

## WILSON HO

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and Department of Chemistry  
University of California, Irvine  
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### 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

150<sup>th</sup> 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, 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

## **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  
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

## **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-present  
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, 5<sup>th</sup> 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; Tsinghua University, China; Institute of Physics, Chinese Academy of Sciences, China; University of Tokyo, Japan; Chonbuk National University, Korea; Inha University, Korea; Columbia University, and others.  
Transfer of homemade helium recycling system (capture, purification, liquefaction)

## **RESEARCH AND EDUCATION STATISTICS**

Refereed Publications: 280  
Students Received Ph.D.: 43  
Postdocs Supervised: 28  
Visiting Faculty and Scientists: 11  
Exchange Graduate Students from Abroad: 10  
Undergraduate Research Interns (since 2014): 34

## RESEARCH THEMES

### Spatially and Temporally Resolved Excitations with the Scanning Tunneling Microscope (STM)

- Development and Application of New Techniques and Instrumentation  
*Low Temperature STM, Inelastic Electron Tunneling, Inelastic Tunneling Probe (itProbe), Near-IR and THz Femtosecond Laser-STM,*
- Single-Molecule Inelastic Electron Tunneling Spectroscopy, Microscopy, and Processes  
*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  
*Spatially and Temporally Resolved Measurements of Single Molecules; Spatially Resolved Imaging of Light Emission and Photo-induced Electron Transfer in a Single Molecule; Coherent Vibration Driven Structural Transitions in Space and Time*
- 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 Spin Centers*
- STM Visualization of Basic Quantum Phenomena in Textbooks and Technology Transfer  
*Inclusion of STM Results in Primary School, High School, and College Textbooks; Technology Transfer of Our Homemade STM Instrument to More Than a Dozen Research Institutions Worldwide*

## SPECIAL PUBLICATIONS

Co-Edited and Contributed in 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).

#### 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, Cornell University  
 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: O<sub>2</sub> and O<sub>2</sub>+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. Garegin 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 H<sub>2</sub> 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  
Looking for job, 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  
*Probing and Visualizing Quantum State Coupling Between Single Molecules*

#### Postdoctoral Associates

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. Kiyoo 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

#### 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 – Present

## WILSON HO PUBLICATIONS

### Abbreviations of Journal Titles

Acc. Chem. Res.	Accounts of Chemical Research
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
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

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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.
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