

# Curriculum Vitae

## Education

B.S. in Chemistry, Wuhan University, China August 1982  
Ph.D. in Chemistry, University of California, Berkeley, CA February 1990

## Professional appointments

1983 – 1989 Research Assistant, Department of Chemistry, University of California, Berkeley  
1990 – 1992 Post-doctoral Research Associate, Department of Chemistry, Rice University  
1993 – 1998 Assistant Professor, Department of Physics, Washington State University  
1998 – 2002 Associate Professor, Department of Physics, Washington State University  
2002 – 2009 Professor, Department of Physics, Washington State University  
2009 – Present Professor, Department of Chemistry, Brown University

## Completed Publications

### a. Chapters in books

1. “A Comparative Study of the Electronic Structure of the First Row Transition Metal Clusters”, (L. S. Wang and H. Wu), *Proc. Int. Symp. of the Sci. and Tech. of Atomically Engineered Materials* (Oct. 30-Nov. 4, 1995, Richmond, VA). Edited by P. Jena, S. N. Khanna, and B. K. Rao (World Scientific, New Jersey, 1996), pp. 245-250.
2. “Probing the Electronic Structure of Transition Metal Clusters From Molecular to Bulk-like Using Photoelectron Spectroscopy”, (L. S. Wang and H. Wu), *Advances in Metal and Semiconductor Clusters. IV. Cluster Materials*. Edited by M. A. Duncan (JAI Press, Greenwich, 1998), pp. 299-343.
3. “Quantum Mechanical Modeling of Structure Evolution of Transition Metal Clusters and Metallo-carbohedrenes” (H. S. Cheng and L. S. Wang), *NATO Science Series E 360: Implications of Molecular and Materials Structure for New Technologies*. Edited by J. A. K. Howard, F. H. Allen, and G. P. Shields (Kluwer Academic Publisher, Netherlands, 1999), pp. 135-150.
4. “Photodetachment Photoelectron Spectroscopy of Transition Metal Oxide Species”, (L. S. Wang), *Advanced Series in Physical Chemistry, Vol. 10. Photoionization and Photodetachment*. Edited by C. Y. Ng (World Scientific, Singapore, 2000), pp.854-957.
5. “Temperature Effects in Anion Photoelectron Spectroscopy of Metal Clusters” (L. S. Wang and X. Li), *Clusters and Nanostructure Interfaces*. Edited by P. Jena, S. N. Khanna, and B. K. Rao (World Scientific, River Edge, New Jersey, 2000), pp. 293-300.
6. “Clusters”, (L. S. Wang), *Encyclopedia of Chemical Physics and Physical Chemistry*. Edited by J. H. Moore and N. D. Spencer (IOP Publishing Inc., Philadelphia, 2001), pp.2113-2130.
7. “Probing the Electronic Structure of Fe-S Clusters: Ubiquitous Electron Transfer Centers in Metalloproteins Using Anion Photoelectron Spectroscopy in the Gas Phase” (X. Yang, X. B. Wang, Y. J. Fu, and L. S. Wang), *Principles of Mass Spectrometry Applied to Biomolecules*. Edited by J. Laskin and C. Lifshitz (Wiley, New Jersey, 2006), pp. 63-117.
8. “Probing the Unique Size-Dependent Properties of Small Au Clusters, Au Alloy Clusters, and CO-Chemisorbed Au Clusters in the Gas Phase” (H. J. Zhai, X. Li, and L. S. Wang), *The Chemical Physics of Solid Surfaces. Vol. 12: Atomic Clusters from Gas Phase to Deposited*. Edited by D. P. Woodruff (Elsevier, New York 2007), pp. 91-150.

## b. Refereed journal articles

1. "Photoelectron Spectroscopy and Infrared Femtosecond Intramolecular Dynamics of  $C_2H_2^+$  and  $C_2D_2^+$ " (J. E. Reutt, L. S. Wang, J. E. Pollard, D. J. Trevor, Y. T. Lee, and D. A. Shirley), *J. Chem. Phys.* **84**, 3022-3031 (1986).
2. "Molecular Beam Photoelectron Spectroscopy of  $Ni(CO)_4$ " (J. E. Reutt, L. S. Wang, Y. T. Lee, and D. A. Shirley), *Chem. Phys. Lett.* **126**, 399-404 (1986).
3. "Molecular Beam Photoelectron Spectroscopy and Femtosecond Intramolecular Dynamics of  $H_2O^+$  and  $D_2O^+$ " (J. E. Reutt, L. S. Wang, Y. T. Lee, and D. A. Shirley), *J. Chem. Phys.* **85**, 6928-6939 (1986).
4. "Molecular Beam Photoelectron Spectroscopy: The  $C_2D_4^+$  ( $X^2B_3$ ) Ground State" (L. S. Wang, J. E. Pollard, Y. T. Lee, and D. A. Shirley), *J. Chem. Phys.* **86**, 3216-3218 (1987).
5. "Molecular Beam Photoelectron Spectroscopy of  $SO_2$ : Geometry, Spectroscopy and Dynamics of  $SO_2^+$ " (L. S. Wang, Y. T. Lee, and D. A. Shirley), *J. Chem. Phys.* **87**, 2489-2497 (1987).
6. "High Resolution UV Photoelectron Spectroscopy of  $CO_2^+$ ,  $COS^+$ , and  $CS_2^+$  Using Supersonic Molecular Beams" (L. S. Wang, J. E. Reutt, Y. T. Lee, and D. A. Shirley), *J. Electron Spectrosc. Relat. Phenom.* **47**, 167-186 (1988).
7. "Vibrational Spectra of  $Se_2^+$  and  $Te_2^+$  in Their Ground States" (L. S. Wang, B. Niu, Y. T. Lee, and D. A. Shirley), *Chem. Phys. Lett.* **158**, 297-300 (1989).
8. "Photoelectron Spectroscopy and Electronic Structure of Heavy Group IV-VI Diatomics" (L. S. Wang, B. Niu, Y. T. Lee, D. A. Shirley, and K. Balasubramanian), *J. Chem. Phys.* **92**, 899-908 (1990).
9. "High Temperature and High Resolution UV Photoelectron Spectroscopy Using Supersonic Molecular Beams" (L. S. Wang, J. E. Reutt-Robey, B. Niu, Y. T. Lee, and D. A. Shirley), *J. Electron Spectrosc. Relat. Phenom.* **51**, 513-526 (1990).
10. "High Resolution Photoelectron Spectroscopy of Clusters of Group V Elements" (L. S. Wang, B. Niu, Y. T. Lee, and D. A. Shirley), *Physica Scripta* **41**, 867-869 (1990).
11. "Electronic Structure and Chemical Bonding of the First Row Transition Metal Dichlorides:  $MnCl_2$ ,  $NiCl_2$ , and  $ZnCl_2$  – A High Resolution Photoelectron Spectroscopic Study" (L. S. Wang, B. Niu, Y. T. Lee, and D. A. Shirley), *J. Chem. Phys.* **93**, 957-966 (1990).
12. "Photoelectron Spectroscopy and Electronic Structure of Clusters of the Group V Elements. I. Dimers" (L. S. Wang, Y. T. Lee, D. A. Shirley, K. Balasubramanian, and P. Feng), *J. Chem. Phys.* **93**, 6310-6317 (1990).
13. "Photoelectron Spectroscopy and Electronic Structure of Clusters of the Group V Elements. II. Tetramers: Strong Jahn-Teller Coupling in the Tetrahedral  $^2E$  Ground States of  $P_4^+$ ,  $As_4^+$ , and  $Sb_4^+$ " (L. S. Wang, B. Niu, Y. T. Lee, D. A. Shirley, E. Ghelichkhani, and E. R. Grant), *J. Chem. Phys.* **93**, 6318-6326 (1990).
14. "Photoelectron Spectroscopy and Electronic Structure of Clusters of the Group V Elements. III. Tetramers: The  $^2T_2$  and  $^2A_1$  Excited States of  $P_4^+$ ,  $As_4^+$ , and  $Sb_4^+$ " (L. S. Wang, B. Niu, Y. T. Lee, D. A. Shirley, E. Ghelichkhani, and E. R. Grant), *J. Chem. Phys.* **93**, 6327-6333 (1990).
15. "Molecular Beam Photoelectron Spectroscopy of Allene" (Z. Z. Yang, L. S. Wang, Y. T. Lee, D. A. Shirley, S. Y. Huang, and W. A. Lester, Jr.), *Chem. Phys. Lett.* **171**, 9-13 (1990).
16. "Vibrational Autodetachment Spectroscopy of  $Au_6^-$ : Image-charge-bound states of a Gold Ring" (K. J. Taylor, C. Jin, J. Conceicao, L. S. Wang, O. Cheshnovsky, B. R. Johnson, P. J. Norlander, and R. E. Smalley), *J. Chem. Phys.* **93**, 7515-7518 (1990).
17. "Temperature Dependent ARPEFS study of  $c(2 \times 2)Cl/Cu(001)$ ", (L. Q. Wang, A. E. Schach von Wittenau, Z. Ji, L. S. Wang, Z. Q. Huang, and D. A. Shirley), *Phys. Rev.* **B44**, 1292-1305 (1991).
18. "Carbon Arc Generation of  $C_{60}$ ", (R. E. Haufler, Y. Chai, L. Chibante, J. Conceicao, C. Jin, L. S. Wang, S. Maruyama, and R. E. Smalley), *Mat. Res. Soc. Symp. Proc.* **206**, 627-637 (1991).

19. "Fullerene Triplet State Production and Decay: R2PI Probes of C<sub>60</sub> and C<sub>70</sub> in a Supersonic Beam", (R. E. Haufler, L. S. Wang, L. P. F. Chibante, C. Jin, J. Conceicao, Y. Chai, and R. E. Smalley), *Chem. Phys. Lett.* **179**, 449-454 (1991).
20. "Threshold Photodetachment of Cold C<sub>60</sub><sup>-</sup>", (L. S. Wang, J. Conceicao, C. Jin, and R. E. Smalley), *Chem. Phys. Lett.* **182**, 5-11 (1991).
21. "Electronic Structure of K<sub>x</sub>C<sub>60</sub><sup>-</sup> in the Gas Phase", (L. S. Wang, O. Cheshnovsky, R. E. Smalley, J. D. Carpenter, and S. -J. Hwu), *J. Chem. Phys.* **96**, 4028-4031 (1992).
22. "Ultraviolet Photoelectron Spectroscopy and Photofragmentation studies of Excess Electrons in Potassium Iodide Cluster Anions", (Y. A. Yang, L. A. Bloomfield, C. Jin, L. S. Wang, and R. E. Smalley), *J. Chem. Phys.* **96**, 2453-2459 (1992).
23. "Photoelectron Spectroscopy and Electronic Structure of Ca@C<sub>60</sub>", (L. S. Wang, J. M. Alford, Y. Chai, M. Diener, and R. E. Smalley), *Z. Phys. D - Atoms, Molecules and Clusters* **26**, 297-299 (1993).
24. "The Electronic Structure of Ca@C<sub>60</sub>", (L. S. Wang, J. M. Alford, Y. Chai, M. Diener, G. E. Scuseria, and R. E. Smalley), *Chem. Phys. Lett.* **207**, 354-359 (1993).
25. "A Study of FeC<sub>2</sub> and FeC<sub>2</sub>H by Anion Photoelectron Spectroscopy" (J. Fan and L. S. Wang), *J. Phys. Chem.* **98**, 11814-11817 (1994).
26. "Photoelectron Spectroscopy of Transition Metal Clusters: Correlation of Valence Electronic Structure to Reactivity", (J. Conceicao, T. Laaksonen, L. S. Wang, T. Guo, P. Nordlander, and R. E. Smalley), *Phys. Rev. B* **51**, 4668-4671 (1995).
27. "Probing the Electronic Structure of Small Iron Clusters", (L. S. Wang, H. S. Cheng, and J. Fan), *Chem. Phys. Lett.* **236**, 57-63 (1995).
28. "FeC<sub>n</sub><sup>-</sup> and FeC<sub>n</sub>H<sup>-</sup> (n = 3, 4): A Photoelectron Spectroscopic and Density Functional Study", (J. Fan, L. Lou, and L. S. Wang), *J. Chem. Phys.* **102**, 2701-2707 (1995).
29. "Si<sub>3</sub>O<sub>4</sub><sup>-</sup>: Vibrationally Resolved Photoelectron Spectrum and *Ab Initio* Calculations", (J. Fan, J. B. Nicholas, J. M. Price, S. D. Colson, and L. S. Wang), *J. Am. Chem. Soc.* **117**, 5417-5418 (1995).
30. "A Combined Density Functional Theoretical and Photoelectron Spectroscopic Study of Ge<sub>2</sub>O<sub>2</sub>", (J. B. Nicholas, J. Fan, H. Wu, S. D. Colson, and L. S. Wang), *J. Chem. Phys.* **102**, 8277-8280 (1995).
31. "Photoelectron Spectroscopy of FeO<sup>-</sup> and FeO<sub>2</sub><sup>-</sup>: Observation of Low-Spin Excited States of FeO and Determination of the Electron Affinity of FeO<sub>2</sub>", (J. Fan and L. S. Wang), *J. Chem. Phys.* **102**, 8714-8417 (1995).
32. "Photoelectron Spectroscopy of Size-Selected Transition Metal Clusters: Fe<sub>n</sub><sup>-</sup>, n = 3-24", (L. S. Wang, H. S. Cheng, and J. Fan), *J. Chem. Phys.* **102**, 9480-9493 (1995).
33. "Two Isomers of CuO<sub>2</sub>: The Cu(O<sub>2</sub>) Complex and the Copper Dioxide", (H. Wu, S. R. Desai, and L. S. Wang), *J. Chem. Phys.* **103**, 4363-4366 (1995).
34. "Study of Iron-Carbon Mixed Clusters, FeC<sub>n</sub> (n = 2-5): A Possible Linear To Cyclic Transition From FeC<sub>3</sub> to FeC<sub>4</sub>", (L. S. Wang), *Surf. Rev. Lett.* **3**, 423-427 (1996).
35. "Iron Clusters and Oxygen-Chemisorbed Iron Clusters", (L. S. Wang, J. Fan, and L. Lou), *Surf. Rev. Lett.* **3**, 695-699 (1996).
36. "Electronic Structure of Small Titanium Clusters: Emergence and Evolution of the 3d Band", (H. Wu, S. R. Desai, and L. S. Wang), *Phys. Rev. Lett.* **76**, 212-215 (1996).
37. "Electronic Structure of Small Copper Oxide Clusters: From Cu<sub>2</sub>O to Cu<sub>2</sub>O<sub>4</sub>", (L. S. Wang, H. Wu, S. R. Desai, and L. Lou), *Phys. Rev. B* **53**, 8028-8031 (1996).
38. "A Photoelectron Spectroscopic Study of Small Silicon Oxide Clusters: SiO<sub>2</sub>, Si<sub>2</sub>O<sub>3</sub> and Si<sub>2</sub>O<sub>4</sub>", (L. S. Wang, H. Wu, S. R. Desai, J. Fan, and S. D. Colson), *J. Phys. Chem.* **100**, 8697-8700 (1996).
39. "Observation and Photoelectron Spectroscopic Study of Novel Mono- and Di-iron Oxide Molecules: FeO<sub>y</sub><sup>-</sup> (y = 1-4) and Fe<sub>2</sub>O<sub>y</sub><sup>-</sup> (y = 1-5)", (H. Wu, S. R. Desai, and L. S. Wang), *J. Am. Chem. Soc.* **118**, 5296-5301 (1996). [Additions and Corrections: *J. Am. Chem. Soc.* **118**, 7434 (1996)].
40. "Sequential Oxygen Atom Chemisorption on Surfaces of Small Iron Clusters", (L. S. Wang, H. Wu, and S. R. Desai), *Phys. Rev. Lett.* **76**, 4853-4856 (1996).

41. "Dimer Growth, Structure Transition and Antiferromagnetic Ordering in Small Chromium Clusters", (H. S. Cheng and L. S. Wang), *Phys. Rev. Lett.* **77**, 51-54 (1996).
42. "Evolution of the Electronic Structure of Small Vanadium Clusters From Molecular to Bulk-like", (H. Wu, S. R. Desai, and L. S. Wang), *Phys. Rev. Lett.* **77**, 2436-2439 (1996).
43. "Vibrationally Resolved Photoelectron Spectroscopy of  $\text{AlO}^-$  and  $\text{AlO}_2^-$ ", (S. R. Desai, H. Wu, and L. S. Wang), *Int. J. Mass Spectrom. Ion Processes* **159**, 75-80 (1996).
44. "Photoelectron Spectroscopy and Electronic Structure of Met-Car  $\text{Ti}_8\text{C}_{12}$ ", (L. S. Wang, S. Li, and H. Wu), *J. Phys. Chem.* **100**, 19211-19214 (1996).
45. "A Study of the Structure and Bonding of Small Aluminum Oxide Clusters by Photoelectron Spectroscopy,  $\text{Al}_x\text{O}_y^-$  ( $x = 1, 2, y = 1-5$ )", (S. R. Desai, H. Wu, C. Rohfling, and L. S. Wang), *J. Chem. Phys.* **106**, 1309-1317 (1997).
46. "Small Silicon Oxide Clusters: Chains and Rings", (L. S. Wang, S. R. Desai, H. Wu, and J. B. Nicholas), *Z. Phys. D - Atoms, Molecules and Clusters* **40**, 36-39 (1997).
47. "Chemical Bonding Between Cu and Oxygen - Copper Oxides vs  $\text{O}_2$  Complexes: A Study of  $\text{CuO}_x$  ( $x = 0-6$ ) Species by Anion Photoelectron Spectroscopy", (H. Wu, S. R. Desai, and L. S. Wang), *J. Phys. Chem. A* **101**, 2103-2111 (1997).
48. "Photoelectron Spectroscopy of Chromium Clusters: Observation of Even-Odd Alternations and Theoretical Interpretation", (L. S. Wang, H. Wu, and H. Cheng), *Phys. Rev. B* **55**, 12884-12887 (1997).
49. "Growth Pathways of Metallocarbohedrenes: Cage-like or Cubic?", (L. S. Wang and H. Cheng), *Phys. Rev. Lett.* **78**, 2983-2986 (1997).
50. " $\text{Si}_3\text{O}_x$  ( $x = 1-6$ ): Models for Oxidation of Silicon Surfaces and Defect Sites in Bulk Oxide Materials", (L. S. Wang, J. B. Nicholas, M. Dupuis, H. Wu, and S. D. Colson), *Phys. Rev. Lett.* **78**, 4450-4453 (1997).
51. "A Study of Nickel Monoxide (NiO), Nickel Dioxide (ONiO), and Ni- $\text{O}_2$  Complex by Anion Photoelectron Spectroscopy", (H. Wu and L. S. Wang), *J. Chem. Phys.* **107**, 16-21 (1997).
52. "Probing the Electronic Structure of Metallocarbohedrenes:  $\text{M}_8\text{C}_{12}$  ( $\text{M} = \text{Ti}, \text{V}, \text{Cr}, \text{Zr}, \text{and Nb}$ )", (S. Li, H. Wu, and L. S. Wang), *J. Am. Chem. Soc.* **119**, 7417-7422 (1997).
53. "Vibrationally Resolved Photoelectron Spectra of  $\text{TiC}_x^-$  ( $x = 2-5$ ) Clusters", (X. B. Wang, C. F. Ding, and L. S. Wang), *J. Phys. Chem. (Letter) A* **101**, 7699-7701 (1997).
54. "Electronic Structure and Photoelectron Spectroscopy of AlSi Mixed Dimer", (X. B. Wang and L. S. Wang), *J. Chem. Phys.* **107**, 7667-7672 (1997).
55. "Electronic Structure of Titanium Oxide Clusters:  $\text{TiO}_y$  ( $y = 1-3$ ) and  $(\text{TiO}_2)_n$  ( $n = 1-4$ )", (H. Wu and L. S. Wang), *J. Chem. Phys.* **107**, 8221-8228 (1997).
56. "Photoelectron Spectroscopy of Transition Metal Clusters", (L. S. Wang and H. Wu), *Z. Phys. Chem. (Munich)* **203**, 45-55 (1998).
57. "A Photoelectron Spectroscopic Study of Vanadium Oxide Anions:  $\text{VO}_x^-$  ( $x = 1-4$ )", (H. Wu and L. S. Wang), *J. Chem. Phys.* **108**, 5310-5318 (1998).
58. "New Magic Numbers in  $\text{Ti}_x\text{C}_y^-$  Anion Clusters and Implication for the Growth Mechanisms of Large Carbide Clusters", (L. S. Wang, X. B. Wang, H. Wu, and H. C. Cheng), *J. Am. Chem. Soc.* **120**, 6556-6562 (1998).
59. " $\text{Al}_3\text{O}_x$  ( $x = 0-5$ ) Clusters: Sequential Oxidation, Metal-to-Oxide Transformation, and Photo-isomerization" (H. Wu, X. Li, X. B. Wang, C. F. Ding, and L. S. Wang), *J. Chem. Phys.* **109**, 449-458 (1998).
60. "s-p Hybridization and Electron Shell Structures in Aluminum Clusters: A Photoelectron Spectroscopy Study", (X. Li, H. Wu, X. B. Wang, and L. S. Wang), *Phys. Rev. Lett.* **81**, 1909-1912 (1998).
61. "The Chemical Bonding and Electronic Structure of RhC, RhN, and RhO by Anion Photoelectron Spectroscopy", (X. Li and L. S. Wang), *J. Chem. Phys.* **109**, 5264-5268 (1998).

62. "Photodetachment Spectroscopy of A Doubly Charged Anion: Direct Observation of the Repulsive Coulomb Barrier", (X. B. Wang, C. F. Ding, and L. S. Wang), *Phys. Rev. Lett.* **81**, 3351-3354 (1998).
63. "Probing the Potential Barriers and Intramolecular Electrostatic Interactions in Free Doubly Charged Anions", (L. S. Wang, C. F. Ding, X. B. Wang, and J. B. Nicholas), *Phys. Rev. Lett.* **81**, 2667-2670 (1998).
64. "Photoelectron Spectroscopy and Electronic Structure of  $\text{ScO}_n^-$  ( $n = 1-4$ ) and  $\text{YO}_n^-$  ( $n = 1-5$ ): Strong Electron Correlation Effects in  $\text{ScO}^-$  and  $\text{YO}^-$ ", (H. Wu and L. S. Wang), *J. Phys. Chem. A* **102**, 9129-9135 (1998).
65. "Photoelectron Spectroscopy of Doubly Charged Anions: Intramolecular Coulomb Repulsion and Solvent Stabilization" (C. F. Ding, X. B. Wang, and L. S. Wang), *J. Phys. Chem. A* **102**, 8633-8636 (1998).
66. "Observation of a Spin-Protected High Energy Isomer of  $\text{Al}_4\text{N}^-$  Cluster", (S. K. Nayak, B. K. Rao, P. Jena, X. Li, and L. S. Wang) *Chem. Phys. Lett.* **301**, 379-384 (1999).
67. "Photodetachment Photoelectron Spectroscopy of Doubly Charged Anions:  $\text{S}_2\text{O}_8^{2-}$ " (C. F. Ding, X. B. Wang, and L. S. Wang), *J. Chem. Phys.* **110**, 3635-3638 (1999).
68. "First Experimental Photoelectron Spectra of Superhalogens and Their Theoretical Interpretation" (X. B. Wang, C. F. Ding, L. S. Wang, A. I. Boldyrev, and J. Simons), *J. Chem. Phys.* **110**, 4763-4771 (1999).
69. "Photodetachment Photoelectron Spectroscopy of Multiply Charged Anions Using Electrospray Ionization" (L. S. Wang, C. F. Ding, X. B. Wang, and S. E. Barlow), *Rev. Sci. Instrum.* **70**, 1957-1966 (1999).
70. "High Resolution Photoelectron Spectroscopy of  $\text{C}_{60}^-$ " (X. B. Wang, C. F. Ding, and L. S. Wang), *J. Chem. Phys.* **110**, 8217-8220 (1999).
71. "A Combined Photoelectron Spectroscopy and Ab Initio Study of the Hypermetallic  $\text{Al}_3\text{C}$  Molecule" (A. I. Boldyrev, J. Simons, X. Li, W. Chen, and L. S. Wang), *J. Chem. Phys.* **110**, 8980-8985 (1999).
72. "Investigation of Free Singly and Doubly Charged Alkali Metal-Sulfate Ion Pairs:  $\text{M}^+(\text{SO}_4^{2-})$  and  $[\text{M}^+(\text{SO}_4^{2-})]_2$  ( $\text{M} = \text{Na}, \text{K}$ )" (X. B. Wang, C. F. Ding, J. B. Nicholas, D. A. Dixon, and L. S. Wang), *J. Phys. Chem. A* **103**, 3423-3429 (1999).
73. "Electron Tunneling through the Repulsive Coulomb Barrier in Photodetachment of Multiply Charged Anions" (X. B. Wang, C. F. Ding, and L. S. Wang), *Chem. Phys. Lett.* **307**, 391-396 (1999).
74. "Tetracoordinated Planar Carbon in the  $\text{Al}_4\text{C}^-$  Anion. A Combined Photoelectron Spectroscopy and Ab Initio Study" (X. Li, L. S. Wang, A. I. Boldyrev, and J. Simons), *J. Am. Chem. Soc.* **121**, 6033-6038 (1999).
75. "Observation of Negative Electron-Binding Energy in a Molecule" (X. B. Wang and L. S. Wang), *Nature* **400**, 245-248 (1999). (**Highlighted: C&E News, July 19, 1999**)
76. "The Electronic Structure of  $\text{MoC}$  and  $\text{WC}$  by Anion Photoelectron Spectroscopy" (X. Li, S. Liu, W. Chen, and L. S. Wang), *J. Chem. Phys.* **111**, 2464-2469 (1999). [Erratum: *J. Chem. Phys.* **129**, 119902 (2008)]
77. "Photodetachment of Free Hexahalogenometallate Doubly Charged Anions in the Gas Phase:  $[\text{ML}_6]^{2-}$ , ( $\text{M} = \text{Re}, \text{Os}, \text{Ir}, \text{Pt}$ ;  $\text{L} = \text{Cl}$  and  $\text{Br}$ )" (X. B. Wang and L. S. Wang), *J. Chem. Phys.* **111**, 4497-4509 (1999).
78. "The Electronic Structure and Chemical Bonding of Hypermetallic  $\text{Al}_3\text{C}$  by Ab Initio Calculations and Anion Photoelectron Spectroscopy" (A. I. Boldyrev, J. Simons, X. Li, and L. S. Wang), *J. Chem. Phys.* **111**, 4993-4998 (1999).
79. "Photoelectron Spectra of Aluminum Cluster Anions: Temperature Effects and Ab Initio Simulations" (J. Akola, M. Manninen, H. Hakkinen, U. Landman, X. Li, and L. S. Wang), *Phys. Rev. B* **60**, R11297-R11300 (1999).
80. "Experimental Search for the Smallest Stable Multiply-Charged Anions in the Gas Phase" (X. B. Wang and L. S. Wang), *Phys. Rev. Lett.* **83**, 3402-3405 (1999).

81. "Electronic Structure and Chemical Bonding Between the First Row Transition Metals and C<sub>2</sub>: A Photoelectron Spectroscopy Study of MC<sub>2</sub><sup>-</sup> (M = Sc, V, Cr, Mn, Fe, and Co)" (X. Li and L. S. Wang), *J. Chem. Phys.* **111**, 8389-8395 (1999).
82. "σ- and π-Coordinated Al in AlC<sub>2</sub><sup>-</sup> and AlCSi<sup>-</sup>. A Combined Photoelectron Spectroscopy and Ab Initio Study" (A. I. Boldyrev, J. Simons, X. Li, and L. S. Wang), *J. Am. Chem. Soc.* **121**, 10193-10197 (1999).
83. "Origin of the Unusual Stability of MnO<sub>4</sub><sup>-</sup>" (G. L. Gutsev, B. K. Rao, P. Jena, X. B. Wang, and L. S. Wang), *Chem. Phys. Lett.* **312**, 589-605 (1999).
84. "Vibrationally Resolved Photoelectron Spectroscopy of PO<sub>3</sub><sup>-</sup> and the Electronic Structure of PO<sub>3</sub>" (X. B. Wang and L. S. Wang), *Chem. Phys. Lett.* **313**, 179-183 (1999).
85. "Photodetachment of Gaseous Multiply-Charged Anions — Copper Phthalocyanine Tetrasulfonate Tetraanion: Tuning Molecular Electronic Energy Levels by Charging and Negative Electron Binding" (X. B. Wang, K. Ferris, and L. S. Wang), *J. Phys. Chem. A* **104**, 25-33 (2000). **(Featured on Cover)**
86. "Photodetachment of Multiply-Charged Anions" (L. S. Wang), *Comments on Modern Phys. D* **2**, 207-221 (2001). **(Invited)**
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**c. Invited Lectures** (for the past 10 years)

**Professional conferences**

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  38. The 2000 International Chemical Congress of Pacific Basin Societies (Pacifichem 2000), Dec. 14-19, 2000, Honolulu. *Probing metal-metal and metal-ligand interactions in singly and multiply charged transition metal complexes in the gas phase using photodetachment spectroscopy.*
  39. 6th Winter Gordon Research Conference on Gaseous Ions: Structures, Energetics, and Reactions, Feb. 25 – Mar. 2, 2001, Ventura, California. *Photodetachment of Multiply Charged Anions in the Gas Phase*
  40. 221<sup>st</sup> ACS National Meeting, San Diego, CA, April 1-5, 2001. *Photodetachment photoelectron spectroscopy of multiply charged anions*
  41. 2001 Northwest Regional Meeting of the American Chemical Society (NORM 2001), Seattle, WA, June 14-17, 2001. *Photodetachment photoelectron spectroscopy of multiply charged anions*
  42. 222<sup>nd</sup> ACS National Meeting, Chicago, IL; August 26-30, 2001. *Probing the solvation of complex and multiply charged anions in the gas phase using photodetachment photoelectron spectroscopy*
  43. 2002 Gordon Research Conference on Molecular and Ionic Clusters, Ventura, CA; January 6-11, 2002. *Photodetachment of bare and solvated multiply charged anions*
  44. World Famous Scientists Forum: International Workshop on Cluster Science and Nanotechnology, Nanjing University, Nanjing, China, May 20-24, 2002. (1) Experimental Search and Characterization of Icosahedral Clusters:  $X@Al_{12}$  ( $X = C, Ge, Sn, Pb$ ) Using Photoelectron Spectroscopy; (2) Lithium-Assisted Self-Assembly of Aluminum Carbide Nanowires and Nanoribbons.
  45. International Symposium on “Novel Materials: From Clusters to Nano-structures”, Jekyll Island, GA, June 3-7, 2002. *Aromatic Metal Clusters.*
  46. 2002 Northwest Regional Meeting of the American Chemical Society (NORM 2002), Spokane, WA, June 20-21, 2002. *Investigations of the Structure and Bonding of Al-Alloy Clusters: From Gas Phase Studies to Syntheses of Cluster-Based Nanomaterials.*
  47. Workshop on “Chemistry at Interfaces”, University of California, Irvine, CA, July 1, 2003. *Solvation and Solvent Stabilization of Multiply Charged Anions in the Gas Phase.*
  48. 45<sup>th</sup> Rocky Mountain Conference on Analytical Chemistry, Symposium on “Nanotechnology”, Denver, CO, July 27-31, 2003. *Probing the Electronic Structure of Cubane [Fe<sub>4</sub>S<sub>4</sub>]: Nature’s Favorite Cluster for Electron Transfer and Storage.*
  49. 2003 Gordon Research Conference on Clusters, Nanocrystals & Nanostructures, New London, CT, August 3-8, 2003. *Planar Clusters.*
  50. 3<sup>rd</sup> IEEE Conference on Nanotechnology (IEEE-NANO 2003), San Francisco, CA, August 12-14, 2003. *Synthesis and Characterization of Helical Nanowires.*
  51. International Union of Materials Research Societies (IUMRS-ICAM 2003), Yokohama, Japan, October 8-12, 2003. *Synthesis and Characterization of Helical Nanowires.*
  52. International Symposium on Functional Clusters and Cluster Based Nano-Materials, Okazaki Conference Center, Institute for Molecular Science, December 15-17, 2003. *Planar Clusters: From Aromaticity to Molecular Wheels.*
  53. International Symposium on “Transition Metal Oxides – Clusters, Surfaces and Solids – Structures, Dynamics and Reactivity”, Berlin-Schmoeckwitz, Germany, March 21-24, 2004. *Probing the Electronic Structure of Transition Metal Oxide Clusters.*
  54. 227<sup>th</sup> ACS National Meeting, Anaheim, CA. March 28 – April 1, 2004. *Symposium on Intermolecular Interactions and Reactions Involving Ions and Open-Shell Systems. Photodetachment of Multiply Charged Anions.*
  55. 2004 Joint Regional Meeting of the Northwest and Rocky Mountain Sections of the American Chemical Society. Utah State University, Logan, Utah. June 6-9, 2004. *Planar Boron Clusters.*
  56. 2004 Gordon Research Conference on Nitrogen Fixation. Colby-Sawyer College, New London, NH; June 20-25, 2004. *Probing the Intrinsic Electronic Structure of the Fe<sub>4</sub>S<sub>2</sub> Cubanes in the Gas Phase.*

57. 4<sup>th</sup> Joint Meeting of Chinese Physicists World-Wide and International Conference on Physics Education & Frontier Research. Shanghai, June 28 – July 1, 2004. 1. Photoelectron Spectroscopy of Size-Selected Anion Clusters; 2. Photodetachment of Multiply Charged Anions.
58. 227<sup>th</sup> ACS National Meeting, Philadelphia, PA. August 22-26, 2004. Symposium on “CATALYSIS BY METAL OXIDES: Comparison Between Bulk Mixed Oxides, Supported Oxides, Oxide Clusters, Organometallic Oxides and Oxide Single Crystals”. Probing the Electronic Structure and Chemical Bonding of Metal Oxide Clusters Using Photoelectron Spectroscopy.
59. 12<sup>th</sup> International Symposium on Small Particles and Inorganic Clusters (ISSPIC 12), September 6-10, 2004, Nanjing, China. Planar Clusters.
60. Helsinki Winter School in Theoretical Chemistry 2004: A Frontier of Chemistry — New Species. Department of Chemistry, University of Helsinki, Helsinki, Finland. December 13-16, 2004. 1. Discovering New Species in the Gas Phase: From Planar Tetracoordinate Carbon Molecules to All-Metal Aromatic and Antiaromatic Clusters. 2. Discovering New Species in the Gas Phase: Unique Gold Clusters and Novel Au-Containing Molecules.
61. 7<sup>th</sup> Annual Meeting of the Northwest Section of the American Physical Society, May 13-14, 2005, Victoria, BC, Canada. Probing the Unique Size-Dependent Electronic and Structural Properties of Nanoclusters.
62. American Chemical Society Petroleum Research Fund Summer School on Photoelectron Spectroscopy, June 12-16, 2005; University of Arizona, Tucson, Arizona. 1. Probing the Electronic Structure of Free and Size-Selected Nanoclusters Using Photoelectron Spectroscopy. 2. Photoelectron Spectroscopy of Multiply-Charged Anions and Solution Phase Chemistry in the Gas Phase.
63. 230<sup>th</sup> American Chemical Society Meeting, Washington, D.C., Aug. 28 – Sept. 1, 2005. Symposium on Structures and Properties of Small Clusters. Probing the Unique Size-Dependent Electronic and Structural Properties of Boron and Gold Clusters.
64. 9<sup>th</sup> National Conference of Chemical Reaction Kinetics, September 24-27, 2005; Hanzhou, China. Investigation of Multiply Charged Anions and Solution Chemistry in the Gas Phase.
65. 2005 Condensed Phase and Interfacial Molecular Science Research Meeting, Office of Basic Energy Sciences, Chemical Sciences, Geosciences & Biosciences Division, US Department of Energy, Airlie Conference Center, Warrenton, Virginia, October 23-26, 2005. Gas Phase Investigation of Condensed Phase Phenomena.
66. The 2005 International Chemical Congress of Pacific Basin Societies (Pacifichem 2005), Dec. 15-20, 2005, Honolulu. Probing the Unique Size-Dependent Electronic and Structural Properties of Boron and Gold Nanoclusters.
67. AirUCI Workshop on Processes at Interfaces, University of California at Irvine. Laguna Beach, CA, Jan. 26-27, 2006. Solvation of Complex Anions.
68. 2006 Gordon Research Conference on Photoions, Photoionization and Photodetachment, Jan. 29 – Feb. 3, 2006; Buellton, CA. Photodetachment of Multiply Charged Anions, Solvated Anions, and Vibrationally Cold Anions.
69. 53<sup>rd</sup> Annual Western Spectroscopy Association Conference, Feb. 1-3, 2006, Asilomar Conference Center, Pacific Grove, CA. Photoelectron Spectroscopy of Multiply Charged Anions and Solution Phase Species in the Gas Phase.
70. 2006 Gordon Research Conference on Molecular and Ionic Clusters, Feb. 19-24, 2006, Ventura, CA. Probing the Electronic, Structural, and Chemical Properties of Metal Clusters Using Photoelectron Spectroscopy.
71. 231<sup>st</sup> American Chemical Society Meeting, Atlanta, GA, March 26–30, 2006. Symposium on Theoretical and Experimental Advances in the Study of Low-Energy Electron-Induced Processes in Complex Systems. Probing the Microsolvation of Complex Anions Using Photoelectron Spectroscopy.
72. Symposium on Size Selected Clusters 2007 (S3C), Brand, Austria; March 12-16, 2007. Cage Clusters of Gold and Tin: The Golden Buckyballs and Stannaspherene.
73. Anions 2007 Symposium, Park City, Utah. June 29 – July 3, 2007. Photoelectron Spectroscopy of Multiply Charged Anions
74. 2007 Gordon Research Conference on Clusters, Nanocrystals & Nanostructures, Mount Holyoke College, South Hadley, MA, July 29 - August 3, 2007. Stannaspherene and Plumbaspherene: Cousins of the Fullerenes?
75. 234<sup>th</sup> American Chemical Society Meeting, Boston, MA, August 18–23, 2007. Symposium on Hydration: From Clusters to Aqueous Solution. Hydration of Multiply-Charged Anions: Observation of Intra-Cluster Hydrolysis and Temperature-Dependent Conformation Changes
76. 10<sup>th</sup> National Chemical Dynamics Symposium, Dalian Bayshore Hotel, Dalian, China, September 20-24, 2007. Probing the Electronic and Structural Properties of Atomic Clusters Using Photoelectron Spectroscopy
77. AirUCI Annual Workshop, University of California-Irvine, January 23-24, 2008, Balboa Bay Club, Newport Beach, CA. Entropic Effect on the Conformation Changes of Hydrated Dicarboxylate Dianions.

78. American Physical Society 2008 March Meeting, New Orleans, LA, March 11-14, 2008., Focused Session “Cluster Assembled Nanoscale Materials”. Probing the electronic and atomic structures of nanoclusters using photoelectron spectroscopy.
79. 235<sup>th</sup> American Chemical Society Meeting, New Orleans, LA, April 6–10, 2008. Symposium on Computational Spectroscopy. Cage clusters of gold and tin: golden buckyballs and stannaspherene.
80. 2008 Gordon Research Conference on Atomic & Molecular Interactions, Colby-Sawyer College, New London, NH, July 6-11, 2008. Photoelectron spectroscopy of multiply charged anions and very cold anions.
81. 2008 Gordon Research Conference on Water & Aqueous Solutions, Holderness School, Holderness, NH, July 27-August 1, 2008. Solvent stabilization and microsolvation of multiply charged and complex anions.
82. 236<sup>th</sup> American Chemical Society Meeting, Philadelphia, PA, August 17–21, 2008. Symposium on Spectroscopic Probes of Chemical Dynamics in Gaseous and Condensed Phases. Microsolvation of complex anions: solvation induced conformation changes and entropic effects.
83. 16<sup>th</sup> International Symposium on Boron, Borides and Related Materials (ISBB2008), Matsue, Shimane, Japan, September 7-12, 2008. Probing the electronic structure and chemical bonding of boron clusters using photoelectron spectroscopy of size-selected cluster anions.
84. AirUCI Annual Workshop, University of California-Irvine, January 27-28, 2009, Hotel Laguna, Laguna Beach, CA. Microsolvation of complex anions: the temperature effects.
85. Symposium on *Atomic and Molecular Clusters, Nanostructures and Nanocatalysis, and Novel Molecules and Chemical Bonding*, Departments of Chemistry, Physics, and Environmental Sciences and Engineering, Fudan University, Shanghai, July 1, 2009. Probing the unique electronic structures and chemical bonding in atomic clusters using photoelectron spectroscopy.
86. 238<sup>th</sup> American Chemical Society Meeting, Washington D.C., August 16–20, 2009. Symposium on 25 Years of ZEKE. Photoelectron Imaging of Multiply Charged Anions.
87. 2010 Gordon Research Conference on Photoions, Photoionization & Photodetachment. Hotel Galvez, Galveston, TX, January 31 – February 5, 2010. **Invited Talk:** Photodetachment photoelectron spectroscopy of atomic clusters and multiply charged anions.
88. 15<sup>th</sup> International Symposium on Small Particles and Inorganic Clusters (ISSPIC 15), September 19-24, 2010, Oaxaca, Mexico. **Invited Talk:** Probing the structural isomers, structural transitions, and O<sub>2</sub> reaction of gold clusters using photoelectron spectroscopy.
89. The 2010 International Chemical Congress of Pacific Basin Societies (Pacifichem 2010), Dec. 15-20, 2010, Honolulu. **Invited Talk:** Covalent Gold.

### Colloquia

- 030/6/00 Department of Chemistry, University of Minnesota, Minneapolis, MN. Probing Solution Phase Chemistry in the Gas Phase: Photodetachment of Multiply Charged Anions Using Electrospray.
- 04/24/00 Department of Chemistry, Ohio State University, Columbus, OH. Probing Solution Phase Chemistry in the Gas Phase: Photodetachment of Multiply Charged Anions Using Electrospray.
- 04/26/00 Department of Chemistry, Northwestern University, Evanston, IL. Probing Solution Phase Chemistry in the Gas Phase: Photodetachment of Multiply Charged Anions Using Electrospray.
- 04/27/00 Argonne National Laboratory, Argonne, IL. Probing Solution Phase Chemistry in the Gas Phase: Photodetachment of Multiply Charged Anions Using Electrospray.
- 05/19/00 Department of Physics, Universitat Kaiserslautern, Kaiserslautern, Germany. Photodetachment of Multiply Charged Anions.
- 05/22/00 Theoretische Chemie, Physikalisch-Chemisches Institut, Universitat Heidelberg, Germany. Photodetachment of Multiply Charged Anions.
- 05/24/00 Institut fur Organische Chemie, Technische Universitat, Berlin, Germany. Searching for Pentaatomic Tetracoordinate Planar Carbon Molecules.
- 09/15/00 Department of Chemistry, Gonzaga University, Spokane, WA. Tetracoordinate Planar Carbon Molecules.
- 09/26/00 Department of Chemistry, California Institute of Technology, Pasadena, CA. Probing solution phase chemistry in the gas phase: photodetachment of multiply charged anions.
- 10/09/00 Department of Chemistry, Louisiana State University, Baton Rouge, LA. Probing solution phase chemistry in the gas phase: photodetachment of multiply charged anions.
- 11/10/00 Department of Chemistry, University of Kentucky, Lexington, KY. Probing the electronic structure of novel clusters using anion photoelectron spectroscopy.

- 01/26/01 Department of Chemistry, Iowa State University, Ames, IA. Probing solution phase chemistry in the gas phase using electrospray and photoelectron spectroscopy
- 02/08/01 Department of Chemistry, Kansas State University, Manhattan, KS. Photodetachment of Gaseous multiply charged anions
- 05/10/01 Department of Physics, University of Missouri-Rolla, Rolla, MO. Photodetachment Spectroscopy of Cluster Anions
- 07/18/01 Department of Chemistry, Universidad Nacional Autonoma de Mexico. Probing the electronic structure of metal clusters using anion photoelectron spectroscopy
- 09/18/01 Department of Physics, Washington State University. Probing condensed phase phenomena in the gas phase: from solid to solution
- 10/01/01 Department of Chemistry, Washington State University. From tetracoordinate planar carbon molecules to all-metal aromatic molecules
- 07/01/02 Department of Physics, Fudan University, Shanghai, China. Probing Free Atomic Clusters Using Photoemission.
- 07/02/02 Department of Chemistry, Fudan University, Shanghai, China. From Tetracoordinate Planar Carbon Molecules to All-Metal Aromatic Molecules.
- 07/03/02 Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences. Probing Free Atomic Clusters Using Photoemission.
- 07/15/02 Department of Chemistry, Wuhan University, Wuhan, China. From Tetracoordinate Planar Carbon Molecules to All-Metal Aromatic Molecules.
- 10/08/02 Department of Chemistry, University of California, Berkeley. Photodetachment of Multiply Charged Anions: From Solution to Gas Phase.
- 10/22/02 Department of Chemistry, Johns Hopkins University. Photodetachment of Multiply Charged Anions: From Solution to Gas Phase.
- 10/25/02 Department of Chemistry, Yale University. Photodetachment of Multiply Charged Anions: From Solution to Gas Phase.
- 11/18/02 Department of Physics, University of Idaho. From Gas Phase Clusters to Nanomaterials.
- 08/11/03 Department of Chemistry, Stanford University. Probing the Electronic Structures of Multiply Charged Anions and Fe-S Clusters in the Gas Phase.
- 10/13/03 Department of Chemistry, Seoul National University, Seoul, Korea. Probing Solution Chemistry in the Gas Phase.
- 10/14/03 Department of Chemistry, Korea Advanced Institute of Science and Technology, Daejeon, Korea. Synthesis and Characterization of Helical Nanowires.
- 10/15/03 Department of Chemistry, Pohang University of Science and Technology, Pohang, Korea. Planar Clusters: From Tetracoordinate Planar Carbon to Aromaticity.
- 12/12/03 Research Institute for Green Technology, National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan. Probing the Electronic Structure of Size-Selected Clusters.
- 01/15/04 Laboratory of Structural Biology, Division of Computer Research & Technology, National Heart, Lung, and Blood Institute, National Institute of Health, Bethesda, MA. Probing the Electronic Structures of Multiply-Charged Anions and Fe-S Clusters.
- 01/15/04 Department of Chemistry, Georgetown University, Washington, DC. Planar Clusters: From Planar Carbon Molecules to Aromatic Clusters.
- 03/17/04 Department of Chemistry, University of Marburg, Germany. Planar Clusters: From Planar Carbon Molecules to Aromatic Clusters.
- 03/18/04 Department of Chemistry, University of Karlsruhe, Germany. Probing the Electronic Structures of Multiply-Charged Anions and Fe-S Clusters.
- 03/19/04 Department of Physics, Freiburg University, Germany. Probing the Electronic Structure of Size-Selected Clusters.
- 04/28/04 Department of Chemistry, University of Washington, Seattle, WA. From Planar Tetracoordinate Carbon Molecules to Aromatic Clusters.
- 07/02/04 Department of Chemistry, Fudan University, Shanghai, China. Aromatic and Antiaromatic Clusters.
- 01/13/05 Department of Chemistry, University of Arizona, Tucson, Arizona. Probing the Electronic Structure of Free and Size-Selected Nanoclusters Using Photoelectron Spectroscopy.

- 03/29/05 Department of Physics, Washington State University, Pullman, WA. Probing the Electronic Structure of Size-Selected Nanoclusters Using Photoelectron Spectroscopy.
- 04/25/05 Division of Chemistry, Argonne National Laboratory, Argonne, IL. Probing the Electronic Structure of Free Size-Selected Clusters Using Photoelectron Spectroscopy.
- 09/22/05 Department of Physics, Tsinghua University, Beijing, China. Probing the Unique Size-Dependent Electronic and Structural Properties of Nanoclusters Using Photoelectron Spectroscopy and Ab Initio Calculations.
- 09/23/05 Institute of Chemistry, Chinese Academy of Sciences, Beijing, China. Probing the Unique Size-Dependent Electronic and Structural Properties of Nanoclusters Using Photoelectron Spectroscopy and Ab Initio Calculations.
- 11/14/05 Institute of Physical Chemistry, University of Karlsruhe, Karlsruhe, Germany. Boron Clusters.
- 03/21/06 Department of Physics, Washington State University, Pullman, WA. Photodetachment of Multiply Charged Anions.
- 07/10/06 Institute of Organic Chemistry and Biochemistry, Academy of Sciences of the Czech Republic and the Center for Complex Molecular Systems and Biomolecules, Prague. Photoelectron Spectroscopy of Nanoclusters, Multiply Charged anions, and Solution Phase Species in the Gas Phase.
- 07/18/06 Institute of Physical Chemistry, University of Karlsruhe, Karlsruhe, Germany.  $\text{Sn}_{12}^{2-}$ : Stannaspherene.
- 08/04/06 Institute of Physical Chemistry, University of Karlsruhe, Karlsruhe, Germany. Low-Temperature Electrospray Photoelectron Spectroscopy, Multiply Charged Fullerenes, and Hollow Golden Cages.
- 10/05/06 Department of Physics, Washington State University. Physics 501 Lecture. Probing the Unique Electronic and Atomic Structures of Size-Selected Nanoclusters.
- 12/06/06 Department of Chemistry, Fudan University, Shanghai. Probing the Unique Electronic and Atomic Structures of Nanoclusters.
- 01/18/07 Department of Chemistry, Columbia University. Probing the Unique Electronic and Atomic Structures of Nanoclusters.
- 01/19/07 Department of Chemistry, Johns Hopkins University. Probing the Unique Electronic and Atomic Structures of Nanoclusters.
- 03/08/07 Institute of Physical Chemistry, University of Karlsruhe, Karlsruhe, Germany. Structural Evolution of Gold Clusters.
- 06/12/07 Department of Chemistry, Humboldt University, Berlin, Germany. Cluster Model Studies of Early Transition Metal Oxide Catalysts
- 06/18/07 Institute of Physics, University of Rostock, Germany. Probing the Electronic and Structural Properties of Atomic Clusters Using Photoelectron Spectroscopy
- 06/22/07 Fritz-Harbor-Institut der Max-Planck-Gesellschaft, Berlin, Germany. Probing the Unique Electronic and Atomic Structures of Nano-Clusters
- 06/25/07 The Berliner Elektronenspeicherring-Gesellschaft für Synchrotronstrahlung (BESSY), Berlin, Germany. Probing the Unique Electronic and Atomic Structures of Nano-Clusters Using Photoelectron Spectroscopy
- 06/26/07 Department of Chemistry, Humboldt University, Berlin, Germany. Probing the Electronic and Atomic Structures of Size-Selected Clusters Using Photoelectron Spectroscopy
- 06/28/07 Institute of Chemistry, Technical University Berlin, Germany. Cage Clusters of Gold and Tin: Golden Buckyballs and Stannaspherenes
- 05/29/08 Institute of Physics, National University of Mexico (UNAM), Mexico City. Probing the electronic and atomic structures of nanoclusters using photoelectron spectroscopy.
- 06/30/08 Institute of Physical Chemistry, University of Karlsruhe, Karlsruhe, Germany. Recent progresses on clusters and multiply charged anions.
- 09/26/08 Department of Chemistry, Brown University, Providence, RI. Probing the unique electronic and atomic structures of nano-clusters and solution chemistry in the gas phase
- 06/15/09 Department of Chemistry, Xinzhou Teacher's University, Xinzhou City, Shanxi Province. Probing the unique electronic and atomic structures of nano-clusters using photoelectron spectroscopy
- 06/26/09 Department of Chemistry, Fuzhou University, Fuzhou City, Fujian Province. Cage clusters of tin and gold: stannaspherene and golden buckyballs



- 06/29/09 Xiamen University (Nan Chiang Lectureship), Xiamen City, Fujian Province. Probing the unique electronic and atomic structures of nano-clusters using photoelectron spectroscopy
- 10/01/09 Department of Chemistry, Colorado State University, Fort Collins, CO. Probing the unique electronic and atomic structures of nano-clusters and solution chemistry in the gas phase.
- 10/02/09 Department of Chemistry, University of Colorado, Boulder, CO. Probing the unique electronic and atomic structures of nano-clusters and solution chemistry in the gas phase.
- 11/13/09 Department of Chemistry, Brown University, Providence, RI. Probing the size-dependent chemical and physical properties of Nanoclusters.
- 11/17/09 Institute of Physical Chemistry, Karlsruhe Institute of Technology, Karlsruhe, Germany. Recent progress on the investigation of gold clusters.
- 04/16/10 Department of Chemistry, Wesleyan University, Middletown, CT. Probing the unique electronic and atomic structures of nano-clusters and solution chemistry in the gas phase.
- 12/06/10 Department of Physics, Brown University, Providence, RI. Probing the electronic and atomic structures of nanoclusters and multiply charged anions.

## Service

- Affiliate Senior Chief Research Scientist, Pacific Northwest National Laboratory, Richland, Washington (1993-2009)
- National Science Foundation Review Panel, Physical Chemistry, May 2001, Arlington, Virginia.
- Co-organizer, Symposium on “New Frontier in Chemical Bonding”. Joint Regional meeting of the Northwest and Rocky Mountain Sections of the American Chemical Society. June 6-9, 2004, Logan, Utah.
- Organizer, *Symposium on Atomic and Molecular Clusters*, 4<sup>th</sup> Joint Meeting of Chinese Physicists World-Wide and International Conference on Physics Education & Frontier Research. Shanghai, June 28 – July 1, 2004.
- Co-organizer, American Chemical Society Petroleum Research Fund Summer School on Photoelectron Spectroscopy, June 12-16, 2005; University of Arizona, Tucson, Arizona.
- International Advisory Committee, *International Symposium of Small Particles and Inorganic Clusters* (ISSPIC), 2004 to present.
- International Advisory Committee, *International Symposium on Size Selected Clusters* (S<sup>3</sup>C), 2004 to present.
- Editorial Advisory Board, *Journal of Physical Chemistry*, 2007 - present
- Editorial Board Member, *Chinese Journal of Chemical Physics*, 2006 – present.
- Panel member, BESAC New Era Subcommittee Workshop on Solving Science and Energy Grant Challenges with Next Generation Photon Sources “Photon Workshop”, U. S. Department of Energy, October 26-29, 2008; Rockville, MD.
- International Advisory Board, Karlsruhe Center for Functional Nanostructures (CFN), Karlsruhe Institute of Technology, Germany, 2008 to present.
- Guest Professor, Department of Chemistry, Fudan University, Shanghai, China, 2003 to present.
- Chair, Gordon Research Conference on *Clusters, Nanostructures & Nanocrystals*, 2011.

## Academic Honors

- 2007 Elected AAAS Fellow
- 2007 Sahlin Faculty Excellence Award for Research, Scholarship & Arts, Washington State University
- 2006 Senior Humboldt Research Award
- 2005 John Simon Guggenheim Fellow

- 2005 Distinguished Faculty Award, College of Sciences, Washington State University
- 2003 Fellow, American Physical Society
- 2001 Creativity Award, U.S. National Science Foundation
- 1997 Westinghouse Distinguished Professor in Materials Science and Engineering
- 1997 Alfred P. Sloan Research Fellow
- 1996 NSF CAREER Award
- 1983 Chinese Academy of Sciences Fellowship