

Jingguang G. Chen (Curriculum Vitae)

Current Positions: Thayer Lindsley Professor of Chemical Engineering,
Columbia University, New York, NY 10027
Senior Chemist, Chemistry Department, Brookhaven National Lab

Positions Held:

2012 – Present: Thayer Lindsley Professor of Chemical Engineering, Columbia University
2012 – Present: Joint Appointment at Chemistry Department, Brookhaven National Lab
2013 – Present: Guest Professor, Chemical Engineering, Tsinghua University, China
2012 – Present: Adjunct Professor, Chemical Engineering, University of Delaware
2008 – 2012: Claire D. LeClaire Professor of Chemical Engineering, University of Delaware
2009 – 2012: Co-Director, Energy Frontier Research Center on Biomass Conversion
2005 – 2012: Professor of Chemistry (courtesy appointment), University of Delaware
2008 – 2010: Interim Director, University of Delaware Energy Institute
2000 – 2007: Director, Center for Catalytic Science and Technology (CCST)
2002 – 2007: Professor of Chemical Engineering, University of Delaware
2002 – 2005: Professor of Materials Science and Engineering (courtesy appointment)
1998 – 2001: Associate Professor of Materials Science and Engineering and Chemical Engineering, University of Delaware
1994 – 1998: Spokesperson for Exxon U1A Beamline at Brookhaven National Laboratory
1990 – 1998: Staff Scientist, Exxon Corporate Research Laboratory, Annandale, New Jersey

Selected Awards:

Robert Burwell Lectureship in Catalysis, North American Catalysis Society (2017)
Zhang Dayu Lectureship, Dalian Institute of Chemical Physics (2017)
George Olah Award in Hydrocarbon/Petroleum Chemistry, American Chemical Society (2015)
Giuseppe Parravano Memorial Award in Catalysis, Michigan Catalysis Society (2015)
Fellow, American Chemical Society (2013)
Herman Pines Award in Catalysis, Chicago Catalysis Club (2011)
Excellence in Undergraduate Advising and Mentoring, University of Delaware (2011)
Excellence in Catalysis Award, New York Catalysis Society (2008)
Fellow, American Vacuum Society (2008)
Excellence in Catalysis Award, Philadelphia Catalysis Club (2004)
Alexander von Humboldt Postdoctoral Fellow (Germany, 1988 – 1989)
Leybold-Heraeus Award (Leybold-Heraeus Corporation, 1987)
Russell and Siguard Varian Fellow (American Vacuum Society, 1986)
Graduate Student Award (American Vacuum Society Conference, 1986)
Andrew W. Mellon Predoctoral Fellow (University of Pittsburgh, 1985 – 1987)
USA-China Chemistry Graduate Program Fellowship (1982 – 1984)

Editorial Boards:

Associate Editor, *ACS Catalysis* (2016 – present)
Associate Editor, *Applied Surface Science* (2011 – 2015)
Editorial Board, *Surface Science Reports* (2004 – 2011)
Editorial Advisory Board, *Acta Physico-Chimica Sinica* (2009 – present)
Editorial Advisory Board, *Chinese Journal of Catalysis* (2007 – present)
Editorial Advisory Board, *Encyclopedia of Surface and Colloid Science* (2004 – 2008)
Editorial Advisory Board, *Surface Science* (2001 – 2003)
Editorial Advisory Board, *Langmuir* (1998 – 2000)

Selected Service in Catalysis and Energy Communities:

Member, DOE Basic Energy Sciences Advisory Committee (BESAC) (2017 – 2020)
Member: Council for DOE/BES Chemical and Biochemical Sciences (2012 – 2016)
USA Representative, Board of International Association of Catalysis Societies (2016 – Present)
Director-at-Large: North American Catalysis Society (2005 – Present)
Co-Founder and Team Leader: Synchrotron Catalysis Consortium for DOE (2005 – Present)
Co-Chair: DOE Chemical Sciences Workshop on N₂ Activation (2016)
Co-Chair: DOE/BES Roundtable on Sustainable Ammonia Synthesis (2016)
Co-Chair: DOE/BES Catalysis PIs Meeting (2015)
Chair: Catalysis Division of American Chemical Society (2014 – 2015)
Director-at-Large: Catalysis Division of American Chemical Society (2008 – 2012)
Executive Committee: Catalysis and Reaction Engineering Division of AIChE (2009 – 2012)
Executive Committee: Surface Science Division of American Vacuum Society (2008 – 2010)
Advisory Board: Photon Sciences Division of BNL (2013 – Present)
Advisory Board: DOE Center for Functional Nanomaterials (2007 – 2011)
Advisory Board: DOE Energy Frontier Research Center at LSU (2009 – 2011)
Catalysis Secretariat: American Chemical Society (2006 – 2007)
Elected Chair: Philadelphia Catalysis Club (2004)
Elected Chair: Gordon Research Conference on Catalysis (2002)

Education and Training:

1988 - 1989	Alexander von Humboldt Postdoctoral Fellow Forschungszentrum-Julich, Germany; Advisor: Harald Ibach
1983 - 1988	Andrew W. Mellon Pre-doctoral Fellow University of Pittsburgh, Ph.D. Chemistry; Advisor: John T. Yates,
1978 - 1982	B.S. Chemistry Nanjing University, China

Highlights of Publications and Patents:

- 14,000+ total citations (57 *h-index*)
- 21 United States patents issued
- Publication [#334] was selected as cover in *Energy & Environ. Sci.*
- Publication [#331] was selected as cover in *Chem. Soc. Rev.*
- Publication [#330] was reported in *Chemical & Engineering News* in April 2015
- Publication [#316] was designated as “hot paper” and quoted in *ChemViews*
- Publication [#310] was selected as *ACS Editors' Choice*
- Publication [#302] was selected as Frontispiece of *Angew. Chem. Int. Ed. in Oct. 2015*
- Publication [#295] was quoted in many media outlets, including *Newsworks*
- Publication [#275] was designated as “hot paper” in *Angew. Chem. Int. Ed.*
- Publication [#268] was quoted in many media outlets, including *Science Daily*
- Publication [#257] was most down-loaded article in *J. Catalysis* in June 2013
- Publication [#250] was invited review on correlating model surfaces with supported catalysts in *Chemical Reviews*
- Publication [#248] was Invited Perspective on synchrotron techniques for catalysis
- Publication [#236] was highlighted in *Chemical & Engineering News* in January 2012
- Publication [#230] was Invited Perspective on low cost electrocatalysts
- Publication [#223] was selected as front cover of *Angew. Chem. Int. Ed.* in July 2011

- Publication [#209] was selected as front cover of *Angew. Chem. Int. Ed.* and highlighted in *Angewandte Chemie* press release in October 2010
- Publication [#200] was highlighted in *Nature Publications* press release in May 2010
- Publication [#171] was selected as front cover of *Angew. Chem. Int. Ed.* and highlighted in *Angewandte Chemie* press release in September 2008
- Publication [#165] was selected as front cover of *ChemSusChem* in 2008
- Publication [#161] was Top Cited Article (2005-2010) in *Surface Science Reports*
- Publication [#126] was invited review on surface chemistry of metal carbides in *Chemical Reviews*
- Publication [#117] has been cited over 500 times for fundamental insights of electronic and chemical modification of subsurface bimetallic monolayers
- Publications [#94, 95] were featured in *News of the Week in Chemical & Engineering News* in February 2002
- Publication [#57] was invited review for NEXAFS analysis of transition metal compounds
- Publication [#48] was invited review on chemical properties of metal carbides and nitrides in *Chemical Reviews*

United States Patents:

- 1 “Selective Opening of Five and Six Membered Rings”, S. Hantzer, M.S. Touvelle and J.G. Chen, United States Patent, 5,811,624 (1998).
- 2 “Desulfurization and Aromatic Saturation of Feedstream Containing Condensed Refractory Organosulfur Heterocycles and Aromatics”, D.P. Klein, M.S. Touvelle, E.S. Ellis, C.W. Hudson, S. Hantzer, J.G. Chen, D.E.W. Vaughan, J.J. Schorfheide, W.C. Baird, G.B. McVicker, United States Patent, 5,925,239 (1999).
- 3 “Desulfurization and Ring Opening of Petroleum Streams”, G.B. McVicker, J.J. Schorfheide, W.C. Baird, Jr., M.S. Touvelle, M. Daage, D.P. Klein, E.S. Ellis, D.E.W. Vaughan and J.G. Chen, United States Patent, 5,928,498 (1998).
- 4 “Desulfurization Processes for Refractory Organosulfur Heterocycles”, W.C. Baird, Jr., G.B. McVicker, J.J. Schorfheide, D.P. Klein, S. Hantzer, M. Daage, M.S. Touvelle, E.S. Ellis, D.E.W. Vaughan and J.G. Chen, United States Patent, 5,935,420 (1999).
- 5 “Desulfurization and Ring Opening of Petroleum Streams”, G.B. McVicker, J.J. Schorfheide, W.C. Baird, Jr., M.S. Touvelle, M. Daage, D.P. Klein, E.S. Ellis, D.E.W. Vaughan and J.G. Chen, United States Patent, 6,103,106 (2000).
- 6 “Desulfurization of Petroleum”, G.B. McVicker, J.J. Schorfheide, W.C. Baird, Jr., M.S. Touvelle, M. Daage, D.P. Klein, E.S. Ellis, D.E.W. Vaughan and J.G. Chen, United States Patent, 6,193,877 (2001).
- 7 “Desulfurization of Petroleum Streams Containing Condensed Ring Heterocyclic Organosulfur Compounds”, D.P. Klein, M.S. Touvelle, E.S. Ellis, J.G. Chen, D.E.W. Vaughan, J.J. Schorfheide, W.C. Baird, G.B. McVicker, United States Patent, 6,221,240 (2001).
- 8 “Desulfurization Processes for Refractory Organosulfur Heterocycles”, W.C. Baird, Jr., G.B. McVicker, J.J. Schorfheide, D.P. Klein, S. Hantzer, M. Daage, M.S. Touvelle, E.S. Ellis, D.E.W. Vaughan and J.G. Chen, United States Patent, 6,245,221 (2001).
- 9 “Ring Opening with Group VIII Metal Catalysts Supported on Modified Substrate”, W.C. Baird, Jr., J.G. Chen and G.B. McVicker, United States. Patent, 6,586,650 (2003).
- 10 “Method and Catalyst for Opening Naphthenic Rings of Naphthenic Ring-Containing

- Compounds”, W.C. Baird, Jr., D.P. Klein, M.S. Touvelle and J.G. Chen, United States Patent, 6,589,416 (2003).
11. “Ring Opening with Group VIII Metal Catalysts Containing Cracking Moderators”, W.C. Baird, Jr., J.G. Chen and G.B. McVicker, United States Patent, 6,623,625 (2003).
 12. “Naphthene Ring Opening over a Ring Opening Catalyst Combination”, W.C. Baird, Jr., J.G. Chen and G.B. McVicker, United States Patent, 6,623,626 (2003).
 13. “Regeneration of Hydrogen Sulfide Sorbents”, J.G. Chen, L.D. Brown, W.C. Baird, Jr., G.B. McVicker, E.S. Ellis, M.S. Touvelle, D.P. Klein and D.E.W. Vaughan, United States Patent, 6,649,043 (2003).
 14. “Naphthene Ring Opening over an Iridium Ring Opening Catalyst”, W.C. Baird, Jr., D.P. Klein, J.G. Chen and G.B. McVicker, United States Patent, 6,683,020 (2003).
 15. “Regeneration of Iron-Based Hydrogen Sulfide Sorbents”, J.G. Chen, L.D. Brown, W.C. Baird, Jr., G.B. McVicker, E.S. Ellis, M.S. Touvelle, D.P. Klein and D.E.W. Vaughan, United States Patent, 6,723,230 (2004).
 16. “PVD Supported Mixed Metal Oxide Catalysts”, S. Chaturvedi, J.G. Chen, M.B. Clark, Jr. and A.M. Gaffney, United States Patent, 6,984,750 (2006).
 17. “Method of Preparing Ethylene Glycol from Cellulose”, T. Zhang, M. Zheng, N. Ji, A. Wang, Y. Shu, X. Wang, and J.G. Chen, United States Patent, 7,960,594 (2011).
 18. “Bimetallic Alkylation Catalysts”, A.M. Gaffney, P.J. Angevine, C.Y. Yeh, J.H. Koegler, and J.G. Chen, United States Patent, 8,105,968 (2012).
 19. “Method of Producing Ethylene Glycol from Polyhydroxyl Compound”, T. Zhang, M. Zheng, A. Wang, N. Ji, Y. J. Pang, Z. Tai, X. Wang, and J.G. Chen, United States Patent, 8,324,433 (2012).
 20. “Methods of Using Tungsten Carbide Catalysts in Preparation of Ethylene Glycol”, T. Zhang, N. Ji, M. Zheng, A. Wang, Y. Shu, X. Wang, and J.G. Chen, United States Patent, 8,692,032 (2014).
 21. “Fuel Cell Catalyst Including Carbon Support Particles with Metal Carbide Layer and Catalytic Material and Fuel Cell Using the Same”, B. Merzougui, M. Shao, L.V. Protsailo and J.G. Chen, United States Patent, 9,147,884 (2015).
 22. “Electrocatalysts for Hydrogen Evolution and Oxidation Reactions”, F. Jiao, Q. Lu, G.S. Hutchings and J.G. Chen, United States Patent, pending (#2016/0010228).

Publications in Refereed Journals:

1. J.G. Chen, J.E. Crowell and J.T. Yates, Jr., "Onset of Oxidation of Al(111) at Low Temperatures: A Study by EELS and AES", *Physical Review*, B33 (1986) 1436-1439.
2. J.E. Crowell, J.G. Chen and J.T. Yates, Jr., "Surface Sensitive Spectroscopic Study of the Interaction of Oxygen with Al(111): Low Temperature Chemisorption and Oxidation", *Surface Science*, 165 (1986) 37-64.
3. J.G. Chen, J.E. Crowell and J.T. Yates, Jr., "Assignment of a Surface Vibrational Mode by Chemical Means: Modification of the Lattice Modes of Al₂O₃ by a Surface Reaction with H₂O", *Journal of Chemical Physics*, 84 (1986) 5906-5909.
4. J.E. Crowell, J.G. Chen and J.T. Yates, Jr., "The Adsorption and Decomposition of Carboxylic Acids on Al(111)", *Journal of Electron Spectroscopy and Related Phenomena*, 39 (1986) 97-106.
5. J.G. Chen, J.E. Crowell and J.T. Yates, Jr., "An EELS and TPD Study of the Adsorption and Decomposition of Acetic Acids on the Al(111) Surface", *Surface Science*, 172 (1986) 733-753.
6. J.E. Crowell, J.G. Chen and J.T. Yates, Jr., "A Vibrational Study of the Adsorption and Decomposition of Formic Acid and Surface Formate on Al(111)", *Journal of Chemical*

- Physics*, 85 (1986) 3111-3122.
7. J.G. Chen, T.P. Beebe, Jr., J.E. Crowell and J.T. Yates, Jr., "Reaction of Atomically Clean Aluminum and Chemically Modified Aluminum with Alkyl Halides", *Journal of the American Chemical Society*, 109 (1987) 1726-1729.
 8. J.G. Chen, J.E. Crowell and J.T. Yates, Jr., "Differentiation of Single vs. Multiple Vibrational Excitation Processes on Surfaces: An EELS Investigation of the Al₂O₃ Vibrational Modes", *Physical Review (Rapid Communication)* B35 (1987) 5299-5302.
 9. J.E. Crowell, J.G. Chen, D.M. Hercules and J.T. Yates, Jr., "The Adsorption and Thermal Decomposition of Water on Clean and Oxygen-Pre-dosed Al(111)", *Journal of Chemical Physics*, 86 (1987) 5804-5815.
 10. J.G. Chen, J.E. Crowell and J.T. Yates, Jr., "The Metal-Metal Oxide Interface: A Study of Thermally Activated Diffusion at the Ni/ Al₂O₃ Interface Using Electron Spectroscopies", *Surface Science*, 185 (1987) 373-393.
 11. J.G. Chen, J.E. Crowell and J.T. Yates, Jr., "Ni Cluster Chemistry on Al₂O₃: A Vibrational EELS Study Using Chemisorbed CO on a Model Catalyst: Ni/Al₂O₃/Al(111)", *Surface Science*, 187 (1987) 243-264.
 12. J.E. Crowell, J.G. Chen and J.T. Yates, Jr., "An Electron Spectroscopic Study of the Growth and Thermally Activated Diffusion of Ni Thin Films on Al(111) and Al₂O₃ /Al(111)", *Thin Solid Films*, 153 (1987) 341-347.
 13. L. Ng, J.G. Chen, P. Basu and J.T. Yates, Jr., "Electron Stimulated Decomposition of Alkyl and Fluoroalkyl Ethers Adsorbed on Al₂O₃", *Langmuir*, 3 (1987) 1161-1167.
 14. J.G. Chen, P. Basu, L. Ng and J.T. Yates, Jr., "A Comparative Study of the Reactivities of H₂O, CH₃OH and CH₃OCH₃ towards Al(111)", *Surface Science*, 194 (1988) 397-418.
 15. J.G. Chen, J.E. Crowell, P. Basu, L. Ng and J.T. Yates, Jr., "Dissociative Chemisorption of CO on the Ni Films Promoted by Al: Detection of a Precursor State to CO Dissociation by EELS", *Journal of Physical Chemistry*, 92 (1988) 2574-2579.
 16. P. Basu, J.G. Chen, L. Ng, M.L. Colaianni and J.T. Yates, Jr., "Fragmentation of Molecular Adsorbates by Electron and Ion Bombardment: Methoxy Chemistry on Al(111)", *Journal of Chemical Physics*, 89 (1988) 2406-2411.
 17. J.G. Chen, P. Basu, T.H. Ballinger and J.T. Yates, Jr., "A Transmission Infrared Spectroscopic Investigation of the Reaction of Dimethyl Ether with Alumina Surfaces", *Langmuir*, 5 (1989) 352-356.
 18. J.G. Chen, W. Erley and H. Ibach, "A FT-RAIRS Investigation of the Nature of the 3-Fold Bridge-CO Species on Ni(111)", *Surface Science*, 223 (1989) L891-896.
 19. J.G. Chen, W. Erley and H. Ibach, "A RAIRS Investigation of the Interaction between the Coadsorbed NO and Oxygen on Ni(111): Observation of a Substantial N-O Bond Strengthening", *Surface Science*, 224 (1989) 215-234.
 20. J.G. Chen, M.L. Colaianni, J.T. Yates, Jr. and G.B. Fisher, "Thermal Behavior of a Rh/Al₂O₃ Model Catalyst: The Disappearance of Surface Rh upon Heating", *Journal of Physical Chemistry*, 94 (1990) 5059-5062.
 21. J.G. Chen, W. Erley and H. Ibach, "A RAIRS Observation of the Local Interaction between the Coadsorbed NO and CO on Ni(111)", *Surface Science*, 227 (1990) 79-89.
 22. J.G. Chen, W. Erley and H. Ibach, "Significant N-O Bond Strengthening upon the Interaction of NO with Coadsorbed Oxygen on Ni(111)", *Vacuum*, 41 (1990) 74-75.
 23. W. Erley, J.G. Chen and D. Sander, "The Formation of Acetic Anhydride by Decomposition of Acetic Acid on Ni(111)", *Journal of Vacuum Science and Technology*, A8 (1990) 976-978.
 24. J.G. Chen, S. Lehwald, G. Kisters, E. Preuss and H. Ibach, "A Surface Stress Induced

- (1x1) to (5x1) Reconstruction of an Ir(100) Surface", *Journal of Electron Spectroscopy and Related Phenomena*, 54/55 (1990) 405-413.
25. M.D. Weisel, J.G. Chen and F.M. Hoffmann, "Characterization of CO/H₂ Reaction Intermediate by FT-IRAS: Potassium Formate on Ru(001)", *Journal of Electron Spectroscopy and Related Phenomena*, 54/55 (1990) 787-794.
 26. J.G. Chen, M.L. Colaianni, W.H. Weinberg and J.T. Yates, Jr., "Direct Vibrational Detection of Surface Reaction Channels Leading to CO Dissociation and to Its Inhibition on Mo(110)", *Chemical Physics Letters*, 177 (1991) 113-117.
 27. S. Lehwald, J.G. Chen, G. Kisters, E. Preuss and H. Ibach, "Surface Phonon Dispersion Investigation of the (1x1) to (5x1) Reconstruction of an Ir(100) Surface", *Physical Review*, B43 (1991) 3920-3927.
 28. G. Kisters, J.G. Chen, S. Lehwald and H. Ibach, "Adsorption of CO on the Unreconstructed and Reconstructed Ir(100) Surfaces", *Surface Science*, 245 (1991) 65-71.
 29. J.G. Chen, M.D. Weisel, J.H. Hardenbergh, F.M. Hoffmann, C.A. Mims and R.B. Hall, "Evidence for the Potassium-Promoted Activation of Methane on a K-Doped NiO/Ni(100) Surface", *Journal of Vacuum Science and Technology*, A9 (1991) 1684-1687.
 30. J.G. Chen, M.D. Weisel and R.B. Hall, "A Vibrational Investigation of the Stability, Morphology and Surface Reactivity of NiO on Ni(100)", *Surface Science*, 250 (1991) 159-168.
 31. R.B. Hall, J.G. Chen, J.H. Hardenbergh and C.A. Mims, "Reactivity of NiO and K-Doped NiO Thin Films on Ni(100) with Hydrogen and Methane", *Langmuir*, 7 (1991) 2548-2554.
 32. M.L. Colaianni, J.G. Chen, W.H. Weinberg and J.T. Yates, Jr., "The Adsorption and Dissociation of CO on Clean and Oxygen-Modified Mo(110) Surfaces", *Journal of the American Chemical Society*, 114 (1992) 3735-3743.
 33. J.G. Chen, D.A. Fischer, J.H. Hardenbergh and R.B. Hall, "A Fluorescence-Yield Near-Edge Spectroscopy (FYNES) Investigation of the Reaction Kinetics of NiO/Ni(100) with Hydrogen", *Surface Science*, 279 (1992) 13-22.
 34. M.L. Colaianni, J.G. Chen, W.H. Weinberg and J.T. Yates, Jr., "Oxygen on Mo(110): Low-Temperature Adsorption and High Temperature Oxidation", *Surface Science*, 279 (1992) 211-222.
 35. J.G. Chen, M.L. Colaianni, W.H. Weinberg and J.T. Yates, Jr., "The Cu/Al₂O₃/Al(111) Interface: Initial Film Growth and Thermally-Induced Diffusion of Copper into the Bulk", *Surface Science*, 279 (1992) 223-232.
 36. M.D. Weisel, J.G. Chen, F.M. Hoffmann, Y.-K. Sun and W.H. Weinberg, "A FT-IRAS Study of the Formation and Decomposition of Chemisorbed Formate on Clean and Potassium-Modified Ru(001)", *Journal of Chemical Physics*, 97 (1992) 9396-9411.
 37. M.L. Colaianni, J.G. Chen and J.T. Yates, Jr., "Facile Carbon Monoxide Dissociation on Copper: Promotion by Aluminum", *Journal of Physical Chemistry*, 97 (1993) 2707-2710.
 38. J.G. Chen, M.D. Weisel, Z.-M. Liu and J.M. White, "Effect of Carbon Modification on a Vanadium (110) Surface: Observation of Surface Reactivities characteristics of Platinum-Group Metals", *Journal of the American Chemical Society*, 115 (1993) 8875-8876.
 39. J.G. Chen, B.D. DeVries, J.T. Lewandowski, and R.B. Hall, "Direct Differentiation of Surface and Bulk Compositions of Powder Catalysts: Application of Electron-Yield and Fluorescence-Yield NEXAFS to LixNi1-xO", *Catalysis Letters*, 23 (1994) 25-35.

40. J.G. Chen, C.M. Kim, B. Fruhberger, B.D. DeVries and M.S. Touvelle, "A NEXAFS Determination of the Oxidation State of Vanadium Carbide on V(110): Observation of Charge Transfer from Vanadium to Carbon", *Surface Science*, 321 (1994) 145-155.
41. C.M. Kim, B.D. DeVries, B. Fruhberger and J.G. Chen, "A HREELS and NEXAFS Characterization of Atomic and Molecular Oxygen Species on a Vanadium (110) Surface", *Surface Science*, 327 (1995) 81-92.
42. J.G. Chen, "Selective Activation of C-H and C=C Bonds on Metal Carbides: A Comparison of Reactions of n-Butane and 1,3-Butadiene on Vanadium Carbide Films on V(110)", *Journal of Catalysis*, 154 (1995) 80-90.
43. J.G. Chen, B.D. DeVries, B. Fruhberger C.M. Kim and Z.-M. Liu, "Spectroscopic Characterization of Thin Vanadium Carbide Films on a Vanadium (110) Surface: Formation, Stability and Reactivities", *Journal of Vacuum Science and Technology*, A13 (1995) 1600-1605.
44. R. Kapoor, S.T. Oyama, B. Fruhberger, B.D. DeVries and J.G. Chen, "Characterization of Early Transition Metal Carbides and Nitrides by NEXAFS", *Catalysis Letters*, 34 (1995) 179-189.
45. B. Fruhberger and J.G. Chen, "Modification of the Surface Reactivity of Mo(110) upon Carbide Formation", *Surface Science*, 342 (1995) 38-46.
46. B. Fruhberger and J.G. Chen, J. Eng, Jr., and B.E. Bent, "Reactivities of Carbon and Nitrogen-Modified Mo(110): A Comparison of Modification Effects by Surface and Interstitial Adatoms", *Journal of Vacuum Science and Technology*, A14 (1996) 1475-1481.
47. J.G. Chen, B. Fruhberger and M.L. Colaianni, "NEXAFS Characterization of Compositions and Reactivities of Transition Metal Oxides", *Journal of Vacuum Science and Technology*, A14 (1996) 1668-1673.
48. J.G. Chen, "Carbide and Nitride Overlayers on Early Transition Metal Surfaces: Preparation, Characterization and Reactivities", *Chemical Reviews*, 96 (1996) 1477-1498.
49. J.G. Chen and B. Fruhberger, "Similarities in the Decomposition and Dehydrogenation of Cyclohexene on (4x4)-C/Mo(110) and Pt(111)", *Surface Science*, 367 (1996) L102-110.
50. B. Fruhberger and J.G. Chen, "Reaction of Ethylene with Clean and Carbide-Modified Mo(110): Converting the Surface Reactivity of Mo to Pt-Group Metals", *Journal of the American Chemical Society*, 118 (1996) 11599-11609.
51. B. Fruhberger, J. Eng, Jr. and J.G. Chen, "Observation of Anomalous Reactivities of Ni/Pt(111) Bimetallic Surfaces", *Catalysis Letters*, 45 (1997) 85-92.
52. C.C. Yu, S. Ramanathan, B. Dhandapani, J.G. Chen and S.T. Oyama, "Bimetallic Nb-Mo Carbide Hydroprocessing Catalysts: Synthesis, Characterization and Activity Studies", *Journal of Physical Chemistry*, B 101 (1997) 512-518.
53. R. Kapoor, S.T. Oyama, B. Fruhberger and J.G. Chen, "NEXAFS Characterization and Reactivity Studies of Bimetallic Vanadium Molybdenum Oxynitride Hydrotreating Catalysts", *Journal of Physical Chemistry*, B 101 (1997) 1543-1547.
54. J. Eng, Jr., B.E. Bent, B. Fruhberger and J.G. Chen, "Studies of the Adsorption Geometry and Decomposition Mechanisms of Benzene on Clean and Carbide-Modified Mo(110) Surfaces Using Vibrational Spectroscopy", *Journal of Physical Chemistry*, B 101 (1997) 4044-4054.
55. M.E. Castro, J.G. Chen, R.B. Hall and C.A. Mims, "Reactions of Hot Methyl Groups with Surface Hydrogen during CH₃-I Bond Scission on Ni(111)", *Journal of Physical Chemistry*, B 101 (1997) 4060-4070.

56. D.-H. Sun, B.E. Bent and J.G. Chen, "Chemistry of Cyclopentadiene on a Cu(100) Surface: Detection of cyclopentadienyl (C₅H₅) species as reaction intermediates", *Journal of Vacuum Science and Technology*, A15 (1997) 1581-1585.
57. J.G. Chen, "NEXAFS Investigations of Transition Metal Oxides, Nitrides, Carbides, Sulfides and Other Interstitial Compounds", *Surface Science Reports*, 30 (1997) 1-152.
58. A.V. Teplyakov, A.B. Gurevich, M.X. Yang, B.E. Bent and J.G. Chen, "NEXAFS and TPD Studies of Molecular Adsorption of Hydrocarbons on Cu(100): Segmental Correlations with the Heats of Adsorption", *Surface Science*, 396 (1998) 340-348.
59. V.S. Lusvardi, M.A. Barteau, J.G. Chen, J. Eng, Jr., B. Fruhberger and A.V. Teplyakov, "A NEXAFS Investigation of the Reduction and Reoxidation of TiO₂(001)", *Surface Science*, 397 (1998) 237-250.
60. A.V. Teplyakov, B.E. Bent, J. Eng, Jr and J.G. Chen, "Vibrational Mode-Softening of Alkanes on Clean and Modified Cu and Mo Surfaces: Absence of a Simple Correlation with Thermal Desorption Temperature", *Surface Science*, 399 (1998) L342-L350.
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332. K. Chang, J.G. Chen, Q. Lu and M-J. Cheng, “Quantum Mechanical Study of N-Heterocyclic Carbene Adsorption on Au Surfaces”, *Journal of Physical Chemistry A*, 121 (2017) 2674-2682.
333. W. Wan, G.R. Jenness, K. Xiong, D.G. Vlachos and J.G. Chen, “Ring-opening reaction of furfural and tetrahydrofurfuryl alcohol on hydrogen pre-dosed Ir(111) and Co/Ir(111) surfaces”, *ChemCatChem*, 9 (2017) 1701-1707.
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Selected Invited Talks and Department Seminars:

Zhang Dayu Award Lecture, Dalian Institute of Chemical Physics, Dalian, June 2017

Plenary Lecture, 2nd International Conference on Applied Surface Science, Dalian, June 2017

Keynote Lecture, 25th North American Catalysis Meeting (NAM), Denver, June 2017

Invited Talk, Electrochemical Society Annual Meeting, New Orleans, May 2017

Department Seminar, Chemical Engineering, North Carolina State University, March 2017

Department Seminar, Chemical Engineering, Tianjin University, January 2017

Invited Talk, American Vacuum Society (John Yates Symposium), Nashville, November 2016

Department Seminar, Energy Sciences Institute, Yale University, November 2016
Invited Talk, American Chemical Society Annual Meeting, Philadelphia, August 2016
Keynote Lecture, Post-ICC Conference on Nano and Interfacial Catalysis, Dalian, July 2016
Invited Talk, 16th International Congress of Catalysis Conference, Beijing, July 2016
Plenary Lecture, Conference on Plasma Applications for Catalysis, Tianjin, June 2016
TsingFen Lecture, Chemistry Department, Tsinghua University, June 2016
Department Seminar, Chemical Science and Engineering, Tongji University, June 2016
Department Seminar, Chemical Engineering, University of Tennessee, April 2016
Invited Talk, American Chemical Society Annual Meeting, San Diego, March 2016
Department Seminar, Materials Sci. & Engineering, Stony Brook University, February 2016
Invited Talk, Catalysis Club of Philadelphia, January 2016
Department Seminar, Chemical Engineering, Zhejiang University, January 2016
Invited Talk, AIChE Annual Meeting, Salt Lake City, November 2015
Department Seminar, Chemical Engineering, Lehigh University, November 2015
Keynote Lecture, Sino-USA Annual Chemical Engineering Meeting, Shanghai, October 2015
Chemical Engineering Forum Lecture, Tsinghua University, October 2015
Invited Talk, American Chemical Society Annual Meeting, Boston, August 2015
Industry Seminar, SABIC Technology Center, June 2015
Parravano Memorial Award Lecture, Michigan Catalysis Society Annual Meeting, May 2015
Invited Talk, Southwest Catalysis Club Annual Meeting, April 2015
Department Seminar, Chemical Engineering, University of Houston, April 2015
Department Seminar, Chemical Engineering, University of California, Riverside, April 2015
Nano@Wayne Seminar, Wayne State University, April 2015
George Olah Award Lecture, American Chemical Society Meeting, Denver, March 2015
Department Seminar, Chemical Engineering, Villanova University, March 2015
Distinguished Speaker Seminar, University of Alabama at Huntsville, March 2015
Invited Tutorial Talk, AIChE Annual Meeting, Atlanta, November, 2014
Department Seminar, Chemical Engineering, University of South Florida, October 2014
Keynote Lecture, American Chemical Society Annual Meeting, San Francisco, August 2014
Department Seminar, Dalian Institute of Chemical Physics, July 2014
Department Seminar, Chemistry Department, Nanjing University, June 2014
Department Seminar, Mechanical Engineering, Shanghai Jiaotong University, June 2014
Department Seminar, Chemistry Department, Columbia University, May 2014
Industry Seminar, BASF Company, New Jersey, May 2014
Department Seminar, Materials Science and Engineering, Tsinghua University, April 2014
Department Seminar, Chemical Engineering, Princeton University, April 2014
Eastman Catalysis Lectureship, University of South Carolina, April 2014
Department Seminar, Chemical Engineering, University of Pittsburgh, April 2014
Industry Seminar, ExxonMobil Research and Engineering, New Jersey, April 2014
Department Seminar, Chemical Engineering, Ohio State University, March 2014
Invited Talk, American Chemical Society Annual Meeting, Dallas, March 2014
Invited Talk, Annual Meeting of Material Research Society (MRS), Boston, December 2013
Department Seminar, Chemical Engineering, City College of New York, October 2013
Department Seminar, Chemical Engineering, Rutgers University, October 2013
Invited Talk, New York Catalysis Club, October 2013
Department Seminar, Chemical Engineering, Johns Hopkins University, September 2013
Physical Chemistry Forum Lecture, Peking University, July 2013
Industry Seminar, ExxonMobil Strategic Research Laboratory, March, 2013
Keynote Lecture, Laboratory for Surface Modification Symposium, Rutgers Univ. March, 2013

Department Seminar, Chemistry, Tufts University, February, 2013
Invited Talk, AIChE Annual Meeting, Pittsburgh, October, 2012
Department Seminar, Chemical Engineering, Tsinghua University, October 2012
Department Seminar, Chemical Engineering, Xi'an Jiaotong University, October 2012
Invited Lecture, Chinese National Science Foundation Planning Meeting, October 2012
Keynote Lecture, American Chemical Society Annual Meeting, Philadelphia, August 2012
Invited Lecture, Gordon Research Conference on Catalysis, New Hampshire, June 2012
Department Seminar, Chemical Engineering, Univ. Texas at Austin, April 2012
Industry Seminar, Celanese Ltd., April 2012
Department Seminar, Chemical Engineering, Univ. Kansas, October 2011
Invited Talk, DOE/BES Contractors' Meeting, October 2011
Invited Talk, National Academies Chemical Sciences Roundtable, September 2011
Plenary Lecture, Annual Meeting of the Chicago Catalysis Club, May 2011
Invited Lecture, American Chemical Society Annual Meeting, Anaheim, March 2011
Invited Lecture, New York Catalysis Club, March 2011
Plenary Lecture, Chemical Heritage Foundation, Philadelphia, September 2010
Invited Talk, American Chemical Society Annual Meeting, Boston, August 2010
Invited Lecture, Philadelphia Catalysis Club, May 2010
Industry Seminar, ExxonMobil Chemicals, May 2010
Department Seminar, Chemical Engineering, Univ. Virginia, April 2010
Frontier Seminar in Catalysis, Pacific Northwest National Laboratory, March 2010
Department Seminar, Chemical Engineering, Columbia Univ. February 2010
Invited Lecture, Workshop on Design of Catalytic Materials, Univ. Notre Dame, January 2010
Invited Lecture, Chicago Catalysis Club, November 2009
Department Seminar, Argonne National Laboratory, November 2009
Industry Seminar, British Petroleum, November 2009
Department Seminar, Chemical Engineering, Tsinghua University, September 2009
Invited Talk, American Chemical Society Annual Meeting, Washington, DC, August 2009
Keynote Lecture, New England Catalysis Club Annual Meeting, April 2009
Invited Lecture, Michigan Catalysis Club, April 2009
Invited Talk, American Chemical Society Annual Meeting, Salt Lake City, March 2009
Department Seminar, New Jersey Institute of Technology, February 2009
Department Seminar, Univ. Wisconsin at Madison, January 2009
Industry Seminar, Air Liquide, November 2008
Department Seminar, Department of Chemical Engineering, Purdue Univ. September 2008
Industry Seminar, W.R. Grace, August 2008
Invited Lecture, Gordon Research Conference on Fuel Cells, July 2008
Industry Seminar, BASF, March 2008
Department Seminar, Department of Chemistry, Lehigh Univ. December 2007
Invited, Basic Research Needs for Energy, AIChE Meeting, Salt Lake City, November 2007
Department Seminar, Chemical Engineering, Pennsylvania State Univ. October 2007
Industry Seminar, Eastman Chemicals, September 2007
Keynote Lecture, North American Catalysis Meeting, Houston, June 2007
Department Seminar, Dalian Institute of Chemical Physics, China, May 2007
Distinguished Lecture in Catalysis, Pacific Northwest National Laboratory, March 2007
Department seminar, Department of Chemistry, Univ. Ottawa, January 2007
Keynote Lecture, ExxonMobil Research Symposium, October 2006
Keynote Lecture, American Chemical Society Annual Meeting, San Francisco, September 2006
Industry Seminar, ABB Lummus, June 2006

Invited Lecture, National Synchrotron Light Source Annual Meeting, May 2006
Industry Seminar, Headwaters Nanotechnology Inc. April 2006
Keynote Lecture, Annual Meeting of New York Catalysis Club, March 2006
Department Seminar, Department of Chemical Engineering, Ohio State Univ. December 2005
Distinguished Lecture in Nanocatalysis, Chemical Engineering, Tufts Univ. November 2005
Department Seminar, Chemical Engineering, Univ. Pennsylvania, October 2005
Department Seminar, Chemical Engineering, City College of New York, September 2005
Industry Seminar, ExxonMobile Research and Engineering, June 2005
Invited Talk, American Chemical Society, San Diego, March 2005
Industry Seminar, W.L. Gore Associates, November 2004
Invited Lecture, Center of Surface Science, Rutgers University, October 2004
Keynote Lecture, American Vacuum Society Annual Meeting, Anaheim, October 2004
Department Seminar, Chemistry Department, Brookhaven National Laboratory, August 2004
Invited Talk, American Chemical Society Annual Meeting, Philadelphia, August 2004
Industry Seminar, BOC Company, July 2004
Invited Lecture, Gordon Research Conference on Catalysis, New Hampshire, June 2004
Hua-Ying Distinguished Lecture, Nanjing Univ. May 2004
Department Seminar, Chemical Engineering, Virginia Tech, March 2004
Industry Seminar, DuPont Experimental Station, October 2003
Invited Talk, American Chemical Society Annual Meeting, New York, September 2003
Plenary Lecture, 2nd International Conference on Elementary Processes in Molecules,
Puerto Rico, May 2003
Department Seminar, Chemical Engineering, North Carolina State Univ. March 2003
Department Seminar, Department of Chemistry, Texas A&M Univ. November 2002
Department Seminar, Chemical Engineering, Yale Univ. October 2002
Department Seminar, Department of Chemistry, Peking Univ. October 2002
Invited Talk, American Chemical Society Annual Meeting, Boston, August 2002
Industry Seminar, ExxonMobil Research and Engineering, July 2002
Invited Talk, American Chemical Society Annual Meeting, Orlando, April 2002
Department Seminar, Department of Chemistry, BrynMawr College, February, 2002
Department Seminar, Chemical Engineering, Carnegie Mellon Univ. December 2001
Invited Lecture, Annual Synchrotron User Meeting, Brookhaven National Lab, May 2001
Department Seminar, Department of Chemistry, Temple University, April 2001
Department Seminar, Oak Ridge National Laboratory, June 2001
Invited Lecture, DOE “Catalysis Futures Workshop”, Berkeley, March, 2001
Industry Seminar, Johnson Matthey Company, March 2001
Invited Lecture, Pacifichem Meeting, Honolulu, December 2000
Invited Lecture, Pittsburgh Catalysis Club Annual Meeting, December 2000
Keynote Lecture, American Vacuum Society Conference, Boston, October 2000
Industry Seminar, Rohm and Haas Company, October 2000
Invited Lecture, Philadelphia Catalysis Club, September 2000
Industry Seminar, Lyondell Company, September 2000
Invited Lecture, Surface Science Center, University of Pittsburgh, August 2000
Department Seminar, Department of Materials Science, Drexel University, January 2000
Invited Talk, North American Catalysis Meeting, Boston, May 1999
Department Seminar, Department of Chemistry, University of Illinois at Chicago, May 1998
Invited Talk, American Chemical Society Annual Meeting, Dallas, April 1998
Keynote Lecture, North American Meeting of the Catalysis Society, Chicago, May 1997
Invited Talk, American Chemical Society Annual Meeting, San Francisco, April 1997

Invited Lecture, Gordon Research Conference on Reactions at Surfaces, February 1997
Invited Lecture, Gordon Research Conference on Catalysis, New London, NH, June 1996
Invited Talk, Pacifichem Meeting, Honolulu, December 1995