiang, 2008 – 2010
Faculty, Department of Physics, Peking University, China
21. Qing Huan, 2010 – 2011
Faculty, Institute of Physics, Chinese Academy of Sciences, Beijing, China
22. Joonhee Lee, 2006 – 2008
Postdoctoral Associate, University of California, Irvine; Faculty, University of Reno, Nevada
23. Ungdon Ham, 2007 – 2011
Postdoctoral Associate, Seoul National University, Korea; Research Fellow, POSTECH, Korea
24. Haigang Zhang, 2011 – 2014
Postdoctoral Associate, Argonne National Laboratory; R&D Scientist, Asylum Research
25. Hikari Kimura, 2009 – 2014
Management Consultant, Corporate Values Associates, Tokyo, Japan

26. Zhumin Han, 2016-2017, Scientific Engineer, Lam Research Corporation, Fremont, CA
27. Wei Tao, 2015 – 2017, Postdoctoral Associate, Nanyang Technological University, Singapore.
28. Tinwei Hu, 2016 – 2017, Research Associate, Xi'an Jiaotong University, China
29. Youngwook Park, 2020-2021, Postdoc, Fritz-Haber Institute, Berlin, Germany
30. Irving Caballero-Quintana, 2020-2022

VISITING FACULTY/SCIENTISTS

1. Haskell Taub, 1984 - 1985
Faculty, University of Missouri, Columbia
2. Bengt Kasemo, 1988 - 1989
Faculty, Chalmers University, Sweden
3. Rene Franchy, 1988 - 1989
Scientific Staff, IGV-KFA Jülich, Germany
4. Richard E. Palmer, 1990
Faculty, The University of Birmingham, England
5. Deng-Sung Lin, 1999
Faculty, National Chiao-Tung University, Taiwan; National Tsing Hua University, Taiwan
6. Hanna Reisler, 2002
Faculty, University of Southern California
7. Eric Altman, 2005
Faculty, Yale University
8. Ja-Yong Koo, 2011
Scientific Staff, Korea Research Institute of Standards and Science
9. Elizabeta Cava, 2013
Assistant Researcher, University of Konstanz, Germany
10. Peinian Liu, 2014
Faculty, East China University of Science and Technology
11. SungWoo Nam, 2020
Faculty, University of Illinois at Urbana-Champaign

EXCHANGE GRADUATE STUDENTS

1. Peter Sjövall, Chalmers University, Sweden, 1989 – 1990
2. Carsten Rohr, RWTH, Aachen, Germany, 1995 – 1996
3. Eric Reimhult, Chalmers University, Sweden, 1998
4. Alexander Winkler, Carl von Ossietzky University, 2002 – 2003
5. Joonhee Lee, Yonsei University, Korea, 2003 – 2005
6. Qing Huan, Institute of Physics, Chinese Academy of Sciences, China, 2006 – 2009
7. Xiaoming Huang, Beijing University, 2007 – 2009
8. Shichao Yan, Institute of Physics, Chinese Academy of Sciences, 2008 – 2009
9. Haigang Zhang, Institute of Physics, Chinese Academy of Sciences, 2010 – 2011
10. Baojie Feng, Institute of Physics, Chinese Academy of Sciences, 2013 – 2014

UNDERGRADUATE RESEARCHERS (SINCE 2014)

- 1-4. Siyu Chen, Hongming Guan, Shuai Wan, Yonghao Yuan, Nankai University, China, Sept. – Nov. 2014
- 5-8. Yixuan Han, Hao Lu, Xintong Wang, HaoXiong Zhang, Nankai University, China, Jan. – Mar. 2015
- 9-12. Chunhan Feng, Yilan Ji, Huimeng Zhang, Zhen Zhang, Nankai University, China, July – August 2015
13. Qi Cai, UC Irvine, July – August 2015
- 14-16. Xiwen Cui, Mengcheng Jiang, Xiaoyun Wei, Nankai University, China, October 2015 – January 2016
17. Rebeca Chavaz, UC Irvine, January 2016 – June 2016
18. Sona Abentian, University of Arizona, Tucson, May 2016 – August 2016
19. Everton Ramires de Oliveira, Federal University of Technology, Paraná, Brazil, Brazil Scientific Mobility Program, May 2016 – August 2016

- 20-23. Shengpeng Liu, Peking University; Yunpeng Xia, University of Science and Technology of China; Xiang Zhao and Yue Zhang, Nankai University, July 2016 – September 2016
- 24-26. Janese Bibbs, Albany State University, June 2017 – August 2017; Wenlu Shi, Nankai University; July 2017 – September 2017; Jingjing Wu, Nankai University, August 2017 – November 2017
27. Bingtian Guo, Nankai University, August 2018 – October 2018
28. Jiaqi Guo, UC Irvine, April 2019 – June 2020
- 29-33. Dan Bai, Zhongyuan Liu, Xielin Wang, University of Science and Technology of China; Ruqi Shi, Di Wu, Nankai University, July 2019 – September 2019
34. Zhouyi Chen, UC Irvine, August 2020 – June 2021
35. Isaac A. Fishman, UC Irvine, September 2021 – June 2023
36. Peiyu Zhu, UC Irvine, September 2021 – June 2023
37. Juncheng Li, Fudan University, October 2023 – February 2024
38. Jerry Chen, UC Irvine, January 2024 – September 2024
- 39-40. Julia Nina R. Corrales, Mt. SAC Community College, Sumukh Mahesh, UC Riverside, July 2024 – September 2024
41. Cheng Han Tang, UC Irvine, July 2024 – present

WILSON HO PUBLICATIONS

Abbreviations of Journal Titles

Acc. Chem. Res.	Accounts of Chemical Research
ACS Nano	ACS Nano
Angew. Chem.	Angewandte Chemie
Appl. Phys.	Applied Physics
Appl. Surf. Sci.	Applied Surface Science
Carbon	ChemPhysChem
Chem. Phys. Lett.	Chemical Physics Letters
Comments on Cond. Matter Phys.	Comments on Condensed Matter Physics
J. Am. Chem. Soc.	Journal of the American Chemical Society
J. Appl. Phys	Journal of Applied Physics
J. Chem. Phys.	Journal of Chemical Physics
J. Crystal Growth	Journal of Crystal Growth
J. Electron Spectrosc. Rel. Phenom.	Journal of Electron Spectroscopy and Related Phenomena
J. Phys. Chem.	Journal of Physical Chemistry
J. Vac. Sci. Technol.	Journal of Vacuum Science and Technology
Langmuir	Langmuir
Mat. Res. Soc. Symp. Proc.	Materials Research Society Symposium Proceedings
Mod. Phys. Lett.	Modern Physics Letters
Nano Lett.	Nano Letters
Nature Chemistry	Nature Chemistry
Physica Scripta	Physica Scripta
Phys. Rev.	Physical Review
Phys. Rev. Lett.	Physical Review Letters
Proc. Nat. Acad. Sci.	Proceedings of the National Academy of Science
Res. Chem. Interm.	Research on Chemical Intermediates
Rev. Sci. Instrum.	Review of Scientific Instruments
Science	Science
Sci. Adv.	Science Advances
Solid State Commun.	Solid State Communications
Surf. Sci.	Surface Science
Surf. Sci. Rep.	Surface Science Reports
Thin Solid Films	Thin Solid Films

LIST OF PUBLICATIONS

1. "Surface Properties of a Two-Band Semiconductor," Extended Abstract, *J. Vac. Sci. Technol.* **12**, 351-352 (1975), with S.L. Cunningham and W.H. Weinberg.
2. "Green's Function Calculation of the Surface Properties of a Two-Band Crystal," *Phys. Rev. B* **12**, 3027-3045 (1975), with S.L. Cunningham, W.H. Weinberg, and L. Dobrzynski.
3. "Chemisorption on a Model bcc Metal," *J. Vac. Sci. Technol.* **13**, 349-350 (1976), with S.L. Cunningham and W.H. Weinberg.
4. "Single Atom Chemisorption on a bcc Metal," *Surf. Sci.* **54**, 139-153 (1976), with S.L. Cunningham and W.H. Weinberg.
5. "On the Lowering of the Electronic Energy in Model Insulators due to Surface Reconstruction," *Solid State Commun.* **18**, 429-431 (1976), with S.L. Cunningham, W.H. Weinberg, and L. Dobrzynski.
6. "Chemisorption of a Monolayer of Atoms on a bcc Metal Surface," *Surf. Sci.* **62**, 662-674 (1977), with S.L. Cunningham and W.H. Weinberg.
7. "Chemisorption on a Model Insulator," *Surf. Sci.* **66**, 495-506 (1977), with S.L. Cunningham and W.H. Weinberg.
8. "Surface Reconstruction of a Two-Band Crystal. I. Green's Function Formalism," *Appl. Surf. Sci.* **1**, 33-43 (1977), with S.L. Cunningham, W.H. Weinberg, and L. Dobrzynski.
9. "Surface Reconstruction of a Two-Band Crystal. II. Model Results," *Appl. Surf. Sci.* **1**, 44-58 (1977), with S.L. Cunningham, W.H. Weinberg, and L. Dobrzynski.
10. "Calculations of Inelastic Tunneling Cross Sections Using Self-Consistent Multiple Scattering Techniques," Abstract in *Inelastic Electron Tunneling Spectroscopy*, edited by T. Wolfram, Springer Series in Solid-State Sciences **4**, 144 (1977), with J.W. Davenport, J. Kirtley, and J.R. Schrieffer.
11. "Theory of Inelastic Low-Energy Electron Scattering from Oriented Molecules," Abstract, *J. Vac. Sci. Technol.* **15**, 416 (1978), with J.W. Davenport and J.R. Schrieffer.
12. "Theory of Vibrationally Inelastic Scattering from Oriented Molecules," *Phys. Rev. B* **17**, 3115-3127 (1978), with J.W. Davenport and J.R. Schrieffer.
13. "Observation of Non-Dipole Electron Impact Vibrational Excitation: H on W(100)," *Phys. Rev. Lett.* **40**, 1463-1466 (1978), with R.F. Willis and E.W. Plummer.

14. "Vibrational Excitation of Hydrogenic Modes on Tungsten by Angle Dependent Electron-Energy-Loss Spectroscopy," *Surf. Sci.* **80**, 593-601 (1979), with R.F. Willis and E.W. Plummer.
15. "Inelastic Electron Scattering: Surface Vibrational Spectroscopy," In AIP Conference Proceedings, No. 61, Workshop on the Physics of Surfaces: Aspects of the Kinetics and Dynamics of Surface Reaction, edited by U. Landman (AIP, New York, 1980) pp. 249-274, with E.W. Plummer and S. Andersson.
16. "Angle-resolved and Variable Impact Energy Electron Vibrational Excitation Spectroscopy of Molecules Absorbed on Surfaces," *J. Vac. Sci. Technol.* **17**, 134-140 (1980), with N.J. Dinardo and E.W. Plummer.
17. "Mechanisms for Low Energy Electron Vibrational Excitation of Adsorbates: H on W(100)," *Phys. Rev. B* **21**, 4202-4222 (1980), with R.F. Willis and E.W. Plummer.
18. "A Vibrational Frequency and Intensity Analysis of the Bonding Structure of N₂ on W(100)," *Surf. Sci.* **95**, 171-189 (1980), with R.F. Willis and E.W. Plummer.
19. "Kinetics of the Adsorption and Reaction of H₂ and O₂ on Nickel (110)," Extended Abstract, *J. Vac. Sci. Technol. A* **2**, 1019-1020 (1984), with J.S. Villarrubia.
20. "A Versatile Temperature Controller for the Investigation of Surface Phenomena," *Rev. Sci. Instrum.* **55**, 732-736 (1984) with J.A. Stroschio and L.J. Richter.
21. "Reaction of Hydrogen and Adsorbed Oxygen on Ni(110)," *Surf. Sci.* **144**, 370-384 (1984), with J.S. Villarrubia.
22. "Wide Temperature Range Sample Manipulator for Surface Studies in Ultrahigh Vacuum," *Rev. Sci. Instrum.* **55**, 1672-1674 (1984), with J.A. Stroschio.
23. "Temperature Programmed Electron Energy Loss Spectroscopy: Kinetics of CH₃OH Decomposition on Ni(110)," *Chem. Phys. Lett.* **111**, 185-189 (1984), with L.J. Richter, B.A. Gurney, and J.S. Villarrubia.
24. "The Chemisorption and Decomposition of Ethylene and Acetylene on Ni(110)," *Surf. Sci.* **148**, 499-525 (1985), with J.A. Stroschio and S.R. Bare.
25. "Characterization of the Adsorption and Decomposition of Methanol on Ni(110)," *Surf. Sci.* **150**, 399-418 (1985), with J.A. Stroschio and S.R. Bare.
26. "Reaction of Methanol on Si(111)-7x7," *Surf. Sci.* **154**, 35-51 (1985), with J.A. Stroschio and S.R. Bare.
27. "The Effects of Preadsorbed Oxygen on the Adsorption and Decomposition of Methanol on Ni(110)," *Surf. Sci. Lett.* **155**, L281-L291 (1985), with S.R. Bare and J.A. Stroschio.

28. "Observation of Structure-Induced Surface Vibrational Resonances on Metal Surfaces," Phys. Rev. Lett. **54**, 1428-1431 (1985), with J.A. Stroschio, M. Persson, and S.R. Bare.
29. "Long Range Quasi-elastic Scattering of Low-Energy Electrons by Conduction-Band Surface Plasmons on Si(111)-7x7," Phys. Rev. Lett. **54**, 1573-1576 (1985), with J.A. Stroschio.
30. "Isolation of a Formate Intermediate in the Decomposition of Methanol on Ni(110)-(2x1)O," Summary Abstract, J. Vac. Sci. Technol. A **3**, 1647-1648 (1985), with S.R. Bare and J.A. Stroschio.
31. "Desorption Rate Limited Structural Transitions of CO on Ni(110) Studied by Time-Resolved Electron Energy Loss Spectroscopy," J. Vac. Sci. Technol. A **3**, 1541 (1985), with B.A. Gurney.
32. "The Deuterium Kinetic Isotope Effect in the Decomposition of Methanol on Ni(110)," J. Vac. Sci. Technol. A **3**, 1549-1553 (1985), with L.J. Richter.
33. "Time-Resolved Electron Energy Loss Spectroscopy of Surface Kinetics," J. Vac. Sci. Technol. A **3**, 1432-1438 (1985).
34. "Dipole Active Surface Vibrational Resonances on Clean and Hydrogen Covered Ni(110)," J. Vac. Sci. Technol. A **3**, 1627-1630 (1985), with J.A. Stroschio, M. Persson, and S.R. Bare.
35. "Reactive Adsorption of H₂CO on Ni(110) at 95 K," J. Chem. Phys. **83**, 2165-2169 (1985), with L.J. Richter.
36. "Kinetics of Unimolecular Decomposition: Methanol on Ni(110)," J. Chem. Phys. **83**, 2569-2582 (1985), with L.J. Richter.
37. "The Effects of Surface Geometry and Island Formation on Alkali-Promoted Surfaces: The Coadsorption of CO and K on Ni(110)," J. Chem. Phys. **83**, 4808-4816 (1985), with L.J. Whitman.
38. "Adsorbate Fluorescence EXAFS: Determination of Bromine Bonding Structure in C(2x2)Br-Ni(001)," Solid State Commun. **55**, 925-927 (1985), with B. Lairson and T. Rhodin.
39. "Thermal and Laser Induced Decomposition of Fe(CO)₅ on Si(100)," in Proceedings of the Materials Research Society Symposium on *Beam Induced Chemical Processes*, Boston, MA, December 2-7, 1985, pp. 67-69, with C.E. Bartosch and J. A. Stroschio.
40. "Geometric Structure and Surface Vibrational Resonances: The bcc Fe(111) Surface," Phys. Rev. B **33**, 2879-2882 (1986), with J.A. Stroschio, M. Persson, and C.E. Bartosch.

41. "Structure-Induced Surface Vibrational Resonances on Metal Surfaces," *J. Electron Spectrosc. Rel. Phenom.* **38**, 11-19 (1986), with M. Persson and J.A. Stroscio.
42. "Alkali-Metal Promotion of a Dissociation Precursor: N₂ on Fe(111)," *Phys. Rev. Lett.* **56**, 1984-1987 (1986), with L.J. Whitman, C.E. Bartosch, G. Strasser, and M. Grunze.
43. "Surface Vibrations and (2x1) Superstructures on fcc(110) Metal Surfaces," *Phys. Rev. B* **33**, 6758-6770 (1986), with J.A. Stroscio and M. Persson.
44. "Observation of Significant Nitrogen-Oxygen Bond Weakening in Nitric Oxide on Rh(100)," *J. Vac. Sci. Technol. A* **4**, 1487-1490 (1986), with J.S. Villarrubia, L.J. Richter, and B.A. Gurney.
45. "The Adsorption, Interconversion, and Dissociation of CO on Fe(111)," *J. Chem. Phys.* **85**, 1052-1060 (1986), with C.E. Bartosch and L.J. Whitman.
46. "Position Sensitive Detector Performance and Relevance to Time Resolved Electron Energy Loss Spectroscopy," *Rev. Sci. Instrum.* **57**, 1469-1482 (1986), with L.J. Richter.
47. "Design and Performance of a Double Pass High Resolution Electron Energy Loss Spectrometer," *Rev. Sci. Instrum.* **57**, 1483-1493 (1986), with J.A. Stroscio.
48. "A New Mechanism for K-Promotion of Surface Reactions: N₂ on K-Promoted Fe(111)," *J. Chem. Phys.* **85**, 3688-3698 (1986), with L.J. Whitman and C.E. Bartosch.
49. "Laser-Surface Adsorbate Interactions: Thermal Versus Photoelectronic Excitation of Mo(CO)₆ on Si(111)," *Phys. Rev. Lett.* **57**, 1425-1428 (1986), with C.E. Bartosch, N.S. Gluck, and Z. Ying.
50. "The Influence of Adsorbate-Adsorbate Interactions on Surface Structure: The Coadsorption of CO and H₂ on Rh(100)," *J. Chem. Phys.* **86**, 477-490 (1987), with L.J. Richter and B.A. Gurney.
51. "Mechanisms of Carbon and Oxygen Incorporation into Thin Metal Films Grown by Laser Photolysis of Carbonyls," *J. Appl. Phys.* **61**, 998-1005 (1987), with N.S. Gluck, G.J. Wolga, C.E. Bartosch, and Z. Ying.
52. "Spectroscopy of Surface Kinetics and Reaction Mechanisms," *J. Phys. Chem.*, **91**, 766-779 (1987).
53. "Mechanisms of Laser Interaction with Metal Carbonyls Adsorbed on Si(111) 7x7: Thermal versus Photoelectronic Effects," *J. Chem. Phys.* **86**, 4957-4978 (1987), with N.S. Gluck, Z. Ying, and C.E. Bartosch.
54. "Nitric Oxide Adsorption, Decomposition, and Desorption on Rh(100)," *J. Chem. Phys.* **87**, 750-764 (1987), with J. S. Villarrubia.

55. "Geometric Structures, Pseudoband Gaps, and Surface Vibrational Resonances on Metal Surfaces," *Physica Scripta* **36**, 548-558 (1987), with M. Persson and J. A. Stroscio.
56. "Summary Abstract: Vibrational Modes of Hydrogen Adsorbed on Rh(100) and Their Relevance to Desorption Kinetics," *J. Vac. Sci. Technol. A* **5**, 453-454 (1987), with L. J. Richter.
57. "Summary Abstract: The Kinetics of CO Dissociation on Fe(111)," *J. Vac. Sci. Technol. A* **5**, 538-539 (1987), with L. J. Whitman, B. A. Gurney, L. J. Richter, and J. S. Villarrubia.
58. "Summary Abstract: Formate Production From Coadsorbed CO, H₂O, and O on Rh(100)," *J. Vac. Sci. Technol. A* **5**, 632-634 (1987), with B. A. Gurney.
59. "Summary Abstract: Mechanisms of Laser Interaction with Metal Carbonyls on Si(111) 7x7: Identification of Solely Photochemical and Solely Thermal Processes," *J. Vac. Sci. Technol. A* **5**, 1608-1609 (1987), with Z. Ying, N. S. Gluck, and C. E. Bartosch.
60. "Effect of Adsorbate Proximity on Surface Reactions: Synthesis and Decomposition of the Formate Intermediate in UHV from Coadsorbed CO, H₂O, and O on Rh(100)," *J. Chem. Phys.* **87**, 1376-1391 (1987), with B. A. Gurney.
61. "Laser and Thermal Induced Reactions of Mo(CO)₆, CH₃CH₂OH, and NO on Si(111) 7x7," in Proceedings of the Materials Research Society Symposium on *Photon, Beam and Plasma Stimulated Chemical Processes at Surfaces*, Boston, MA, December 1-4, 1986, Vol. 75 (MRS, Pittsburgh, 1987), pp. 551-558, with Z. Ying.
62. "Synthesis of OH from Reaction of O and H on the Rh(100) Surface," *J. Chem. Phys.* **87**, 5562-5577 (1987), with B. A. Gurney.
63. "The Populations of Bridge and Top Site CO on Rh(100) vs Coverage, Temperature, and During Reaction with O," *J. Chem. Phys.* **87**, 6710-6721 (1987), with B. A. Gurney, L. J. Richter, and J. S. Villarrubia.
64. "Time Resolved Electron Energy Loss Spectroscopy of Surface Kinetics," *J. Electron Spectrosc. relat. Phenom.* **45**, 1-18 (1987).
65. "Quasi-Elastic Electron Scattering as a Probe of the Silicon Surface Space Charge Region," *Phys. Rev B* **36**, 9736-9745 (1987), with J. A. Stroscio.
66. "Vibrational Spectroscopy of H on Pt(111): Evidence for Universally Soft Parallel Modes," *Phys. Rev. B* **36**, 9797-9800 (1987), with L. J. Richter.
67. "Photogenerated Charge Carrier Induced Surface Reaction: NO on Si(111) 7x7," *Phys. Rev. Lett.* **60**, 57-60 (1988), with Z. Ying.

68. "Multidetector Electron Energy Loss Spectrometer for Time-Resolved Surface Studies," *Rev. Sci. Instrum.* **59**, 22-44 (1988), with B. A. Gurney, L. J. Richter, and J.S. Villarrubia.
69. "Mechanisms for Photodissociation and Photodesorption of Molecules Adsorbed on Solid Surfaces," *Comments on Cond. Matter Phys.* **13**, 293-327 (1988). 70. "Thermal and Photon Induced Reactions of CH₃CH₂OH on Si(111) 7x7," *Surf. Sci.* **198**, 473-490 (1988), with Z. Ying.
70. "Coadsorption Induced Site Changes: Bridging Hydrogen from CO and H on Rh(100)," *Surf. Sci.* **195**, L182-L192 (1988), with L. J. Richter and T. A. Germer.
71. "Summary Abstract: The Role of Electron-Hole Pairs in Photon Induced Reaction and Desorption of NO and Mo(CO)₆ on Si(111) 7x7," *J. Vac. Sci. Technol. A* **6**, 834-835 (1988), with Z. Ying.
72. "Summary Abstract: How Potassium Promotes Dissociation of NO on Rh(100)," *J. Vac. Sci. Technol. A* **6**, 880-882 (1988), with L. J. Whitman.
73. "Summary Abstract: Mechanisms of Laser Interaction with NO Adsorbed on GaAs(110)," *J. Vac. Sci. Technol. A* **6**, 1435-1436 (1988), with S. K. So and F. J. Kao.
74. "The Adsorption and Photochemistry of Mo(CO)₆ on Rh(100)," *J. Chem. Phys.* **89**, 562-569 (1988), with T. A. Germer.
75. "Dissociation Kinetics on an Alkali Metal-Promoted Surface," *Surf. Sci.* **204**, L725-L731 (1988), with L. J. Whitman.
76. "Photon-Induced Reactions of NO Adsorbed on GaAs (110)," *Applied Phys.* **A47**, 213-217 (1988), with S. K. So.
77. "Electron Energy Loss Spectroscopy of H Adsorbed on Rh(100): Interpretation of Overtone Spectra as Two-Phonon Bound States," *Phys. Rev. B* **38**, 10403-10420 (1988), with L. J. Richter, T. A. Germer, and J. P. Sethna.
78. "The Kinetics and Mechanisms of Alkali Metal-Promoted Dissociation: A Time Resolved Study of NO Adsorption and Reaction on Potassium-Promoted Rh(100)," *J. Chem. Phys.* **89**, 7621-7645 (1988), with L. J. Whitman.
79. "Improved Multidetector for Time Resolved Electron Loss Spectroscopy," *Rev. Sci. Instrum.* **60**, 12-16 (1989), with L.J. Richter, W.D. Miehler, L.J. Whitman, and W.A. Noonan.
80. "CO Adsorption Site Occupations on Fe(111) vs Coverage and Temperature: The Kinetics of Adsorption and Reaction," *J. Chem. Phys.* **90**, 2050-2062 (1989), with L.J. Whitman, L.J. Richter, B.A. Gurney, and J.S. Villarrubia.

81. "EELS of Molecular Beam and Temperature Induced Surface Processes: Implications on Time Dependent Surface Phenomena," *Surf. Sci.* **211/212**, 289-302 (1989).
82. "Effects of Potassium on the Adsorption and Reactions of Nitric Oxide on Silicon Surface," in *Chemical Perspectives of Microelectronic Materials*, edited by M.E. Gross, J.T. Yates, Jr., and J. Jasinski, Proceedings of the Materials Research Society Meeting, Boston, MA, November 28 - December 3, 1988, Vol. 131 (1989), pp. 209-214, with Z. Ying.
83. "Desorption Kinetics on an Alkali Metal-Precovered Surface: CO and K on Pt(111)," *J. Chem. Phys.* **90**, 6018-6025 (1989), with L.J. Whitman.
84. "Energy Transfer and Photochemistry on a Metal Surface: Mo(CO)₆ on Rh(100)," *J. Vac. Sci. Technol. A* **7**, 1878-1881 (1989), with T.A. Germer.
85. "Adsorption and Reactions of Nitric Oxide on Si(111)7x7," *J. Vac. Sci. Technol. A* **7**, 2099-2103 (1989), with Z. Ying.
86. "Photochemistry of Oriented Molecules Coadsorbed on Solid Surfaces: The Formation of CO₂ + O from Photodissociation of O₂ Coadsorbed with CO on Pt(111)," *J. Chem. Phys.* **91**, 2755-2756 (1989), with W.D. Mieher.
87. "Nonthermal Photon-Assisted Chemistry of Oriented Molecules on Solid Surfaces," in *Photochemistry in Thin Films*, edited by T.F. George, J.E. Butler, H.-L. Dai, S.M. George, J.T. Ho, and T. Venkatesan, SPIE Proceedings, OE/LASE '89, Los Angeles, CA, January 15-20, 1989, Vol. 1056 (1989), pp. 157-166.
88. "Thermo- and Photo-Induced Reactions of NO on Si(111)7x7, I. Adsorption and Chemical Reactions," *J. Chem. Phys.* **91**, 2689-2705 (1989), with Z.C. Ying.
89. "A Time Resolved Electron Energy Loss Spectroscopy Study of CO on Pt(111): Adsorption Site Occupations Versus Coverage and Temperature," *J. Chem. Phys.* **91**, 3228-3239 (1989), with W.D.Mieher and L.J. Whitman.
90. "Thermoinduced and Photoinduced Reactions of NO on Si(111)7x7, II. Effects of Potassium Coadsorption," *J. Chem. Phys.* **91**, 5050-5058 (1989), with Z.C. Ying.
91. "Adsorption and Reactions of NO on Ag(111) at 80 K," *J. Chem. Phys.* **91**, 5701-5706 (1989), with S.K. So and R. Franchy.
92. "Photoreactions of Mo(CO)₆ on Potassium Precovered Silicon Surface with UV to IR Radiation," in *Laser and Particle Beam Chemical Processes on Surfaces*, edited by A.W. Johnson, G.L. Loper, and T.W. Sigmon, Proceedings of the Materials Research Society Meeting, Boston, MA, November 28 - December 3, 1988, pp. 245-250 (1989), with Z.C. Ying.

93. "Alkali Metal Promotion of Thermo- and Photochemistry," in *Physical and Chemical Aspects of Alkali Metal Adsorption*, edited by H.P. Bonzel, A.M. Bradshaw, and G. Ertl, Proceedings of 50th WE-Heraeus Seminar, Bad Honnef, Federal Republic of Germany, February 27 - March 1, 1989, pp. 159-172 (1989).
94. "Direct Characterization of the Hydroxyl Intermediate During Reduction of Oxygen on Pt(111) by Time-Resolved Electron Energy Loss Spectroscopy," *Chem. Phys. Lett.* **163**, 449-454 (1989), with T.A. Germer.
95. "Coadsorbate Effects in Surface Photochemistry: NO and O₂ on Pt(111)," *J. Chem. Phys.* **92**, 5162-5164 (1990), with W.D. Miher.
96. "Formation of Hydroxyl and Water from Photoreaction of Hydrogen and Molecular Oxygen Coadsorbed on Pt(111)," *J. Chem. Phys.* **93**, 1474-1475 (1990), with T.A. Germer.
97. "Surface Photochemistry," in *Proceedings on Desorption Induced by Electronic Transitions (DIET IV)*, edited by G. Betz and P. Varga, Gloggnitz, Austria, October 2-4, pp. 48-64 (Springer-Verlag, Berlin Heidelberg, 1990).
98. "Photophysics and Photochemistry of NO on Ag(111), Cu(111), and Si(111)7x7," in *Proceedings on Desorption Induced by Electronic Transitions (DIET IV)*, edited by G. Betz and P. Varga, Gloggnitz, Austria, October 2-4, 1989, pp. 85-92 (Springer-Verlag, Berlin Heidelberg, 1990), with R. Franchy, S.K. So, and Z.C. Ying.
99. "Photodesorption of NO on Ag(111) at 80 K," in *Proceedings of the 11th International Vacuum Congress and 7th International Conference on Solid Surfaces*, Köln, Federal Republic of Germany, September 25-29, 1989, *Vacuum* **41**, 284-286 (1990), with R. Franchy and S.K. So.
100. "NO₂ Adsorption on Graphite at 90 K," *Chem. Phys. Lett.* **171**, 125-130 (1990), with P. Sjövall, S.K. So, B. Kasemo, and R. Franchy.
101. "Alkali Promotion of Photodissociation of Mo(CO)₆," *Phys. Rev. Lett.* **65**, 741-744 (1990), with Z.C. Ying.
102. "Photodissociation of Adsorbed Mo(CO)₆ Induced by Direct Photoexcitation and Hot Electron Attachment I. Surface Chemistry," *J. Chem. Phys.* **93**, 9077-9088 (1990), with Z.C. Ying.
103. "Thermoinduced and Photoinduced Reactions of NO on Si(111)7x7, III. Photoreaction Mechanisms," *J. Chem. Phys.* **93**, 9089-9095 (1990), with Z.C. Ying.
104. "Hot H Photochemistry of H₂S and CO Coadsorbed on Cu(111) at 68 K," *J. Chem. Phys.* **94**, 4075-4077 (1991), with D.V. Chakarov.

105. "Control of Surface Photoreactions by Alkali Coadsorption," *Mod. Phys. Lett. B* **5**, 181-185 (1991), with Z.C. Ying.
106. "Photophysics and Photochemistry on Surfaces," in *New Aspects of Photon-Induced Processes on Surfaces*, Proceeding of the First International Meeting on Optoelectronic Industry and Technology Development, Naha, Okinawa, Japan, January 9-11, 1991, edited by I. Tanaka, M. Hirose, Y. Aoyagi, T. Itou, and M. Kawasaki (1991), pp. 37-45.
107. "Photodissociation of Adsorbed Mo(CO)₆ Induced by Direct Photoexcitation and Hot Electron Attachment II. Physical Mechanisms," *J. Chem. Phys.* **94**, 5701-5714 (1991), with Z.C. Ying.
108. "Resonant Photodissociation of Mo(CO)₆ Adsorbed on Graphite and Ag(111)," *J. Chem. Phys.* **95**, 656-671 (1991), with S.K. So.
109. "Photodesorption of NO from Ag(111) and Cu(111)," *J. Chem. Phys.* **95**, 1385-1399 (1991), with S.K. So and R. Franchy.
110. "Correlation of Electronic and Optical Transitions: Mo(CO)₆ Adsorbed on Clean and K-Preadsorbed Si(111)7x7," *Surf. Sci.* **255**, L550-L556 (1991), with D.V. Chakarov and Z. C. Ying.
111. "Enhancement of Photoyield Associated with Disruption of Bonding During Adsorbate Sublimation," *Surf. Sci.* **258**, L691-L696 (1991), with D.V. Chakarov.
112. "A Differentially Pumped Electron Energy Loss Spectrometer with Multichannel Detector for Time Resolved Studies at Intermediate Ambient Pressures," *Rev. Sci. Instrum.* **63**, 1652-1670 (1992), with P.W. Lorraine and B.D. Thoms.
113. "Translationally and Vibrationally Activated Reaction of CO₂ on Si(111)7x7," *J. Chem. Phys.* **96**, 3285-3297 (1992), with P.W. Lorraine, B.D. Thoms, and R.A. Machonkin.
114. "Translational and Internal Energy Distributions of CO Photochemically Desorbed from Oxidized Ni(111)," *J. Chem. Phys.* **96**, 4808-4811 (1992), with M. Asscher, F.M. Zimmermann, L.L. Springsteen, and P.L. Houston.
115. "Fundamental Mechanisms of Surface Photochemistry," *Res. Chem. Interm.* **17**, 27-38 (1992).
116. "Theoretical Aspects of Photoinitiated Chemisorption, Dissociation and Desorption of O₂ on Pt(111)," *Langmuir* **8**, 1111-1119 (1992), with A.W.E. Chan and R. Hoffmann.
117. "A Molecular Beam Study of Ethane on Si(111)7x7: Energy Accommodation and Trapping," *J. Chem. Phys.* **97**, 2759-2766 (1992), with B.D. Thoms and P.W. Lorraine.

118. "High Resolution Electron Energy Loss Spectroscopy," Chapter in *Investigation of Surfaces and Interfaces-Part A*, edited by B.W. Rossiter and R.C. Baetzold. Physical Methods of Chemistry Series, 2nd ed., Vol. IXA, Ch. 4, pp. 209-320 (1993).
119. "Femtosecond versus Nanosecond Surface Photochemistry: O₂ + CO on Pt(111) at 80 K," Phys. Rev. Lett. **70**, 4098-4101 (1993), with F.-J. Kao, D. G. Busch, and D. Gomes da Costa.
120. "Femtosecond Desorption of Molecular Oxygen from Pt(111)," Springer Series in Chem. Phys., Vol. 55, edited by J.-L. Martin, A. Migus, G.A. Mourou, and A.H. Zewail, pp. 350-353 (Springer-Verlag, Berlin Heidelberg, 1993), with F.-J. Kao, D. G. Busch, D. Gomes da Costa, and D. Cohen.
121. "Femtosecond Laser Desorption of Molecularly Adsorbed Oxygen from Pt(111)", Phys. Rev. Lett. **71**, 2094-2097 (1993), with F.-J. Kao, D.G. Busch, D. Cohen, and D. Gomes da Costa.
122. "Charge-Coupled-Device Based Time-of-Flight Charged Particle Analyzer," Rev. Sci. Instrum. **64**, 3132-3138 (1993), with T.A. Germer, R.Y. Young, and M.K. Ravel.
123. "Bimolecular Surface Photochemistry: Mechanisms of CO Oxidation on Pt(111) at 85 K," J. Chem. Phys. **99**, 9279-9295 (1993), with W.D. Miehler.
124. "Surface Photochemistry," in *Surface Science: The First Thirty Years*, edited by C. B. Duke, Surf. Sci. **299/300**, 996-1007 (1994).
125. "Rotational and Spin-Orbit Distributions of Photochemically Desorbed Molecules," Phys. Rev. Lett. **72**, 1295-1298 (1994), with F.M. Zimmermann.
126. "Velocity Distributions of Photochemically Desorbed Molecules," J. Chem. Phys. **100**, 7700-7706 (1994), with F.M. Zimmermann.
127. "Rotational-Translational Correlations in Photochemically Desorbed Molecules," J. Chem. Phys. **101**, 5313-5318 (1994), with F.M. Zimmermann.
128. "Low Temperature Surface Photochemistry: O₂ and CO on Ag(110) at 30 K," Surf. Sci. Lett. **321**, L233-L238 (1994), with R.A. Pelak.
129. "Thermally Activated Oxidation of NH₃ on Pt(111): Intermediate Species and Reaction Mechanisms," Surf. Sci. **322**, 151-167 (1995), with W.D. Miehler.
130. "Thermal and Photo-induced Desorption, Dissociation, and Surface Reactions of H₂S Adsorbed on Si(111)7x7," Surf. Sci. **323**, 57-70 (1995), with D.V. Chakarov.
131. "Photodesorption of CO from Si(100) -2x1: Wavelength and Intensity Dependence," Surf. Sci. **336**, 85-92 (1995), with R.Y. Young and K.A. Brown.

132. "Femtosecond Desorption Dynamics Probed by Time-Resolved Velocity Measurements", *Phys. Rev. Lett.* **75**, 673-676 (1995), with D.G. Busch, S. Gao, R.A. Pelak, and M.F. Booth.
133. "The Interaction of Methyl Chloride and Si(100)2x1," *Surf. Sci.* **338**, 111-116 (1995), with K.A. Brown.
134. "Translational Energy and Desorption Rate of NO from Pt(111) by Femtosecond Laser Pulses," in *Laser Techniques in Surface Science II*, edited by J.M. Hicks, W. Ho, and H.-L. Dai, SPIE's 40th Annual Meeting, 9-14 July 1995, San Diego, CA (SPIE, Bellingham, 1995), pp. 62-72, with R.A. Pelak, M.F. Booth, D.G. Busch, and S. Gao.
135. "Femtosecond Dynamics of Electron-Vibrational Heating and Bond-Breaking," in *Laser Techniques in Surface Science II*, edited by J.M. Hicks, W. Ho, and H.-L. Dai, SPIE's 40th Annual Meeting, 9-14 July 1995, San Diego, CA (SPIE, Bellingham, 1995), pp. 97-108, with S. Gao.
136. "Hot-Electron-Induced Vibrational Heating at Surface: Importance of a Quantum-Mechanical Description," *Surf. Sci.* **341**, L1031-L1036 (1995), with S. Gao and B.I. Lundqvist.
137. "A Threading Tool for Hard Materials," *Rev. Sci. Instrum.* **66**, 5371-5372 (1995), with K.A. Brown.
138. "Femtosecond Dynamics of Electron-Vibrational Heating and Desorption," *Surf. Sci.* **344**, L1252-L1258 (1995), with S. Gao and D.G. Busch.
139. "State Resolved Studies of Photochemical Dynamics at Surfaces," *Surf. Sci. Rep.* **22**, 127-248 (1995), with F.M. Zimmermann.
140. "Dynamics of Surface Photochemistry," in *Surface Photochemistry V*, edited by M. Anpo (Wiley, Sussex, 1996), pp. 19-63, with F.M. Zimmermann.
141. "Surface Photochemistry," in *Laser Spectroscopy and Photochemistry on Metal Surfaces V*, edited by H.L. Dai and W. Ho, Advanced Series in Physical Chemistry (World Scientific, Singapore, 1995), pp. 1047-1140.
142. "Translationally Activated Dissociation of CO₂ on Si(100)2x1," *J. Chem. Phys.* **104**, 2385-2391 (1996), with K.A. Brown and D.Q. Hu.
143. "Supersonic Jet Epitaxy of Aluminum Nitride on Silicon (100)," *J. Appl. Phys.* **79**, 7667-7671 (1996), with K.A. Brown, S.A. Ustin, and L. Lauhon.
144. "Coadsorbed Effects in Surface Photochemistry: Bimolecular Reactions and Photodesorption Yield Enhancement for NO Coadsorbed with O₂ on Pt(111)," *Surf. Sci.* **359**, 23-36 (1996), with W.D. Mieher and R.A. Pelak.

145. "Reactions at Metal Surfaces Induced by Femtosecond Laser, Tunneling Electrons, and Heating," in The Centennial Issue, *J. Phys. Chem.* **100**, 13050-13060 (1996).
146. "Direct Observation of the Crossover from Single to Multiple Excitations in Femtosecond Surface Photochemistry," *Phys. Rev. Lett.* **77**, 1338-1341 (1996), with D.G. Busch.
147. "Femtosecond Laser-Induced Dynamical Quantum Processes on Solid Surfaces (DQPSS)," in Proceedings of the International Symposium on Dynamical Quantum Processes on Solid Surfaces, edited by A. Okiji, September 20-22, 1995, Osaka, Japan, *Surf. Sci.* **363**, 166-178 (1996).
148. "Supersonic Jet Epitaxy: An Improved Method for Nitride Deposition," in Proceedings of the Materials Research Society Meeting, November 27 - December 1, 1995, Boston, MA, Vol. 395, *Gallium Nitride and Related Materials*, **395**, 301-306 (1996), with P.E. Norris, L.D. Zhu, H.P. Maruska, S.A. Ustin, and L. Lauhon.
149. "Single Crystal Wurtzitic Aluminum Nitride Growth on Silicon Using Supersonic Gas Jets," in Proceedings of the Materials Research Society Meeting, November 27 - December 1, 1995, Boston, MA, Vol. 395, *Gallium Nitride and Related Materials*, **395**, 319-324 (1996), with S.A. Ustin, L. Lauhon, K.A. Brown, and D.Q. Hu.
150. "A Nonthermally Accessible Phase for CO on the Si(100) Surface," *Phys. Rev. Lett.* **78**, 1178-1181 (1997), with D. Hu, X. Chen, S. Wang, and W.A. Goodard, III.
151. "Characterization of Femtosecond Laser Pulses with GaN Thin Films," *Thin Solid Films* **306**, 137-140 (1997), with A. Wada and M.A. Khan.
152. "Single Molecule Dissociation by Tunneling Electrons," *Phys. Rev. Lett.* **78**, 4410-4413 (1997), with B.C. Stipe, M.A. Rezaei, S. Gao, M. Persson, and B.I. Lundqvist.
153. "Growth of Cubic SiC Thin Films on Silicon from Single Source Precursors by Supersonic Jet Epitaxy," in Proceedings of the Materials Research Society Meeting, December 2-6, 1996, Boston, MA, **441**, 705-710 (1997), with J.-H. Boo, S.A. Ustin, H.P. Maruska, P.E. Norris, I.-H. Kim, and C. Sung.
154. "Atomistic Studies of O₂ dissociation on Pt(111) Induced by Photons, Electrons, and by Heating," *J. Chem. Phys.* **107**, 6443-6447 (1997), with B.C. Stipe and M.A. Rezaei.
155. "Site-Specific Displacement of Si Adatoms on Si(111)-7x7," *Phys. Rev. Lett.* **79**, 4397-4400 (1997), with B.C. Stipe and M.A. Rezaei.
156. "Large Area Supersonic Jet Epitaxy of AlN, GaN, and SiC on Silicon," in Proceedings of the Materials Research Society Meeting, December 2-6, 1996, Boston, MA, **449**, 227-282 (1997), with L.J. Lauhon and S.A. Ustin.

157. "Inducing and Viewing the Rotational Motion of a Single Molecule," *Science* **279**, 1907-1909 (1998), with B.C. Stipe and M.A. Rezaei.
158. "Single Crystal Gallium Nitride on Silicon Using SiC as an Intermediate Layer," in *Proceedings of the Materials Research Society Meeting*, December 1-5, 1997, Boston, MA, **482**, 313-318 (1998), with S.A. Ustin.
159. "Single Crystal Silicon Carbide on Silicon Using a Supersonic Gas Jet of Methylsilane," in *Proceedings of the Materials Research Society Meeting*, December 1-5, 1997, Boston, MA, **483**, 279-284 (1998), with S.A. Ustin, C. Long, and L. Lauhon.
160. "Growth of Hexagonal GaN Thin Films on Si(111) with Cubic SiC Buffer Layers," *J. Crystal Growth* **189/190**, 183-188 (1998), with J.-H. Boo and S.A. Ustin.
161. "MOCVD of BN and GaN Thin Films on Silicon: New Attempt of GaN Growth with BN Buffer Layer," *J. Crystal Growth* **189/190**, 439-444 (1998). %, with J.-H. Boo and C. Rohr.
162. "The Growth of Hexagonal Boron Nitride Thin Films on Silicon Using Single Source Precursor," *Thin Solid Films* **322**, 9-13 (1998), with C. Rohr and J.-H. Boo.
163. "Growth of Epitaxial Cubic SiC Thin Films Using Single Source Precursors," *Mat. Sci. Forum* **264-268**, 187-190 (1998), with J.-H. Boo, S.-B. Lee, S.A. Ustin, H.P. Maruska, P.E. Norris, I.-H. Kim, and C. Sung.
164. "Supersonic Jet Epitaxy of Single Crystalline Cubic SiC Thin Films on Si Substrate from t-Butyldimethylsilane," *Thin Solid Films* **324**, 124-128 (1998), with J.-H. Boo and S.A. Ustin.
166. "Inducing and Viewing Bond Selected Chemistry with Tunneling Electrons," *Acc. Chem. Res.* **31**, 567-573 (1998).
165. "Single-Molecule Vibrational Spectroscopy and Microscopy," *Science* **280**, 1732-1735 (1998), with B.C. Stipe and M.A. Rezaei.
166. "Coupling of Vibrational Excitation to the Rotational Motion of a Single Adsorbed Molecule," *Phys. Rev. Lett.* **81**, 1263-1266 (1998), with B.C. Stipe and M.A. Rezaei.
167. "Inducing and Imaging Single Molecule Dissociation on a Semiconductor Surface: H₂S and D₂S on Si(111)-7x7," *J. Chem. Phys.* **109**, 6075-6078 (1998), with M.A. Rezaei and B.C. Stipe.
168. "Atomically Resolved Determination of the Adsorption Sites as a Function of Temperature and Coverage: H₂S on Si(111)-7x7," *J. Phys. Chem.* **102**, 10941-10947 (1998), with M.A. Rezaei and B.C. Stipe.
169. "Supersonic Jet Epitaxy of Silicon Carbide on Silicon using Methylsilane," *Solid State Electronics* **42**, 2321-2327 (1998), with S.A. Ustin and C.-P. Long.

170. "A Variable-Temperature Scanning Tunneling Microscope Capable of Single-Molecule Vibrational Spectroscopy," *Rev. Sci. Instrum.* **70**, 137-143 (1999), with B.C. Stipe and M.A. Rezaei.
171. "Localization of Inelastic Tunneling and the Determination of Atomic-Scale Structure with Chemical Specificity," *Phys. Rev. Lett.* **82**, 1724-1727 (1999), with B.C. Stipe and M.A. Rezaei.
172. "Imaging the Atomically Resolved Dissociation of D₂S on Si(100) from 80 to 300 K," *J. Chem. Phys.* **110**, 3548-3552 (1999), with M.A. Rezaei and B.C. Stipe.
173. "Atomically Resolved Adsorption and STM Induced Desorption on a Semiconductor: NO on Si(111)-(7x7)," *J. Chem. Phys.* **110**, 4891-4896 (1999), with M.A. Rezaei and B.C. Stipe.
174. "Low-Temperature Epitaxial Growth of Cubic SiC Thin Films on Si(111) Using Supersonic Molecular Jet of Single Source Precursors," *Thin Solid Films* **343-344**, 650-655 (1999), with J.-H. Boo and S.A. Ustin.
175. "Structural Defects in 3C-SiC Grown on Si by Supersonic Jet Epitaxy," *J. Appl. Phys.* **86**, 2509-2515 (1999), with C. Long and S.A. Ustin.
176. "Single Molecule Vibrational Spectroscopy and Microscopy: CO on Cu(001) and Cu(110)," *Phys. Rev. B* **60**, R8525-R8528 (1999), with L.J. Lauhon.
177. "Vibrational Analysis of Single Molecule Chemistry: Ethylene Dehydrogenation on Ni(100)," *J. Am. Chem. Soc.* **121**, 8479-8485 (1999), with J. Gaudioso and H.J. Lee.
178. "Single Molecule Thermal Rotation and Diffusion: Acetylene on Cu(001)," *J. Chem. Phys.* **111**, 5633-5636 (1999), with L.J. Lauhon.
179. "Single-Bond Formation and Characterization with a Scanning Tunneling Microscope," *Science*, **286**, 1719-1722 (1999), with H.J. Lee.
180. "Control and Characterization of a Multistep Unimolecular Reaction," *Phys Rev. Lett.* **84**, 1527-1530 (2000), with L.J. Lauhon.
181. "Single Molecule Chemistry and Vibrational Spectroscopy: Pyridine and Benzene on Cu(001)," *J. Phys. Chem.* **104**, 2463-2467 (2000), with L.J. Lauhon.
182. "An Apparatus for Supersonic Jet Epitaxy of Thin Films," *Rev. Sci. Instrum.* **71**, 1479-1487 (2000), with S.A. Ustin and K.A. Brown.
183. "Electronic and Vibrational Excitation of Single Molecules with a Scanning Tunneling Microscope," in *DIET 8 Conference Proceedings, Surf. Sci.* **451**, 219-225 (2000), with L.J. Lauhon.

184. "Structural Determination by Single Molecule Vibrational Spectroscopy and Microscopy: Contrast Between Copper and Iron Carbonyls," *Phys. Rev. B* **61**, R16347-R16350 (2000), with H.J. Lee.
185. "Electronic Resonance and Symmetry in Single-Molecule Inelastic Electron Tunneling," *Phys. Rev. Lett.* **85**, 1914-1917 (2000), with J.R. Hahn, H.J. Lee, and W. Ho.
186. "Vibrationally-Mediated Negative Differential Resistance in a Single Molecule," *Phys. Rev. Lett.* **85**, 1918-1921 (2000), with J. Gaudioso and L.J. Lauhon.
187. "Single Molecule Vibrational Spectroscopy and Microscopy: Cu(II) Etioporphyrin-I on Cu(001)," *J. Chem. Phys.* **113**, 4837-4839 (2000), with T.M. Wallis, X. Chen, and W. Ho.
188. "Direct Observation of the Quantum Tunneling of Single Hydrogen Atoms with a Scanning Tunneling Microscope", *Phys. Rev. Lett.* **85**, 4566-4569 (2000), with L.J. Lauhon.
189. "The Initiation and Characterization of Single Bimolecular Reactions with a Scanning Tunneling Microscope," *Faraday Discussion* **117**, 249-255 (2000), with L.J. Lauhon.
190. "Spectroscopy of Materials at the Spatial Limit," in *Proceedings of the Science Frontier Tsukuba 1999 Conference*, edited by L. Esaki (Universal Academy Press, Tokyo, 2000), pp. 321-329
191. "Effects of Temperature and Other Experimental Variables on Single Molecule Vibrational Spectroscopy with the Scanning Tunneling Microscope", *Rev. Sci. Instrum.*, **72**, 216-223 (2001), with L.J. Lauhon.
192. "Inducing and Observing the Abstraction of a Single Hydrogen Atom in Bimolecular Reactions with a Scanning Tunneling Microscope", *J. Phys. Chem.* **105**, 3987-3992 (2001), with L.J. Lauhon.
193. "Symmetry Selection Rules for Vibrationally Inelastic Tunneling", *Phys. Rev. Lett.* **86**, 2593-2596 (2001), with N. Lorente, M. Persson, and L.J. Lauhon.
194. "Single Molecule Vibrations, Conformational Changes, and Electronic Conductivity of Five-Membered Heterocycles", *J. Am. Chem. Soc.* **123**, 10095 (2001), with J. Gaudioso.
195. "Direct Comparisons of Rates for Low Temperature Diffusion of Hydrogen and Deuterium on Cu(001) from Quantum Mechanical Calculations and Scanning Tunneling Microscopy Experiments", *J. Chem. Phys.* **115**, 5620 (2001), with J. Kua, L.J. Lauhon, and W.A. Goddard III.
196. "Steric Turnoff of Vibrationally Mediated Negative Differential Resistance in a Single Molecule", *Angew. Chem. Int. Ed.* **40**, 4080 (2001), with J. Gaudioso.

197. "Oxidation of a Single Carbon Monoxide Molecule Manipulated and Induced with a Scanning Tunneling Microscope", *Phys. Rev. Lett.* **87**, 166102-1-4 (2001), with J.R. Hahn.
198. "Single Molecule Imaging and Vibrational Spectroscopy with a Chemically Modified Tip of a Scanning Tunneling Microscope", *Phys. Rev. Lett.* **196102-1** (2001), with J.R. Hahn.
199. "State-Resolved Femtosecond Two-Pulse Correlation Measurements of NO Photodesorption from Pt(111)", *Surf. Sci.* **514**, 404-408 (2002), with T. Yamanaka, A. Hellman, and S. Gao.
200. "STM Images and Chemisorption Bond Parameters of Acetylene, Ethynyl, and Dicarbon Chemisorbed on Copper", *J. Phys. Chem. B* **106**, 8161-8171 (2002), with F.E. Olsson, M. Persson, N. Lorente, and L.J. Lauhon.
201. "Manipulation and Characterization of Xenon-Metalloporphyrin Complexation with a Scanning Tunneling Microscope", *J. Am. Chem. Soc.* **124**, 14804-14809 (2002), with X. Qiu, G.V. Nazin, and A. Hotzel.
202. "Vibrational Spectroscopy and Imaging of Single Molecules: Bonding of CO to Single Palladium Atoms on NiAl(110)", *J. Chem. Phys.* **117**, 10947-10952 (2002), with N. Nilius and T.M. Wallis.
203. "Development of One-Dimensional Band Structure in Artificial Gold Chains", *Science* **297**, 1853-1856 (2002). Published online 22 August 2002; 10.1126/science.1075242, with N. Nilius and T.M. Wallis.
204. "Electron Density Oscillations in Gold Atomic Chains Assembled Atom-by-Atom", *Phys. Rev. Lett.* **89**, 236802 (2002), with T. M. Wallis and N. Nilius.
205. "Single Molecule Chemistry", *J. Chem. Phys.* **117**, 11033-11061 (2002).
206. "Vibrationally Resolved Fluorescence Induced with Sub-Molecular Precision", *Science*, **299**, 542-546 (2002), with X.H. Qiu and G.V. Nazin.
207. "Influence of a Heterogeneous Al₂O₃ Surface on the Electronic Properties of Single Pd Atoms", *Phys. Rev. Lett.* **90**, 046808 (2003), with N. Nilius and T.M. Wallis.
208. "Localized Molecular Constraint on Electron Delocalization in a Metallic Chain", *Phys. Rev. Lett.* **90**, 186102 (2003).
209. "Distance Dependence of the Interaction Between Single Atoms: Gold Dimers on NiAl(110)", *Phys. Rev. Lett.* **90**, 196103 (2003), with N. Nilius and T.M. Wallis.
210. "Atomic Engineering of Photon Emission with a Scanning Tunneling Microscope", *Phys. Rev. Lett.* **90**, 216110 (2003), with G.V. Nazin and X.H. Qiu.

211. "Single Molecule Vibrational and Electronic Analyses of the Formation of Inorganic Complexes: CO Bonding to Au and Ag Atoms on NiAl(110)", *J. Chem. Phys.* **119**, 2296-2300 (2003), with T.M. Wallis and N. Nilius.
212. "From Single Atoms to One-Dimensional Solids: Artificial Gold Chains on NiAl(110)", *Jpn. J. Appl. Phys.* **42**, 4790-4794 (2003), with N. Nilius and T.M. Wallis.
213. "Visualization and Spectroscopy of a Metal-Molecule-Metal Bridge", *Science* **302**, 77-81 (2003), with G.V. Nazin and X.H. Qiu.
214. "Adsorption Induced Hydrogen Bonding by CH Group", *J. Chem. Phys.* **119**, 6232-6236 (2003), with S. Gao and J.R. Hahn.
215. "Erratum: Electronic Density Oscillations in Gold Atomic Chains Assembled Atom by Atom [Phys. Rev. Lett. 89, 236802 (2002)]", *Phys. Rev. Lett.* **92**, 099901 (2004), with T.M. Wallis and N. Nilius.
216. "Influence of Adsorbate-Substrate Interaction on the Local Electronic Structure of C₆₀ Studied by Low-Temperature STM", *Phys. Rev. B* **69**, 115434 (2004), with C. Silien, N.A. Pradhan, and P.A. Thiry.
217. "Electronic States of Linear Au Clusters Supported on Metal Surfaces: Why Are They Like Those of a Particle in a Box?", *J. Chem. Phys.* **120**, 7738-7740 (2004), with G. Mills, B. Wang, and H. Metiu.
218. "Spin Splitting of s and p States in Single Atoms and Magnetic Coupling in Dimers on a Surface", *Phys. Rev. Lett.* **92**, 186802 (2004), with H.J. Lee and M. Persson.
219. "Vibronic States in Single Molecule Electron Transport", *Phys. Rev. Lett.* **92**, 206102 (2004), with X.H. Qiu and G.V. Nazin.
220. "Vibronic States in Single Molecules: C₆₀ and C₇₀ on Ultrathin Al₂O₃ Films", *J. Chem. Phys.* **120**, 11371-11375 (2004), with N. Liu and N.A. Pradhan.
221. "Building Alloys from Single Atoms: Au-Pd Chains on NiAl(110)", *J. Phys. Chem. B* **108**, 14616-14619 (2004), with N. Nilius and T.M. Wallis.
222. "Mechanisms of Reversible Conformational Transitions in a Single Molecule", *Phys. Rev. Lett.* **93**, 196806 (2004), with X.H. Qiu and G.V. Nazin.
223. "Control of Relative Tunneling Rates in Single Molecule Bipolar Electron Transport", *Phys. Rev. Lett.* **93**, 236802 (2004), with S.W. Wu, G.V. Nazin, X. Chen, and X.H. Qiu.
224. "Tuning the Bipolar Conductance of an Alkali-Doped C₆₀ Layer Sandwiched between Two Tunneling Barriers", *Nano Lett.* **5**, 55-59 (2005), with N.A. Pradhan, N. Liu, and C. Silien.

225. "Electronic Properties of Artificial Au Chains with Individual Pd Impurities", *J. Chem. Phys.* **122**, 011101 (2005), with T.M. Wallis, N. Nilus, and G. Mikaelian.
226. "Tailoring Electronic Properties of Atomic Chains Assembled by STM", *Appl. Phys. A* **80**, 951-956 (2005), with N. Nilus and T.M. Wallis.
227. "Atomic Scale Conductance Induced by Single Impurity Charging", *Phys. Rev. Lett.* **94**, 076801 (2005), with N.A. Pradhan, N. Liu, and C. Silien.
228. "Vibronic Transitions in Single Metalloporphyrins", *ChemPhysChem* **6**, 971-975 (2005), with H.J. Lee and J.H. Lee.
229. "Vibrational Spectroscopy of Individual Doping Centers in a Monolayer Organic Crystal", *J. Chem. Phys. Comm.* **122**, 181105-1-4 (2005), with G.V. Nazin and X.H. Qiu.
230. "Tunneling Rates in Electron Transport Through Double-Barrier Molecular Junctions in a Scanning Tunneling Microscope", *Proc. Nat. Acad. Sci.* **102**, 8832-8837 (2005), with G.V. Nazin and S.W. Wu.
231. "Orbital Specific Chemistry: Controlling the Pathway in Single-Molecule Dissociation", *J. Chem. Phys.* **122**, 244704-1-3 (2005), with J.R. Hahn.
232. "Vibronic Spectroscopy of Single C₆₀ Molecules and Monolayers with the STM", *J. Phys. Chem.* **109**, 8513-8518 (2005), with N.A. Pradhan and N. Liu.
233. "Charging and Interaction of Individual Impurities in a Monolayer Organic Crystal", *Phys. Rev. Lett.* **95**, 166103 (2005), with G.V. Nazin and X.H. Qiu.
234. "Direct Observation of C₂ Hydrocarbon-Oxygen Complexes on Ag(110) with a Variable Low Temperature Scanning Tunneling Microscope", *J. Phys. Chem. B* **109**, 20350-20354 (2005).
235. "Realization of a Particle-in-a-Box: Electron in an Atomic Pd Chain", *J. Phys. Chem. B* **109**, 20657-20660 (2005), with N. Nilus and T.M. Wallis.
236. "Spectroscopy and Microscopy of Spin-Sensitive Rectification Current Induced by Microwave Radiation", *Nano Letters* **5**, 2613-2617 (2005), with J.H. Lee and X.W. Tu.
237. "Chemisorption and Dissociation of Single Oxygen Molecules on Ag(110)", *J. Chem. Phys.* **123**, 214702 (2005), with J.R. Hahn.
238. "Atomic-Scale Rectification at Microwave Frequency", *J. Chem. Phys.* **124**, 021105 (2006), with X.W. Tu and J.H. Lee.
239. "Atomic Scale Control of Single Molecule Charging", *J. Chem. Phys.* **124**, 131101 (2006), with G. Mikaelian, N. Ogawa, and X.W. Tu.

240. "Imaging and Vibrational Spectroscopy of Single Pyridine Molecules on Ag(110) Using a Low-Temperature Scanning Tunneling Microscope", *J. Chem. Phys.* **124**, 204708 (2006), with J.R. Hahn.
241. "Atomic-Scale Coupling of Photons to Single-Molecule Junctions", *Science*, published online 20 April 2006; 10.1126/science. **312**, 1362-1365 (2006), with S.W. Wu and N. Ogawa.
242. "Spatial Variations in Submolecular Vibronic Spectroscopy on a Thin Insulating Film", *Phys. Rev. Lett.* **98**, 166103 (2007), with N. Ogawa and G. Mikaelian.
243. "Chemical Imaging of Single 4,7,12,15-tetrakis[2.2]paracyclophane by Spatially Resolved Vibrational Spectroscopy", *J. Chem. Phys.* **127**, 244711-1-5 (2007), with N. Liu, C. Silien, J.B. Maddox, S. Mukamel, B. Liu, and G.C. Bazan.
244. "Reversible Switching among Three Adsorbate Configurations in a Single [2.2]Paracyclophane-Based Molecule", *Nano Lett.* **8**, 208-213 (2008), with C. Silien, N. Liu, J.B. Maddox, S. Mukamel, B. Liu, and G.C. Bazan.
245. "Controlling Single-Molecule Negative Differential Resistance in a Double-Barrier Tunnel Junction", *Phys. Rev. Lett.* **100**, 126807-1-4 (2008), with X.W. Tu and G. Mikaelian.
246. "Conductance Hysteresis and Switching in a Single-Molecule Junction", *J. Phys. Chem. C* **112**, 5241-5244 (2008), with S.W. Wu, N. Ogawa, and G.V. Nazin.
247. "Intramolecular Photon Emission from a Single Molecule in a Scanning Tunneling Microscope," *Phys. Rev. B* **77**, 205430-1-5 (2008), with S.W. Wu and G.V. Nazin.
248. "Visualization of Fermi's Golden Rule Through Imaging of Light Emission From Atomic Silver Chains", *Science* **325**, 981-985 (2009), with C. Chen and C.A. Bobisch.
249. "Vibrational Mode Specific Bond Dissociation in a Single Molecule," *J. Chem. Phys.* **131**, 044706 (2009), with J.R. Hahn.
250. "Spatially Inhomogeneous Inelastic Electron Tunneling in Oxygen-Ethylene Complexes on Ag(110) Resolved with a Scanning Tunneling Microscope", *Phys. Rev. B* **80**, 165428 (2009), with J.R. Hahn.
251. "Two-Photon-Induced Hot-Electron Transfer to a Single Molecule in a Scanning Tunneling Microscope", *Phys. Rev. B* **82**, 085444 (2010), with S.W. Wu.
252. "Viewing the Interior of a Single Molecule: Vibronically Resolved Photon Imaging at Submolecular Resolution", *Phys. Rev. Lett.* **105**, 217402 (2010), with C. Chen, P. Chu, C.A. Bobisch, and D.L. Mills.

253. "Spatial Imaging of Individual Vibronic States in the Interior of Single Molecules", *J. Chem. Phys.* **135**, 014705 (2011), with Q. Huan, Y. Jiang, Y.Y. Zhang, and U. Ham.
254. "Real Space Imaging of Kondo Screening in a Two-Dimensional O₂ Lattice", *Science* **333**, 324 (2011), with Y. Jiang, Y.N. Zhang, J.X. Cao, and R.Q. Wu.
255. "Spin Splitting Unconstrained by Electron Pairing: The Spin-Vibronic States", *Phys. Rev. Lett.* **108**, 106803 (2012), with Ungdon Ham.
256. "Localized Interaction of Single Porphyrin Molecules with Oxygen Vacancies On TiO₂(110)", *J. Chem. Phys.* **137**, 234707 (2012), with Markus Lackinger and Martin S. Janson.
257. "Submolecular Control, Spectroscopy and Imaging of Bond-Selective Chemistry in Single Functionalized Molecules", *Nature Chemistry* **5**, 36–41 (2013), with Ying Jiang, Qing Huan, Laura Fabris, and Guillermo C. Bazan.
258. "Imaging Single Electron Spin in a Molecule Trapped Within a Nanocavity of Tunable Dimension", *J. Chem. Phys.* **138**, 074703 (2013), with Ungdon Ham.
259. "Rotational and Vibrational Excitations of a Single Hydrogen Molecule Trapped within a Nanocavity of Tunable Dimension", *Phys. Rev. Lett.* **111**, 146102 (2013), with S. Li, A. Yu, F. Toledo, Z. Han, H. Wang, H.Y. He, R. Wu, and W. Ho.
260. "Real-Space Imaging of Molecular Structure and Chemical Bonding by Single-Molecule Inelastic Tunneling Probe", *Science* **344**, 885-888 (2014), with C. Chiang, C. Xu, and Z. Han.
261. "Interplay Between Electronic Properties and Interatomic Spacing in Artificial Gold Chains on NiAl(110)", *J. Phys. Chem. C* **118**, 29001-29006 (2014), with N. Nilius, T.M. Wallis, and M. Persson.
262. "Rotational Spectromicroscopy: Imaging the Orbital Interaction between Molecular Hydrogen and an Adsorbed Molecule", *Phys. Rev. Lett.* **114**, 206101 (2015), with S. Li, D. Yuan, A. Yu, G. Czap, and R. Wu.
263. "Single-Molecule Rotational and Vibrational Spectroscopy and Microscopy with the Scanning Tunneling Microscope", *J. Phys. Chem. C* **119**, 14737-14741 (2015), with A. Yu, S. Li, and G. Czap.
264. "Trapping and Characterization of a Single Hydrogen Molecule in a Continuously Tunable Nanocavity", *J. Phys. Chem. Lett.* **6**, 3453-3457 (2015), with H. Wang, S. Li, H. He, A. Yu, F. Toledo, Z. Han, and R. Wu.

265. "Nature of Asymmetry in the Vibrational Line Shape of Single-Molecule Inelastic Electron Tunneling Spectroscopy with the STM", *Phys. Rev. Lett.* **116**, 166101 (2016), with C. Xu, C.-L. Chiang, and Z. Han.
266. "Quantitative Understanding of van der Waals Interactions by Analyzing the Adsorption Structure and Low-Frequency Vibrational Modes of Single Benzene Molecules on Silver", *J. Phys. Chem. Lett.* **7**, 228-233 (2016), with D. Yuan, Z. Han, G. Czap, C.-L. Chiang, C. Xu, and R. Wu.
267. "Tunneling Electron Induced Charging and Light Emission of Single Panhematin Molecules", *J. Phys. Chem. C* **120**, 21099-21103 (2016), with A. Yu, S.W. Li, B. Dhital, and H.P. Lu.
268. "Tunneling-Electron-Induced Light Emission from Single Gold Nanoclusters", *Nano Lett.* **16**, 5433-5436 (2016), with A. Yu, S.W. Li, and G. Czap.
269. "Single Molecule Vibrational Spectroscopy: CO Bonding to Edge and Terrace Positions on Ag, Au, and Pd Islands on NiAl(110)", *J. Phys. Chem. Lett.* **7**, 4683-4688 (2016), with T.M. Wallis and N. Nilius.
270. "Imaging van der Waals Interactions", *J. Phys. Chem. Lett.* **7**, 5205-5211 (2016), with Z.M. Han, X.Y. Wei, C. Xu, C.-L. Chiang, Y.X. Zhang, and R.Q. Wu.
271. "Probing Intermolecular Coupled Vibrations between Two Molecules", *Phys. Rev. Lett.* **118**, 036801-1-5 (2017), with Z.M. Han, G. Czap, C. Xu, C.-L. Chiang, D.W. Yuan, and R.Q. Wu.
272. "Imaging the Halogen Bond in Self-assembled Halogenbenzenes on Silver", *Science* **358**, 206-210 (2017), with Z.M. Han, G. Czap, C.-L. Chiang, C. Xu, P.J. Wagner, X.Y. Wei, Y.X. Zhang, and R.Q. Wu.
273. "Joint Space-Time Coherent Vibration Driven Conformational Transitions in a Single Molecule", *Phys. Rev. Lett.* **119**, 176002-1-5 (2017), with S. Li, S. Chen, J. Li, and R. Wu.
274. "Visualization of Nano-Plasmonic Coupling to Molecular Orbital in Light Emission Induced by Tunneling Electrons", *Nano Lett.* **18**, 3076-3080 (2018), with A. Yu, S. Li, H. Wang, S. Chen, and R. Wu.
275. "Bond-Selected Photodissociation of Single Molecules Adsorbed on Metal Surfaces", *Phys. Rev. Lett.* **122**, 077401-1-6 (2019), with S. Li, G. Czap, H. Wang, L. Wang, S. Chen, A. Yu, and R. Wu.
276. "Detection and Characterization of Anharmonic Overtone Vibrations of Single Molecules on a Metal Surface", *Phys. Rev. Lett.* **122**, 106801-1-5 (2019), with G. Czap, Z. Han, and P.J. Wagner.

277. "Probing and imaging spin interactions with a magnetic single-molecule sensor", *Science* **364**, 670-673 (2019), with G. Czap, P.J. Wagner, F. Xue, L. Gu, J. Li, J. Yao, and R. Wu.
278. "Detection of Spin-Vibration States in Single Magnetic Molecules", *Phys. Rev. Lett.* **123**, 106803-1-6 (2019), with G. Czap, P.J. Wagner, J. Li, F. Xue, J. Yao, and R. Wu.
279. "Effects of van der Waals Dispersion Interactions in Density Functional Studies of Adsorption, Catalysis, and Tribology on Metals", *J. Phys. Chem. C* **124**, 16926-16942 (2020), with D. Yuan, Y. Zhang, and R. Wu.
280. "Bottom-up Synthesis of Nitrogen-containing Graphene Nanoribbons from the Tetrabenzopentacene Molecular Motif", *Carbon* **170**, 677-684 (2020), with Z. Feng, A. Mazaheripour, D.J. Dibble, P. Wagner, G. Czap, G. Kladnik, A. Cossaro, A. Verdini, L. Floreano, G. Bavdek, G. Comelli, D. Cvetko, A. Morgante, and A.A. Gorodetsky.
281. "Atomic-Scale Quantum Sensing Based on the Ultrafast Coherence of an H₂ Molecule in an STM Cavity", *Science* **376**, 401-405 (2022), with L. Wang and Y. Xia.
282. "Confinement-Induced Catalytic Dissociation of Hydrogen Molecules in a Scanning Tunneling Microscope", *J. Am. Chem. Soc.* **144**, 9618-9623 (2022), with S. Li, G. Czap, J. Li, Y. Zhang, A. Yu, D. Yuan, H. Kimura, and R. Wu.
283. "Atomic-Scale Rectification and Inelastic Electron Tunneling Spectromicroscopy", *Nano Lett.* **22**, 7848-7852 (2022), with J. Yao, P.J. Wagner, Y. Xia, and G. Czap.
284. "Electrical Manipulation of Quantum Coherence in a Two-Level Molecular System", *Phys. Rev. Lett.* **130**, 096201 (2023), with L. Wang, D. Bai, and Y. Xia.
285. "Single-Molecule Continuous-Wave Terahertz Rectification Spectroscopy and Microscopy", *Nano Lett.* **23**, 2915-2920 (2023), with S. Chen and W. Shi.
286. "Avoided level Crossing and Entangled States of Interacting Hydrogen Molecules Detected by the Quantum Superposition Microscope", *ACS Nano* **17**, 23144-23151 (2023), with Y. Xia, L. Wang, and D. Bai.
287. "Origin of Photoinduced DC Current and Two-level Population Dynamics in a Single Molecule", *Sci. Adv.* **10**, eadk9211 (2024), with J. Yao, Y. Park, W. Shi, and S. Chen.
288. "Mechanisms Underlying a Quantum Superposition Microscope Based on THz-Driven Coherent Oscillations in a Two-Level Molecular Sensor", *Phys. Rev. Lett.* **132**, 076903 (2024), with Y. Xia and L. Wang.