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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 Chemistry, University of California,
Irvine, CA, 2000-present

PROFESSIONAL AFFILIATIONS

American Chemical Society

American Physical Society

American Vacuum 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, 2005-2006

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 National Academy of Sciences, 2013

SPECIAL 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
Jortner Lectures, University of Tel Aviv, Israel, 2013

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
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 APS Irving Langmuir Prize in Chemical Physics, 2004, 2006
Selection Committee for APS Davisson-Germer Prize, 2004; Chair of Committee, 2006
Boulder School 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, Hefei, China, 2005-2009
International Advisory Board of the National Center for Nanoscience and Technology, Beijing, China, 2006 – present
Department of Energy Panel Reviews, 2009
NSF Panel Review, 2011
DOE Review Panel of Division of Materials Science at Stanford-SLAC, 2012
Stanford-SLAC Linac Coherent Light Source Scientific Advisory Committee, 2013-15

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 Molecules, 2002

CURRENT RESEARCH INTERESTS

- Development and Application of New Techniques and Instrumentation
Low Temperature STM, Inelastic Electron Tunneling Spectroscopy and Microscopy, Optical-STM, Magnetic-STM, Atomic Scale Plasmonic Surface Photochemistry
- Single Molecule Chemistry
Molecular Transformation and Changes in its Electronic, Vibrational, Charge, and Spin States: Diffusion, Rotation, Vibration, Conformation Changes, Molecular Chirality; Energy, Charge, and Spin Transfers; Single Bond Breaking and Formation
- 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
- Nano-photochemistry and Light-Matter Interaction: Diffraction Unlimited sub-Å Resolution
CW and Femtosecond Laser Induced Transformation in the Interior of Single Molecules: Spatial and Temporally Resolved Measurements of Single Molecules; Spatially Resolved Imaging of Light Emission and Photo-induced Electron Transfer in a Single Molecule
- Spins in Single Atoms, Molecules, and Artificial Nanostructures
The Role of Spin in Magnetism, Electron Transport, Energy Transfer, and Chemistry with Spatial and Temporal Resolution; Sub-Kelvin and 9 Tesla STM for Probing a Single Electron Spin; Observed Spin Splitting in a Single Vibronic Peak in a Single Molecule

RESEARCH HIGHLIGHTS

- Observation of non-dipole scattering in angle-resolved, high resolution electron energy loss spectroscopy (EELS) for vibrational analysis of phonons and molecular vibrations at surfaces.
- Elucidation of the different mechanisms of photochemistry at solid surfaces induced by

continuous wave, nanosecond, and femtosecond lasers; investigation of femtochemistry of adsorbed molecules.

- Demonstration of single molecule vibrational spectroscopy by inelastic electron tunneling spectroscopy with the scanning tunneling microscope (STM-IETS) and its extension to other inelastic processes: single electron spin excitation, light emission from single atoms, molecules, and synthetic nanostructures with sub-Å resolution.
- Achievement of photoinduced electron transfer to a single molecule with sub-Å resolution by light induced electron tunneling in the STM – defeating diffraction limited resolution.
- Realization of single molecule chemistry: molecular dynamics (rotation, intramolecular vibrational relaxation, conformational change), breaking and forming single bonds, spatial control of bimolecular reactions, synthesis of single organometallic molecules, and imaging charge and spin distributions in molecular orbitals.
- Discovery of spin spectroscopy for molecules without unpaired electrons: the spin-vibronic states in single molecules, coupling electronic, vibrational, and spin states.
- Inclusion of STM results in chemistry textbooks, including a widely used freshman college chemistry textbook; technology transfer of our homemade STM instrument to more than a dozen research institutions worldwide.

RESEARCH and EDUCATION STATISTICS

Refereed Publications: 260

Students received Ph.D.: 34

Postdocs supervised: 25

Visiting Faculty and Scientists: 8

Exchange Graduate Students from abroad: 9

EDUCATION OUTREACH and TECHNOLOGY TRANSFER

STM results and figures appearing in Textbooks: “Principles of Modern Chemistry”, D.W. Oxtoby, H.P. Gillis, and A. Champion, 7th edition (Thomson Brook/Cole, Belmont, VA, 2008); California Elementary School Science Textbook; High School Chemistry Textbook in Taiwan.

Transfer of STM instrumentation (microscope, electronics, software): Princeton University; University of Tennessee; North Carolina State University; EPFL in Lausanne, Switzerland; Tsinghua University, Beijing, China; 2 in the Institute of Physics, Chinese Academy of Sciences, Beijing, China; University of Tokyo, Japan; Chonbuk National University, Korea; Inha University, Korea.

HOMEMADE INSTRUMENTATION

Angle resolved, high resolution electron energy loss spectrometer (3 constructed) and with multidetectors (2 constructed); Femtosecond lasers with 5 stages of dye amplifiers (1 constructed) and tunable IR (1 constructed); Low temperature, ultrahigh vacuum STM (5 constructed for 10 K and one constructed for 600 mK with 9 Tesla B field.)