

Curriculum Vitae for Alec M. Wodtke

PERSONAL INFORMATION

Name: Wodtke, Alec M.
Nationality: United States of America
Date of birth: 10 July 1959
URL for web site: <http://www.mpibpc.mpg.de/wodtke>

EDUCATION AND PROFESSIONAL PREPARATION

1986–8 Post-doctoral researcher, Max Planck Institute for Fluid Dynamics, Göttingen, Germany
1986 Ph.D. Department of Chemistry, University of California, Berkeley, Berkeley CA, USA
1981 Bachelor's Degree, Department of Chemistry, University of Utah, Salt Lake City Utah, USA

CURRENT POSITION(S)

2015– Professeur Titulaire, Ecole Polytechnique Fédérale Lausanne, Lausanne Switzerland
2010– Director, Max Planck Institute for Biophysical Chemistry, Göttingen Germany
2010– Professor, Institute for Physical Chemistry, University of Göttingen, Germany
2010– Research Professor, Department of Chemistry and Biochemistry, University of California Santa Barbara, Santa Barbara CA USA

PREVIOUS POSITIONS

2016–18 Director, Institute for Physical Chemistry, University of Göttingen, Germany
2010 Professor Above-Scale, Department of Chemistry and Biochemistry, University of California Santa Barbara, Santa Barbara CA USA
1996–2010 Full Professor, Department of Chemistry and Biochemistry, University of California Santa Barbara, Santa Barbara CA USA
1993–96 Associate Professor, Department of Chemistry and Biochemistry, University of California Santa Barbara, Santa Barbara CA USA
1988–93 Assistant Professor, Department of Chemistry and Biochemistry, University of California Santa Barbara, Santa Barbara CA USA

FELLOWSHIPS AND AWARDS

2010– Alexander von Humboldt Professorship
2009– Elected Fellow of the American Physical Society
2007– Elected Fellow of the American Association for the Advancement of Science
1998 Alexander von Humboldt Research Award to Senior US Scientists
1992 Alfred P. Sloan Research Fellow
1992 Camille and Henry Dreyfus Teacher Scholar Award
1989 National Science Foundation Presidential Young Investigator Award
1982 National Science Foundation Pre-doctoral Fellow

SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

I have graduated 22 Ph.D. students and mentored 24 post-doctoral researchers at the two professor positions I have occupied during my career in Santa Barbara and in Göttingen.

TEACHING ACTIVITIES

2010– Lectures held in all areas of physical chemistry, Institute for Physical Chemistry, University of Göttingen, Göttingen Germany
1988–2010 Lectures held in all areas of physical and general chemistry, Department of Chemistry and Biochemistry, University of California Santa Barbara, Santa Barbara CA USA

PROFESSIONAL SERVICE

2019 ▪ Guest Editor, PNAS
2018 ▪ Member International Advisory Board ECOSS-34 Åarhus, Denmark.

- Member, Steering Committee, 9th Exploratory Round Table Conference, Shanghai China November 28-30, 2018
- 2017
 - Co-Chair, iCOMET with Roland Wester, Jan 16-20, 2017, Seefeld, Austria
 - Co-Chair, MPS-EPFL-Center Conference on Molecular Nanosystems, Ascona, Switzerland
- 2016
 - Co-Chair, ICASEC Summer School on Dynamics at Surfaces, Sept. 4-9 2016, Göttingen with Rainer Beck
- 2015
 - Speaker and Founding Member of the International Center for Advanced Studies of Energy Conversion
 - Co-organizer, Bunsentagung on Nonadiabatic Effects in chemical kinetics, Dynamics and spectroscopy, Nov.1-4 2015, Göttingen Germany
 - Co-organizer, Intentional Conference on Molecular Energy Transfer, Oct. 2015, Chengdu China
 - Co-organizer, Summer school on VUV FELs in Molecular, Cluster and Surface Science: A Future Frontier for Energy Research, Oct 2015, Dalian China.
 - Chair, Gordon Conference on Dynamics at Surfaces, 2015, Salve Regina University, Newport Rhode Island
- 2013
 - Co-organizer, Workshop on VUV FELs in Molecular, Cluster and Surface Science: A Future Frontier for Energy Research, Sept. 23-28, 2013, Dalian China.
 - Vice-Chair, Gordon Conference on Dynamics at Surfaces, Aug 11-16, 2013, Salve Regina University, Newport Rhode Island
 - Co-organizer, Workshop on Dynamics and Reactions of hydrogen Atoms with Gold and Silver surfaces, May 24-26, 2013, Hann-Münden, Germany
 - Co-organizer, MPS-EPFL Winter school on Chemical Dynamics at Surfaces, March 10-15, 2013, Ringbergschloß, Germany
- 2012
 - Member, Local Organizing Committee, Workshop on Future Applications of Environmental TEM in Heterogeneous Catalysis, July 9-19, 2012, Göttingen Germany
 - Member, Organizing Committee, VIIIth Prague Workshop on Photoinduced Molecular Processes, March 18-22 2012
 - Member, Scientific Board, MPS-EPFL Center in Molecular Nanoscience and Technology
- 2011-
 - Member, International Advisory Committee, International Symposium on Molecular beams
 - Member of Editorial Board, Zeitschrift für Physikalische Chemie
 - Advisory Editorial Board Member, Chemical Physics Letters
 - Member, International Max Planck Research School for Physics of Biological and Complex Systems, MPRSpbcs, Göttingen
- 2011
 - Member, Organizing Committee, 2011 Sustainable Energy Workshop (SEW 2011), Taipei, Taiwan, Dec. 15-16 2011
 - Member, Organizing Committee, 2011 Workshop on the Chemistry and Physics of Energy Conversion at Interfaces, Dalian China Dec. 12-13, 2011
- 2009-2012
 - Member of Program Committee - Faraday Discussion on Molecular Reaction Dynamics in Gases, Liquids and Interfaces. Assisi Italy, June 2012
- 2010-2012
 - Editorial Advisory Board Member, Journal of Physical Chemistry
- 2009-2010
 - Faculty Advisor for “Chemists without Borders” UCSB regional chapter, first regional

- chapter for chemists without borders in the nation
- 2009 ▪ Chair of Program Committee – US-China partnership workshop on surface science and heterogeneous catalysis – Dalian China June 14-19 2009
- 2008 ▪ Chair of the Nominating Committee for the Division of Chemical Physics, American Physical Society
- Panel member and speaker: The Importance of International Partnerships. at the “Emerging Energy Technologies Summit: Concept to Commerce”, Feb 8 2008, Santa Barbara CA
- 2007 ▪ Featured Discussant at a public community gathering to highlight China’s role in nanotechnology research and development, Nov. 29, 2007, Santa Barbara Public Library.
- Partnership for Faculty Equity and Diversity: Chair’s Retreat on Diversity in Faculty Recruitment, Lake Arrowhead, Oct 10-12, 2007
- Invited Workshop Participant “Science for a New Class of Soft X-ray Light Sources”, October 8-10, 2007, Lawrence Berkeley Laboratory, Berkeley, California. Workshop participants are charged to define directions of science that would be enabled by attosecond-picosecond soft X-ray light sources and clarify the most important design parameters for future development.
- Member of the Nominating Committee for the Division of Chemical Physics, American Physical Society
- Evaluation Committee Member for the State Key Laboratory for Molecular Reaction Dynamics, Dalian Institute of Chemical Physics, PRC.
- NSF Math Life and Physical Engineering and Nano-Sciences Panel Member for review of PIRE program proposals
- 2006 ▪ Member of Editorial Board, Chinese Journal of Chemical Physics
- Invited Workshop Participant, “Building Strong Academic Chemistry Departments Through Gender Equity”, Washington DC Jan 29-31 2006
- 2005 ▪ Organizer of Inaugural Workshop for the Partnership for International Research and Education – Electron Chemistry and Catalysis at Interfaces, UCSB Dec 8 2005.
- Guest Editor Journal of Chemical Physics for special issue to honor Yuan T. Lee’s 70th birthday
- Evaluation Committee Member for the State Key Laboratory for Molecular Reaction Dynamics, Dalian Institute of Chemical Physics, PRC.
- Evaluation Committee Member for Condensed Phase Chemical Physics research program at Pacific Northwest National Laboratory March 6-9.
- Chairman: Gordon Conference on Molecular Energy Transfer, Ventura CA. Proposed and initiated satellite mini-conference for graduate students and post-docs to enhance youth participation.
- 2002 ▪ Organizer: APS symposium on “Vibronic Chemistry in Isolated Molecules, at Surfaces and In Solution” 2002 March Meeting, Indianapolis, Indiana.
- 2001 ▪ Organizer: ACS Symposium on Stereochemistry in Aligned Environments at 2001 National Meeting: Chicago Illinois.
- 2000-2004 ▪ Member Editorial Board, Journal of Chemical Physics
- 1995-1999 ▪ Spokesperson for the Chemical Dynamics Beamline at the Advanced Light Source, Lawrence Berkeley Laboratory
- 1993-1995 ▪ Project Leader for the Chemical Dynamics Participating Research Team at the Advanced Light Source, Lawrence Berkeley Laboratory

- 1995 ▪ AFOSR Review Panel for the Geophysics lab Hanscomb Airforce Base
- 1996 ▪ Organizer: ILS-XII, Symposium on Cavity Ring-Down Spectroscopy, Rochester NY, Oct. 20-25 1996
- Annually Reviews papers for: Journal of Chemical Physics, Physical Review Letters, Chemical Physics, Chemical Physics Letters, Science, Nature, Nature-Chemistry, Science, Journal of Physical Chemistry, Surface Science, Physical Chemistry Chemical Physics, Proceedings of the National Academy of Sciences, Chinese Journal of Chemical Physics, Catalysis Letters, Journal of Vacuum Science and Technology, Spectrochimica Acta.
- Annually Reviews Proposals for: Department of Energy, National Science Foundation Division of Chemistry and Division of Physics, Air Force Office of Scientific Research, Swiss National Science Foundation, Chinese Academy of Science

MEMBERSHIP IN PROFESSIONAL SOCIETIES

- American Chemical Society, Member
- American Physical Society, Fellow
- Deutsche Bunsen-Gesellschaft für physikalische Chemie, Member
- Gesellschaft der Deutschen Chemiker
- Member Deutsche physikalische Gesellschaft

UNIVERSITY SERVICE

- 2007 UC Presidential Post-doctoral Program Evaluation Committee
- 2004- Chancellor's Outreach Advisory Board, Member
- 2004-2006 Associate Director, Institute for Quantum and Complex Dynamics
- 2004-2006 iQCD Steering Committee, Member
- 2004- CNSI Steering committee, Member
- 2004- NRI Steering Committee, Member
- 2004- Heeger-Chair Committee, Member
- 2003- Dean's Committee on Information Technology Recharges, Member
- 2003-2009 Chairman, Department of Chemistry and Biochemistry.

GRANT HISTORY

GÖTTINGEN (13 701 100 €)

1. 2018-2021, Deutsche Forschungsgemeinschaft, BENCH, 115.500€
2. 2018-2022 Cooperative Research Group for the Elementary Dynamical Processes at Model Catalytic Surfaces (EDPMCS) Experiment (a part of the Molecular Physics at Interfaces Initiative at the Dalian Coherent Light Source) , (together with Xueming Yang) 4.47 Million €total (MPG-CAS-DFG joint funding) (Wodtke budget is 2 million €), 2018-2022
3. 2017-2018 DFG and VW-Stiftung, Compact and mobile molecular beam surface scattering apparatus for use at major light source, INST 186/1241-1 FUGG, 750,000 €
4. 2017-2022, European Research Council – Advance Grant, *PROBING CHEMICAL DYNAMICS AT SURFACES WITH ULTRA-FAST ATOM PULSES (HBEAM)* 2.500.000 €
5. 2016-2018, Deutsche Forschungsgemeinschaft, *Molecular interactions at graphene surfaces*, 115.500€
6. 2015-2017, Niedersachsen Vorab: Niedersächsisch-israelische Gemeinschaftsvorhaben, "Molecule interaction with electronically modified surfaces: towards next generation of heterogeneous catalysts" with Pr. Igor Rahinov, Ph.D. The Open University of Israel, 296.600 € April 2015-December 2017.
7. 2015 Dynamics at Surfaces Gordon Research Conference and Seminar, 10,000 US\$, Grant number 0000214120
8. VUV-FELs in Molecular Cluster and Surface Science: A Future Frontier for Energy Research,

285,800 RMB to carry out an international workshop in Dalian China

9. Collaborative Research Center on Atomic Scale Control of Energy Conversion, Vize-Sprecher, 2013-21, INST 186/1074-1 and INST 186/1074-2 €1,012,800
10. DFG (ANR), Dynamics and Reactions of hydrogen Atoms with Gold and Silver surfaces – DRAGS, WO 1541/1-1, 258,000 €
11. DFG and VW-Stiftung, An advanced molecular-beam surface-scattering apparatus for studies under extreme conditions, INST 186/952-1, 500,000 €
12. DFG and VW-Stiftung, Rydberg Tagging Surface Scattering Machine, INST 186/902-1, €750,000
13. DFG and VW-Stiftung, Fourier Transform Limited IR Source, INST 186/901-1, 250,000 €
14. Alexander von Humboldt Foundation, Deutschland, Alexander von Humboldt Professorship, April 2011-March 2016, 5,000,000 €

SANTA BARBARA (13 721 215 US\$)

15. Ministry of Science and Technology, Peoples Republic of China, 1.65 Million RMB (\$US 235,000) for student exchange program between UCSB and the Dalian Institute of Chemical Physics. Professor Yang Xueming PI, Jan 2007-Jan 2010
16. Air Force Office of Scientific Research, "Laser-driven surface photochemistry", FA9550-07-1-0206, \$534,000, Jan. 1 2007- Dec. 31 2009.
17. National Science Foundation, "Partnership for International Research and Education in Electron Chemistry and Catalysis at Interfaces", Alec Wodtke (PI) with Co-PI's Horia Metiu, Martin Moskovits, Susannah Scott, Steve Buratto OISE-0530268, \$2,500,000, Oct. 1. 2005, Sept. 30 2010.
18. National Science Foundation, Molecule-surface scattering with velocity controlled molecular beams, CHE-, \$513,756, July 15 2008 – July 14, 2011.
19. Co-PI on California LSAMP Bridge To The Doctorate Cohort V, UCSB, PI: Michael Drake, National Science Foundation, \$987,000, Aug 1 2009- July 30 2011
20. Acquisition of a Gas Chromatograph Time-of-Flight Mass Spectrometer for Small Molecule Analysis with Cyber Enabled Remote Access for Research, Education, and Outreach, CHE-0840521, \$333,705, Aug. 1 2009.
21. Department of Energy, Electronically non-adiabatic dynamics at the gas-solid interface, DE-FG02-03ER15441, \$850,000, Dec. 15 2009 – Feb. 14 2013 (returned)
22. Department of Energy Office of Basic Energy Sciences, "Electronically Non-Adiabatic Interactions in Molecule-Metal Surface Scattering: Can We Trust the Born-Oppenheimer Approximation in Surface Chemistry, DE-FG02-03ER15441, \$413,000 Dec. 15, 2006-December 14, 2009, 1 man month
23. National Science Foundation, "Hexapole Focusing of Optically-pumped Molecules: Vibrational Promotion of Electron Emission", CHE-0454806, \$420,000, Sept. 1. 2005, Aug. 31 2008.
24. Chinese Academy of Science International Collaboration Group, 分子物性及动态化学, Alec Wodtke (Co-PI) with Xueming Yang (PI), and other Co-PI's Hua Guo, Donghui Zhang, David Parker, Rex Skodje, Kopin Liu, Dalian Institute of Chemical Physics, Dalian China, July 1 2004 - 2007, \$725,000.-
25. AFOSR Equipment Supplement Grant, Production and IR spectroscopy of molecular beams of cyclic N₃: Equipment Supplement Proposal, May 2004, \$85,069
26. Air Force Office of Scientific Research: "The Chemistry of Cyclic All-Nitrogen Molecules", FA9550-04-1-0057, \$474,927, Feb 15, 2004-Dec. 31 2006.
27. DOE Equipment Supplement Grant, Supplemental Request to: Electronically non-adiabatic

- interactions in molecule metal-surface scattering: Can we trust the Born-Oppenheimer approximation in surface chemistry?, July 1- Aug 14, 2004, \$57,510
28. Department of Energy Office of Basic Energy Sciences, "Electronically Non-Adiabatic Interactions in Molecule-Metal Surface Scattering: Can We Trust the Born-Oppenheimer Approximation in Surface Chemistry, DE-FG02-03ER15441, 430,000 August 15, 2003-December 14, 2006, 1 man month
 29. The 2005 Gordon Research Conference on Molecular Energy Transfer, Alec Wodtke and Anne McCoy. AirForce Office of Scientific Research , Aug 1 2004 March 2005, \$7,500
 30. The 2005 Gordon Research Conference on Molecular Energy Transfer, Alec Wodtke and Anne McCoy. Department of Energy Office of Basic Energy Sciences, Aug 1 2004 March 2005, \$7,500
 31. National Science Foundation, "*Dipole moments of highly vibrationally excited molecules: Probing the electronic structure changes associated with large amplitude vibration*", CHE-0138514, \$418,750, May 1, 2002-April 30 2005.
 32. Defense University Research Instrumentation Program: "Instrumentation for the study of Reactive Vibrational Relaxation", F49620-01-1-0201, \$273,000, March 1, 2001 - Feb. 27 2002.
 33. Air Force Office of Scientific Research: "*Large amplitude vibrational influence on electron transfer reactions*", F49620-01-1-0193, \$457,000, Dec 1, 2000-Nov.30 2003
 34. Department of Energy Office of Basic Energy Sciences, "*Reactivity of highly vibrationally excited polyatomic Molecules at surfaces*", DE-FG03 99 ER 14984, \$360,000, Sept 1, 1999-July, 30 2003, 1 man month
 35. National Institutes of Health, National Human Genome Research Institute, "*Mass spectrometric sequencing with long read lengths*", 5R21HG02023-02, \$257,819, July 1999-2001
 36. NATO Collaborative Research Grant, "*Molecular Beams of Oriented, Highly Vibrationally Excited Molecules*", \$8,600, June 1, 1998.
 37. National Science Foundation, Instrumentation and Laboratory Improvement (ILI) "*Simulations and Data Processing as Aids in Biological and Materials Chemistry*", \$85,068, July, 1 1998
 38. Defense University Research Instrumentation Program: "*Instrumentation for the study of Reactive Vibrational Relaxation*", \$68,960, March 1, 1998 - Feb. 27 1999
 39. Air Force Office of Scientific Research: "*Reactive Vibrational Relaxation in the Gas-Phase and on Surfaces*", F49620-95-1-0234, \$337,960, March 1, 1998-Nov.30 2000
 40. National Science Foundation, "*Quantum State Specific neutral Time-of-Flight: A new Probe of the correlated product energy distribution in photodissociation*", CHE-9726267, \$386,000, Jan. 1, 1998-Nov. 30, 2000
 41. National Science Foundation *Production and Destruction Chemistry of Highly Excited O₂* ATM-9633002, \$330,000.00, November 15, 1996-November 14, 1999.
 42. Air Force Office of Scientific Research: "*Gas Phase and Surface Reactivity of Highly Vibrationally and Translationally Excited Molecules*", F49620-95-1-0234, \$345,917 March 1995-March 1998
 43. National Science Foundation Division of Experimental Physical Chemistry Instrumentation Grant "*High Resolution Nd:YAG Pumped Optical Parametric Oscillator Lasers for the Chemistry Laser Pool at UCSB*", CHE-9413030, (together with S.K. Shin, M. T. Bowers and P. C. Ford): \$219,000 1994 (four PI's)
 44. Department of Energy, Office of Basic Energy Sciences: "*Interaction of Highly Vibrationally Excited Molecules With Clean Metal Surfaces*", DE-FG03-94ER14492/A000, \$300,000, Sept. 1994-June 14, 1997
 45. National Science Foundation Division of Experimental Physical Chemistry "*New Mechanism of Energy Transfer in Highly Vibrationally Excited Molecules*", CHE-9318885: \$360,000, June 1994-June 1997

46. National Science Foundation Atmospheric Chemistry Division, *"Vibrational Relaxation Measurements for Highly Vibrationally Excited Oxygen: Are Quantum States Important in the Atmosphere"*, ATM-9300074: \$215,000, Sept. 1993-August 1996
47. Camille and Henry Dreyfus Teacher Scholar Award: \$50,000 1992-1993
48. Alfred P. Sloan Research Fellowship: \$30,000 1992-1993
49. ACS- Petroleum Research Foundation: *"State Specific Effects on Intramolecular Vibrational Redistribution"*, \$43,000, 1991-1992
50. Equipment supplement to above: \$10,000
51. National Science Foundation Atmospheric Chemistry Division, *"Vibrational Non-LTE Effect of relevance to stratospheric Ozone"*, ATM-8922214 : \$178,600 1990-1993
52. Equipment Supplement to above: \$11,340
53. Equipment Supplement to above: \$44,900
54. National Science Foundation, Presidential Young Investigator/Reactions of Vibrationally Excited Molecules: CHE-8957978, \$312,500 1989-1994
55. ACS Petroleum Research Fund: \$18,000 1989-1991
56. University-wide Energy Research Group: \$21,000 1989-1990
57. Regents Junior Faculty Fellow (UC): \$4000 1989-1990

SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL ASSOCIATES

PhD students: Daniel Matsiev, Russel Cooper, Xueming Yang, Chris Larson, Jerry Larue, Jeffrey Mack, Alfredo Quinto-Hernandez, Jason White, Christopher Rogaski, Christopher Morgan, Steven Gulding, Zhi-sheng Li, Lauren White, Matthew Nooney, Yuanyuan Ji, Svenja Janke, Fabian Grätz, Jan Geweke, Jannis Neugbohren, Kai Golibrzuch, Daniel Engelhart, Nils Bartels, Sven Kaufmann, Roman Wagner, Hinrich Hahn, Jascha Lau Sebastian Kruger, Jörn Werdecker, Yvonne Dorenkamp, HongYan Jiang (30)

Post-docs: Marcel Drabbels, Christof Bartels, Igor Rahinov, Tim Schäfer, Hongtao Hou, Nils Hansen, Petros Samartzis, Yuhui Huang, Alexander Kandratsenka, Jun Chen, Jeongmin, John Price, Luis Velarde, Hendrik Nahler, Myung-Hwa Kim, Michael Murphy, Caver Yuvez, Rienk Jongma, Pranav Shirhatti, Daniel Harding, Monika Grütter, Qin Ran, Sven Koehler, Steven Harich, Barratt Park, Oliver Bünermann, Quan Shuai, Sumit Kumar, Hak ki Yu, Oddur Ingolfsson, Chen Li, Christian Reichardt, Ohiana Galparsoro, Kai Golibrzuch (33)

PUBLIC SCIENTIFIC PRESENTATIONS (MORE THAN 300)

1986

1. Physical Chemistry Seminar, SRI International, "IRMPD of Nitroalkanes" 1986

1987

2. Physical Chemistry Seminar, Max Plank Institute for Fluid Dynamics, "IRMPD of large molecules" 1987

1988

3. Max Planck Retreat conference, "Laser induced predissociation fluorescence" 1988

1989

4. Physical Chemistry Seminar, U.C. Irvine, "Laser induced predissociation fluorescence" January 1989

5. Physical Chemistry Seminar, Wesleyan University, "Spectroscopy of highly vibrationally excited molecules" Oct. 1989
6. Physical Chemistry Seminar, University of Southern California, "Spectroscopy of highly vibrationally excited molecules" Nov. 1989
7. Physical Chemistry Seminar, University of Kaiserslautern, "Spectroscopy of highly vibrationally excited molecules" Dec. 1989
8. Physical Chemistry Seminar, Max Planck Institute Göttingen, Federal Republic of Germany, "Spectroscopy of highly vibrationally excited molecules" December 1989

1990

9. Physical Chemistry Seminar, U. of Texas, Austin, "The vibrational structure of hydrogen cyanide up to 54 kcal/mol" February 20, 1990
10. Physical Chemistry Seminar, Cal. State Univ., Northridge, "The vibrational structure of hydrogen cyanide up to 54 kcal/mol" March 16, 1990
11. International Quantum Electronics Conference, "The vibrational structure of hydrogen cyanide up to 54 kcal/mol" May 25, 1990
12. University of Chicago, "The vibrational structure of hydrogen cyanide up to 54 kcal/mol" June 8, 1990
13. Symposium on Spectroscopy, Columbus Ohio, "The vibrational structure of hydrogen cyanide up to 54 kcal/mol" June 11, 1990
14. U. Wisconsin Madison, "The vibrational structure of hydrogen cyanide up to 54 kcal/mol" June 19, 1990
15. General Motors Research Laboratories, Warren MI, "Application of tunable excimer lasers in combustion diagnostics and molecular spectroscopy" June 21, 1990

1991

16. U. Kaiserslautern, Kaiserslautern, Germany, "Vibrational energy transfer of highly vibrationally excited NO", June 1991
17. Conference on the Dynamics of Molecular Collisions, Lake George, NY, "Vibrational energy transfer of highly vibrationally excited NO" (youngest invited speaker), July 1991
18. Gordon Conference on electronic molecular spectroscopy, Wolfeboro NH, "Stimulated emission pumping of small and medium sized molecules" (youngest invited speaker) August 1991
19. Physical Chemistry Seminar, SRI International, "Vibrational energy transfer of highly vibrationally excited NO" August 1991
20. Physical Chemistry Seminar, U. of Redlands, "Transition state spectroscopy of a simple isomerization reaction" September 1991

1992

21. SPIE Conference, Los Angeles CA, "Vibrational energy transfer of highly vibrationally excited NO" January, 1992
22. Western States spectroscopy Conference, Asilomar CA, "Vibrational energy transfer of highly vibrationally excited NO" January 1992
23. Physical Chemistry Seminar, University of California, Davis, "Applications of Nanosecond Spectroscopy in Chemical Reaction Dynamics", March 17, 1992
24. Physical Chemistry Seminar, California Institute of Technology, "Applications of Nanosecond Spectroscopy in Chemical Reaction Dynamics", May 7, 1992
25. Workshop on Experimental and Theoretical Studies of Vibration-Rotation Spectra of Highly Excited Molecules, Telluride CO, July 5-11, 1992
26. Workshop on Large Amplitude Motions and Intramolecular Dynamics, Telluride CO, July 26-31, 1992
27. Workshop on Chemical Physics Approaches to Atmospheric Questions, Telluride CO, August 2-7 1992
28. Optical Society of America, Interdisciplinary Laser Symposium: High Resolution Spectroscopy and Dynamics Albuquerque, NM, "Stimulated Emission Pumping studies of Chemical Dynamics", September 20-25, 1992
29. ACS Southwest Regional Meeting: Symposium on Intramolecular Dynamics and Kinetics of Excited Molecules, Lubbock TX, "Stimulated Emission Pumping studies of Chemical Dynamics" October 21-23, 1992
30. IBM Research Laboratories, Almaden CA, "Stimulated Emission Pumping studies of Chemical Dynamics" September 14, 1992
31. Physical Chemistry Seminar, University of California, Berkeley, "Stimulated Emission Pumping studies of Chemical Dynamics" September 15, 1992
32. Physical Chemistry Seminar, Cal. Poly Univ., San Luis Obispo, "Transition state spectroscopy of a simple isomerization reaction" November 19, 1992

1993

33. High Resolution Spectroscopy Topical Conference of the OSA, Salt Lake City UT, January 18, 1993
34. Western States Spectroscopy Association Conference, Asilomar CA, January 1993
35. Workshop on the end station design for the Chemical dynamics beam line at LBL's ALS, February 5, 1993
36. Physical Chemistry Seminar, Catholic University of Nijmegen, "The Role of highly vibrationally excited O₂ in the stratosphere", April 20, 1993
37. Physical Chemistry Seminar, Max Planck Institut für Strömungsforschung, "The Role of highly vibrationally excited O₂ in the stratosphere", Göttingen Germany, May 13, 1993

38. Physical Chemistry Seminar, Free University of Amsterdam, "The Role of highly vibrationally excited O₂ in the stratosphere", Physical Chemistry Seminar, May 30, 1993
39. Telluride Workshop on Atmospheric Chemistry, "The Role of highly vibrationally excited O₂ in the stratosphere", August 8-13, 1993
40. Physical Chemistry Seminar, University of California San Diego, "The Role of highly vibrationally excited O₂ in the stratosphere", Physical Chemistry Seminar, October 12, 1993
41. Physical Chemistry Seminar, University of Colorado, "The Role of highly vibrationally excited O₂ in the stratosphere" Chemical Physics Colloquium, Boulder, November 12, 1993
42. Physical Chemistry Seminar, University of California Los Angeles, "The Role of highly vibrationally excited O₂ in the stratosphere", Physical Chemistry Seminar, December 6, 1993
43. Fall Meeting of the American Geophysical Union, "The Role of highly vibrationally excited O₂ in the stratosphere", San Francisco, CA, Dec. 6-11, 1993

1994

44. Informal Conference on Photochemistry, "The Role of highly vibrationally excited O₂ in the stratosphere", Toronto Ontario, May 15-20, 1994
45. Physical Chemistry Seminar, Rice University, "The Role of highly vibrationally excited O₂ in the stratosphere", October 5 1994
46. Physical Chemistry Seminar, U. Texas Austin, "The Role of highly vibrationally excited O₂ in the stratosphere", October 6 1994
47. Physical Chemistry Seminar, U. C. Irvine, "The Role of highly vibrationally excited O₂ in the stratosphere", November 29 1994
48. Modern Spectroscopy of Solids Liquids and Gases, Topical Meeting of the Optical Society of America, "The Role of highly vibrationally excited O₂ in the stratosphere", Santa Fe NM, February 11, 1995

1995

49. Physical Chemistry Seminar, Cal. State U. at Chico, "The Role of highly vibrationally excited O₂ in the stratosphere", March 17, 1995
50. Faraday Discussion #100, Atmospheric Chemistry Measurements Mechanisms and Models, "State-to-state rate constants for relaxation of highly vibrationally excited O₂ and implications for its atmospheric fate", Norwich, England April, 19 1995.
51. Physical Chemistry Seminar, University of Kaiserslautern, "The Role of highly vibrationally excited O₂ in the stratosphere", June 19, 1995
52. Physical Chemistry Seminar, University of Nijmegen, "The Role of highly vibrationally excited O₂ in the stratosphere", June 22, 1995
53. Physical Chemistry Seminar, AMOLF, Amsterdam, "The Role of highly vibrationally excited O₂ in the stratosphere", June 23, 1995
54. Conference On Molecular Energy Transfer, "The Role of highly vibrationally excited O₂ in the

stratosphere", Bamberg, Germany, June 25, 1995

55. Physical Chemistry Seminar, University of Southern California, "The Role of highly vibrationally excited O₂ in the stratosphere", October 16, 1995

1996

56. Physical Chemistry Seminar, University of Oregon, May 13 1996, "New topics in chemical reaction dynamics of small molecules: from the atmosphere to the surface"
57. AFOSR contractors Meeting, Boulder Colorado, June 2-5, 1996, "The determination of the infrared radiative lifetimes of a vibrationally excited neutral molecule using stimulated-emission-pumping, molecular-beam time-of-flight"
58. Gordon Conference of Atomic and Molecular Interactions, Colby Sawyer College, New London NH, June 30-July 5 1996, "The role of highly vibrationally excited O₂ in the upper atmosphere"
59. Workshop on large molecule energy transfer, McLaren's on the Lake, McLaren Vale, Australia July 7-12 1996, "Energy transfer in highly vibrationally excite NO and O₂"
60. Physical Chemistry Seminar, University of California Riverside, Oct. 9, 1996, "State resolved velocity measurements: a probe of gas-phase and surface chemical dynamics"
61. Physical Chemistry Seminar, Brookhaven National Laboratory, Oct. 23, 1996, "State resolved velocity measurements: a probe of gas-phase and surface chemical dynamics"
62. Physical Chemistry Seminar, University of Indiana, Nov. 21, 1996, "Is a quantum-state-specific picture important in the understanding of atmospheric chemistry"
63. Physical Chemistry Seminar, Ohio State University, Nov. 25, 1996, "State resolved velocity measurements: a probe of gas-phase and surface chemical dynamics"
64. Physical Chemistry Seminar, University of Wisconsin Madison, Nov. 26, 1996, "State resolved velocity measurements: a probe of gas-phase and surface chemical dynamics"
65. Modern Trends in Chemical Dynamics, Taipei, Taiwan, Dec. 8-12, 1996, "State resolved velocity measurements: a probe of gas-phase and surface chemical dynamics"
66. Physical Chemistry Seminar, Institute for Atomic and Molecular Science, Taipei, Taiwan Dec 13. 1996, "State resolved velocity measurements: a probe of gas-phase and surface chemical dynamics"

1997

67. American Chemical Society Meeting: Symposium on Orientation and Alignment in Chemical Processes, April 13-18, 1997, "Alignment of recombinatively desorbed hydrogen from Cu(111): quantum state and velocity dependence"
68. Gordon Research Conference on Atmospheric Chemistry, June 15-20 1997, "Production of highly vibrationally excited O₂ in ozone photolysis: Wavelength dependence of the quantum yield" (Poster Presentation)
69. Conference on the Dynamics of Molecular Collisions, Gull Lake Minnesota, July 20-25 1997, "Experimental measurements of Correlated product motion in Photodissociation"

70. Physical Chemistry Seminar Cal State Long Beach, October 22 1997, "Molecular Square Dancing: Correlation of Product Motion in Photochemistry"
71. 33rd annual Western Regional ACS meeting, Irvine California, October 23, 1997, "Molecular Square Dancing: Correlation of Product Motion in Photochemistry"
72. Chemistry Colloquium, University of Notre Dame, Oct. 30 1997, "Molecular Square Dancing: Correlation of Product Motion in Photochemistry"

1998

73. LASE-98 (SPIE) Symposium on laser techniques for state-selected and state-to-state chemistry IV, San Jose, "Molecular Square Dancing: Correlation of Product Motion in Photochemistry"
74. Chemistry Colloquium, Stanford University, March 12 1998, "Curiosity-driven research: Friend or Foe"
75. University of Puerto Rico, "Curiosity-driven research: Friend or Foe", San Juan, March 23 1998
76. Chemistry Colloquium, Grenoble France, April 1998, "Curiosity-driven research: Friend or Foe"
77. Chemistry Colloquium, Grenoble France, April 1998, "Curiosity-driven research: Friend or Foe"
78. Informal Photochemistry Conference, May 10-14, 1998, "State-to-state chemistry in the Stratosphere"
79. AFOSR contractors Meeting, Monterey California, May 17-20, 1998, "Crossed-beam and surface scattering of highly vibrationally excited NO"
80. Seminar series of the Kaiserslautern Laser Center, University of Kaiserslautern, Germany, June 12 1998, "Molecular Square Dancing and Atomic Refrigeration"
81. Seminar at Department of Chemistry, Free University of Amsterdam, Holland, June 16, 1998, "Rapid Evaporative Cooling: A new way to control fragmentation in mass spectrometry"
82. Seminar at the Department of Physics at University of Leiden, Holland, June 17 1998, "Alignment of recombinatively desorbed hydrogen from Cu(111): quantum state and velocity dependence"
83. Seminar at California State University Los Angeles, "Atomic Refrigerators", Oct. 6, 1998
84. Seminar at University of California Santa Cruz, "Atomic Refrigerators", Oct 28, 1998

1999

85. Poster Presentation "Rapid Evaporative Cooling Mass Spectrometry", Winter Gordon Conference on Structures, Energetics, And Dynamics Of Gaseous Ions, Ventura California Feb. 28-March 4 1999
86. Poster Presentation "Chemical Interactions of Super excited molecule on Metal surfaces" Gordon Research Conference of Chemical Reactions at Surfaces, Ventura California ,Feb. 28-March 4 1999

87. Invited Lecture, "Chemical Interactions of Super excited molecule on Metal surfaces", Department of Chemistry, Swiss Federal Institute of Technology Lausanne. June 16 1999
88. Invited Lecture, "Rapid evaporative cooling suppresses fragmentation in mass spectrometry: synthesis of 'unprotonated' water cluster ions", Conference on the Molecular Aspects of Gas Dynamics (sponsored by the Academia Nazionale dei Lincei), Perugia Italy, June 19 1999
89. Invited Lecture, "Collisions and Chemistry of Super Excited molecules" Conference of Molecular Energy Transfer, COMET XVI, Assisi, Italy, June 20-25 1999
90. Poster Presentation, "Rapid evaporative cooling suppresses fragmentation in mass spectrometry: synthesis of 'unprotonated' water cluster ions". Rienk T. Jongma, Yuhui Huang, Shiming Shi, and Alec M. Wodtke, Conference of Molecular Energy Transfer, COMET XVI, Assisi, Italy, June 20-25 1999
91. Poster Presentation, "Chemical Interactions of Super-Excited Molecules on Metal Surfaces", H. Hou, C.T. Rettner, D.J. Auerbach, Y. Huang, S.J. Gulding, A.M. Wodtke, Conference of Molecular Energy Transfer, COMET XVI, Assisi, Italy, June 20-25 1999
92. Invited Lecture, "Controlling Reagent Vibration: A Key To Understanding Chemical Dynamics At Surfaces", Gordon Conference On Dynamics at Surfaces, Andover NH, August 8-13, 1999
93. Invited Lecture, "Rapid Evaporative Cooling Mass Spectrometry", 25th International Free Radicals Symposium, Flagstaff AZ, August 15-20, 1999.
94. Invited Lecture, ACS Regional Meeting, Oct. 6-7, 1999.
95. Invited Lecture, "Chemistry with stretched molecules", Department of Chemistry Colloquium Series, University of Arizona, Oct. 14, 1999.
96. Invited Lecture, "Chemical interactions of Super-Excited Molecules on Metal Surfaces", University of Utah, P-Chem. Seminar, Oct. 18, 1999.

2000

97. Community Outreach, "19 2nd graders from La Patera School tour the lab", Jan. 14 2000
98. Invited Lecture, "Chemistry with stretched molecules", Department of Chemistry Colloquium Series, Emory University, Feb. 10, 2000.
99. Invited Lecture, "Chemistry with stretched molecules", Department of Chemistry Chemical Physics Seminar Series, California Institute of Technology, April 4, 2000.
100. Invited Lecture, "Chemistry with stretched molecules", FOM for Plasma Physics Rijnhuizen, The Netherlands, April 26, 2000
101. Invited Lecture, "Chemistry with stretched molecules", European Geophysical Society Meeting, Nice France, April 28, 2000.
102. Invited Lecture, "Chemistry with stretched molecules", Department of Chemistry EPFL, Lausanne Switzerland, May 1 2000.
103. Invited Lecture, "Chemistry with stretched molecules", Department of Physics University of Bielefeld, Bielefeld, Germany May 3, 2000.

104. Invited Lecture, "Chemistry with stretched molecules", AFOSR Contractors Meeting, Waltham, MA, May 22, 2000.
105. Invited Lecture, "Chemistry with stretched molecules", Institute of Atomic and Molecular Science (IAMS), Taipei Taiwan, June 12, 2000
106. Invited Lecture, "Chemistry with stretched molecules", Synchrotron Radiation Research Center, Hsinchu, Taiwan, June 13, 2000
107. Invited Lecture, "Chemistry with stretched molecules", CECAM Workshop on Molecular Aspects of Gas Dynamics, Lyon France, June 28, 2000
108. Invited Lecture, "Chemistry with stretched molecules", University of Kiel, Physical Chemistry Colloquium, Kiel Germany, June 29 2000.
109. Invited Lecture, "Chemistry with stretched molecules: Vibrational promotion of an electron transfer reaction", Pacifichem 2000, Symposium on "Photon and Electron Induced Processes on Surfaces", December 14 - 19, 2000, Honolulu, Hawaii

2001

110. Invited Lecture, Lake Arrowhead Workshop on Ion Chemistry and Mass Spectrometry, "Electron Attachment TOF mass spectrometry", 1/26/2001-1/28/2001, Lake Arrowhead, California
111. Poster Presentation: Gordon Research Conference on Molecular Energy Transfer, "Combining Stimulated Emission Pumping with Hexapoles", 1/14/2001-1/19/2001, Ventura California
112. Poster Presentation: Gordon Research Conference on Ion Chemistry, "Electron Attachment TOF mass spectrometry", 2/25/2001-2/29/2001, Ventura California
113. Physical Chemistry Seminar, Department of Chemistry, Montana State University, "Electron Attachment TOF mass spectrometry: A new tool for studying fragile species", Bozeman Montana, 3/23/2001
114. Physical Chemistry Seminar, Environmental and Molecular Sciences Laboratory, PNNL, "Electron Attachment TOF mass spectrometry: A new tool for studying fragile species", Richland Washington, 3/26/2001
115. AFOSR Contractors meeting, Newport Beach CA. "Electron Attachment TOF mass spectrometry: A new tool for studying fragile species", May 21-24 2001.

2002

116. Invited Speaker, Physical Chemistry Seminar, University of Illinois, Champagne Urbana, Feb 13 2002.
117. Invited Speaker, Gedächtniskolloquium für Peter Andresen, University of Bielefeld, February 15, 2002.
118. Invited Speaker, Physical Chemistry Seminar, University of California San Diego, March 12, 2002.
119. Invited Speaker, ACS meeting Orlando Florida, April 7 2002.

120. AFOSR Contractors Meeting, May 19-22, 2002, Waltham Massachusetts, Photochemistry of CIN_3^+ and CIN_3 revealed by velocity map imaging.
121. Invited Speaker, Atomic and Molecular Interactions Gordon Conference, July 7 2002.
122. Invited Speaker "Physical Chemistry Seminar", Boston University, Boston Massachusetts, Sept. 16 2002
123. Invited Speaker "Physical Chemistry Seminar", Massachusetts Institute of Technology, Boston Massachusetts, Sept. 17 2002
124. Invited Speaker "Physical Chemistry Seminar", University of Sherbrooke, Quebec Canada, Sept. 18 2002
125. Invited Speaker "Physical Chemistry Seminar", Emory University, Atlanta Georgia, Sept. 20 2002
126. Invited Speaker "Conference on Stereo-Dynamics of Chemical Reactions" Schoorl, the Netherlands Dec. 1 – 6 2002
127. Invited Colloquium Speaker, University of Leiden, Leiden, the Netherlands Dec. 10, 2002
128. Invited Speaker, "Meeting of the European Network on Cold Molecule Science", "Experimental Technology surrounding the study of highly vibrationally excited molecules" ,Rijnhuizen, Holland Dec. 11-12 2002.

2003

129. AFOSR Contractors meeting, Newport Beach CA. "Evidence for the photolytic production of cyclic N_3 " May 18-20 2003.
130. Plenary Lecture, "International Symposium on Molecular Beams", Lisbon, Portugal, June 8-13 2003.
131. Conference on the Dynamics of Molecular Collisions, Granlibakken California, July 13-18 2003
Two Poster presentations made
132. Gordon Conference on Dynamics at Surfaces, Andover NH, Aug 10-15 2003, Our work was presented by Dr. Daniel J. Auerbach as an invited lecture.
133. Gordon Conference on Dynamics at Surfaces, Andover NH, Aug 10-15 2003, Poster presentation
134. Invited Lecture, University of California Santa Barbara Department of Chemistry and Biochemistry, "Electronically Non-Adiabatic Interactions In Molecule Metal-Surface Scattering: Do We Know How To Think About Surface Chemistry?", Oct. 20, 2003

2004

135. Invited lecture. Symposium on Atomic, Cluster and Surface Physics (SASP), La Thuile (Aosta) Italy, Invited lecture. "Electronically non-adiabatic interactions in molecule metal-surface scattering: Can we trust the Born-Oppenheimer approximation in surface chemistry?", February 1-6 2004
136. Invited lecture. Free University of Berlin, "Electronically non-adiabatic interactions in molecule

- metal-surface scattering: Can we trust the Born-Oppenheimer approximation in surface chemistry?", February 9 2004
137. Invited Lecture. University of Göttingen, "Electronically non-adiabatic interactions in molecule metal-surface scattering: Can we trust the Born-Oppenheimer approximation in surface chemistry?", February 10, 2004.
 138. Invited Lecture. University of Marburg, "Electronically non-adiabatic interactions in molecule metal-surface scattering: Can we trust the Born-Oppenheimer approximation in surface chemistry?", February 11, 2004.
 139. Invited Lecture. University of Muenster, "Electronically non-adiabatic interactions in molecule metal-surface scattering: Can we trust the Born-Oppenheimer approximation in surface chemistry?", February 12, 2004.
 140. Invited Lecture. American Physical Society March Meeting, "Observation of electron emission from a metal surface due to collisions of vibrationally excited Molecules", March 26th 2004.
 141. Invited Lecture. Emory University – Atlanta Georgia, "Do we know how to think about surface chemistry? Electronically non-adiabatic interactions in molecule metal-surface scattering", April 5 2004.
 142. Invited Lecture. University of North Carolina - Chapel Hill, "Do we know how to think about surface chemistry? Electronically non-adiabatic interactions in molecule metal-surface scattering", April 7 2004.
 143. Invited Lecture. Dalian Institute of Chemical Physics, "Do we know how to think about surface chemistry? Electronically non-adiabatic interactions in molecule metal-surface scattering", June 20 2004.
 144. Invited Lecture, International Symposium on Gas Kinetics, University of Bristol, UK August 7-12 2004
 145. Plenary Lecture, MOLEC XV, Sept. 5-10 2004.
 146. Invited Lecture, Physical Chemistry Seminar, Evidence for Photolytic Production of Cyclic-N₃, Marquette University, Dec. 17 2004.

2005

147. Poster Presentation, Gordon Conference on Molecular Energy Transfer, Jan 9-14 2005 Buellton CA, "Photofragment Translational Spectroscopy of ClN₃: Cl to NCl Branching Ratio and Bimodal Translation Energy Distribution in the Radical Channel"
148. Poster Presentation, Gordon Conference on Molecular Energy Transfer, Jan 9-14 2005 Buellton CA, "Direct Observation of Electron Emission from a Low Work Function Metal Surface During Scattering of Vibrationally Excited Molecules"
149. Poster Presentation, Gordon Conference on Molecular Energy Transfer, Jan 9-14 2005 Buellton CA, "ClN₃ photodissociation at 248 nm, studied by synchrotron ionization of photofragments"
150. Poster Presentation, Gordon Conference on Molecular Energy Transfer, Jan 9-14 2005 Buellton CA, "A new instrument for studies of electronically non-adiabatic phenomena in surface scattering"

151. Poster Presentation, Gordon Conference on Molecular Energy Transfer, Jan 9-14 2005 Buellton CA, "Hexapole focusing of vibrationally excited molecules prepared by optical pumping"
152. Invited Lecture, "Evidence for Photolytic Production of cyclic-N₃", Dalian Institute of Chemical Physics, Dalian China, March 18 2005
153. Invited Lecture, "Evidence for Photolytic Production of cyclic-N₃", Institute for Chemistry, Beijing, China, March 21 2005
154. Invited Lecture, "Evidence for Photolytic Production of cyclic-N₃", University of Science and Technology, Hefei China, March 22, 2005
155. Invited Lecture, "Do we know how to think about surface chemistry? Electronically non-adiabatic interactions in molecule metal-surface scattering", US-China Workshop on Advanced Materials, sponsored by the International Center for Materials Research, Beijing China, May 23-26 2005.
156. Invited Lecture, "The Standard Model of Chemical reactivity: How well does it describe reactions at metallic interfaces?", Sonderforschungsbereich Seminar series on "Quantum Aggregates", June 22, 2005.
157. Invited Lecture, "State-specific surface scattering with laser prepared molecules", Conference on the Dynamics of Molecular Collisions, Asilomar CA, July 10-15 2005.
158. Invited Lecture, American Chemical Society Meeting, Symposium on "The Influence of Local Structure and Reagent Energy on Chemical Reactions at Solid Surfaces", Electronically non-adiabatic interactions at the molecule metal interface, August 28- Sept. 1 2005
159. Invited Lecture, European Conference on Surface Science, "Electronically non-adiabatic interactions at the molecule metal interface", Sept. 3-9 2005
160. Invited Lecture, Second MPG-UCSB Workshop on Future Trends in Materials Science, "Do we know how to think about surface chemistry? Electronically non-adiabatic interactions at the molecule metal interface", Sept. 11-14, 2005, Berlin, Germany
161. Invited Lecture, "The Standard Model of Chemical reactivity: How well does it describe reactions at metallic interfaces?", Toulouse, France
162. 2005 Meeting on Condensed Phase and Interfacial Molecular Science, Sponsored by the U.S. Department of Energy, Office of Basic Energy Sciences, Airlie Conference Center, October 23 – 26, 2005
163. "The Standard Model of Chemical reactivity: How well does it describe reactions at metallic interfaces?", Inaugural Workshop for the Partnership for International Research and Education in Electron Chemistry and Catalysis at Interfaces, Dec. 8, 2005
164. Invited Lecture, Pacificchem, Honolulu, HI, Evidence for Photolytic Production of Cyclic-N₃, Dec. 9-14, Dec. 15-20 2005

2006

165. Invited Lecture, Materials Research Outreach Program Symposium, "Converting Chemical Energy to Electronic Current: The role of electronically non-adiabaticity in reactions at metal interfaces", University of California Santa Barbara, Jan 21-26 2006.
166. Special Exchange Seminar Jackson State University, The "Standard Model" of chemical

- reactivity: How well does it describe reactions at metallic interfaces?, Jackson, Mississippi Feb 3 2006
167. Weitzman Institute, Rehovot Israel, The “Standard Model” of chemical reactivity: How well does it describe reactions at metallic interfaces?, Feb 25 2006
 168. Hebrew University of Jerusalem, Jerusalem Israel, The “Standard Model” of chemical reactivity: How well does it describe reactions at metallic interfaces?, Feb 28 2006
 169. Keynote Lecture and UCSB Delegation Leader to ‘Israeli Chemical Society Annual Meeting’ Feb 27-28, 2006 Tel Aviv, The “Standard Model” of chemical reactivity: How well does it describe reactions at metallic interfaces?
 170. Invited Lecture, The “Standard Model” of chemical reactivity: How well does it describe reactions at metallic interfaces?, Inauguration Workshop of the MPG-CAS Partner group “First-Principles Theory of High-Pressure Oxidation Catalysis” on The Chemical Physics of Materials, June 1-3 2006 Dalian, China.
 171. Invited Lecture, Photochemical Production of Cyclic-N₃, Airforce Office of Scientific Research Contractors Meeting, Arlington VA, June 5-7, 2006.
 172. Invited Lecture, “Electronically non-adiabatic influences on chemistry at the gas-solid interface” Gordon Research Conference on Atomic and Molecular Interactions Colby-Sawyer College, July 9-14 2006.
 173. "Experimental approaches to optically pumping molecules for beam/surface scattering studies", PIRE-ECCI/ ICMR Summer School on Techniques of Surface Science and Catalysis, Santa Barbara, Aug. 13-26 2006.
 174. Invited Lecture, “Photochemical Production of the Ring-closed form of N₃”, Symposium on “Chemistry in Extreme Environments”, American Chemical Society National Meeting, Sept 10-14, 2006, San Francisco CA.
 175. Invited Lecture, “Photochemical Production of the Ring-closed form of N₃”, Polynitrogen Workshop, 15, 16 Sep 2006, University of Southern California, Los Angeles California
 176. Invited Plenary Lecture, “Electronic Excitations induced by molecule-surface interactions”, 16th International Workshop on Inelastic Ion-Surface Collisions (IISC-16), Sep. 17 - 22, 2006, Schloß Hernstein, A-2560 Hernstein, Austria
 177. Invited Lecture, “Electronically non-adiabatic energy dissipation at surfaces”, International Workshop of the Collaborative Research Centre SFB 616 „Energy Dissipation at Surfaces“, Sept. 24th to Sept 28th at Schloß Eichholz in Wesseling, Germany.
 178. Invited Lecture, “Electronically non-adiabatic influences on chemistry at the gas-solid interface”, Joint SSRL-ALS Workshop On Ultrafast Dynamics On Surfaces And In Liquids. SSRL, October 11 2006.
 179. Invited Lecture, “Do we have a theory for reactions at metal interfaces?: The unsolved problem of electronic non-adiabaticity”, 7 November 2006, California Institute of Technology, Department of Chemistry, Chemical Physics Seminar
 180. Invited Lecture, “Do we have a theory for reactions at metal interfaces?: The unsolved problem of electronic non-adiabaticity”, Trends in Chemical Dynamics: From Small Molecules to Biomolecules. December 10-15, 2006, Hotel Royal Chiao Hsi, Taiwan.

2007

181. Invited Lecture, "Photochemical production of cyclic-N₃" 2007 Meeting of the Western Spectroscopy Association, Jan. 31-Feb 2 2007, Asilomar, California
182. Invited Lecture, "Do we have a theory for reactions at metal interfaces?: The unsolved problem of electronic non-adiabaticity", XXII International Symposium on Molecular Beams, May 27-June 1 2007, Freiburg Germany.
183. Invited Lecture, "Do we have a theory for reactions at metal interfaces?: The unsolved problem of electronic non-adiabaticity", XX International Conference on Molecular Energy Transfer, June 3rd – 7th 2007, Arcachon, France
184. Invited Lecture, "Photochemical production of cyclic-N₃", 29th International Symposium on Free Radicals, August 12-17, 2007, Big Sky Montana
185. Invited Lecture, "State-specific molecule-surface scattering", Gordon Conference on Gas-Surface Dynamics, August 12-17, 2007, Proctor Academy, Andover New Hampshire
186. Invited Lecture, "Inverse velocity dependence of vibrationally promoted electron emission from a metal surface", Elementary Reactive Processes at Surfaces; Donostia-San Sebastian, Spain, August 30-Sept. 1, 2007
187. Invited Lecture, "Inverse velocity dependence of vibrationally promoted electron emission from a metal surface", Institute of Atomic and Molecular Sciences, Taipei, Taiwan, Sept. 12, 2007
188. Invited Lecture, "Photochemical production of cyclic-N₃", NSRRC Hsinchu, Taiwan Sept. 10 2007
189. Invited Lecture, "Do we have a theory for reactions at metal interfaces?: The unsolved problem of electronic non-adiabaticity", The Hong Kong Institute for Advanced Study UCSB International Centre for Materials Research workshop on Advanced Materials. Hong-Kong University of Science and Technology, September 12-15, 2007
190. Invited Lecture, "Do we have a theory for reactions at metal interfaces?: The unsolved problem of electronic non-adiabaticity", National Tsinghua University, Beijing, China, Sept. 14, 2007
191. Invited Lecture, "Electronic Excitations induced by molecule-surface interactions", Non-Adiabatic Dynamics at Surfaces, Oct. 22-25 2007, Schloß Reisenburg, Germany
192. Invited Lecture, "Electronic Excitations induced by molecule-surface interactions", Leiden University, Oct. 26, 2007, Leiden, the Netherlands
193. Invited Lecture, "Do we have a theory for reactions at metal interfaces?: The unsolved problem of electronic non-adiabaticity", 2007 Symposium on Chemical Physics, Nov 9-11 2007, University of Waterloo
194. Invited discussion leader, UCSB-PNNL planning meeting sponsored by the PIRE-ECCI program, Dec. 7-9 2007, Santa Barbara California.

2008

195. Invited Lecture, "Do we have a theory for reactions at metal interfaces?: The unsolved problem of electronic non-adiabaticity", XVI. Symposium on Atomic, Cluster and Surface Physics (SASP 2008) January 20-25, 2008 in Les Diablerets, Switzerland.

196. Invited Lecture, “Obtaining an atomistic understanding of surface chemistry”, UCSB-MPG Workshop on Inorganic Materials for Energy Conversion, Storage and Conservation. Tuesday, February 19th to Friday, February 22nd, 2008 UCLA Lake Arrowhead Conference Center, Lake Arrowhead, CA 92352
197. Invited Lecture, “Do we have a theory for reactions at metal interfaces?: The unsolved problem of electronic non-adiabaticity”, Argonne National Laboratory, March 17, 2008
198. Invited Lecture, “Do we have a theory for reactions at metal interfaces?: The unsolved problem of electronic non-adiabaticity”, Department of Chemistry, University of Hawaii, April 3, 2008
199. Invited Lecture, *Molecular Beam studies of Molecule Surface Interactions*, Physical Chemistry Seminar, April 15 2008, University of California Berkeley.
200. Reverse Site visit PIRE program – April 29 2008
201. Invited Lecture, *Velocity map imaging of surface photochemistry*, AFOSR Molecular Dynamics/Theoretical Chemistry Contractors Meeting, May 19-21, Vienna, Virginia.
202. Invited Lecture, *Molecular Beam studies of Molecule Surface Interactions*, Fifth Annual University of California Symposium on Surface Science and its Applications, June 18-20, 2008, Santa Barbara California
203. Invited Lecture, PIRE-ECCI *Molecule-surface interactions, where is the limit to theoretical simulations of catalytic model systems*, Workshop on Grand Challenges in Surface Science and Catalysis August 10, 2008, Santa Barbara California
204. Invited Lecture, *Excited electrons in interfacial chemistry*, September 18 2008, North Dakota State University.
205. Invited Lecture, “*Excited electrons in interfacial chemistry*”, American Vacuum Society National Meeting, Oct 19-24, 2008, Boston Massachusetts
206. Invited lecture and discussion leader, “*PIRE at UCSB: Successes, Obstacles and Key Lessons Learned*”, PIRE Grantee’s meeting, December 11-12 2008, National Science Foundation Headquarters, Arlington VA

2009

207. Invited Lecture, *Chemical Dynamics at Solid Surfaces*, Gordon Conference on Molecular Energy Transfer, Jan 18-23 2009 Ventura, CA
208. Invited Lecture, *Chemical Dynamics at Solid Surfaces*, International Symposium on Molecular Kinetics and Dynamics, March 16-17 2009, Göttingen, Germany
209. Tulip Summer School IV – Modern Developments in Spectroscopy, April 15-18 2009, The Golden Tulip Hotel "Noordwijk - De Duinen", Noordwijk, The Netherlands.
210. Invited Lecture, “*State-to-state molecule-surface scattering studies of electronically nonadiabatic inelastic energy transfer*”, DIET XII, April 19-23, 2009, Callaway Gardens, Pine Mountain, Georgia.
211. Invited Lecture, “*State-to-state molecule-surface scattering studies of electronically nonadiabatic inelastic energy transfer*”, The 1st Joint Symposium for the Chemistry Faculties of Nanjing University and Göttingen University, Oct. 9th – 11th, 2009, (Zhixing hall on the Campus of the Nanjing University)

212. Invited Lecture, “*State-to-state molecule-surface scattering studies of electronically nonadiabatic inelastic energy transfer*”, CPIMS, Oct 18-21, 2009
213. Invited Lecture, “*Electronic Excitations by Adsorbate Motion on Metal Surfaces: Breakdown of the Born-Oppenheimer Approximation in Surface Chemistry*”, University of Muenster, Nov 12 2009
214. Invited Lecture, “*Electronic Excitations by Adsorbate Motion on Metal Surfaces: Breakdown of the Born-Oppenheimer Approximation in Surface Chemistry*”, University of Essen-Duisburg, December 8, 2009
215. Invited Lecture, “*Energy Transfer at Interfaces beyond the Born-Oppenheimer Approximation*” SFB-602, Göttingen, Germany, December 11 2009

2010

216. Invited Lecture, “*New Mechanisms of Metal Oxide Nanowire Growth*”, 2010 Materials Research Outreach Symposium, February 3-5, 2010, Santa Barbara, California
217. Invited Lecture, “*State-to-state molecule-surface scattering studies of electronically nonadiabatic inelastic energy transfer*”, 2010 Mesilla Chemistry Workshop on Electronic Non-Adiabatic Dynamics, February 7-10 2010, Mesilla New Mexico
218. Invited Lecture, “*State-to-state molecule-surface scattering studies of electronically nonadiabatic inelastic energy transfer*”, Gesellschaft der deutschen Chemiker, May 4-5 2010, Kaiserlautern Germany
219. Invited Lecture, “*State-to-state molecule-surface scattering studies of electronically nonadiabatic inelastic energy transfer*”, Uni-Würzburg, May 6 2010, Würzburg, Germany
220. Invited Lecture, “*Vibrational Overtone Excitation in molecule-surface scattering*”, 10th European Conference on Atoms, Molecules and Photons (ECAMP10), July 5-9 2010, Salamanca Spain.
221. International Symposium on Advancing the Chemical Sciences ISACS-2: Challenges in Physical Chemistry and Nanoscience, “*Energy Transfer at Interfaces beyond the Born-Oppenheimer Approximation: Observation of Vibrational Overtone Excitation*”, July 13-16 2010, Budapest, Hungary
222. Invited Lecture, “*Energy Transfer at Interfaces beyond the Born-Oppenheimer Approximation: Observation of Vibrational Overtone Excitation*”, Clusters and Reaction Dynamics session at the 2010 Gordon Research Conference on Atomic and Molecular Interactions to be held July 18-July 23, 2010 at Colby Sawyer College in New London, New Hampshire. (Presented By Daniel J. Auerbach)
223. Invited Lecture, “*Energy Transfer at Interfaces beyond the Born-Oppenheimer Approximation*”, Faculty Retreat of the Max Planck Institute for biophysical Chemistry, August 13-14, 2010; Uslar-Volpriehausen, Germany.
224. Invited Lecture, “*H-atom Rydberg tagging: A new approach to studying energy transfer at surfaces*”, 2010 PIRE-ECCI P.I. Planning Meeting, Dalian, China ,Sept 8-10, 2010.
225. Invited Lecture, “*Energy Transfer at Interfaces beyond the Born-Oppenheimer Approximation: Observation of Vibrational Overtone Excitation*”, 3rd Asia Pacific Symposium on Radiation Chemistry and 10th Biennial Trombay Symposium on Radiation & Photochemistry, (APSRC-TSRP-2010), September 14-17, Treasure Island Resorts, Lonavala, INDIA.

226. Invited Lecture, “*Energy Transfer at Interfaces beyond the Born-Oppenheimer Approximation: Observation of Vibrational Overtone Excitation*”, International Conference on Advanced Oxidation Processes, Sept.18-21, 2010, School of Environmental Sciences, Mahatma Gandhi University, Kottayam, Kerala, India
227. Invited Lecture, “*Energy Transfer at Interfaces beyond the Born-Oppenheimer Approximation: Observation of Vibrational Overtone Excitation*”, ICONIC European Training Network, Hersonissos, Crete on Sept. 24 & 25, 2010.
228. Invited lecture, Frontiers in surface science and heterogeneous catalysis, A symposium on the occasion of the 70th birthday of Prof. Dr. Horia Metiu, Oct. 11 2010, Santa Barbara CA.
229. Focus Workshop MOLX10, 15-17 November, Dresden; Small molecules: From isolated systems to environment driven dynamics
230. Invited Lecture, “*Energy Transfer at Interfaces beyond the Born-Oppenheimer Approximation*”, Elementary Reactive Processes at Surfaces (ERPS 2010), Bordeaux (France) from November 30th to December 3rd, 2010.
231. Invited Lecture, “*Vibrational overtone excitation in electron mediated energy transfer at metal surfaces*”, Symposium on "Frontiers in State-to-state Dynamics", Pacificchem Conference Honolulu Hawaii, Dec. 15-20 2010

2011

232. Keynote Speech, „*Follow your nose*“ *The importance of curiosity in Science*, Alexander von Humboldt Society Network meeting, Göttingen, February 2, 2011
233. Invited Lecture, *Electronically nonadiabatic chemical dynamics at metal surfaces*, Institute for Molecules and Materials Colloquium, Nijmegen University, February 22 2011
234. Invited Lecture, *Electronically nonadiabatic chemical dynamics at metal surfaces*, University of Manchester, March 9 2011
235. Invited Lecture, *Electronically nonadiabatic chemical dynamics at metal surfaces*, Symposium on Chemical reactions and dynamics at surfaces: Advances in experiment and theory, American Chemical Society Annual Meeting, Anaheim California, March 27-31, 2011
236. Invited Lecture, *Energy – Now what?* The Humboldt Club of Göttingen, April 8 2011
237. Antrittsrede, *Gaining a deeper understanding of surface chemistry through molecular beam surface scattering experiments*, Universität Göttingen April 13 2011
238. Invited Lecture, Max Planck Institute for Solid State Research, April 20 2011
239. Invited Lecture, “*Vibrational overtone excitation of molecules colliding with metal surfaces: Can electronic friction theories explain it?* Gordon Conference on Dynamics at Surfaces, August 7-12 2011, Salve Regina University in Newport, Rhode Island, USA.
240. Invited Lecture, *Nonadiabatic chemical dynamics at metal surfaces*, symposium on "Energetic Chemistry at Solid and Liquid Surfaces", American Chemical Society Annual Meeting, Denver Colorado, August 28 - September 1, 2011
241. Invited Lecture, “*Born-Oppenheimer breakdown in molecule surface interactions: “Electronic friction” or not?*”, Division of Molecular Physics, Stockholm University, September 5 2011

242. Plenary Lecture, “*Electronically nonadiabatic interactions between molecules and surfaces*”, Conference on Molecular Energy Transfer, Jesus College, Oxford & Dept. of Chemistry Oxford University, Sept 11-16 2011
243. Workshop participant, “*Beam-surface scattering as a probe of chemical reaction dynamics at interfaces*”, German-Swedish Meeting on Special Topics of Materials Science, Göttingen, Nov. 28-29 2011
244. Invited Speaker, “*Beam-surface scattering as a probe of chemical reaction dynamics at interfaces*”, Göttingen-Nanjing-Chemistry Congress 2011 December 8th – 9th, 2011
245. Workshop participant, “*Beam-surface scattering as a probe of chemical reaction dynamics at interfaces*”, Workshop on the Physics and Chemistry of Energy Conversion at Interfaces, Dalian Institute of Chemical Physics, Dalian China, 13 December 2011
246. Workshop participant, “*Beam-surface scattering as a probe of chemical reaction dynamics at interfaces*”, PIRE-ECCI Sustainable Energy Workshop, Taipei, Taiwan, 15-16, December 2011

2012

247. Invited Lecture, „*Multiquantum vibrational excitation of NO scattered from Au(111): benchmark data and comparison to theories of nonadiabatic molecule-surface interactions*”, XVIIIth International Symposium on Atomic, Cluster and Surface Physics, Alp D’Huez, France, January 22-27 2012
248. Keynote Speech, “*What does it mean to be a Humboldt Professor*”, Alexander von Humboldt Professor Award Celebration, Berlin, 15 May 2012
249. Invited Lecture, “*Collaboration Opportunities to advance our understanding of Molecular Interactions*”, EPFL-MPS Center on Molecular Nanoscience and Technology Kick-off Meeting 30.-31. May 2012
250. Invited Lecture, Physics Colloquium, “*Electronically nonadiabatic chemical dynamics at metal surfaces*”, Institut f. Ionenphysik und Angewandte Physik Universität Innsbruck, Austria June 5 2012
251. DRAGS Kick-off Workshop, “*Surface Dynamics: Beyond the Born-Oppenheimer Static Surface Approximation*”, June 9-11, 2012, Villa Camille, Banyuls sur Mer
252. Conference Organizer and delegate, *Faraday Discussion #157 on Reaction Dynamics in Gasses Liquids and Interfaces*: June 25-27, 2012 Assisi Italy.
253. Invited Lecture, “*Growth and environmentally induced structural change of Nano-scale objects: Opportunity for in situ studies*”, Göttingen ETEM Workshop on Heterogeneous Catalysis, Surface Science and Energy Research, July 8-11, 2012, Göttingen Germany
254. Invited Lecture, “*Chemical Dynamics at Surfaces*”, Gordon Conference on Atomic and Molecular Interactions, July 15-20 2012, Salve Regina University in Newport, Rhode Island, USA.
255. Invited Lecture, “*Chemical Dynamics at Surfaces*”, PIRE-ECCI Summer School, September 10-14, Dalian China
256. Invited Lecture, Max Planck Institute for Biophysical Chemistry, “*Removing Aberrations from the World’s greatest microscope*”, October 15, 2012, Göttingen Germany

257. Invited Lecture, CECAM workshop, "*Electronically nonadiabatic chemical dynamics at metal surfaces: The Problem of Chemistry and molecular interactions*", October 24-26, 2012, Zaragoza, Spain
258. Invited Lecture, "*Surface Dynamics: Beyond the Born-Oppenheimer Static Surface Approximation*", International Meeting of the ICONIC Marie Curie European network on Imaging and Control in Chemistry, Nov. 2-4, 2012, Chichely Hall, Milton Keynes, United Kingdom
259. Invited Lecture, "*Removing Aberrations from the World's greatest microscope*", Biomedical Section Science Symposium, Nov. 19-20, 2012 Berlin Germany
260. Invited Lecture, "*Electronically non-adiabatic chemical dynamics at metal surfaces*", Dynamical Phenomena at Surfaces: The role of Complexity, Leiden, the Netherlands Nov. 26-30 2012
261. Invited Lecture, "*Electronically non-adiabatic chemical dynamics at metal surfaces*", Elementary Reactive Processes at Surfaces, Leiden, the Netherlands Dec. 3-7 2012

2013

262. Invited Lecture, "*Molecular interactions at Metal surfaces*", Technische Universität München, January 14 2013, München, Deutschland
263. Invited Lecture, "*Molecular interactions at Metal surfaces*", International Symposium on the theme topic "*Electronic structure and dynamics of molecules and clusters*", Feb 17-20, 2013, Kolkata India
264. Invited Lecture, "*The potential for a high-gain harmonic-generation vacuum ultraviolet free electron laser to advance molecular science*", Deutsche Elektronen Synchrotron (DESY), March 8 2013
265. Winter School on Dynamics at Surfaces, "*What makes things nonadiabatic in molecular interactions at metal surfaces?*" March 10-15 2013, Ringberg, Germany
266. DRAGS Workshop, "*Toward a Dynamical Understanding of Surface Chemistry*" May 24-26, 2013, Hannoverisches Münden, Germany
267. Invited Lecture, "*Toward a Dynamical Understanding of Surface Chemistry*", Jubilee Workshop SFB616 "Energy Dissipation at Surfaces, 3.-8. June 2013, Physikzentrum in Bad Honnef, Germany. My talk June 4th
268. Invited lecture, "*Electronically nonadiabatic chemical dynamics at metal surfaces*", Gesellschaft der Deutschen Chemiker – Kolloquium, Universität Marburg, 5 June 2013
269. Plenary Lecture, "*Charge transfer reactions induce Born-Oppenheimer breakdown in surface chemistry: Applications of double resonance spectroscopy in molecule-surface scattering*", 68th OSU International Symposium on Molecular Spectroscopy, June 17-21, 2013, Columbus Ohio, USA
270. Invited Lecture, "*Toward a Dynamical Understanding of Surface Chemistry*", Dynamics of Molecular Collisions, July 7-12 2013 Lake Tahoe, Nevada.
271. Invited Lecture, "*Toward a Dynamical Understanding of Surface Chemistry*", HAYASHI CONFERENCE : Next decades of Surface Science, 16-20 July 2013, Hayama, Japan

272. Invited Lecture, “*Electronically nonadiabatic interactions of free radicals at metal surfaces: Does the unpaired electron matter?*”, Free Radical Symposium, July 21-26 2013 Potsdam, Germany.
273. ICONIC End meeting “*New Perspectives in Dynamics at Surfaces*”, July 28-31, 2013, Nijmegen Holland
274. Invited Lecture, “*New Perspectives in Dynamics at Surfaces*”, VUV FELs in Molecular, Cluster and Surface Science: A Future Frontier for Energy Research, Sept. 22-27, 2013, Dalian China
275. Invited Lecture, “*New Perspectives in Dynamics at Surfaces*”, Clustertreffen, Oct. 6-11 2013, Herzogenhorn-Schwarzwald, Germany
276. Invited Lecture, “*Building the World’s greatest Microscope*”, Kick off meeting SFB 1073. Atomic Scale control of energy conversion, October 31 - November 1, 2013, Göttingen, Germany
277. Invited Lecture, “*New Perspectives in Dynamics at Surfaces*”, SCATTERING OF ATOMS AND MOLECULES FROM SURFACES (SAMS-2), November 4-7, 2013. Potsdam, Germany
278. Invited Lecture, “*State-to-State Dynamical Studies of Surface Chemistry and Energy Transfer*”, Physical Chemistry Seminar in the Institute of Chemical Sciences and Engineering at the Ecole Polytechnique Federale Lausanne, Nov. 9 2013, Lausanne Switzerland.
279. Invited Lecture, “Physical Chemistry in Göttingen”, Bundesfachschaftentagung der Chemie (BuFaTa), Nov. 15 2013 Göttingen, Germany

2014

280. Invited Lecture, “*Applications of VUV FEL’s in Dynamics at Surfaces*” Workshop on Spectroscopy of Chemical Reactions in Gases and Plasmas, February 20. 2014 Helmholtz Zentrum, Berlin
281. "Hauptvortrag", “*Toward a Dynamical Understanding of Surface Chemistry*” at the DPG Spring Meeting in Dresden, March 30 - April 04, 2014
282. Physikalischen Kolloquium, “*Toward a Dynamical Understanding of Surface Chemistry*”, University of Kassel, May 8 2014
283. Invited Lecture, “*Toward a Dynamical Understanding of Surface Chemistry*”, Institut de Recherche sur les Systèmes Atomiques et Moléculaires Complexes, Toulouse France June 23 2014
284. Invited Lecture, “*Steric effects in electronically nonadiabatic interactions in molecule surface collisions*”, Stereodynamics 2014, August 17-22, 2014, St. Petersburg, Russia.
285. Invited Lecture, “*Toward a Dynamical Understanding of Chemistry at Metal Surfaces*”, American Vacuum Society Annual Meeting, Symposium on Dynamics at Surfaces and Adiabatic Phenomena, Nov 9-14 2014 Baltimore, Maryland.
286. Invited Lecture, “*Surface Chemistry, One Step at a Time*”, Joint Harvard MIT Seminar in Physical Chemistry, Boston, Nov 13
287. Invited Lecture, “*Toward a Dynamical Understanding of Surface Chemistry*”, Frontiers in Chemistry Seminar, Wayne State University, Nov. 17 2014

288. Invited Lecture, “*Surface Chemistry, One Step at a Time*”, Workshop on Chemical Energy Conversion Göttingen , Boston, Nov 19-20 2014

2015

289. Invited Lecture, “*Toward a Dynamical Understanding of Surface Chemistry*”, GDCh-Kolloquium University of Bonn, 13 January 2015
290. Invited Lecture, “*CO desorption from a catalytic surface: Elucidation of the role of steps by velocity-selected residence time measurements*”, 3rd International Symposium on Chemistry for Energy Conversion and Storage (ChemEner2015), Harnack Haus, Berlin. 18-20 January 2015
291. Invited Lecture, “*Toward a Dynamical Understanding of Surface Chemistry*”, 31st meeting of the Schweizerische Arbeitsgemeinschaft Oberflächen und Grenzflächen - SAOG - (Swiss Working Group of Surface and Interface Science) at the Institute of Physics, University of Fribourg, Switzerland, January, 22-23 2015.
292. Invited Lecture, “*Surface Chemistry, One Step at a Time*”, Workshop on "Frontiers of Multiscale Modelling", Rudolfshütte, Zell am See, Austria Jan 27-31 2015
293. *Department of Dynamics at Surfaces Workshop on Modern Topics in Chemical Physics*, Ringbergschloß May 20-23 (2015)
294. Drags Workshop, “*Pump-Probe Experiments with Neutral Matter*”, Cahors France <http://www.hotel-kyriad-cahors.com/en/index-en.php> June 17-19, 2015
295. Invited Lecture, “*Toward a Dynamical Understanding of Surface Chemistry*”, 15th International Conference on Vibrations at Surfaces (VAS15), San Sebastian, Spain, June 22-26, 2015.
296. Invited Lecture, “*The dynamics of molecular interactions and chemical reactions at metal surfaces: Testing the foundations of theory*”, International Symposium on Molecular Beams, Segovia Spain, June 28-July 3 2015.
297. Invited Lecture, “*Toward a Dynamical Understanding of Surface Chemistry*”, Summer school of the Max Planck EPFL Center on Molecular Nanoscience and Technology, Schloß Ringberg, July 26-31, 2015
298. Plenary Lecture, “*A Dynamical Approach to Surface Chemistry*”, European Conference on Surface Science (ECOSS-31), August 31 – Sept 4 2015, Barcelona Spain
299. Fritz Haber Institute of the Max Planck Society, “*A Dynamical Approach to Surface Chemistry*”, Berlin, Sept 16-17 2015
300. Fritz Haber Institute of the Max Planck Society, Discussion Leader Future of Physical Chemistry Symposium, Berlin, Sept 28-30 2015
301. Invited Lecture, “*Applications of VUV FEL's in Dynamics at Surfaces*”. Sino-German Center Symposium VUV FELs in Molecular, Cluster and Surface Science: Perspectives at the Dalian Coherent Light Source, Dalian China October 7-10 2015.
302. Invited Lecture, *A Dynamical Approach to Surface Chemistry* Ajou University, Suwon Korea, Oct. 12 2015
303. Invited Lecture, *A Dynamical Approach to Surface Chemistry*, iCOMET, Chengdu China

October 11-16 2015

2016

304. Invited Lecture, Münchner Chemische Gesellschaft, *A Dynamical Approach to Surface Chemistry: Testing the Foundations of Theory*, Technische Universität München (Department Chemistry). Jan. 19, 2016
305. Hanse Lecture in Energy Science, *Revealing the Atomic Motions of Heterogeneous Catalysis*, Hanse Wissenschaftskolleg Institute for Advanced Study, Dehlmenhorst, Germany, April 25 2016
306. *Building the World's Greatest Microscope: Revealing the atomic scale dynamics of surface chemistry*, GGNB Ring Vorlesung, June 3, 2017
307. Invited Lecture, Gordon Conference on Molecular Interactions and Dynamics, "The influence of electron-hole pair excitation on adsorption", Stonehill College in Easton, Massachusetts, July 10-15 2016
308. Invited Lecture, "HCl dissociation and energy transfer / CH₄ inelastic scattering", EPFL-MPS Center on Molecular Nanoscience and Technology Science day Meeting October 13-14 2016 Stuttgart
309. Invited Lecture, *The dynamics of molecular interactions and chemical reactions at metal surfaces: Testing the foundations of theory*, 16th International Symposium on Stereodynamics, Taipei, Taiwan, Nov. 6-11, 2016
310. Invited Lecture, *The dynamics of molecular interactions and chemical reactions at metal surfaces: Testing the foundations of theory*, 16th Special Seminar at the Dalian Institute of Chemical Physics, Dalian China, Nov. 15, 2016
311. Invited Lecture, *Building the World's Greatest Microscope: Revealing the atomic scale dynamics of surface chemistry*, Physics Colloquium, University of Bremen, Bremen, Nov. 24, 2016
312. Invited Lecture, *Building the World's Greatest Microscope: Revealing the atomic scale dynamics of surface chemistry*, GdCh Chemistry Colloquium, Karlsruhe Institute of Technology 15. December 2016.

2017

313. Invited Talk, *Mid-infrared laser-induced fluorescence with nanosecond time resolution using a superconducting nanowire single photon detector: New technology for molecular science*, Conference on Molecular Nanostructures 2017, Monte Verità, Ascona, Switzerland, March 5 - 10, 2017
314. Invited Talk, *Mid-infrared laser-induced fluorescence with nanosecond time resolution using a superconducting nanowire single photon detector: New technology for molecular science*, Max Planck Institute for biophysical chemistry Science Retreat, Uslar Germany, April 6-7, 2017
315. Keynote Lecture, *Building the World's Greatest Microscope: Revealing the atomic scale dynamics of surface chemistry*, Spectroscopy and Dynamics Group Meeting at the Faraday Joint Interest Group Conference, University of Warwick, Warwick England, April 11-13, 2017
316. Invited Lecture, *The molecular dynamics of chemicurrents*, CECAM workshop on Challenges in reaction dynamics of gas-surface interactions and methodological advances in dissipative and non-adiabatic processes, Toulouse, France, June 26-29, 2017

317. Invited Lecture, *Imaging Transient Chemical Bond Formation by H-atom Scattering from Graphene*, Dynamics of Molecular Collisions, Granlibakken Conference Center, Tahoe City, California, July 9-14 2017

318. Invited Lecture, Gordon Conference on Dynamics at Surfaces, *Imaging the kinetics of surface reactions*, Salve Regina University, Newport Rhode Island, July 30-Aug 4 2017

2018

319. Plenary Lecture, *Imaging Transient Chemical Bond Formation by H-atom Scattering from Graphene*, The 14th biennial DAE – BRNS “Trombay Symposium on Radiation & Photochemistry”, (TSRP – 2018) January 3 – 7, 2018, at BARC, Mumbai, India

320. Invited Lecture, *Building the World's Greatest Microscope: Revealing the atomic scale dynamics of surface chemistry*, Hyderabad, India, visiting Pranav January 8-9, 2018

321. Invited Lecture, *Velocity resolved surface kinetics: Combining ion imaging, molecular beams and surface science*, Campus Seminar, Max Planck Institute for biophysical Chemistry, Göttingen, Germany, 21 February 2018

322. Invited Lecture, *Does electronic non-adiabaticity influence rates of surface reactions?* Nonadiabatica 2018: Theory of Nonadiabatic Processes, Hebrew University of Jerusalem, 12-15 March 2018

323. Invited Lecture, *Can we theoretically predict chemical reaction rates at metal surfaces?*, MPIbpc Faculty Retreat, Uslar, Germany, April 20 2018.

324. Invited Lecture, *Velocity resolved kinetics of surface chemical reactions*, Workshop on porous materials, Max Planck Institute for Kohlenforschung, Mülheim, Germany, July 13 2018

325. *Concepts for detecting reaction intermediates in surface reactions*. Symposium on Dynamics at Surfaces, Kloster Erfurt, Erfurt, Germany July 16-18 2018

326. Invited Lecture, *Velocity-resolved kinetics of site-specific carbon monoxide oxidation on platinum surfaces*, International conference on "Non-equilibrium dynamics of Condensed Matter in the Time Domain", Abbey Rolduc, the Netherlands Sept. 3 until Sept. 6, 2018.

327. Invited Lecture, *Forschen in Deutschland: „Baut auf!“*, 62nd Kongress der Deutschen Gesellschaft für Gynäkologie, Deutschland als Forschungsstandort, Berlin, Germany Nov. 1 2018

2019

328. Invited Lecture, *Breakdown of the Born-Oppenheimer Approximation in Surface Chemistry*, Spring 2019 American Chemical Society National Meeting, Symposium on “Modeling dynamics in dense manifolds of electronic states,” Orlando, Florida, March 31-April 4 2019.

329. Invited Lecture, *Velocity-resolved kinetics of elementary reactions in heterogeneous catalysis*, Workshop on FEL applications in Physical Chemistry, HZDR Dresden Germany May 2,3 2019.

330. *Overview of the Department of Dynamics at Surfaces*, Fachbeirat (SAB) May 7-10 Göttingen

331. *Department of Dynamics at Surfaces Workshop on Modern Topics in Chemical Physics*, Ringbergschloß May 15-18, 2019

332. Invited Lecture, *Pump-probe with neutral matter using pulsed molecular beams*, International Symposium on Molecular Beams, Surgeons' Hall (<https://www.surgeonshall.com/>), Edinburgh Scotland, June 23-28 2019.
333. Invited Lecture, *Vibrational energy pooling studied by mid-infrared laser induced fluorescence in with a superconducting nanowire single photon detector*, International Symposium on Free radicals, Hangzhou, China, September 15-20, 2019
334. Invited Lecture, *Vibrational energy pooling studied by mid-infrared laser induced fluorescence in with a superconducting nanowire single photon detector*, iCOMET, Hefei, China, September 22-27, 2019
335. Invited Lecture, “*H-atom scattering from graphene*”, Scattering of Atoms and Molecules from Surfaces (SAMS-4), September 24-27, 2019. Madrid Spain
336. Invited Lecture, the Werner Kuhn Invited Lecture, University of Basel, October 23, 2019
337. Invited Lecture, GdCh Kolloquium, University Essen-Duisburg, November 27, 2019
338. Invited Lecture, “*Velocity resolved kinetics*”, as part of the *Fundamental Research in Energy and Sustainability Hour* (FRESH) lecture series, Leiden, the Netherlands, December 5 2019.

2020

339. Uni Duiburg Essen Christof Schulz, January 14 2020
340. SASP Feb 2-7 2020 St Moritz
341. GRC Interactions Molecules June 28 -July 3 2020 Stonehill College Mass

NON-REVIEWED PUBLICATIONS AND PATENT APPLICATIONS

1. Mathematica notebook to calculate Wigner 9-J Symbols, A.M. Wodtke, Joshua Halpern, <http://www.mathsource.com/cgi-bin/msitem?0210-890>
2. *When I think of Germany*, A.M. Wodtke, (DUZ) deutsche Universitätszeitung January 24 2014
3. *Deutschland du hast es besser*, A.M. Wodtke, Spiegel on-line Feb 3, 2014
<http://www.spiegel.de/unispiegel/jobundberuf/us-forscher-lobt-wissenschaftsstandort-deutschland-a-946167.html>
4. EUROPEAN PATENT APPLICATION, *Graphene with very high charge carrier mobility and preparation thereof*, EP 2 801 551 A1, Date of publication: 12.11.2014, Application number: 13197029.5, Date of filing: 12.12.2013
5. INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT), *Graphene with very high charge carrier mobility and preparation thereof*, International Application Number: PCT/EP2014/059374, International Filing Date: 7 May 2014 (07.05.2014)

RESEARCH PUBLICATIONS

More than 225 research articles in peer reviewed Journals: 10 in Science or Nature; 7 in Physical Review Letters, Angewandte Chemie - Int. Ed., Geophysical Research Letters or Accounts of Chemical Research. 'Google Scholar' reports 8795 cumulative citations, h-index=51; 'ISI-Web of Science' reports 6997 cumulative citations, h-index of 44

1984

1. *Experimental Investigation of Resonances in Reactive Scattering: F + H₂ reaction*, D. M. Neumark, A. M. Wodtke, G. N. Robinson, C. C. Hayden, Y. T. Lee, Phys. Rev. Lett. **53**(3), 226 (1984)
2. *Dynamic Resonances in the Reaction of Fluorine Atoms with Hydrogen Molecules*, D. M. Neumark, A. M. Wodtke, G. N. Robinson, C. C. Hayden, Y. T. Lee, ACS Symposium Series No. 263, "Resonances in Electron-Molecule Scattering, Van der Waals Complexes and Reactive Chemical Dynamics"

1985

3. *Molecular Beam Studies of the F + H₂ reaction*, D. M. Neumark, A. M. Wodtke, G. N. Robinson, C. C. Hayden, Y. T. Lee, J. Chem. Phys., **82**(7), 3045 (1985)
4. *Molecular Beam Studies of the F + D₂ and F + HD reactions*, D. M. Neumark, A. M. Wodtke, G. N. Robinson, C. C. Hayden, K. Shobatake, R. K. Sparks, T. P. Schaefer, Y. T. Lee, J. Chem. Phys., **82**(7), 3067 (1985)
5. *Photodissociation of Acetylene at 193.3 nm*, A. M. Wodtke, Y. T. Lee, J. Phys. Chem., **89**, 4744 (1985)

1986

6. *The Observation of CH₃O in the collision free multiphoton dissociation of CH₃NO₂*, A. M. Wodtke, E. J. Hints, Y. T. Lee, J. Chem. Phys., **84**(2) 1044 (1986)
7. *Infrared Multiphoton dissociation of three nitroalkanes*, A. M. Wodtke, E. J. Hints, Y. T. Lee, J. Phys. Chem., **90**, 3549 (1986)

1987

8. *Very high resolution photofragmentation translational spectroscopy*, A. M. Wodtke, Y. T. Lee, "Advances in Gas-Phase Photochemistry and Kinetics: Molecular Photodissociation Dynamics" M. N. R. Ashfold, J. E. Baggot eds., Royal Society of Chemistry, Series 539.6 QD561. (1987)

1988

9. *State selective detection of CO using a tunable ArF laser*, G. Meijer, A. M. Wodtke, H. Schlueter, H. Voges, P. Andresen, J. Chem. Phys., **89**, 2588 (1988)
10. *Predissociation of O₂ in the B-state*, A. M. Wodtke, L. Huewel, H. Schlueter, H. Voges, G. Meijer, P. Andresen, J. Chem. Phys., **89**, 1929 (1988)
11. *High Sensitivity detection of NO in a flame using a tunable ArF laser*, A. M. Wodtke, L. Huewel, H. Schlueter, H. Voges, G. Meijer, P. Andresen, Optics Lett., **13**, 910 (1988)
12. *Infrared multiphoton dissociation of ethyl and methyl acetate*, E. J. Hints, A. M. Wodtke, X. S. Zhao, Y. T. Lee, J. Phys. Chem. **92**, 5379 (1988)

1989

13. *A simple way to improve a tunable ArF laser*, A. M. Wodtke, L. Huewel, H. Schlueter, P. Andresen, Rev. Sci. Instr. **60**, 801 (1989)
14. *The potential energy function for O₂ and the transition dipole moment the Schumann-Runge band near X-state dissociation*, X. Yang, A. M. Wodtke, J. Chem. Phys., **90**, 7114 (1989)

15. *The photodissociation of vinylbromide and the heat of formation of the vinyl radical*, A. M. Wodtke, E. J. Hints, X. S. Zhao, Israel J. Chem., **29**, 383 (1989) Dynamics of Molecular Processes (Part A) B. Gerber, A. Nitzan eds.
16. *Reply to comment on: predissociation of O₂ in the B-state*, A. M. Wodtke, L. Huewel, J. Chem. Phys., **91**, 6540 (1989)
17. *Position Sensitive Detection with Laser induced fluorescence*, L. Huewel, A. M. Wodtke, P. Andresen, H. Voges, XVI ICPEAC Proceedings, New York (1989)

1990

18. *Efficient State specific preparation of highly vibrationally excited NO*, X. Yang, A. M. Wodtke, J. Chem. Phys., **92**, 116 (1990)
19. *The rotational structure of highly vibrationally excited HCN*, X. Yang, C. A. Rogaski, A.M. Wodtke, J. Chem. Phys., **92**, 2111 (1990)
20. *Vibrational structure of highly vibrationally excited HCN up to 18,900 cm⁻¹*, X. Yang, C. A. Rogaski, A.M. Wodtke, J. Opt. Soc. Am. B, **7**, 1835 (1990)
21. *Reply to Comment on: Highly vibrationally excited HCN*, X. Yang, A. M. Wodtke, J. Chem. Phys., **93**, 3723 (1990)
22. *The Vibrational quantum number dependence of Nitric Oxide self relaxation up to v" = 25*, X. Yang, E. H. Kim, A. M. Wodtke, J. Chem. Phys., **93**, 4483 (1990)
23. *Application of tunable excimer lasers in the study of highly vibrationally excited molecules*, X. Yang, C. A. Rogaski, E. H. Kim, D. McGuire, A. M. Wodtke, Lambda Physics Highlights, **24**, 1 (1990)

1991

24. *Production and Photodissociation of CCl₃ Radicals in a molecular beam*, E. J. Hints, X. Zhao, W. M. Jackson, W. B. Miller, A. M. Wodtke, Y. T. Lee, J. Phys. Chem., **95**, 2799 (1991)
25. *Observation of Orbit Rotation predissociation in the O₂ Schumann-Runge system*, X. Yang, A. M. Wodtke, J. Chem. Phys., **94**, 2469 (1991)

1992

26. *Quantum state specific time of flight measurements on CO*, J. M. Price, A. Ludvikson, M. Hsu, S. Hongo, R. M. Martin, A. M. Wodtke, J. Chem. Phys., **96**, 1854 (1992)
27. *Vibrational Energy Transfer of highly vibrationally excited NO*, X. Yang, E. H. Kim, A. M. Wodtke, J. Chem. Phys., **96**, 5123 (1992)
28. *State-to-state spin-orbit and rotational energy transfer in very highly vibrationally excited nitric oxide*, X. Yang, A. M. Wodtke, J. Chem. Phys., **96**, 5111 (1992)
29. *Vibrational Energy Transfer in the Chemical Energy Regime using Stimulated Emission Pumping*, X. Yang, E. Kim, A. Wodtke, SPIE Conference Proceedings, Los Angeles California, 1992
30. *Efficient State specific preparation of ¹⁵N¹⁸O*, X. Yang, D. McGuire, A. M. Wodtke, J. Mol. Spectrosc. **154**, 361 (1992)

31. *Axis Switching Transitions and the stimulated emission pumping spectrum of HCN*, D.M. Jonas, X. Yang, A. M. Wodtke, J. Chem. Phys., **97**, 2284 (1992)

1993

32. *Controlling the Quantum Numbers in Chemical Reactions: Reactivity and Energy Transfer of Highly vibrationally excited molecules*, X. Yang, A. M. Wodtke, International Reviews of Physical Chemistry, David Clary, Editor vol. **12**, No. 1 pp.123-147 (1993)
33. *Application of Synchrotron Radiation in Chemical Dynamics*, P. Heimann, M. Koike, A. Kung, C. Y. Ng, A. M. Wodtke, Workshop Report, February 5-6, 1993, Claremont Hotel Berkeley, California, LBL report-34131, CONF-9302-107, May 1993
34. *Stimulated Emission Pumping Studies of Energy Transfer in Highly Vibrationally Excited Molecules*, X. Yang, J. M. Price, J. A. Mack, C. G. Morgan, C. A. Rogaski, D. McGuire, E. H. Kim, A. M. Wodtke, Feature Article: J. Phys. Chem., **97**, 3944 (1993)
35. *Vibrational state specific vibrational self-relaxation rate constants for highly vibrationally excited O₂ (v=19-28)*, J.M. Price, J.A. Mack, C.A. Rogaski, A.M. Wodtke, Chem. Phys. **175**, 83 (1993)
36. *Laboratory evidence for a possible non-LTE mechanism of stratospheric ozone formation*, C. A. Rogaski, J. M. Price, J. A. Mack, A. M. Wodtke, Geophys. Res. Lett. **20**, 2885 (1993)

1994

37. *Molecular Beam Stimulated Emission Pumping Spectroscopy of Propynal*, C. A. Rogaski, A. M. Wodtke, J. Chem. Phys., **100**, 78 (1994)
38. *Coherent Cavity Ring Down Spectroscopy*, G. Meijer M. G. H. Bogaarts, R. T. Jongma, D. H. Parker, A. M. Wodtke, Chem. Phys. Lett., **217**, 112 (1994)
39. *The Structure of Acetaldehyde in its First Excited Singlet State: Experiment and Theory*, J. M. Price, J. Mack, G. v. Helden, X. Yang, A. M. Wodtke, J. Phys. Chem., **98**, 1791 (1994)
40. *The "Ozone Deficit" Problem: O₂(X, v₂≥26) + O(³P) Channel in the 226-nm Photodissociation of Ozone*, R. L. Miller, A. G. Suits, P. L. Houston, R. Toumi, J. A. Mack, A. M. Wodtke, Science, **265**, 1831 (1994)

1995

41. *The first vibronically-resolved measurement of correlated-product-state distributions in ultraviolet photodissociation: ketene at 308 nm*, Marcel Drabbels, Christopher G. Morgan, David S. McGuire, Alec M. Wodtke, J. Chem. Phys., **102**, 611 (1995)
42. *High Resolution Spectroscopy of Chemical Isomerization: Stimulated Emission Pumping of HCN*, D. Jonas, X. Yang, C. A. Rogaski, A. M. Wodtke, Advanced Series in Physical Chemistry vol. 4: Molecular Dynamics and Spectroscopy by Stimulated Emission Pumping, pp. 513-541, Eds. R. W. Field, H. L. Dai, World Scientific, London
43. *How Does Collisional Energy Transfer Depend on Vibrational Excitation: Transient Chemical Bond Formation versus Chemical Reaction*, X. Yang, J. M. Price, J. A. Mack, C. G. Morgan, C. A. Rogaski, A. M. Wodtke, Advanced Series in Physical Chemistry vol. 4: Molecular Dynamics and Spectroscopy by Stimulated Emission Pumping, pp. 619-657, Eds. R. W. Field, H. L. Dai, World Scientific, London

44. *Energy transfer of molecules with chemically significant amount of vibrational energy*, X. Yang, J. M. Price, J. A. Mack, C. A. Rogaski, C. G. Morgan, A. M. Wodtke, Advances in Chemical Kinetics and Dynamics, **2A**, 105 (1995)
45. *The Spin-Forbidden $a^4\Pi(v=13-15)$ and $b^4\Sigma^-(v=3) \leftarrow X^2\Pi(v=0)$ Bands of Nitric Oxide: A new Scheme for Quantum State-Specific High-Resolution Kinetic Energy Measurements*, M. Drabbels, C. G. Morgan, A. M. Wodtke, J. Chem. Phys., **103**, 7700 (1995)
46. *Quantum-State-Specific Time-of-Flight as a probe of CO Photodesorption from GaAs(100)*, Matt Nooney, J. M. Price, R. M. Martin, A. M. Wodtke, Chem. Phys. Lett., **245**, 377 (1995)

1996

47. *Reactive $O_2(v \geq 26)$ as a source of stratospheric O_3* , R. Toumi, P. L. Houston, A. M. Wodtke, J. Chem. Phys. **104**, 775 (1996)
48. *The correlated product state distribution of ketene photodissociation at 308 nm*, C. G. Morgan, M. Drabbels, A. M. Wodtke, J. Chem. Phys. **104**, 7460 (1996)
49. *The Electric Dipole Moment and Hyperfine Structure of NO $B^2\Pi$: High Resolution Laser-Induced Fluorescence Spectroscopy of the $B^2\Pi(v=3-5) \leftarrow X^2\Pi(v=0)$ Bands*, M. Drabbels and A.M. Wodtke, Chem. Phys. Lett. **256**, 8 (1996)
50. *State-to-state rate constants for relaxation of highly vibrationally excited O_2 , and implications for its atmospheric fate*, C. A. Rogaski, J. A. Mack, A. M. Wodtke, Faraday Discussion (Atmospheric Chemistry) **100** 229 (1996)
51. *Molecular Energy Transfer*, G. Flynn, C. Parmenter and A. M. Wodtke, J. Phys. Chem., **100**, 12817 (1996)
52. *State-specific neutral time-of-flight of CO from ketene photodissociation at 351 nm: The internal energy distribution of $CH_2(X^3B_1)$* , C.G. Morgan, M. Drabbels, A. M. Wodtke, J. Chem. Phys., **105**, 4550 (1996)
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