

## Resume: CHARLES T. CAMPBELL

### ADDRESS:

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### EDUCATIONAL BACKGROUND

1975, B.S., University of Texas, Austin, TX (Chemical Engineering)  
1979, Ph.D., University of Texas, Austin, TX (Phys. Chemistry, under Prof. J. M. White)

### EMPLOYMENT RECORD

2012-present B. Seymour Rabinovitch Endowed Chair in Chemistry  
2023-present Emeritus Professor of Chemistry, University of Washington, Seattle, WA  
1992-2022 Professor of Chemistry, University of Washington, Seattle, WA and  
Adjunct Prof. of Physics (since 1994) and  
Adjunct Prof. of Chemical Engineering (since 2003)  
2004-2012 Lloyd E. and Florence M. West Endowed Professorship in Chemistry  
2001-2006 CoDirector, PNNL / Univ. of Washington Joint Institute for Nanoscience  
2003-2004 Director, Center for Nanotechnology, Univ. of Washington  
1997-2003 Founding CoDirector, Center for Nanotechnology, Univ. of Washington  
1989-1992 Associate Professor, University of Washington, Seattle, WA  
1986-1989 Associate Professor, Indiana University, Bloomington, IN  
1981-1986 Staff Member, Los Alamos National Laboratory, Los Alamos, NM  
1979-1981 Postdoctoral Research Associate, University of Munich, West Germany  
(under Prof. G. Ertl, winner of the 2007 Nobel Prize in Chemistry)  
1977 Summer Graduate Student, Sandia National Labs, Albq., NM

### HONORS / AWARDS

Ohio State University, Frontiers in Spectroscopy Lectures (scheduled for 2023, but postponed due to shoulder surgery).  
Neckers Lecturer, Southern Illinois University at Carbondale, 2022-23, April 7, 2023.  
Elected Honorary Fellow of the Chinese Chemical Society, 2020.  
American Chemical Society Catalysis Division Award for Exceptional Achievements in Catalysis, 2020.  
Inaugural Wolfgang Sachtler Lecturer, Northwestern University Center for Catalysis and Surface Science, Sept. 7, 2017.  
The Gauss Professorship of the Göttingen Academy of Science, Germany, 2016-17.  
Elected Fellow of the AVS, 2016.  
Humboldt Lecture, Schloss Ringberg, Germany, 2016.  
Fink Lecture, Georgia Institute of Technology, April 21, 2016.  
Medard W. Welch Award (the premier award of the AVS), 2015.  
Elected Member of the Washington State Academy of Sciences, 2013.  
Robert Burwell Lectureship in Catalysis of the North American Catalysis Society, 2013.  
Gerhard Ertl Lecture Award 2012 (Past awardees: Gabor Somorjai (2008), Jens Norskov (2009), Sir John Thomas (2010) and Roald Hoffmann (2011)).  
Elected Fellow of the American Chemical Society, 2011.

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Elected Fellow of the American Association for the Advancement of Science, 2010.  
Ipatieff Lectureship, Northwestern University, 2010/2011.  
NSF Center for Chemistry at the Space Time Limit (CaSTL) Lectureship, 2011.  
H. Willard Davis Lecture, Chemistry Dept., University of South Carolina, April 24, 2009.  
American Chemical Society Arthur W. Adamson Award for Distinguished Service in the  
Advancement of Surface Chemistry, 2007. (Later renamed as the ACS Award in Surface  
Chemistry.)  
Paul Hopkins Faculty Award of the Chemistry Department, University of Washington,  
2006-7.  
Reilly Lectureship, University of Notre Dame, 2007.  
University Lectureship, University of Ottawa, Department of Chemistry, Oct. 14, 2005.  
University Lectureship, University of Washington, Dept. of Chemistry, Oct. 27, 2005.  
Lloyd E. and Florence M. West Endowed Professorship in Chemistry (2004-12)  
Alexander von Humboldt Research Award (2003)  
American Chemical Society Award in Colloid or Surface Chemistry (2001).  
St. John's College, Cambridge University, England, Overseas Visiting Scholar Fellowship  
(1996)  
John Yarwood Memorial Award of the British Vacuum Council (1989)  
Camille and Henry Dreyfus Foundation Teacher/Scholar Award (1988-92)  
DuPont Young Faculty Award (1988-89)  
Indiana University Outstanding Young Faculty Award (1988)  
Alfred P. Sloan Research Fellowship (1986-88)  
Alexander von Humboldt Fellowship, University of Munich (1980-81)  
NSF NATO Postdoctoral Fellowship, University of Munich (1979-80)  
NSF Energy-Related Graduate Traineeship, University of Texas (1976-79)  
Graduate Student Research Grant at University of Texas (1978-79)  
Recipient: H. R. Henze Teaching Excellence Award - Chemistry (1975-76)  
Alcoa and Dean's Office Scholarship, University of Texas (1974-75)  
Lubrizol Foundation Scholarship, University of Texas (1973-74)  
Valedictorian, Kelly High School, Beaumont, TX, 1971

### EDITORIAL RESPONSIBILITIES

Editor-in-Chief of the journal *Surface Science Reports* (2013-present).  
Editorial Board of *Catalysis Reviews – Science and Engineering* (2012-present).  
Guest Co-Editor with Beatriz Roldan, Manos Mavrikakis and Younan Xia: *Chemical Reviews*, Thematic Issue on Advanced Materials and Methods for Catalysis /  
Electrocatalysis by Transition Metals, 2021.  
Guest Co-Editor with Štefan Vajda and Núria López: *Journal of Chemical Physics*  
special issue on Catalytic Properties of Model Supported Nanoparticles, 2019.  
Editor-in-Chief of the journal *Surface Science* (1/02 – 7/12).  
Guest Co-Editor with Joachim Sauer: *Chemical Reviews*, Special Issue on Surface  
Chemistry of Oxides (2013).  
Guest Co-Editor with Younan Xia and Hong Yang: *Accounts of Chemical Research*,  
Special Issue on Nanoparticles for Catalysis (2013)

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Guest Editor, *Topics in Catalysis*, Special issue on Structure/Function Relationships in Heterogeneous Catalysis: Insights using Well-Defined Model Catalysts, in memory of D. W. Goodman, 2013.

Guest Co-Editor with John Yates: *Proceedings of the National Academy of Science*, Feature Issue on Surface Chemistry, Volume 108, 2011.

Editorial Board of *Journal of Physical Chemistry* (2013-15).

Editorial Board of *Frontiers of Chemical Science and Engineering* (2010-2012).

Editorial Board of *Surface Science* (2012-present).

Scientific Advisory Board of *Catalysis Letters* and *Topics in Catalysis* (2013-present)

Editorial Board of *Journal of Chemical Physics* (2002-4).

Editorial Board of *Journal of Catalysis* (1991- 2001).

### SCIENTIFIC ADVISORY BOARDS

Exascale Catalytic Chemistry (ECC) Project, Sandia National Laboratory, Livermore, CA  
Idaho National Laboratory, Energy and Environment Science and Technology

Directorate Strategic Advisory Committee, 2010-2020.

Pacific Northwest National Lab Institute for Integrated Catalysis Advisory Board, 2013-present.

Founding Member of the Scientific Advisory Board for Northwestern University's Center for Catalysis and Surface Science (CCSS), 2017 – 2019.

International Scientific Advisory Board of the Fritz Haber Institute of the Max Planck Society, Berlin, Germany, 2005-2016.

Committee of Visitors (COV) for the National Science Foundation (NSF) Division of Chemistry, 2016

NSF Subcommittee on Food Systems, an ad hoc subcommittee of the NSF Mathematical and Physical Sciences Advisory Committee, 2013-14.

External Advisory Board: Institute for Catalysis in Environmental Processes (ICEP), Northwestern University, 2015.

DOE Energy Frontier Research Center for Atomic Level Catalyst Design, Science Advisory Board, 2012-2015.

Plexera, LLC., Seattle, WA, <http://www.plexera.com/> (2009-2015).

Scientific Advisory Board of the Fritz Haber Institute of the Max Planck Society – Chinese Academy of Sciences Partner Group “Structure-Activity relations of Model Systems for Heterogeneous Catalysis, 2010-2014.

Pacific Northwest National Lab EMSL Scientific Advisory Committee, 2003-2013.

Sandia National Lab, Sunshine to Petrol (S2P) Program External Advisory Board, 2009-11.

Asemblon, Inc., Seattle, WA, <http://asemblon.com/> (2005-2009).

Lumera, Inc., Bothel, WA (2004-2008)

Prolinx, Inc.; Bothell, WA (2001-2003)

University of Washington NESAC/BIO Advisory Board, 2005-2010.

Washington Technology Center, Board of Directors (1997-2000)

### PROFESSIONAL SOCIETY COMMITTEES / OFFICES

American Chemical Society (ACS) Committee on the Petroleum Research Fund (PRF), 2023-2025.

Washington State Academy of Sciences Membership Committee, 2017-present.

Washington State Academy of Sciences, Chair, Section 1 Membership Subcommittee for Section 1 (Physical and Mathematical Sciences), 2020-present.

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ACS National Award Canvassing Committee: Arthur W. Adamson Award, 2013-15.  
Board of Directors, International Workshop on Oxide Surfaces, 2006-2009  
Pacific Coast Catalysis Society Representative to North American Catalysis Soc., 2006-7  
National President, Phi Lambda Upsilon, Honorary Chemical Society, 2002-5  
National Vice President, Phi Lambda Upsilon, Honorary Chemical Society 1999-2002  
Chairman, Colloid and Surface Chemistry Division of the American Chemical Soc., 1993  
Chairman-Elect, Colloid and Surface Chemistry Div. of the Am. Chemical Society, 1992  
Vice-Chairman, Colloid and Surface Chemistry Div. of the Am. Chemical Soc., 1991  
Co-Chairman, Continuing Symposium on Surface and Colloid Chemistry of Advanced  
Materials, Colloid and Surface Chemistry Div. of the Am. Chem. Soc., 1988-1991  
Treasurer, Colloid & Surface Division of the American Chemical Society, 1984-1989  
Executive Committee, New Mexico Chapter of American Vacuum Society, 1983-1984  
President, Lamar University Chapter of Phi Eta Sigma (Freshman Honor Fraternity),  
1971

### SCIENTIFIC REVIEW and ADVISORY COMMITTEES

Helmholtz Association Review Panel, Karlsruhe Institute of Technology (Key  
Technologies- Material Sciences), Germany, 2017.  
Oak Ridge National Lab, DOE BES Catalysis Program Review Panel, 2017.  
Lawrence Berkeley National Lab, DOE BES Catalysis Program Review Panel, 2014.  
Co-Chair, Science Theme Advisory Panel, Surface and Interfacial Processes, EMSL,  
Pacific Northwest National Lab, 2009-11.  
IUPAC Task Group: Critical evaluation of thermodynamic properties of hydrogen  
storage materials: metal organic frameworks and metal or complex hydrides, 2009-  
11.  
Review Committee, Department of Chemistry, University of British Columbia, 2010.  
Panelist and Writer: DOE OBES Workshop on “Basic Research Needs in Catalysis for  
Energy Applications”, Bethesda, MD, Aug. 6-8, 2007.  
Sandia National Lab, Materials Science Review, 2007.  
PNNL, Catalysis and Surface Science Program External Review, 2006.  
German Research Foundation (DFG) Excellence Initiative: Catalysis Review Panel,  
2006.  
DOE OBES Workshop on Advanced Resources for Catalysis Research, Pacific  
Northwest National Lab, Sept. 21-2, 2004.  
Lawrence Berkeley National Lab, Materials Science Review, 1998 and 2010.  
DOE / Oak Ridge National Lab, Chemical Sciences Programs Review, 1997.  
DOE Labs Technology Research Program Review, Catalysis/Chemical Conversion,  
1996.

### UNIVERSITY SERVICE (University of Washington)

Chair’s Advisory Committee, Chemistry Department 2013-present  
Academic Personnel Committee, Chemistry Department 2013-2017  
Chair, Search Committee for Chair of Physics Department 2013-14  
Chair, PNNL Graduate Fellowship Committee, Chemistry Department 2013-2018  
Molecular Engr. & Sciences Review Committee 2015  
Molecular Engineering Building Subcommittee (2007)

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Molecular Engineering Working Group (2006-7)  
CoDirector, PNNL / Univ. of Washington Joint Institute for Nanoscience (2001-2006)  
Director, Center for Nanotechnology, Univ. of Washington (2003-2004)  
Co-established (with V. Vogel) the PhD program in Nanotechnology, the first PhD in  
Nanotechnology in the USA. It evolved into the University's current PhD  
program  
in Molecular Engineering and Sciences (MoES), 2001.  
Founding CoDirector, Center for Nanotechnology, Univ. of Washington (1997-2003)  
Faculty Search Committees, Chemistry Department: many years.

### SYMPOSIA ORGANIZED (chronological order)

Molecular Processes at Solid Surfaces: Chemical Modification of Surfaces, for the Spring  
1984 ACS National Meeting (Colloid and Surface Chemistry Division)  
Bimetallic Surface Chemistry and Catalysis, co-organized with B.E. Koel for the Fall  
1987 ACS National Meeting (Colloid and Surface Chemistry Division)  
Solid Surfaces and Catalysis, for the 1989 International Chemical Congress of the Pacific  
Basin Societies, Honolulu, Hawaii, December 1989  
Model Catalytic Systems, for the North American Meeting of the Catalysis Society,  
Pittsburgh, PA, May 2-7, 1993.  
Co-founder: Gordon Research Conference on Chemical Reactions at Surfaces, which was  
first held in 1993 in Ventura, CA and continues into the future, held every 2 years,  
with most recent in Tuscany, Italy in Feb. 2023.  
Materials Chemistry on Oxide and Carbide Surfaces, PacifiChem 2000, Dec. 14-19,  
2000, Honolulu, HA  
Adamson Award Symposium Honoring J. M. White, San Diego ACS Meeting, 4/4-5/01.  
Co-Chair: Gordon Research Conference on Chemical Reactions at Surfaces, Feb. 16-21,  
2003, Ventura, CA.  
Program Committee: 2004 Meeting of the Pacific Northwest Chapter of the American  
Vacuum Society combined with the 26th Annual Symposium on Applied Surface  
Analysis.  
Program Committee: 26th Annual Symposium on Applied Surface Analysis (Surface  
Analysis 2004) June 16-18, 2004 in Richland, WA.  
Chair: Gordon Research Conference on Chemical Reactions at Surfaces, Feb. 13-18,  
2005, Ventura, CA..  
Organizing Committee: North American Meeting of the Catalysis Society, CA, 2009.  
Chairman, Annual meeting of the Pacific Coast Catalysis Club, Seattle, 2006.  
Organizing Committee, 5<sup>th</sup> International Workshop on Oxide Surfaces (IWOX-5), Lake  
Tahoe, NV, Jan. 2007.  
International Advisory Committee , 25<sup>th</sup> European Conference on Surface Science  
(ECOSS), July 28 -August 1, 2008, Liverpool, UK.  
DOE Contractors Annual Meeting, Catalysis and Surface Science, Chair: Future  
Directions, Charlottesville, VA, May 24-26, 2007.  
International Steering Committee, Joint 18th International Vacuum Congress (IVC-18),  
2010 International Conference on Nanoscience and Technology (ICN+T 2010),  
14th International Conference on Solid Surfaces (ICSS-14), and the 5th Vacuum

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and Surface Sciences Conference of Asia and Australia (VASSCAA-5), jointly held in Beijing, China, August 23-27, 2010.

Scientific Program Committee: The 6th International Conference on Gold Science, Technology, and its Applications, Tokyo, Sept. 5-8, 2012.

Organizing Committee: 2015 New Frontiers Workshop - Challenges and Opportunities for Sustainable Production of Chemicals and Fuels Beyond the Shale Gale (co-sponsored by the Dow Materials Institute at University of California, Santa Barbara, and Dow Centre for Sustainable Engineering Innovation, University of Queensland, Australia), UCSB Feb. 2, 2015.

Rabinovitch Symposium Organizer, University of Washington 2015.

### NOTABLE AWARDS OF GRADUATE, UNDERGRADUATE AND POSTDOCTORAL ADVISEES

Zhongtian Mao (grad student) won 2 prestigious graduate student awards at the 2019 National AVS Symposium in Columbus, OH: (1) The Morton M. Traum Award of the AVS Surface Science Division, and (2) The Fundamental Discoveries in Heterogeneous Catalysis Graduate Student Presentation Award.

Griffin Ruehl (grad student): Jane and Joseph McCarthy Award for Excellence in Chemical Engineering Graduate Student Teaching (2018)

Ziareena Al-Mualem (BS Chemistry 2018): 2019 ACS Undergraduate Award in Physical Chemistry

Nirala Singh (Postdoc 2015-7): WRF Innovation Fellowship in Clean Energy, 2016-17

Jason Farmer (PhD 2010) won Best Dissertation from the University of Washington for 2010 from all areas of mathematics, physical sciences and engineering, and thus it was the University's nominee for the Council of Graduate Schools Distinguished Dissertation Award.

Jose Rodriguez (PhD 1988): 2007 North American HENAAC Outstanding Technical Achievement Award for Hispanic Scientists and Engineers.

Also named among the first DOE Office of Science Distinguished Scientist Fellows (2019).

Karl-Heinz Ernst (Postdoc 1990-91): "Distinguished Scientist" of the EMPA in Zurich (only the 2<sup>nd</sup> time this distinction has ever been awarded by this Swiss lab).

Jennifer Shumaker-Parry (PhD 2002): NSF CAREER Award as Professor at Univ. Utah.

Lara Gamble (PhD 1997): 2014 National AVS ASSD Peter Sherwood Mid-Career Award.

Steven L. Tait (PhD 2005): 2014 Indiana University Outstanding Junior Faculty Award as Assistant Professor.

Eric Karp (PhD 2012): 2014 NREL President / Director's Award

Trent Silbaugh (PhD 2014): Jane and Joseph McCarthy Outstanding Teaching Assistant 2010–11 and 2013-14, Graduate School Fund for Excellence and Innovation Travel Award 2012.

Stephanie Hemmingson: 2013 National Science Foundation Graduate Research Fellowship Honorable Mention; 2013 Dorothy & Earl Hoffman Travel Grant of the AVS.

Evan Mann (undergrad): Mary Gates Research Scholarship (2014).

Amilla Frehner (undergrad): Mary Gates Research Scholarship (2015).

Ziareena Al-Mualem (undergrad): Distinguished Research in Chemistry Award, Univ. of Washington (2019), and ACS Undergraduate Award in Physical Chemistry (2019).

Eric M. Karp (PhD 2012): University of Washington Chemical Engineering Early Career Impact

Alumni Award (2023).

**INVITED TALKS AT SCIENTIFIC CONFERENCES**

1. The selective epoxidation of ethylene catalyzed by silver: mechanistic details revealed by single-crystal studies, ACS National Symposium, Philadelphia, August 1984
2. Chlorine promotion of selective ethylene oxidation over Ag(110): kinetics and mechanism, ACS Regional Meeting, Albuquerque, NM, June 1984
3. Medium-pressure studies of the selective catalytic oxidation of ethylene over silver single crystals, International Chemical Congress of Pacific Basin Societies (PACS), Honolulu, December 1984
4. Mechanism and promoter effects in ethylene epoxidation over Ag: single crystal studies, ACS National Symposium, Miami, May 1985
5. Mechanism of ethylene epoxidation on chlorine and cesium modified silver single crystals studies, Gordon Research Conference on Catalysis, June 1985
6. Investigations of sulfur tolerance of water-gas shift catalysts, 6th Annual Gasification Contractors Meeting, DOE, Morgantown Energy Technology Center, June 1986
7. Kinetics and mechanisms of simple catalytic reactions at high pressures on well-defined surfaces, American Chemical Society National Symposium, Anaheim, CA, September 1986
8. Surface, kinetic, and theoretical characterization of model Cu/ZnO catalysts for water-gas shift and methanol synthesis, Spring Dinner Meeting of the Chicago Catalysis Club, April 1987
9. Kinetics and mechanisms of simple catalytic reactions on well-defined catalyst surfaces, Midwest Regional ACS Meeting, Columbus, OH, June 1987
10. The use of ultrahigh vacuum surface analytical methods in understanding high-pressure catalytic reactions, Eastern Analytical Symposium, New York, NY, September 1987
11. Model Cu/ZnO catalysts, Sixth DOE Catalysis and Surface Chemistry Research Conference, NBS, October 1987
12. Application of surface analytical techniques to the characterization of simple catalytic reactions, 34th National Symposium of the American Vacuum Society, Anaheim, CA, November 1987.
13. Testing ensemble sizes in chemisorption and catalysis, Joint Pittsburgh-Cleveland Catalysis Society/American Vacuum Society Meeting, Cleveland, OH, April 1988.
14. Probing ensemble effects in catalysis: hydrocarbon reactions on Pt(111), 62nd Colloid and Surface Science Symposium, Pennsylvania State University, June 1988.
15. Well-defined bimetallic surfaces: structural and chemisorptive properties, 8th Annual Symposium of the Arizona Chapter, Tucson, Arizona, April 1989.
16. Ensemble effects and mechanisms in hydrocarbon reactions over Model platinum catalysts, 2nd European conference on Catalysis (G.M. Schwab Honorary Symposium), Berlin, West Germany, July 1989.
17. Studies of catalytic kinetics and mechanisms over well-defined model catalysts based on single-crystal surfaces, The 1989 British Vacuum Council Annual 8th Interdisciplinary Surface Science Conference (ISSC-8) Liverpool, England, March 20-23, 1989.
18. Surface science studies of single crystal Cu and ZnO with particular relevance to methanol synthesis and water-gas shift, Eighth International Symposium on C1 Chemistry, Kingston, ONT, Canada, July 1989.

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19. Electronic promoters in Catalysis: A Surface Science Perspective, Catalytica Workshop on Catalyst Promoters, Palo Alto, CA, November 1989.
20. Studies of Model Catalyst with Well-Defined Surfaces Combining Ultrahigh Vacuum Surface Characterization with Medium-Pressure Kinetics, National Academy of Sciences and Academy of Sciences of the GDR Workshop on "Developments in Heterogeneous Catalysis," Irvine, CA, March 18-21, 1990.
21. Surface Sciences Studies of the Reactions of Simple Hydrocarbons on Pt(111), National ACS Meeting, Kendall Award Symposium, Boston, April 1990.
22. The Water-Gas Shift Reaction Over Clean and Cs-Promoted Cu Single-Crystal Catalysts: Elementary Processes, Gordon Research Conference on the "Fundamental Interactions of Water with Solid Surface," Kimball Union Academy, Meriden, NH, July 20, 1990.
23. Surface Chemistry Related to Bimetallic Catalysis, U.S.-Brazil NSF Workshop in Catalysis, Rio de Jan., Brazil, October 15, 1990.
24. The Forward and Reverse Water-Gas Shift Reactions on Model Copper Catalysts: Kinetics and Elementary Steps, ACS National Symposium, Colloid Division, April 1991, Atlanta.
25. Hydrocarbon Interactions with Clean and Metal Doped Pt(111) Surfaces, ACS National Symposium, Kendall Award Symposium, April 1991, Atlanta.
26. The Forward and Reverse Water-Gas Shift Reactions on Model Copper Catalysts: Kinetics and Elementary Steps, 18th Annual Spring Symposium of the Michigan Chapter of the American Vacuum Society, Dearborn, MI, May 15, 1991.
27. Studies of Model Catalysts Using Combined UHV Surface Characterization and Medium-Pressure Kinetics, 43rd Annual Congress of the Brazilian National Scientific Society, July 17, 1991, Rio de Janeiro.
28. Hydrocarbon Reactions on Platinum Bimetallic Surfaces, 43rd Annual Congress of the Brazilian National Scientific Society, July 19, 1991, Rio de Janeiro.
29. Studies of Water-Gas Shift and Methanol Synthesis on Model Catalysts, 1992 Gordon Conference on Catalysis, Colby-Sawyer College, New London, NH, June 30, 1992.
30. Energetics of Surface Reactions in the Presence of Additives, 1993 Gordon Conference on Chemical Reactions on Surfaces, Ventura, CA, March 8-12, 1993.
31. Model Cu/ZnO Catalysts Based on Cu Monolayers on ZnO(0001)-O Single Crystal Surfaces, Symposium on Ammonia Synthesis: Position and Future Course", Hornbaek, Denmark, Sept. 1-4, 1993.
32. A New Model for the Growth and Reactivity of Metal Films on Oxide Surfaces: Cu on ZnO(0001)-O, American Vacuum Society National Meeting, Orlando, FLA, Nov. 15-19, 1993.
33. Modelling Metal / Oxide Interactions in Cu/ZnO Catalysis, DOE/BES Heterogeneous Catalysis and Surface Chemistry Research Conference, Oconomowoc, WI, May 25, 1994.
34. Structural, Chemisorption and Catalytic Properties of Well-Defined Metal Particles on Oxide Single Crystal Surfaces, IUVESTA Workshop on Structure and Reactivity of Small Polyatomic Molecules on Surfaces, Brdo, Slovenia, April 9-15, 1995.
35. The Metal / Oxide Interface, International Symp. on Frontiers of Catalytic Surface Science, Catalysis Res. Center of Hokkaido University, Sapporo, Japan, Oct. 2-3, 1995.



36. Studies of Structure-Function Relationships and Mechanisms in Heterogeneous Catalysis Using a Surface Scientist's Approach, Fall Meeting of the Japanese Catalysis Society, Muroran, Japan, Oct 5, 1995.
37. Bismuth Postdosing Thermal Desorption Mass Spectroscopy: Probing Hydrocarbon Reaction on Pt(111), ESF Workshop on Adsorption and Catalytic Reaction Dynamics at Surfaces, Italy, Dec. 17-20, 1995.
38. A New Single-Crystal Adsorption Microcalorimeter: Applications in Metal Film Growth on Oxides, ACS Natl. Symp., Coll. Div., San Francisco, April 16, 1997.
39. Kinetics of Metal Film Growth and Island Thickening on Oxides: Cu/ZnO(0001)-O and Au / TiO<sub>2</sub>(110), ACS Natl. Symp., Phys. Div., San Francisco, April 13, 1997.
40. The Strength of Chemical Bonding at the Metal Particle / Oxide Support Interface, and Its Effect on Dispersion and Chemisorption Properties, Keynote Address, North American Catalysis Society Meeting, Chicago, May 19, 1997.
41. Two New Methods for Characterizing Surface Reactions: Single-Crystal Adsorption Calorimetry and Surface Plasmon Resonance Spectroscopy, Engineering Foundation Conference on Surface Characterization of Adsorption and Interfacial Reactions II, Kona, Hawaii, Jan. 15, 1997.
42. "Model Catalysts from Vapor-Deposited Metal Particles on Single-Crystal Oxide Surfaces: Energetic, Structural, Chemisorption and Catalytic Properties", Southwest Catalysis Society Meeting and Inaugural Symposium of the Texas A&M Center for Catalysis, May 21, 1998.
43. The Strength of Interfacial Bonding at the Metal Particle / Oxide Support Interface, and Its Effect on Metal Catalyst Dispersion and Chemisorption Properties, 81st Canadian Society for Chemistry Conference, Wistler, BC, Canada, June 1-5, 1998.
44. Symposium on the Thermal Stability of Supported PdO/Pd Combustion Catalysts, Catalytica Combustion Systems, Inc., Mountain View, CA, July 16, 1998.
45. Single Crystal Adsorption Microcalorimetry of Metal Adsorption and Adhesion Energies on Oxide Surfaces, ACS National Meeting, Boston, Aug. 23-24, 1998.
46. Single Crystal Adsorption Calorimetry for Measuring Adsorption and Adhesion Energies of Metal Films and Particles on Well-Defined Surfaces, American Vacuum Society Annual Symposium, Baltimore, MD Nov. 2-6, 1998.
47. Calorimetric Measurements of Metal Adsorption and Adhesion Energies on Single-Crystal Oxide Surfaces: Relationship to Metal Particle Morphology and Chemisorption Properties, International Conference on Oxide Surfaces, Elmau, Germany, Jan. 25-29, 1999.
48. Calorimetric Measurements of Metal Adsorption and Adhesion Energies on Single-Crystal Oxide Surfaces: Relationship to Metal Particle Morphology and Chemisorption Properties, Gordon Conference on Chemical Reactions at Surfaces, Mar. 1-5, 1999.
49. Calorimetric Measurements of Metal Adsorption and Adhesion Energies on Single Crystalline Surfaces, Joint Surface and Materials Symposium between Rutgers and Chalmers Universities, Piscataway, NJ, March 17, 1999.
50. The Strength of Interfacial Bonding at the Metal Particle / Oxide Support Interface, and Its Effect on Metal Catalyst Dispersion and Chemisorption Properties, Tri-State Catalysis Club Dinner Meeting, Charleston, West VA, March 18, 1999.
51. Calorimetric Measurements of Metal Adsorption and Adhesion Energies on Single-Crystal Oxide Surfaces: Relationship to Metal Particle Morphology and Chemisorption

- Properties, ESF Workshop on “Catalysis from First Principles”, Copenhagen, May 17-19, 1999.
52. Plenary Lecture: Calorimetric Measurements of Metal Adsorption and Adhesion Energies onto Clean and Well-Defined Surfaces of Single Crystals, 54th Annual Calorimetry Conference, Tallahassee, FL, Aug. 15-20, 1999.
  53. Single Crystal Adsorption Calorimetry on Oxide Surfaces, Faraday Discussion on The Surface Science of Metal Oxides, Ambleside, England, Sep. 1-3, 1999.
  54. The Energetics and Dynamics of Metal Vapor Adsorption on Well-Defined Solids: Oxides, Si(100) and Polymers, IUVESTA workshop on Gas-Surface Interactions: Electronic structure, dynamics and reactivity, Sep., 26-29, 1999 at Schloss Seggau, Leibnitz, Austria
  55. Quantitative Analyses of Biological Interactions using Sensors Based on Surface-Biofunctionalized Surface Plasmon Resonance Devices, American Vacuum Society Natl. Symposium, Seattle, WA, Oct. 28, 1999,
  56. Quantitative Analyses of Biological Interactions using Sensors Based on Surface-Biofunctionalized Surface Plasmon Resonance Devices, SPIE BioMedical Optics Conference, San Jose, CA, Jan. 21-28, 2000.
  57. Fundamental Research in the Surface Science and Physical Chemistry of Heterogeneous Catalysis: Where are We, and Where Should We be Aiming?, American Chemical Soc. Natl. Meeting, San Francisco, Mar. 26-31, 2000.
  58. Kinetics of Adsorption / Desorption at the Liquid / Solid Interface, American Vacuum Society, New Mexico Chapter Annual Symposium, Albuquerque, NM, 5/24/00.
  59. Model Oxide-Supported Metal Catalysts, Gordon Research Conference in Catalysis, New London, NH, June 25-30, 2000.
  60. Microcalorimetric Measurements of Adsorption Energies and Adhesion Energies in Metal Film Growth: Relationships to Morphology, 10th International Conference on Solid Films and Surfaces (ICSFS-10), Princeton University, July 9-13, 2000.
  61. The Energetic Stability of Cu, Ag and Pb Particles on MgO(100): Adsorption and Adhesion Energies of Metals by Calorimetry, 2<sup>nd</sup> Intl. Workshop on Oxide Surfaces, Taos, NM, 1/15-19/01.
  62. Surface Thermodynamics, DOE Workshop in Catalysis Futures, Berkeley, CA, Mar. 1, 2001.
  63. ACS Award Talk: Energetics of Metal Nanoparticles on MgO(100) by Adsorption Microcalorimetry, American Chemical Society Natl. Meeting, San Diego, CA, 4/1-5/01.
  64. German Research Foundation Workshop on Bridging the Pressure and Materials Gap in Catalysis, Berlin, May 21-2, 2001.
  65. Energetics of Metal Nanoparticles on Model Oxide-Supported Metal Catalysts by Adsorption Microcalorimetry, North American Catalysis Soc. Meeting, June 3-8, 2001.
  66. Energetics of Metal Nanoparticles in Oxide Surfaces, Spanish Vacuum Soc. Workshop on Growth and Behaviour of Metal-Oxide Interfaces, Ávila, Spain. July 23-26, 2001
  67. European Conf. On Surface Science, Krakow, Poland, Sep. 4-7, 2001.
  68. Rideal Conference, Manchester, England, Mar. 24-7, 2002.
  69. Materials Research Soc. Natl. Meeting, San Francisco, Apr. 1-4, 2002.
  70. Euroconference on Fundamental Aspects of Surface Science: Structure and Reactivity of Oxide Surfaces, Acquafredda di Maratea, Italy, June 1-6, 2002.
  71. 9<sup>th</sup> Symposium on Surface Physics, Trest, Czech Republic, Sep. 2-6, 2002.

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72. Workshop on Catalysis by Oxide-Supported Metallic Nanoclusters, Santa Barbara, CA, Feb. 25-27, 2003.
73. ACS National Meeting, New York City, Sept. 7, 2003.
74. Regional ACS Symposium, Pittsburgh, PA, Oct. 21, 2003.
75. AAAS Meeting: Symposium on Controlling Chemical Transformations by Catalysis, Seattle, Feb. 12-17, 2004.
76. ACS National Meeting, Symposium in Honor of Art Adamson, Apr. 1, 2004.
77. EuroConference: "Interfaces in Nanostructured Materials", Kloster Irsee, Germany, June 6-11, 2004.
78. Max Plank Gesellschaft Conference "Surface Science Quo Vadis?" in Honor of Gerhard Ertl, Ringsberg, Germany, Sept. 6-9, 2004.
79. American Vacuum Society Natl. Symposium, Anaheim, CA, Nov. 14-19, 2004.
80. ACS National Meeting, Symposium on Growth and Catalysis of Metal Overlayers, March 13-17, 2005.
81. ACS National Meeting, Symposium in Honor of Adamson Awardee, R. Hamers, March 13-17, 2005.
82. Materials Research Society Annual Symposium, San Francisco, CA, Mar. 28-31, 2005.
83. Science and Technology Roundtable, Technology Alliance, Seattle, WA, May 13, 2005.
84. Workshop on Nanoparticles and Oxide Surfaces, Schloss Ringberg, Tegernsee, Germany, Sept. 4-9, 2005.
85. Association of Biomolecular Resource Facilities Meeting (ABRF 2006), Vendor's Session, Long Beach, CA, Feb. 14, 2006.
86. ACS National Meeting, Division of Chemical Education, Symp. On Balancing the Equation: Finding a Personal <-> Professional Equilibrium, Atlanta, GA, Mar. 26-30, 2006.
87. ACS National Meeting, Symp. on Nanotechnology in Catalysis, GA, Mar. 26-30, 2006.
88. Annual Meeting of the Deutsche Bunsen Gesellschaft (German Federal Society) for Physical Chemistry, Erlangen, May 25-27, 2006.
89. ACS National Meeting, PChem Division, Symposium on Fundamentals of Oxide Catalysts, San Francisco, CA, Sept. 10-14, 2006. (given by my postdoc, Jonathan Harris)
90. Workshop on "Catalysis from First Principles" (C1P) 2006, CECAM - Psi-k, Lyon, France, 11 - 14 September 2006.
91. International Conference on Solid Films and Surfaces (ICSFS-13), San Carlos de Bariloche, Argentina, Nov. 6-10, 2006.
92. American Institute of Chemical Engineers National Meeting, San Francisco, CA, Nov. 17, 2006.
93. Workshop on Catalysis and Surface Science, Santa Barbara, CA, Dec. 13-15, 2006.
94. Gordon Research Conference: Chemical Reactions at Surfaces, Ventura, CA, Feb. 11-16, 2007.
95. Physical Electronics Conference, Urbana, IL, June 19-22, 2007.
96. Pacific Coast Catalysis Society, Pasedena, CA, Nov. 2, 2007.
97. Annual Meeting of the German Physical Society, Berlin, Feb. 25-29, 2008.
98. ACS National Meeting, New Orleans, Apr. 6-10, 2008.
99. 6<sup>th</sup> Congress of the International Society for Theoretical Chemical Physics, Vancouver, BC, Canada, July 19-24, 2008.

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100. 25 Years of Biointerface Science Symposium, University of Washington, Seattle, Aug. 24-7, 2008.
101. ACS National Meeting, Philadelphia, Aug. 17-21, 2008.
102. International Symposium on Surface Science and Nanotechnology (ISSS-5), Tokyo, Japan, Nov. 9-13, 2008.
103. Catalysis Club of Chicago Lecture, Dec. 1, 2008.
104. Michigan Catalysis Society Monthly Meeting, Dec. 9, 2008.
105. ACS National Meeting, Symposium on Convergence of Theory with Experiment in Surface Chemistry, Salt Lake City, March 22-26, 2009.
106. ACS National Meeting, Olah Award Symposium, Salt Lake City, March 22-26, 2009.
107. Interdisciplinary Surface Science Conference, Reading, UK, March 30-April 2, 2009.
108. North American Meeting of the Catalysis Society, Plenary Lecture, San Francisco, June 7-12, 2009.
109. Taylor Conference on Heterogeneous Catalysis, Plenary Lecture, Cardiff Univ., UK, June 22-25, 2009.
110. ACS National Meeting, Fuel Division (Separations & Catalysis Needs for Renewable Energy Symposium), San Francisco, March 21-25, 2010.
111. ACS National Meeting, Catalysis Directorate (Madix / Stair Awards Symposium), San Francisco, March 21-25, 2010.
112. Gordon Research Conference on Catalysis, Colby Sawyer College, NH, June 27 – July 2, 2010.
113. 6<sup>th</sup> Tokyo Conference on Advanced Catalytic Science and 5<sup>th</sup> Asian Pacific Congress on Catalysis, Sapporo, Japan, July 18-23, 2010.
114. ACS National Meeting, Petroleum Division (Symposium Honoring Henrik Topsoe's Award), Boston, Aug. 22-26, 2010.
115. AVS National Meeting, Albuquerque, NM, Oct. 17-22, 2010.
116. ACS National Meeting, Petroleum Division Symposium Honoring Jeffery Bricker (Senior Director of Research, UOP) for his ACS Award for Creative Invention), Anaheim, Mar. 27-31, 2011.
117. ACS National Meeting, Fuel Division, Symposium on Nanomaterials and Nanotechnology in Fuels and energy Production, Anaheim, Mar. 27-31, 2011.
118. Catalysis Club of Chicago Spring Symposium, Naperville, IL, May 19, 2011.
119. Faraday Discussion on Gold Catalysis, Cardiff University, UK, July 4-6, 2011.
120. Europacat X, Glasgow, Scotland, August 28-Sept. 2, 2011.
121. ACS National Meeting, Surface Science for Catalysis Symposium, Denver, Aug. 28-Sept. 1, 2011. (presented by graduate student Eric Karp).
122. CaSTL Lectureship: NSF Center for Chemical Innovation on Chemistry at the Space Time Limit (CaSTL) Annual Retreat, Sept. 14, 2011.
123. American Physical Society (APS) March 2012 National Meeting symposium on Chemical Physics for New Energy, Boston, February 27-March 2, 2012.
124. ACS National Meeting, Physical Chemistry Div. Symposium on Frontiers of Catalysis, San Diego, Mar. 25-29, 2012.
125. ACS National Meeting, Joint Symposium in Honor of the 2012 Winners of the ACS Olah and Somorjai Awards, San Diego, Mar. 25-29, 2012.
126. Materials Genome Initiative Workshop on Building the Materials Innovation Infrastructure, Herbert C. Hoover Building, Wash. D.C., May 14-15, 2012.

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127. ACS National Meeting, Catalysis Div. Symposium on "Progress in Electronic and Vibrational Spectroscopy of Catalytic Materials and Reactions", Philadelphia, Aug. 19-23, 2012. (I could not make this meeting, so this was presented by my collaborator, Ye Xu from Oak Ridge National Lab.)
128. Future of Catalysis Symposium honoring Jens Norskov, Stanford, CA, Sept. 27, 2012.
129. 2012 Scientific Meeting of the Northwestern University Center for Catalysis and Surface Science: Symposium on Nanoscience of Catalysts, Oct. 22, 2012.
130. Heraeus-Seminar "Energy-related catalysis today and tomorrow: From fundamentals to applications", March 24-27, 2013, Bad Honnef, Germany.
131. ACS National Meeting, Symposium in Honor of ACS Award in the Chemistry of Materials winner Younan Xia, New Orleans, LA, April 8th, 2013.
132. ACS National Meeting, Symposium in Honor of ACS Olah Award winner Alex Bell, New Orleans, LA, April 8th, 2013.
133. ACS National Meeting, Symposium in Honor of ACS Adamson winner Ulrike Diebold, New Orleans, LA, April 8th, 2013.
134. Faraday Discussion, Introductory Lecture, Berlin, April 10-12, 2013.
135. Gordon Research Pre-Conference Seminar on Chemical Reactions at Surfaces: Panelist, Diablerets, Switzerland, April 27-28, 2013.
136. Gordon Research Conference on Chemical Reactions at Surfaces, Kick-Off Talk, Diablerets, Switzerland, April 28-May 3, 2013.
137. Keynote Lecture, North American Meeting (NAM) of the Catalysis Society, Louisville, KY, June 2-7, 2013.
138. Telluride Conference on Catalysis, Telluride, CO, July 29-Aug. 2, 2013.
139. ACS National Meeting, Oxides in Catalysis Symp. (ENFL), Indianapolis, IN, Sept. 8-12, 2013.
140. ACS National Meeting, Computational Catalysis Symp. (CATL), Indianapolis, IN, Sept. 8-12, 2013.
141. AVS National Meeting, Surface Science Symp. on Metals and Alloys, Longbeach, CA, Oct. 27-Nov. 1, 2013.
142. New York Catalysis Society, Nov. 20, 2013.
143. Philadelphia Catalysis Society, Nov. 21, 2013.
144. Workshop on New Frontiers in Sustainable Fuels and Chemicals, UC Santa Barbara, Feb. 6, 2014.
145. ACS National Meeting, Clusters in Catalysis Symp., Dallas, TX; March 16-20, 2014.
146. ACS National Meeting, Surface and Catalytic Reactions for Energy Efficiency Symp., Dallas, TX; March 16-20, 2014.
147. Western States Catalysis Club, Albuquerque, NM March 21, 2014.
148. German Physical Society Meeting, Dresden. March 30-April 4, 2014.
149. Michigan Catalysis Society, April 22, 2014, Livonia, MI.
150. Southwest Catalysis Society, April 25, 2014, Houston, TX.
151. Keynote Address: New England Catalysis Society Meeting, Worcester, MA, May 9, 2014.
152. DOE Catalysis Science Program Meeting, Annapolis, MD, July 20-23, 2014.
153. ACS National Meeting, Fundamental of Catalysis at Surfaces Symp., San Francisco, Aug. 10-14, 2014.

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154. ACS National Meeting, Advances in Molecular-Level Understanding of Surface Reactivity., San Francisco, Aug. 10-14, 2014.
155. ACS National Meeting, Symp. in Honor of Suljo Linic (Catalysis Lectureship Award), San Francisco, Aug. 10-14, 2014.
156. ACS National Meeting, Symp. in Honor of Sir David A. King, San Francisco, Aug. 10-14, 2014.
157. European Conf. on Solid Surfaces, Antalya, Turkey, Aug. 31-Sept. 5, 2014.
158. Southeast Catalysis Society, Asheville, NC, Sept. 14-15, 2014.
159. DIET 14 – International Workshop on Desorption, Interactions and Electronic Transitions at Surfaces, Monterey Bay, CA, October 13-17, 2014.
160. ACS National Meeting, Symp. on Design of Materials and Chemical Processes: the Genomic Approach, Denver, CO, March 22-26, 2015.
161. ACS National Meeting, Symp. on Surface Chemistry and Catalysis on Oxides, Denver, CO, March 22-26, 2015.
162. ACS National Meeting, Symp. on Advances in Ceria Based Catalysis, Boston, MA, Aug. 16-20, 2015.
163. SLAC and Stanford University, SUNCAT Summer School, August 24-27, 2015.
164. Pacific Coast Catalysis Society Annual Meeting, Richland, WA, Sept. 18, 2015.
165. AVS National Meeting, Medard Welch Award talk, San Jose, CA, Oct. 18-23, 2015.
166. American Institute of Chemical Engineers (AIChE) Annual Meeting, Salt Lake City, Nov. 8-13, 2015.
167. ACS National Meeting, Symposium on Elucidation of Mechanisms and Kinetics on Surfaces, San Diego, March 13-17, 2016.
168. ACS National Meeting, Symposium on Computational and experimental advances towards design of energy efficient catalysts, San Diego, March 13-17, 2016.
169. Headline invited speaker, Faraday Discussion on Designing New Heterogeneous Catalysis, April 4-6, 2016, London, UK.
170. Plenary Speaker, Centennial Celebration Symposium, University of Texas at Austin Department of Chemical Engineering, April 15, 2015.
171. Gordon Conference on Catalysis, Keynote Address, Colby Sawyer College, New London, NH, June 12-17, 2016.
172. Plenary Lecture, 16th International Congress on Catalysis (ICC 16) Beijing, China, July 3-8, 2016.
173. Humboldt Lecture, Annual Meeting of the Fritz Haber Institute, Department of Chemical Physics, Schloss Ringberg, Germany, Sept. 5, 2016.
174. Plenary Lecture, XVIII Netherlands' Catalysis & Chemistry Conference, Mar. 6-8 2017, Noordwijkerhout, The Netherlands.
175. ACS National Meeting, ACS Surface Chemistry Award Symposium in Honor of CM Friend, San Francisco, CA, Apr. 2-7, 2017.
176. ACS National Meeting, Symposium on Mechanisms and Kinetics on Surfaces, San Francisco, CA, Apr. 2-7, 2017.
177. ACS National Meeting, Symposium in Honor of GA Somorjai's 80<sup>th</sup> Birthday , San Francisco, CA, Apr. 2-7, 2017.
178. DW Goodman Symp. On Physical and Analytical Chemistry, Texas A&M University, College Station, TX, May 8-9, 2017.

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179. Plenary Lecture, European Conference on Surface Science (ECOSS-33), Szeged, Hungary, Aug. 27- Sep. 1, 2017.
180. Bonn Humboldt Award Winners Forum, Bonn, Germany, Oct. 11-14, 2017.
181. Center for Electrochemistry Workshop, Feb. 10-11, 2018, Austin, TX.
182. ACS National Meeting, New Orleans, LA, March 18-23, 2018 (**3 invited talks**)
183. 43rd David M. Mason Lectures Symposium, Honoring Prof. R. J. Madix, Stanford University, May 7, 2018
184. IUVSTA 86-ASEVA 28 workshop on Nanoscale Oxide Systems, Avila, Spain, June 2-5, 2018.
185. ACS National Meeting, Symp. On “Fundamental Understanding of Catalysis at Interfaces”, Boston, Aug. 19-23, 2018.
186. AVS National Meeting, Long Beach, CA, Oct. 21-26, 2018.
187. ACS National Meeting, Orlando, FL, Mar. 31-April 4, 2019 (**5 invited talks**).
188. PNNL Workshop on Catalytic Reactivity in Complex Environments, June 20-21, 2019.
189. Telluride Conference on Catalysis, July 20-23, 2019.
190. DOE OBES Catalysis Science PI Meeting, Gaithersburg, MD, July 24-26, 2019.
191. Gordon Research Conference on Dynamics at Surfaces, Newport, RI July 28-Aug. 2, 2019.
192. ACS National Meeting, San Diego, CA, Aug. 25-29, 2019 (**3 invited talks**).
193. ACS National Meeting, Philadelphia, March 22-26, 2020. (**3 invited talks**, cancelled due to COVID)
194. International Congress on Catalysis, Educational Workshop on Fundamentals of Catalyst Characterization, San Diego, June 14-19, 2020. (cancelled due to COVID).
195. ACS National Meeting, San Francisco, Aug. 16-20, 2020. (**4 invited talks**) (cancelled due to COVID).
196. ACS National Meeting, COLL Symp. to honor Surface Chemistry Award winner Vicki Grassian, March 21-25, 2021. (remote).
197. ACS National Meeting, Catal. Div., March 21-25, 2021. (remote).
198. ACS National Meeting, Institute for Integrated Catalysis celebrates 15 years, Atlanta, GA, Aug. 22-26, 2021 (cancelled due to COVID).
199. ACS National Meeting, Atlanta, GA, Aug. 22-26, 2021, Catalysis Division Award Symp. (my Award Talk).
200. Workshop on Interactions of Liquid Water with Catalysts, Liblice Castle, Czech Republic, Nov. 3-6, 2020, but postponed due to COVID to: September 19-22, 2021.
201. ACS National Meeting in San Diego, CA from March 20-24, 2022 (3 invited talks).
202. Spotlight Talk: Liquid Sunlight Alliance (LiSA), April 7, 2022.
203. Telluride Meeting on Catalysis, July 25-29, 2022.
204. ACS National Meeting in Chicago, IL, CATL Div., August 21-25, 2022.
205. AIChE National Meeting, Phoenix, AZ, Nov. 13-18, 2022.

### **FUTURE:**

206. ACS National Meeting, CATL Div., Indianapolis, IN, March 26-30, 2023 (Cancelled due to shoulder surgery.)
207. ACS National Meeting, COLL Div., ACS National Award for Creative Invention - Symposium in honor of Younan Xia, Indianapolis, IN, March 26-30, 2023. (Cancelled due to shoulder surgery.)

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208. ACS National Meeting, COLL Div., ACS Gabor Somorjai Award Symposium in honor of Suljo Linic, Indianapolis, IN, March 26-30, 2023. (Cancelled due to shoulder surgery.)
209. 40 Years of Surface Science and Nanotechnology (hosted by EMPA and U. Zurich), Monte Verita, Ascona, Switz., Oct. 15-20, 2023.
210. ACS National Meeting, COLL Div., Symposium in honor of Joachim Sauer, winner of the 2023 ACS Award in Surface Chemistry, San Francisco, CA, Aug. 13-16, 2023.

### **INVITED UNIVERSITY AND INDUSTRIAL SEMINARS**

1. National Bureau of Standards, 1979.
2. Los Alamos National Lab, 1979.
3. Exxon Research and Development, 1979.
4. University of Strasbourg, France, 1980.
5. University of Munich, West Germany, 1980.
6. KFA Julich, West Germany, 1980.
7. University of Texas at Austin, 1981.
8. University of Texas at Austin, 1983.
9. Lawrence Berkeley Laboratory, 1983.
10. Exxon Research and Development, 1983.
11. Stanford University (Chemical Engineering Dept.), 1983.
12. Massachusetts Institute of Technology (Surface Science Seminar), 1983.
13. Harvard University (Surface Science Seminar), 1983.
14. Sandia National Labs, 1983.
15. Cornell University, 1983.
16. University of California at Santa Barbara, Chemistry Department, 1984.
17. Shell Research and Development, Houston, 1984.
18. Union Carbide, So. Charleston, WV, 1984.
19. KFA Julich, West Germany, 1985.
20. Fritz Haber Institute of the Max Plank Gesellschaft, Berlin, West Germany, 1985.
21. California Institute of Technology, 1985.
22. Purdue University, 1985.
23. Georgia Institute of Technology, 1985.
24. Indiana University, 1985.
25. North Texas State University, 1986.
26. University of Pittsburgh, Chemistry Department, 1986.
27. Case Western Reserve University, 1986.
28. University of Missouri-Columbia, 1986.
29. General Electric Research Labs, Schenectady, NY, 1987.
30. Brookhaven National Laboratory, Upton, NY, 1987.
31. Standard Oil Research and Development, Warrensville, OH, 1987.
32. University of Illinois at Urbana, 1987.
33. University of California at Irvine (Chemistry Dept.) Feb. 24, 1988.
34. University of California at Berkeley, Lawrence Berkeley Lab, Feb. 25, 1988
35. IBM Research Abs, San Jose, CA, Feb. 26, 1988.
36. Department of Physics, University of Warwick, Coventry, ENGLAND, March 13, 1989.



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37. Department of Physical Chemistry, University of Cambridge, Cambridge, ENGLAND, March 16, 1989.
38. Department of Physics, Imperial College, London, ENGLAND, March 17, 1989.
39. Department of Chemistry, University of Washington, Seattle, WA, Feb. 14, 1989.
40. Department of Chemistry, Texas A&M University, Nov. 17, 1989.
41. Department of Chemistry, University of Texas, Nov. 18, 1989.
42. Department of Chemistry, University of Houston, Nov. 21, 1989.
43. Laboratory of Applied Physics, Technical University of Denmark, Feb. 19, 1990.
44. H. C. Orsted Institute, University of Copenhagen, Feb. 21, 1990.
45. Department of Physics, University of Aarhus, Denmark, Feb. 22, 1990.
46. Department of Chemistry, Brown University, April 27, 1990.
47. Department of Chemistry, University of California at San Diego, Jan. 1991.
48. Department of Chemistry, Oregon Graduate Institute, Beaverton, OR, Nov. 1, 1991.
49. Department of Physics, Washington State University, Pullman, Nov. 19, 1991.
50. Department of Chemical Engineering, Cornell University, Ithaca, NY, Dec. 3, 1991.
51. Department of Chemistry, Western Washington University, Bellingham, WA, May 20, 1992.
52. Department of Chemistry, University of Victoria, Canada, Feb. 11, 1993.
53. Department of Chemistry, University of Utah, Oct. 28, 1993.
54. Department of Chemistry, Brookhaven Natl. Lab, April 21, 1994.
55. University of California at Berkeley, Lawrence Berkeley Lab, Dec. 1, 1994.
56. Dept. of Chemistry, University of Southern California, March 20, 1995.
57. Dept. of Chemical Engineering, University of Washington, 1995.
58. Dept. of Chemistry, King Group, Cambridge University, England, Feb. 27, 1996.
59. Dept. of Chemistry, University of Manchester, England, Jan. 24, 1996.
60. Dept. of Chemistry, University of Reading, England, March 19, 1996.
61. Fritz Haber Institute of the Max Plank Gesellschaft, Berlin, Germany, Apr. 25, 1996.
62. ICI Katalco Research, Technology and Engineering, Billingham, Cleveland, England, Apr. 29, 1996.
63. Dept. of Physical Chemistry, Cambridge University, England, May, 1996.
64. Physics Dept., Univ. of Washington, Fall 1996.
65. Chemistry Dept., Univ. of Oregon, Feb. 27, 1998.
66. Chemistry Dept., Univ. of Texas, Mar. 12, 1998.
67. Scientific Design Co., Little Ferry, N. J., Oct. 26, 1998.
68. Dept. of Chemical Engineering, University of Washington, Nov. 16, 1998.
69. Chemistry Dept., Colorado State Univ., Nov. 19, 1998.
70. Chemistry Dept., Univ. of Colorado, Boulder, Nov. 20, 1998.
71. Sandia National Lab, Livermore, CA, Dec. 9, 1998.
72. Surface Science and Catalysis Seminar, Lawrence Berkeley National Lab, Berkeley, CA, Dec. 10, 1998.
73. Union Carbide Research Labs, So. Charleston, WV, March 19, 1999.
74. Molecular Biotechnology Departmental Seminar, Univ. of Washington, April 13, 1999.
75. Technical University of Denmark, Physics Dept., May 20, 1999 (2 talks).
76. Center for Atomic-Scale Materials Physics, Univ. of Aarhus, Denmark, May 21, 1999 (2 talks).
77. University of Wisconsin, Analytical Chemistry Seminar, Oct. 14, 1999.
78. Los Alamos Natl. Lab, May 26, 2000.

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79. UOP, July 27, 2000.
80. Texas A&M University, Chemistry Dept., Sept. 27, 2001.
81. University of Missouri-Columbia, Chemistry Dept., Sept. 28, 2001.
82. University of California at Santa Barbara, Chem. Engr. Dept., Jan. 21, 2002.
83. Northwestern Univ., Chemistry Colloquium, Feb 9, 2002.
84. Northwestern University Chemistry Dept. Colloquium, Feb. 8, 2002.
85. Univ. of California, Berkeley, Surface Chemistry / Catalysis Seminar (LBNL), Oct. 2002.
86. Cambridge University, Chemistry Department Physical Colloquium, Cambridge, England, March 4, 2003.
87. Aarhus University, Physics Dept. Seminar, Denmark, March 6, 2003.
88. Aarhus University, Nanotechnology Seminar, Denmark, March 6, 2003.
89. University College London, Chemistry Department, March 19, 2003.
90. CNRS, Campus de Luminy, Marseille, May 23, 2003.
91. Technical Univ. of Denmark, Surface Physics Department, June 13, 2003.
92. Fritz-Haber-Institute of the Max-Planck Society, Berlin, Germany, June 25, 2003.
93. University of Delaware, Chemistry Dept. Colloquium, Oct. 20, 2003.
94. University of Washington, Condensed Matter Physics Seminar, Dec. 9, 2003.
95. Sandia National Laboratory, Dec. 15, 2003.
96. Los Alamos National Laboratory, Center for Integrated Nanotechnology, Dec. 16, 2003.
97. University of Texas, Department of Chemistry Seminar, Jan. 15, 2004.
98. University of Texas, Department of Chemical Engineering Seminar, Jan. 16, 2004.
99. University of Illinois at Urbana, Chemistry Department, Feb. 2, 2004.
100. Washington University, Chemistry Dept., St. Louis, Apr. 22, 2004.
101. Southern Illinois University Carbondale, April 23, 2004.
102. Harvard University Chemistry Department Woodward Lecture, Oct. 28, 2004.
103. University of Pittsburgh Departmental Colloquium, April 7, 2005.
104. University of Ottawa, Department of Chemistry, University Lectureship, Oct. 14, 2005.
105. University of Washington, Chemistry Department, University Lectureship, Oct. 27, 2005.
106. Univ. of Florida Gainesville, Chem. Engineering Dept., April 3, 2006.
107. Univ. of California Irvine, April 11, 2006.
108. Univ. of Bochum, Germany, June 12, 2006.
109. Argonne National Lab., Chemistry Division Seminar, Oct. 9, 2006.
110. Reilly Lectureship, University of Notre Dame, 2007.
111. University of Buffalo, Chemistry Dept., May 22, 2007.
112. Beijing University, China, June 23, 2008
113. Dalian University, China, June 25, 2008
114. USTC, Hefei, China, June 26, 2008
115. Texas A&M University, Chemistry Department, April. 22, 2009.
116. University of South Carolina, H. Willard Davis Lecture, Chemistry Dept., April 24, 2009.
117. Materials Science and Engineering Dept., Univ. of Washington, Oct. 12, 2009.
118. Lawrence Berkeley Lab, Materials Sciences Div., Surface Science Seminar, Nov. 12, 2009.
119. University of California at Irvine, Chemistry Dept., Feb. 23, 2010.
120. University of Wisconsin- Madison, Chemical Engineering Dept., March 16, 2010.
121. Sandia National Lab, Physical, Chemical, and Nano Sciences Center, June 24, 2010.
122. UCLA Chemistry Department, Physical Division, Sept. 27, 2010.
123. University of Florida Chemistry Department, Nov. 23, 2010.

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124. Stanford University, Jan. 11, 2011.
125. Aarhus University, Interdisciplinary Nanoscience Center (iNANO), Denmark, May 3, 2011.
126. Ippatief Lectureship, Northwestern University, May 23, 2011.
127. Clemson University Chemistry Dept., April 12, 2012
128. University of California at Riverside, Chemistry Department Colloquium, June 6, 2012.
129. University of Illinois at Urbana-Champaign, Department of Chemical & Biomolecular Engineering, Oct. 16, 2012.
130. Northwestern University, Catalysis CSCC Seminar, Oct. 19, 2012.
131. Gerhard Ertl Lecture of the Berlin Universities, Humboldt University, Berlin. Dec. 10, 2012.
132. BASF Corporation, Iselin, NJ, Nov. 20, 2013.
133. Exxon-Mobil Research and Engineering, Clinton, NJ Nov. 21, 2013.
134. University of Houston, Dept. of Chemical & Biomolecular Engineering, Dec. 12-13, 2013.
135. University of California at Berkeley, Physical Chemistry Seminar, April 8, 2014.
136. Dow Chemical Research, Midland, MI, April 23, 2014.
137. University of Oklahoma, School of Chemical, Biological & Materials Engineering, April 24, 2014.
138. University of Colorado at Boulder, Chemistry Department Seminar, Sept. 12, 2014.
139. Indiana University, Physical Chemistry Seminar, Oct. 30, 2014.
140. Pennsylvania State Univ., Chemical Engineering Seminar, Nov. 6, 2014.
141. Harvard University, R.B. Woodward Lecture in the Chemical Sciences, Chemistry Department, April 16, 2015.
142. Washington State University, Dept. of Chemical Engineering Seminar, April 20, 2015.
143. University of Iceland, Department of Chemistry, Sept. 25, 2015.
144. University of Pittsburgh, Department of Chemical & Petroleum Engineering, Dec. 11, 2015.
145. SABIC Technology Center, Corporate R&D, Sugar Land, TX, Mar.29, 2016.
146. Fink Lecture, Georgia Institute of Technology, April 21, 2016.
147. Carnegie Mellon University, Dept. of Chemical Engineering, Nov. 29, 2016.
148. Karlsruhe Institute of Technology, Germany, GDCh Seminar, Jan. 19, 2017.
149. University of Göttingen, Germany, Physical Chemistry Institute, Jan. 26, 2017.
150. CNRS, Campus de Luminy, Marseille, France, Feb. 21, 2017.
151. Institute of Catalysis and Petrochemistry of the Spanish Council for Scientific Research, Autonomous University of Madrid, Spain, Feb. 27, 2017.
152. Leiden University, Institute of Chemistry, van Marum Colloquium, Mar. 8, 2017.
153. Physical Chemistry Colloquium, University of Marburg, Germany, March 30, 2017.
154. Fritz Haber Institute, Chemical Physics Department, Berlin, Germany, April 20, 2017.
155. Inaugural Sachtler Lecturer, Northwestern University Center for Catalysis and Surface Science, Sept. 7, 2017.
156. Technical University of Vienna, Inst. of Applied Physics, Sept. 4, 2017.
157. University of Victoria, Department of Chemistry, Victoria, BC, Canada, Oct. 2, 2017.
158. University of Michigan, Department of Chemical Engineering, Ann Arbor, Oct. 24, 2017.
159. Catalysis Center for Energy Innovation, University of Delaware, MD, March 27, 2018.
160. University of Notre Dame, Dept. of Chemical & Biochem. Engr., Nov. 9, 2018.
161. Washington State University, Dept. of Chemistry, April 15, 2019.
162. The Ohio State University, Dept. of Chemical & Biomolecular Engineering, Oct. 24, 2019.

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163. Danish Technical University, Catalysis in the Time of Coronavirus On-Line Lecture Series, CatTheory Center, Oct. 8, 2020.
164. Cornell University, Materials Science & Engineering Dept., was April 23, 2020, but rescheduled to on-line seminar on Oct. 15, 2020 due to COVID.
165. Forum of Great Minds Lecture, USTC, Hefei, China, on-line, Nov. 16, 2020.
166. EPFL Valais/Wallis Seminar, Sion, Switzerland, Nov. 11, 2020.
167. University of Central Florida, Physics Dept., April 21, 2020, postponed to April 21, 2021 due to COVID, now as university-wide "Distinguished Lecture Series in Catalysis".
168. Stanford University, Department of Chemical Engineering Colloquium, April 6, 2020, then postponed to May 10, 2021 due to COVID.
169. Rice University, Department of Chemical and Biomolecular Engineering, April 9, 2020, postponed to April 27, 2021.
170. SUNCAT Sessions Speaker and Panelist, SLAC, Stanford, CA, May 19, 2021.
171. Univ. of Calif. at Riverside, Dept. of Chem. & Environ. Engineering, May 21, 2021.
172. Iowa State University, Department of Chemical and Biological Engineering, Oct. 27, 2022.

### FUTURE:

173. Southern Illinois University at Carbondale, School of Chemical and Biomolecular Sciences, 2022-23 Neckers Lecturer, April 7, 2023.
174. Ohio State University, Frontiers in Spectroscopy Lectures, date TBD 2023
175. University of Florida, Chemical Engineering Dept., April 20, 2020, postponed to ??? due to COVID.

### **PUBLICATIONS** (Charles T. Campbell)

1. Oxygen Penetration into the Bulk of Palladium, C.T. Campbell, D.C. Foyt, and J.M. White, *J. Phys. Chem.*, 81, 491-494 (1977).
2. The Adsorption, Desorption, and Reactions of CO, O<sub>2</sub>, and NO on Rhodium Surfaces, (Dissertation), C.T. Campbell, (Univ. Microfilms, Ann Arbor, Michigan, 1979).
3. The Adsorption, Desorption, and Reactions of CO and O<sub>2</sub> on Rh, C.T. Campbell and J.M. White, *J. Catal.*, 54, 289-302 (1978).
4. Chemisorption and Reactions of Nitric Oxide on Rhodium, C.T. Campbell and J.M. White, *Appl. of Surface Sci.*, 1, 347-359 (1978).
5. The Langmuir-Hinshelwood Reaction Between Oxygen and CO on Rh, C.T. Campbell, S.-K. Shi, and J.M. White, *Appl. of Surface Sci.*, 2, 382-396 (1979).
6. Kinetics of the Oxygen Titration Reaction by CO on Rh, C.T. Campbell, S.-K. Shi, and J.M. White, *J. Phys. Chem.*, 83, 2255-2259 (1979).
7. The Carbon Monoxide Oxidation Reaction Over Rh, C.T. Campbell, S.-K. Shi, and J.M. White, *J. Vac. Sci. Technol.*, 16, 605-607 (1979).
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342. Impact of pH on Aqueous-Phase Phenol Hydrogenation Catalyzed by Carbon-Supported Pt and Rh, Nirala Singh, Mal-Soon Lee, Sneha A. Akhade, Guanhua Cheng, Donald M. Camaioni, Oliver Y. Gutiérrez, Vassiliki-Alexandra Glezakou, Roger Rousseau, Johannes A. Lercher and Charles T. Campbell, *ACS Catalysis* 9, 1120-1128 (2019).
343. Heats of Adsorption of N<sub>2</sub>, CO, Ar and CH<sub>4</sub> versus Coverage on the Zr-Based MOF NU-1000: Measurements and DFT Calculations, Graeme O. Vissers, Wei Zhang, Oscar E. Vilches, Wei-Guang Liu, Haoyu S. Yu, Donald G. Truhlar and Charles T. Campbell, *Journal of Physical Chemistry C* 123, 6586–6591 (2019). DOI: 10.1021/acs.jpcc.8b12263.
344. Origin of thermal and hyperthermal CO<sub>2</sub> from CO oxidation on Pt surfaces: The role of post-transition state dynamics, active sites, and chemisorbed CO<sub>2</sub>, Linsen Zhou, Alexander Kandratsenka, Charles T. Campbell, Alec M. Wodtke and Hua Guo, *Angewandte Chemie Int. Ed.* 58, 1 – 6 (2019) DOI: 10.1002/anie.201900565.
345. Energetics of Au adsorption and film growth on Pt(111) by single-crystal adsorption

- calorimetry, Gabriel M. Feeley, Stephanie L. Hemmingson and Charles T. Campbell, *Journal of Physical Chemistry C* **123**, 5557-5561 (2019). DOI: 10.1021/acs.jpcc.9b00018.
346. Quantifying adsorption of organic molecules on platinum in aqueous phase by hydrogen site blocking and in situ X-ray absorption spectroscopy, Nirala Singh, Udishnu Sanyal, John L. Fulton, Oliver Y. Gutiérrez, Johannes A. Lercher and Charles T. Campbell, *ACS Catalysis* **9**, 6869–6881 (2019). DOI: 10.1021/acscatal.9b01415.
347. Perspective: Kinetics of elementary thermal reactions in heterogeneous catalysis, G. Barratt Park, Theofanis Kitsopoulos, Dmitriy Borodin, Kai Golibrzuch, Jannis Neugeboren, Daniel J. Auerbach, Charles T. Campbell and Alec M. Wodtke, *Nature Reviews: Chemistry* **3**, 723-732 (2019). (invited) DOI: 10.1038/s41570-019-0138-7.
348. A Simple Bond-Additivity Model Explains Large Decreases in Heats of Adsorption in Solvents Versus Gas Phase: A Case Study with Phenol on Pt(111) in Water, Nirala Singh and Charles T. Campbell, *ACS Catalysis* **9**, 8116–8127 (2019). DOI: 10.1021/acscatal.9b01870.
349. Apparent Activation Energies in Complex Reaction Mechanisms: A Simple Relationship via Degrees of Rate Control, Zhongtian Mao and Charles T. Campbell, *ACS Catalysis* **9**, 9465–9473 (2019). DOI: 10.1021/acscatal.9b02761 (Also selected for inclusion in the *ACS Catalysis* Virtual Issue: Blurring the Lines Between Catalysis Subdisciplines.)
350. The Degree of Rate Control of Catalyst-Bound Intermediates in Catalytic Reaction Mechanisms: Relationship to Site Coverage, Zhongtian Mao and Charles T. Campbell, *Journal of Catalysis*, **381**, 53–62 (2020). DOI: 10.1016/j.jcat.2019.09.044
351. Adhesion Energies of Solvent Films to Pt(111) and Ni(111) Surfaces by Adsorption Calorimetry, John R. Rumptz and Charles T. Campbell, *ACS Catalysis* **9**, 11819–11825 (2019). DOI: 10.1021/acscatal.9b03591.
352. Rab's Bicycle: A Foundation of Chemical Reaction Dynamics, Paul B. Hopkins and Charles T. Campbell, *University of Washington ChemLetter* **37** (2), 6-11 (2019).
353. Aqueous phase catalytic and electrocatalytic hydrogenation of phenol and benzaldehyde over platinum group metals, Nirala Singh; Udishnu Sanyal; Griffin Ruehl; Kelsey Stoerzinger; Oliver Y. Gutiérrez; Donald M. Camaioni; John L. Fulton; Johannes A. Lercher and Charles T. Campbell, *Journal of Catalysis* **382**, 372–384 (2020) <https://doi.org/10.1016/j.jcat.2019.12.034> .
354. Enhanced Bonding of Pentagon-Heptagon Defects in Graphene to Metal Surfaces: Insights from the Adsorption of Azulene and Naphthalene to Pt(111), Benedikt P. Klein, S. Elizabeth Harman, Lukas Ruppenthal, Griffin M. Ruehl, Samuel J. Hall, Spencer J. Carey, Jan Herritsch, Martin Schmid, Reinhard J. Maurer, Ralf Tonner, Charles T. Campbell, J. Michael Gottfried, *Chemistry of Materials* **32**, 1041–1053 (2020). DOI: [10.1021/acs.chemmater.9b03744](https://doi.org/10.1021/acs.chemmater.9b03744)
355. Kinetic Isotope Effects: Interpretation and Prediction Using Degrees of Rate Control, Zhongtian Mao and Charles T. Campbell, *ACS Catalysis* **10**, 4181–4192 (2020). (Also selected for inclusion in the *ACS Catalysis* Virtual Issue: Blurring the Lines Between Catalysis Subdisciplines.)
356. Ni Nanoparticles on CeO<sub>2</sub>(111): Energetics, Electron Transfer and Structure by Ni Adsorption Calorimetry, Spectroscopies and DFT, Zhongtian Mao, Pablo G. Lustemberg, John R. Rumptz, M. Verónica Ganduglia-Pirovano and Charles T.

- Campbell, *ACS Catalysis* **10**, 5101–5114 (2020).
357. Catalytic Properties of Model Supported Nanoparticles, Charles T. Campbell, Nuria Lopez, and Stefan Vajda, *Journal of Chemical Physics* **152**, 140401 (2020) (3 pages). <https://doi.org/10.1063/5.0007579>
358. Energetics and Structure of Ni Atoms and Nanoparticles on MgO(100), Zhongtian Mao, Wei Zhao, Ziareena Al-Mualem and Charles T. Campbell, *Journal of Physical Chemistry C* **124**, 14685–14695 (2020). <https://dx.doi.org/10.1021/acs.jpcc.0c03468>
359. Calorimetric Metal Vapor Adsorption Energies for Characterizing Industrial Catalyst Support Materials, Wei Zhang and Charles T. Campbell, *J. Catalysis* **392**, 209–216 (2020).
360. Silver Adsorption on Calcium Niobate(001) Nanosheets: Calorimetric Energies Explain Sinter-Resistant Support, Wei Zhang, Ritesh Uppuluri, Thomas E. Mallouk and Charles T. Campbell, *J. Am. Chem. Soc.* **142**, 15751–15763 (2020).
361. Energetics of Ag Adsorption on and Adhesion to Rutile TiO<sub>2</sub>(100) Studied by Microcalorimetry, Zhongtian Mao, John R. Rumpitz, and Charles T. Campbell, *Journal of Physical Chemistry C* **125**, 3036–3046 (2021).
362. Introduction: Advanced Materials and Methods for Catalysis and Electrocatalysis by Transition Metals, Younan Xia, Charles T. Campbell, Beatriz Roldan Cuenya and Manos Mavrikakis, *Chemical Reviews* **121**, 563-566 (2021).
363. Predicting a key catalyst-performance descriptor for supported metal nanoparticles: metal chemical potential, Zhongtian Mao and Charles T. Campbell, *ACS Catalysis* **11**, 8284–8291 (2021).
364. Correction to: “Predicting a key catalyst-performance descriptor for supported metal nanoparticles: metal chemical potential”, (Zhongtian Mao and Charles T. Campbell, *ACS Catal.* 2021, 11, 8284–8291) Zhongtian Mao and Charles T. Campbell *ACS Catalysis* **11**, 13744–13744 (2021).
365. Nature of the active sites on Ni/CeO<sub>2</sub> catalysts for methane conversions, Pablo G. Lustemberg, Zhongtian Mao, Agustín Salcedo, Beatriz Irigoyen, M. Verónica Ganduglia-Pirovano and Charles T. Campbell, *ACS Catalysis* **11**, 10604–10613 (2021).
366. Analysis and prediction of reaction kinetics using the degree of rate control, Charles T. Campbell & Zhongtian Mao, *Journal of Catalysis* (invited, for special issue in honor of Michel Boudart), **404**, 647–660 (2021). (<https://doi.org/10.1016/j.jcat.2021.10.002>).
367. Effects of Solvents on Adsorption Energies: a General Bond-Additivity Model, James Akinola, Charles T. Campbell, and Nirala Singh, *J. Physical Chemistry C* (invited for special issue: 125 Years of The Journal of Physical Chemistry) **125**, 24371–24380 (2021) (<https://doi.org/10.1021/acs.jpcc.1c06781>).
368. Acetonitrile Adsorption and Adhesion Energies onto the Pt(111) Surface by Calorimetry, Griffin Ruehl, S. Elizabeth Harman, Líney Árnadóttir and Charles T. Campbell, *ACS Catalysis* **12**, 156–163 (2022). <https://doi.org/10.1021/acscatal.1c04622>
369. Influence of Adhesion on the Chemical Potential of Supported Nanoparticles as Modeled with Spherical Caps, Philipp N. Plessow and Charles T. Campbell, *ACS Catalysis* **12**, 2302–2308 (2022) <https://pubs.acs.org/doi/10.1021/acscatal.1c04633>.
370. Adhesion Energies of Liquid Hydrocarbon Solvents onto Pt(111), MgO(100), Graphene and TiO<sub>2</sub>(110) from Temperature Programmed Desorption Energies,” John R. Rumpitz and Charles T. Campbell, *J. Physical Chemistry C* **125**, 27931–27937 (2021). (Invited for special issue: Cynthia Friend Festschrift.) <https://doi.org/10.1021/acs.jpcc.1c08949>.

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371. Size-Dependent Adsorption and Adhesion Energetics of Ag Nanoparticles on Graphene Films on Ni(111) by Calorimetry, John R. Rumpitz, Zhongtian Mao and Charles T. Campbell, *ACS Catalysis* **12**, 2888–2897 (2022). <https://doi.org/10.1021/acscatal.1c05589>
372. Energetics of Adsorbed Formate and Formic Acid on Cu(111) by Calorimetry, Griffin Ruehl, S. Elizabeth Harman, Olivia Gluth, David LaVoy and Charles T. Campbell, *ACS Catalysis* **12**, 10950–10960 (2022). <https://doi.org/10.1021/acscatal.2c02608>
373. Size-Dependent Energy of Ni Nanoparticles on Graphene Films on Ni(111) and Adhesion Energetics by Adsorption Calorimetry, John R. Rumpitz, Kun Zhao, Jackson Mayo and Charles T. Campbell, *ACS Catalysis* **12**, 12632–12642 (2022). <https://doi.org/10.1021/acscatal.2c02765>
374. Adsorption and Adhesion Energies of *n*-Decane on the Pt(111) Surface by Calorimetry, Elizabeth Harman, Griffin Ruehl and Charles T. Campbell, *Surface Science* 726 (2022) art. no. 122166 (4 pages). <https://doi.org/10.1016/j.susc.2022.122166>
375. Size Dependent Energy and Adhesion of Pd Nanoparticles on Graphene on Ni(111) by Pd Vapor Adsorption Calorimetry, Kun Zhao, Nida Janulaitis, John R. Rumpitz and Charles T. Campbell, *ACS Catalysis* **13**, 2670–2680 (2023). <https://doi.org/10.1021/acscatal.2c06343>
376. Low Energy Ion Scattering Intensities from Supported Nanoparticles: The Spherical Cap Model, Kun Zhao, Daniel J. Auerbach, and Charles T. Campbell, *J. Physical Chemistry C* (submitted).

### **PATENTS - COMMERCIALIZED**

1. U.S. Patent No. 4,985,657, January 15, 1991: “High Flux Ion Gun Apparatus and Method for Enhancing Ion Flux Therefrom”, C.T. Campbell. Commercialized in ion guns sold by LK Technologies, Bloomington, IN.

### **PATENTS - OTHERS**

1. U.S. Patent No. 8,349,761 B2, Jan. 8, 2013: “Dual-Oxide Sinter Resistant Catalyst”, Y. Xia, Y. Dai, B. Lim, C. T. Campbell, B. A. Grayson and P. T. Fanson (with Toyota Research, USA).

### **Ph.D. STUDENTS SUPERVISED**

<u>Name</u>	<u>Thesis Topic</u>	<u>Date Degree Granted</u>
Rodriguez, Jose' A.	Interaction of Single Molecules with Cu Pt, Ag and ZnO Surfaces ( now a staff member at Brookhaven Natl. Lab)	1988 (I.U.)
Henn, Fredrick C.	Reactions of Simple Molecules on Bi/Pt(111) (now with Omicron, Inc.)	1991 (I.U.)
Campbell, Joseph M.	Mechanistic Studies of Water-Gas Shift and Methanol Synthesis over Cs/Cu(110) (Now staff member at Helsinki University of Technology, Center for Chemical Analysis, FINLAND)	1991 (I.U.)
Domagala, Melanie	The Use of Bismuth Adatoms for Investigating the Surface Chemistry of Adsorbed Hydrocarbons on Pt(111) (now with DEA lab in Chicago)	1993
Frydman, Arnaldo	XPS, TPR and Catalytic Characterization of Co/Rh Bimetallic Catalysts on Niobia Supports (now w/ H Power, Inc., Montreal, Canada)	1995 (URJ)

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Frei, Nathan	Adsorption Microcalorimetry	deceased 1996
Gamble, Lara J.	Organofunctionalization of Oxide Surfaces with Alkoxysilanes: Model Studies on TiO <sub>2</sub> (110) (now w/ Zyomyx, Inc., Hayward, CA)	1997
Yoshihara, Jun	Model Cu/ZnO Catalysts (now w/ Mitsubishi Gas Chemical, Japan)	1997
Jung, Linda	Sensor Surfaces (now w/ Zyomyx, Inc., Hayward, CA)	1999
Carlos Andre de Perez	Metals on Oxides (U.Rio de Janiero, Co-advised with Martin Schmal)	1999
Lu, Hongbo B. (Bioengr.)	Surface Functionalization / Biosensors / Protein Adsorption on Hydroxyapatite (now w/ Zyomyx, Inc., Hayward, CA)	2000
Starr, David E.	Adsorption Microcalorimetry (now at Lawrence Berkeley Lab)	2001
Parker, Stephen C. (Physics,)	Sintering kinetics of metal nanoparticles on oxides (now Professor & Chair of Natural Sciences, St. Martin's University, Lacey, WA)	2001
Grant, Ann W.	Metals on Oxides (Now on permanent staff at Volvo Research Labs)	2001
Ajo, Henry M.	Adsorption microcalorimetry of hydrocarbons on Pt(111) (Now a Postdoc at U. Minn.)	2003
Jennifer Shumaker Parry (and Nanotech)	Surface Plasmon Resonance Microscopy Studies of Protein – DNA Interactions (now an Assistant Prof. at U. Utah)	2003
Ngo, Lien T. (and Nanotech)	Catalysis and sintering studies of metal particles on oxides (Now a postdoc in Ireland.)	2004
Diaz, Steven	Adsorption Microcalorimetry of Metal Binding to Oxides (now at Intel)	2005
Xu, Lijun	Theoretical Studies of Metal Nanoparticles on Oxides (co-advised with Hannes Jonsson) (Now at Univ. Texas Austin as postdoc.)	2006
Stephen L. Tait, Jr. (Physics)	Chemical reactivity and sintering of Pd nanoparticles on MgO(100) and Al <sub>2</sub> O <sub>3</sub> (0001). (Now a group leader in Klaus Kern's group at Uni. Stuttgart, Germany)	2005
Jason Farmer	Adsorption calorimetry to probe metal nanoparticles. His dissertation was selected as best dissertation from the University of Washington for 2010 from all areas of mathematics, physical sciences and engineering , and thus it was the University's nominee for the Council of Graduate Schools Distinguished Dissertation Award. Now at Intel.	2010
Wanda Lew	Direct measurements of energetics of molecules adsorbing on Pt(111) using single crystal microcalorimetry	2011
Eric Karp (Chemical Engineering)	Energetics of Adsorbed Catalytic Intermediates on Pt(111) Surfaces. Now at NREL.	2012
Jason Sellers	Adsorption and Thin-Film Adhesion on Single-Crystalline Surfaces: Enthalpies, Entropies, and Kinetic Prefactors for Surface Reactions	2013
James Sharp	Metal / Organic and Metal / Inorganic Interfaces: Interfacial Bond Energies, Structure and Energy- Level Alignment	2014
Trent Silbaugh (Chemical Engr.)	Thermodynamics and Kinetics of Elementary Surface Reaction Steps in Catalysis by Single Crystal Adsorption Calorimetry	2014

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Chris Wolcott (Chemical Engineering)	Energetics of Elementary Steps in Catalysis and Their Use to Search for New Catalysts	2014
Trevor James	Metal Adsorption Calorimetry on Single Crystal Oxide Surfaces. Now at Sonata Materials (ALD research) in Connecticut	2016
James Lownsbury (Chem. Engineering)	Now at Maxim Integrated, Beaverton OR	2016
Stephanie Hemmingson	Metal Adsorption Calorimetry on Single Crystal Oxide Surfaces. Now at Maxim Integrated, Beaverton OR	2016
Spencer J. Carey	Energetics of Catalytic Intermediates on Ni(111) by Calorimetry: Empirical Trends and Benchmarks for Quantum Theory	2018
Wei Zhang	Now with KLA-Tencor Corp.	2020
Zhongtian Mao	Now with Intel.	2020
Griffin Ruehl (Chemical Engineering)	Now with Serán Biosciences, Bend, OR	2022
John R. Rumpitz (ChemE)	Now with Intel.	2022
Elizabeth Harman	Now with TerraPower	2022
Nida Janulaitis (Chem Engineering)		future

### M.S. STUDENTS SUPERVISED

<u>Name</u>	<u>Thesis Topic</u>	<u>Date Degree Granted</u>
Dalton, P.J.	Dehydrogenation Reactions and Ensemble Requirements on Bi/Pt(111)	1987
Madison, R.	Bismuth Coadsorption with Hydrocarbons on Pt(111)	1990
Davidson, J.	The Coadsorption of Cyclic Hydrocarbons and Cesium on Pt(111)	1991
Musgrove, Jana	Adsorption Microcalorimetry, M.S. in Chemistry	2000
Musgrove, Jana	Computer Interfacing to Calorimetry Apparatus, M.S. in Applied Physics	2002
Soren Pedersen	Metal nanoparticles supported on ceria: reactivity and STM studies	2006
Inge Mygind Jensen	Transient kinetic studies of elementary step kinetics in catalytic reactions for H <sub>2</sub> production	2007
Lucas Cameron (Chemical Engineering)	Elucidating the Reverse Water Gas Shift Mechanism on Platinum by Comparison to the Rate of Carbon Dioxide Dissociation	2008
Gabriel M. Feeley	Cu and Au Adsorption Energies on Pt(111)	2015
Sawyer Morgan (Chemical Engineering)	Energetics of Formic Acid Conversion to Adsorbed Formates on Ni(111) by Transient Calorimetry	2016
Jackson T. Mayo	Cal3 research (now at Univ. of Arizona, PhD student)	2021

### UNDERGRADUATE (and HIGH SCHOOL) STUDENTS SUPERVISED IN RESEARCH

<u>Name</u>	<u>Major</u>	<u>Dates</u>
Anthony Diaz	Chemistry (now a professor at Central Washington University)	1990
Jay Hong	Chemistry	1990
Eric Zimmerman	Electrical Engineering	1990

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David Lyons	Architecture	1991
Dae Hwan Kim	Electrical Engineering	1992
Michele Mak	Chemical Engineering	1993
Arkan Kayihan	Chemical Engineering	1993
Angella McFadden	Chemical Engineering	1993
Amy Schumacher	Chemistry	1994
Adam Schaffer	Chemistry	1994
Cheryl Dee	Chemical Engineering	1994-5
A. Esposito	Chemistry	1995
Ann Grant	Chemistry	1995
Andrew Jamieson	Chemistry (MIT)	1996, 1997
Chris Brugos	Biochemistry	1996-1997
Robert Bowman	Chemical Engineering	1997
Sarah Lehto	Chemistry (Whitman College)	1998
Jaime Jimenez	Chemistry	1999
Brian Johnson	undecided	1999-2000
Carsten Stegelman	Physics, Aalborg University Esbjerg, Denmark	summer 2000
Siobhan Quinn	Chemical Engineering	1999-2000
Aaron Lewis	Bioengineering	2000-present
Matthew Stavis	Chemistry (Oberlin College), NSF REU Awardee	2001
Matthew Gratt	Mercer Island High School (won 2 <sup>nd</sup> place Washington State Research Science champion, 2003, based on work in my lab)	2001
Aaron Lewis	Bioengineering	2001-2
David Moilanen	Physics and Chemistry (Mary Gates Fellowship). Went on to grad school at Stanford Univ., Chemistry Dept.	2002-
David Sunderland	Chemistry and Biochemistry	2002
Hsin-Pin Lin	Chemistry	2003
Gina Fridley	Lakeside High School	2003
Libby Heeb	Chemistry	2003-4
Paul Goetsch	Chemistry (full time summer 2005- went on to grad school)	2004-5
Lindsay Merte	Chemistry and Physics	2004
Lynell R. Skewis	Chemistry	2004-5
Kelly Stecker	Chemistry	2005-6
Caitlin Leverson	Roosevelt High School (got paid)	summer 2006
Griffin Canning	Chemistry	summer-fall, 2007
Alex Tanielian	Physics and Chemistry	2007-8
Han-Ching (Joyce) Chiu	Chemistry and Biochemistry	2007-8
Diane Lancaster	Chemistry (now in grad school, U. Wisconsin)	2008-9
Carolyn Schoenbaum	Physics and Chemistry	2008-9
(Gates Fellowship)	(now in grad school, U. Colorado)	
Chelsea Hess	Chemistry	2009-10
Eric Manley	Chemistry	Summer 2010
(Carleton College)		
Linda Youn	Biology and International Studies	2009-10
Hunter Sismaet	Chemistry	2010-11
Jennifer (Hyun Joo) Hwang	Chemistry	2010-11
Evan Nelson	Chemistry and Electrical Engineering double major	2011-3

## CHARLES T. CAMPBELL

Trevor Johnston	Honors Biochemistry major (worked at the ISB with Lee Hood)	2011-12
Timothy Large	Triple major: Physics, Math and Chemistry (Won award. Went to Grad School at UC Boulder)	2011-13
Amanda Newill	Chemistry	2012
Aaron Azose	Undeclared	2012
Sally Turner	Chemistry (shared Cross Award)	2013
Evan Jennings Mann	Chemistry (Mary Gates Research Scholarship: 2014).	2013-14
Ashley Tilson	Chemistry	2013-14
Amilla Frehner	Chemistry	2014-15
Samuel Hwang	Chemical Engineering	2014-15
Minako Goh	Chemistry	2014
Rogelio Valdez	Chemistry	2014
Naomi Miyake	Chemistry (now pursuing PhD in ChemE with R. Davis, U. VA)	2015-16
Mitchell E. Kaiser	Chemistry	2016
John Ehren Eichler	Chemistry (working on Cal1) (now at UT ChE w CB Mullins)	2016-17
Kuan Chen	Chemistry (working on Cal2)	2016-17
Ziareena Al-Mualem	Chemistry (Cal3) (now at UT Austin)	2017-19
Gregory Arps	Chemical Engineering (Cal2)	9/2017-19
Graeme O. Vissers	Chemistry (Vilches) (in NYU Comput. Biology PhD program)	9/2017-3/19
Max F. Steiner	Chemical Engineering (Cal3)	3/2018-6/18
Brayden A. Miranda	Chemistry (Cal2) (UW Pharmacy Doctoral Program)	3/2019-9/19
Sharon (MengJun) Lin	BioChemistry (Cal3)	9/2019-3/2020
Klaiten Kermoade	BioChemistry (Cal2)	1/2020-6/2020
Jackson T. Mayo	Chemistry (Cal3)	3/2020-9/2020
Alison Snyder	Chemistry (Cal2)	3/2020-2021
Olivia Gluth	Chemical Engineering (Cal2)	9/2020-6/2022
David LaVoy	Chemistry (Cal2)	3/2021-6/2022
Shota Hasegawa	Chemistry (Cal3)	3/2022-
Zachary Bachler	Chemistry (Cal3)	5/2022-

## **POSTDOCTORAL ADVISEES**

<u>Name</u>		<u>Dates</u>
Mark Paffett	Ph.D. from Cal. Tech., now staff member at Los Alamos N. L.	1984-85
Karen Daube	Ph.D. from M.I.T., now staff member: General Electric Res. Labs	1985-86
Savaas Seimanides	PhD at Boston University, now in Greece	1987
Junji Nakamura	Japan, now Professor at Tskuba University	1988-89
Mark Bussell	Ph.D. from Berkeley, now a Prof. at Western Washington University	1990
Karl-Heinz Ernst	PhD at Freie Uni. Berlin, Postdoctoral Fellowship from Deutsch Forschungs Gemeinshaft (now staff member at EMPA, Switz.)	1990-91
Markus Hugenschmidt	PhD at Uni. Bonn, Feodor Lynen Fellowship of Alex. Von Humboldt Foundation (now with company in Munich, Germany)	1991-92
Audunn Ludviksson	Ph.D. from U.C. Santa Barbara; now at U. of New Mexico	1992-93
Ruiming Zhang	Ph.D. from Univ. of Illinois at Urbana	1992
Mark Newton	Ph.D. from Univ. Liverpool, England; now at ETH Zurich	1993
Todd Stuckless	Ph.D. from U. Toronto, Canada; now Assist. Prof. at Univ. of British Columbia	1994-97
Dan Bald	Ph.D. from Princeton University now at Intel in Calif	1996-99
Victor Bondzie	Ph.D. in Physics, Univ. of Maine, now at UC Riverside (Pdoc)	1997-99



## CHARLES T. CAMPBELL

Jeffrey T. Ranney	Ph.D. in Chemical Engineering , U. Michigan (now an Engineer for Harris Group, Seattle, WA)	1998-2000
Huilin Zhou	Ph.D. in Chemistry, Stanford University (now on faculty of Pharmacy at UC San Diego)	1998-99
Jane H. Larsen (now Nielsen)	PhD in Physics, Technical University of Denmark (now Professor of Physics at the Technical Univ. of Denmark)	1999-00
Hyeran Ihm	PhD at U. Texas at Austin, TX (Mike White's gp.)	2000-2003
Louis Nelen	PhD at U. Missouri, Columbia, MO	2000-01
Hadi Zareie	PhD in Bioengineering at Hacettepe U., Turkey	2001-2002
Maria Smedh	Ph.D. in Physics at Lund University, Sweden	2001-2003
Gibum Kim	PhD at Texas A&M University (Paul Cremer's gp.)	2002-2005
Partho Bera	PhD at Indian Institute of Science, Bangalore, India (M.S. Hegde's gp.)	2003-5
Junfa Zhu	Now a Professor at Univ. of Science and Technology of China (USTC), Hefei, China (where he got his PhD). Had done prior postdoc at Uni. Erlanger, Germany (H-P. Steinrueck's gp.)	2003-7
Michael Gottfried	Now Professor at Univ. of Marburg, Germany. PhD at Freie University Berlin, Germany (Klaus Christmann gp.) (Fyodor Lynnén Awardee / Alexander von Humboldt Foundation)	2003-4
Jonathan Harris	PhD at Cambridge University, England (David King's group)	2004-5
Simon Penner	PhD at University of Innsbruck, Austria (Konrad Hayek's gp.) (Postdoctoral Fellowship Awardee / Austrian Science Foundation) Now Senior Scientist at University of Innsbruck.	2004-5
Victor M. Atuzar Aguilar	PhD at National Polytechnic Institute, Mexico City (Fulbright Scholar).	2004-5
Ebbe Kruse Vestegaard	PhD at Aarhus Univ., Denmark (F. Besenbacker's gp.)	2004-6
Nancy Ruzycki	PhD at Tulane Univ. (Ulrike Diebold gp.)	2005-6
Ole Lytken	PhD at Technical University of Denmark (Ib Chorkendorff gp.) Now at Uni. Erlangen	2006-8
Jack Baricuatro	PhD at Texas A&M (now at Cal Tech)	2006-7
Matthew C. Crowe	PhD at Univ. of Texas	2008-10
Yunxi Yao	PhD at Dalian Institute of Chemical Physics (Bao's group)	2009-10
Yong Yang	PhD at UC Santa Barbara	2009-11
Isabel X. Green	PhD at U. Virginia (John Yates' group), now Assistant Professor at Illinois State Univ., Dept. of Chemistry	2012-13
Iván Santos López	PhD at Universidad Autónoma de San Luis Potosí, Mexico, CONACyT Postdoctoral Fellowship from Mexico.	2014-15
Wei Zhao	PhD at U. Erlangen in Germany, MS at USTC in China	2015-present
Nirala Singh	PhD in Chem Engr at UC Santa Barbara (with Eric McFarland)	2015-17
Kun Zhao	PhD in École Polytechnique Fédérale de Lausanne (EPFL), Switz.	2020-

### **VISITING SENIOR SCIENTISTS SUPERVISED**

<u>Name</u>		<u>Dates</u>
Dr. Giuliano Moretti	(U. "La Sapienza", Roma, Italy) – NATO Fellowship	1990
Teresa Evans	U. Manchester, PhD student under Geoff Thornton	1997
Karsten Stegelman	Aalborg University Esbjerg, Denmark	2000
Dr. Noah Shamir	Physics Dept., Nuclear Res. Center- Negev, Beer Sheva, Israel	2002-3
Prof. Ronald Imbihl	Physical Chemistry Department, Univ. Hannover, Germany	2002-3

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Dr. Ricardo Chimentao	Rovira i Virgili University – Spain	2005-6
Dr. Swetlana Schauer Schauer	Fritz Haber Institute of the Max Planck Society, Berlin, Germany	April-July, 2007
Fabian Bebensee	University of Erlangen, Germany (Michael Gottfried's group)	June-Sept., 2007
Dr. Noah Shamir	Physics Dept., Nuclear Res. Center- Negev, Beer Sheva, Israel	2007-8
Elisabeth Zillner	University of Erlangen, Germany (Michael Gottfried's group)	Jan. –May, 2008
Dr. Noah Shamir	Physics Dept., Nuclear Res. Center- Negev, Beer Sheva, Israel	2007-8
Prof. Michael Gottfried	Chemistry, Univ. Erlangen, Germany	summer 2008
Prof. Falko Netzer	Physics, Univ. Graz, Austria	summer 2008
Prof. Whikun Yi	Chemistry, Hanyang Univ., Seoul, Korea	2009-10
Prof. Vladimir Matolin	Physics Dept., Charles University, Prague, Czech Republic	summer 2008, 2009
Prof. Javier B. Giorgi	Chemistry Dept., University of Ottawa	2013
Prof. Yuanyuan Ma	Xi'an Jiaotong University, Frontier Institute of Science and Technology (FIST), China	2015-2016
Prof. Yongquan Qu	Xi'an Jiaotong University, FIST, China	summer 2015
Prof. Linhai Duan	Professor, Liaoning Shihua University, China	2015-2016
Prof. Ronald Imbihl	Physical Chemistry Department, Univ. Hannover, Germany	2012-13
Dr. Shawn Lin	Visiting professor from National Taiwan University of Science and Technology	2012
Dr. Tsuyoshi Ito	Hitachi Research, Japan	2012-13
Prof. Yongquan Qu	Frontier Institute of Science and Technology Xi'an Jiaotong University	Summer 2015
Prof. Yaun Yaun Ma	Frontier Institute of Science and Technology Xi'an Jiaotong University	2015-16
Prof. Linhai Duan	Liaoning Shihua University, China	2016
Prof. Junfa Zhu	USTC (University of Science and Technology of China), Hefei	2016-7
Azizeh Farajallah	Chemistry Faculty, Cascadia College, Bothell, WA (Clean Energy Institute "Bridge to Research" Program)	Summer 2018
Líney Árnadóttir	Associate Professor of Chem. Engineering, Oregon State Univ.	2019-20

### **VISITING TEACHERS FROM UNDERGRADUATE INSTITUTIONS SUPERVISED**

Dr. Azizeh Farajalla, Chemistry Faculty, Cascadia College, Bothell, WA. Funded through the UW Clean Energy Institute's "Clean Energy Research Experience for Teachers" Program to do research in our lab in the Summer of 2018.