

Curriculum Vitae E. W. Plummer

Personal Data

Born October 30, 1940
Astoria, Oregon
Married, two children

Educational Background

Undergraduate:

B.A. in Physics and Mathematics, *Summa Cum Laude*, 1962, Lewis and Clark College

Graduate:

Ph.D. in Physics, January 1968, Cornell University

Thesis Title: Binding of the 5d-Transition Elements on Single-Crystal Tungsten Surfaces

Thesis Advisor: Prof. T. N. Rhodin

Honors and Awards

Crown Zellerbach Fellowship, 1960–1962

Cornell Fellowship, 1962–1963

W. Nottingham Award, Physical Electronics Conference, Topical Conference of APS, 1968

Outstanding Performance Rating from U.S. Dept. of Commerce, 1968–1970

The Davisson-Germer Award, APS, 1983

Fellow of American Physical Society, 1981

Guggenheim Fellowship, 1986–1987

Humboldt Senior Scientist Award, 1987

Honorary Professor of Physics at the Institute of Physics, Chinese Academy of Sciences (October 2000)

Listed in the 1,000 Most Cited Physicists (Institute for Scientific Information) 1981–1997

One of top 100 papers published by NIST in the 20th Century

Medard W. Welch Award from the AVS, 2001

Fellow of the American Vacuum Society, 2001

Guangbiao Jianzuo Professor of Physics at Zhejiang University, Hangzhou, China, 2006

National Academy of Sciences, 2006

Distinguished Alumnus Award from Lewis and Clark College, 2007

Professional Experience

September 1967–June 1970

National Research Council Postdoctoral Fellow at National Bureau of Standards

June 1970–July 1973

Assistant Section Chief for Surface Physics in the Far Ultraviolet Section at NBS

July 1973–July 1977

Associate Professor of Physics, University of Pennsylvania

July 1977–1988

Professor of Physics, University of Pennsylvania

July 1988–December 1992

William Smith Professor of Physics, University of Pennsylvania

November 1990–December 1992

Director of the Laboratory for Research on Structure of Matter

March 1992

Visiting Distinguished Scientist at ORNL

December 1993–	Distinguished Professor of Physics, University of Tennessee
	Distinguished Scientist, ORNL
March 2001–2006	Director of the Tennessee Advanced Materials Laboratory
2006–	Director of the Joint Institute for Advanced Materials

Research Interests

Investigations of the phenomena associated with the unique environment at a surface or interface driven by broken symmetry and reduced dimensionality. Specifically of primary interest is the coupling of the electronic, magnetic, and structural properties (static and dynamic) at a surface.

Professional Activities

- Advisory Editorial Board, *Chemical Physics Letters*, 1991–1994
- Member of NRC Panel for “An Assessment of the National Need for Facilities Dedicated to the Production of Synchrotron Radiation,” National Academy of Sciences, 1976
- Member of the Eisenberger-Knotek Committee “Planning Study for Advanced National Synchrotron Radiation Facilities,” DOE, 1984
- Consulting Editor, *Chemical Physics*
- Editorial Board, *Physical Review B*, 1986–1989
- Editorial Advisory Board, *Langmuir*, 1989–1993
- Member, National Academy of Sciences “Materials Science and Engineering Study,” 1986
- Member, Evaluation Committee for Condensed Matter Physics in Sweden, 1986
- Member, Visiting Committee for Physics and Accelerator Departments and the Instrumentation Division of BNL for AUI (1980–1982)
- Member, User’s Advisory Committee for the National Synchrotron Radiation Light Source, BNL (1983–1987)
- Member, Solid State Sciences Committee of the National Academy of Sciences (1986–1989)
- Member, DOE Basic Energy Sciences, Materials Sciences and Engineering Division Review of LBNL and Sandia Livermore (October 1997)
- Chair, Complex Materials Study Group for the “Workshop on Scientific Directions at the Advanced Light Source” (1998)
- Member, Evaluation Panel for “Role of Structure of Surfaces and Interfaces” Program in the Condensed Matter Community of the Netherlands (1999)
- Chair, DOE Sponsored Workshop on “Soft X-Ray Science in the Next Millennium: The Future of Photon-In/Photon-Out Experiments,” Pikeville, Tennessee, March 15–18, 2000
- Chair, DOE-BESAC Subpanel for the Evaluation of the Intense Pulsed Neutron Source (IPNS) at Argonne National Laboratory and the Los Alamos Neutron Science Center (LANSCE) Manuel Lujan Jr. Neutron Scattering Center (2000–2001)
- Member, DOE-Basic Energy Sciences Advisory Committee (2001–2007)
- Member, DOE-Basic Energy Sciences Review of LBNL (October 2001)
- Selection Committee for the Ernest O. Lawrence Award in Physics (2002)
- Co-Editor (with C. B. Duke) of the Special Issue of *Surface Science*, Vol. **500**, entitled “Frontiers in Surface and Interface Science” (2002)
- Scientific Advisory Board for the International Center for Quantum Structure (ICQS) at the Institute of Physics in Beijing, China
- Member, NSF Workshop “NNI Grand Challenge Workshop on Nanomaterials,” June 2003

- Executive Advisory Board for the University of Pennsylvania Materials Research Science and Engineering Center (LRSM) (2003–)
- Review of “Nanotechnology,” Proposed Program by Forschungszentrum Karlsruhe GmbH, for the Helmholtz Research Programme (April 2003)
- Selection Committee for the Ernest O. Lawrence Award in Materials Research (2004)
- Review Panel for the Physics Department at the University of New Hampshire (2005)
- DOE Review of the Advanced Photon Source (2007)
- International Review of the Institute of Physics, Beijing, China (2008)

Publications The color code is: **Blue** for *Physical Review Letters*; **Green** for *Science*; **Red** for *Nature*; **Dark Turquoise** for *PNAS*; **Brown** for *Physics Today*; and **Violet** for Major Reviews.

1. “Atomic Perfection and Field Emission from Tungsten (110) Surfaces,” T. H. Rhodin and E. W. Plummer, *Appl. Phys. Lett.* **11**, 194 (1967).
2. “Atomic Binding of Transition Metals on Clean Single-Crystal Tungsten Surfaces,” E. W. Plummer and T. H. Rhodin, *J. Chem. Phys.* **49**, 3479 (1968).
3. “Atomistic Considerations of Surface Binding on Metal,” E. W. Plummer, T. H. Rhodin, and P. W. Palmberg, *Proceedings 4th International Materials Symposium on Structure and Chemistry of Solid Surfaces*, Book, Wiley Publishers, New York, 1968.
4. “Interaction of Single Atoms with Atomically Defined Surfaces,” E. W. Plummer, *Proceedings of Symposium on Field Ion Microscopy in Physical Metallurgy and Corrosion*, May 1968.
5. “Resonance Tunneling of Field Emitted Electrons Through Adsorbates on Metal Surfaces,” E. W. Plummer, J. W. Gadzuk, and R. D. Young, *Solid State Commun.* **7**, 487 (1969).
6. “Field-Emission Studies of Electronic Energy Levels of Adsorbed Atoms,” R. D. Young and E. W. Plummer, *Phys. Rev. B* **1**, 2088 (1970).
7. “Surface States on Tungsten,” E. W. Plummer and J. W. Gadzuk, *Phys. Rev. Lett.* **25**, 1493 (1970).
8. “Hot-Hole-Electron Cascades in Field Emission from Metals,” J. W. Gadzuk and E. W. Plummer, *Phys. Rev. Lett.* **26**, 92 (1971).
9. “Energy Distributions for Thermal Field Emission,” J. W. Gadzuk and E. W. Plummer, *Phys. Rev. B* **3**, 2125 (1971).
10. “Virtual Impurity Level Density of States as Investigated by Resonances Tunneling,” E. W. Plummer, J. W. Gadzuk, H. E. Clark, and R. D. Young, *Electronic Density of States Conference*, ed. by L. H. Bennett, NBS Special Publication 323 (1972).
11. “Field Emission Deflection Energy Analyzer,” C. E. Kuyatt and E. W. Plummer, *Rev. Sci. Instrum.* **43**, 108 (1972).
12. “Field Emission Energy Distributions of Hydrogen and Deuterium on the (100) and (110) Planes of Tungsten,” E. W. Plummer and A. E. Bell, *J. Vac. Sci. Technol.* **9**, 583 (1972).
13. “Photoemission Observation of a Surface State of Tungsten,” B. J. Waclawski and E. W. Plummer, *Phys. Rev. Lett.* **29**, 783 (1972).
14. “Field Emission Energy Distributions,” E. W. Plummer and J. W. Gadzuk, Chapter in *Progress in Solid State Science*, **3**, ed. by M. Greene, Marcel-Decker, Publisher.
15. “Field Emission and Photoemission Surface Studies,” B. J. Waclawski and E. W. Plummer, *J. Vac. Sci. Technol.* **10**, 292 (1973).
16. “Electronic Characterization of Submonolayer Films,” E. W. Plummer, *Monolayer and Submonolayer Helium Films*, ed. by J. G. Daunt and E. Lerner, Plenum Press, New York, 1973, p. 157.
17. “Field Emission Energy Distributions,” E. W. Plummer and J. W. Gadzuk, *Rev. Mod. Phys.* **45**, 487 (1973).
18. “Field Emission as a Probe of the Surface Density of States,” D. R. Penn and E. W. Plummer, *Phys. Rev. B* **9**, 1216 (1974).

19. "Experimental Observations of Electronic Energy Levels at a Solid-Vacuum Interface," E. W. Plummer, B. J. Waclawski, and T. Vorburger, *J. Electro-Chem. Soc.* **121**, 43 (1974).
20. "Photoelectron Spectra of the Decomposition of Ethylene on (110) Tungsten," E. W. Plummer, B. J. Waclawski, and T. Vorburger, *Chem. Phys. Lett.* **28**, 510 (1974).
21. "Theory of the Angular Dependence of the Photoemission Line Shape from an Adsorbate," A. Liebsch and E. W. Plummer, *Faraday Discuss.* **58**, 19 (1974).
22. "The Applicability of Electron Emission Spectroscopies to Elucidate Chemisorption," E. W. Plummer, Battelle Colloquium, *The Physical Basis for Heterogeneous Catalysis*, ed. by E. Drauglis and R. Jafee, Plenum Press, New York, 1975, p. 203.
23. "Field Emission Work Function," T. Vorburger, E. W. Plummer, and D. Penn, *Surf. Sci.* **48**, 417 (1975).
24. "Photoemission and Field Emission Electron Spectroscopy," E. W. Plummer, Chapter in *Topics in Applied Physics*, Vol. 4, ed. by R. Gomer, Springer-Verlag, 1975, p. 143.
25. "Vacuum Tunneling Spectroscopy," E. W. Plummer, J. W. Gadzuk, and D. R. Penn, *Phys. Today*, April Issue, p. 63 (1975).
26. "Interpretation of the Photoelectron Spectra of Molecularly Adsorbed CO," E. W. Plummer, T. Gustafsson, D. E. Eastman, and J. L. Freeouf, *Solid State Commun.* **17**, 391 (1975).
27. "Photoelectron Spectra of Adsorbed Species," B. J. Waclawski, T. Vorburger, C. C. Kuyatt, and E. W. Plummer, *Prog. Surf. Sci.* **7**, 149 (1976).
28. "Field Emission Energy Distribution (Clean Surfaces)," P. Soven, E. W. Plummer, and N. Karr, *CRC Crit. Rev. Solid State Sci.* **6**, 111 (1976).
29. "Photoemission Studies of Molecular Adsorbates by Synchrotron Radiation," E. W. Plummer and T. Gustafsson, *Proceedings of Conference on Photoemission From Surfaces*, ed. by B. Feuerbacher and R. Willis, Noordwijk, 1976.
30. "Angle-Resolved Photoemission Measurements of p(2 × 2) and c(2 × 2)S and Se on Ni(100)," E. W. Plummer, S. P. Weeks, and T. Gustafsson, *Proceedings of Conference on Photoemission from Surfaces*, ed. by B. Feuerbacher and R. Willis, Noordwijk, 1976.
31. "Partial Photoionization Cross Sections of N₂ and CO Using Synchrotron Radiation," E. W. Plummer, T. Gustafsson, D. E. Eastman and W. Gudat, *Phys. Rev. A* **15**, 2339 (1977).
32. "Addition of an Electron Multiplier to Varian Faraday Cup Assembly for Measuring Angle-Resolved Photoemission," E. W. Plummer, S. P. Weeks, and C. D. Ehrlich, *Rev. Sci. Instrum.* **48**, 190 (1977).
33. "Angle of Incidence Dependence in Angle-Resolved Photoemission from Chemisorbed Molecules: c(2 × 2)O, c(2 × 2)S, and CO on Ni(100)," E. W. Plummer and S. P. Weeks, *Solid State Commun.* **21**, 695 (1977).
34. "Valence Photoemission from Adsorbates," E. W. Plummer and T. Gustafsson, Ch. 12 in *Photoemission from Surfaces*, ed. by B. Feuerbacher, R. Willis, and B. Fitton, Wiley and Sons, New York, 1977, p. 353.
35. "Evidence for the Distortion of C₂H₄ and C₂H₂ Chemisorbed on W(100)," E. W. Plummer, T. V. Vorburger, and B. J. Waclawski, *Chem. Phys. Lett.* **46**, 42 (1977).
36. "Observation of Time-Dependent Relaxation Effects in the Photoelectron Spectra of Molecules," E. W. Plummer, D. Rajoria, L. Kovnat, and W. Salaneck, *Chem. Phys. Lett.* **49**, 64 (1977).

37. "Prediction and Confirmation of Two Bands of Surface Resonances on the (100) Plane of Molybdenum," E. W. Plummer and S. Weng, *Solid State Commun.* **23**, 515 (1977).
38. "Surface Resonances on the (100) Plane of Molybdenum," E. W. Plummer and S. Weng, *Phys. Rev. Lett.* **38**, 434 (1977).
39. "The Orientation of CO Adsorbed on Ni(100)," E. W. Plummer, C. Allyn, and T. Gustafsson, *Chem. Phys. Lett.* **47**, 127 (1977).
40. "Comparison of Angular-Resolved Measurements of Auger Emission from a Clean Nickel (100) Surface with Electron Multiple Scattering Calculations," E. W. Plummer, S. Weeks, and A. Liebsch, *Surf. Sci.* **62**, 197 (1977).
41. "Three Surface Resonances on the (100) Face of W and Mo: An Angle-Resolved Synchrotron Photoemission Study," E. W. Plummer, S. Weng, and T. Gustafsson, *Phys. Rev. Lett.* **39**, 822 (1977).
42. "New Evidence for Multiple Binding Sites for Sulfur at the Ni(100) Vacuum Interface," E. W. Plummer and S. Weeks, *Chem. Phys. Lett.* **48**, 601 (1977).
43. "Electronic Structure of Porphins: All Valence Electron Molecular Orbital Theory and Ultraviolet Photoemission Spectroscopy," K. Yip, C. Duke, W. Salaneck, E. W. Plummer, and G. Loubriel, *Chem. Phys. Lett.* **49**, 530 (1977).
44. "The Chemisorption of CO on Cu(100) Studied With Angle-Resolved Photoelectron Spectroscopy," C. Allyn, E. W. Plummer, and T. Gustafsson, *Solid State Commun.* **24**, 531 (1977).
45. "Geometry of Adsorbates on Solid Surfaces," T. Gustafsson and E. W. Plummer, *Science* **198**, 165 (1977).
46. "Geometric and Electronic Structure of Adsorbates as seen by Photoelectron Spectroscopy," E. W. Plummer, *Proceedings of the 7th International Vacuum Congress*, ed. by R. Dobrozemsky, Vienna, 1977.
47. "Partial Photoionization Cross Sections of CO₂ between 20 and 40 eV Studied with Synchrotron Radiation," E. W. Plummer, T. Gustafsson, D. E. Eastman, and W. Gudat, *Phys. Rev. A* **17**, 175 (1978).
48. "An Analyzer System Capable of Determining Energy and Direction of Charged Particles in Ultrahigh Vacuum," E. W. Plummer, C. Allyn, and T. Gustafsson, *Rev. Sci. Instrum.* **49**, 1197 (1978).
49. "Photoelectron Spectra of Transition-Metal Carbonyl Complexes: A Comparison with the Spectra of Adsorbed CO," W. Salaneck, J. S. Miller, and E. W. Plummer, *Phys. Rev. B* **18**, 1673 (1978).
50. "Final State Effects in Angle-Resolved Photoemission," S. Weeks and E. W. Plummer, *Phys. Rev. B* **17**, 1738 (1978).
51. "c(2 × 2)CO on Ni(100): Photoemission Orientation Determination," C. Allyn, T. Gustafsson, and E. W. Plummer, *Solid State Commun.* **28**, 85 (1978).
52. "Observation of Nondipole Electron Impact Vibrational Excitations: H on W(100), W. Ho, R. F. Willis, and E. W. Plummer, *Phys. Rev. Lett.* **10**, 1463 (1978).
53. "Experimental and Theoretical Study of the Surface Resonances on the (100) Face of W and Mo," S. L. Weng, E. W. Plummer, and T. Gustafsson, *Phys. Rev. B* **18**, 1718 (1978).
54. "Measurement of the Absolute Tunneling Current Density from W(100)," E. W. Plummer and C. Ehrlich, *Phys. Rev. B* **18**, 3767 (1978).

55. "Electronic Structure of Polyenes and Polyacetylene," C. B. Duke, A. Paton, W. R. Salaneck, H. R. Thomas, E. W. Plummer, A. J. Heeger, and A. G. MacDiarmid, *Chem. Phys. Lett.* **59**, 146 (1978).
56. "Vibrational Excitation of Hydrogenic Modes on Tungsten by Angle-Dependent Electron-Energy-Loss Spectroscopy," R. F. Willis, W. Ho, and E. W. Plummer, *Surf. Sci.* **80**, 593 (1979).
57. "Photoionization Resonance in Cr(CO)₆: Implications for Bonding of Adsorbed CO," G. Loubriel and E. W. Plummer, *Chem. Phys. Lett.* **64**, 234 (1979).
58. "Magnetic Surface States on Ni(100)," E. W. Plummer and W. Eberhardt, *Phys. Rev. B* **20**, 1444 (1979).
59. "Photoelectron Spectra of AsF₅-Doped Polyacetylene," W. R. Salaneck, H. R. Thomas, C. B. Duke, A. Paton, E. W. Plummer, A. J. Heeger, and A. G. MacDiarmid, *J. Chem. Phys.* **71**, 2044 (1979).
60. "The Effects on Photoemission of the Spatially Varying Photon Field at a Metal Surface," H. J. Levinson, E. W. Plummer, and P. J. Feibelman, *Phys. Rev. Lett.* **43**, 952 (1979).
61. "Atomic and Solid State Effects in the Angle-Resolved Photoemission Cross Section from an Adsorbate: 4d Levels of c(2 × 2)Te on Ni," I. T. McGovern, W. Eberhardt, and E. W. Plummer, *Solid State Commun.* **32**, 963 (1979).
62. "Photoelectron Spectra of Chromium Tetranitrosyl," E. W. Plummer, G. Loubriel, D. Rajoria, M. Albert, L. Sneddon, and W. R. Salaneck, *J. Electron. Spectrosc. Relat. Phenom.* **19**, 35 (1980).
63. "Angle-Resolved Photoemission Determination of the Band Structure and Multi-Electron Excitations in Ni," W. Eberhardt and E. W. Plummer, *Phys. Rev. B* **21**, 3245 (1980).
64. "Electronic Structure of Ordered Sulfur Overlayers on Ni(001)," E. W. Plummer, B. Tonner, N. Holzwarth, and A. Liebsch, *Phys. Rev. B* **21**, 4306 (1980).
65. "Angle-Resolved and Variable-Impact Energy Electron Vibrational Excitation Spectroscopy of Molecules Adsorbed on Surfaces," W. Ho, N. J. DiNardo, and E. W. Plummer, *J. Vac. Sci. Technol.* **17**, 134 (1980).
66. "Charge Transfer and Non-Rigid Band Effects in the Graphite Compound LiC₆," W. Eberhardt, I. T. McGovern, E. W. Plummer, and J. E. Fischer, *Phys. Rev. Lett.* **44**, 200 (1980).
67. "The Determination of Graphite and Graphite Intercalation Compounds as Determined by Angle-Resolved Photoemission Using Synchrotron Radiation," I. T. McGovern, W. Eberhardt, E. W. Plummer, and J. E. Fischer, *Physica* **99B**, 415 (1980).
68. "Enhanced Photoexcitation from the Surface of Aluminum," H. J. Levinson, E. W. Plummer, and P. Feibelman, *J. Vac. Sci. Technol.* **17**, 216 (1980).
69. "Photoelectron Spectroscopy of Iodine-Doped Polyacetylene," W. R. Salaneck, R. Thomas, R. Bigelow, C. B. Duke, E. W. Plummer, A. J. Heeger and A. G. MacDiarmid, *J. Chem. Phys.* **72**, 3674 (1980).
70. "Photoelectron Spectroscopy [CH(AsF₅)_{0.1}]_x," W. R. Salaneck, R. Thomas, C. B. Duke, E. W. Plummer, A. J. Heeger, and A. G. MacDiarmid, *Synth. Met.* **1**, 133 (1979/80).
71. "H on Mo(100): Photoemission Results and its Significance to the Correlation Between the Surface Resonance and the Surface Reconstruction," S. L. Weng, T. Gustafsson, and E. W. Plummer, *Phys. Rev. Lett.* **44**, 344 (1980).

72. “Inelastic Electron Scattering: Surface Vibrational Spectroscopy,” E. W. Plummer, W. Ho, and S. Andersson, *AIP Conference Proceedings*, American Institute of Physics, New York **249** (1980).
73. “A Vibrational Frequency and Intensity Analysis of the Bonding Structure of N₂ on W(100),” W. Ho, R. F. Willis, and E. W. Plummer, *Surf. Sci.* **95**, 171 (1980).
74. “Mechanism for Low-Energy Electron Vibrational Excitation of Adsorbates: H on W(100),” W. Ho, R. F. Willis, and E. W. Plummer, *Phys. Rev. B* **21**, 4202 (1980).
75. “Magnetic Exchange Splitting of Electronic Surface States on Ni(100),” W. Eberhardt, E. W. Plummer, K. Horn, and J. Erskine, *Phys. Rev. Lett.* **45**, 273 (1980).
76. “Vibrational Excitation Cross Section for Adsorbed CO,” S. Andersson, B. N. J. Persson, T. Gustafsson, and E. W. Plummer, *Solid State Commun.* **34**, 473 (1980).
77. “Design Criteria and Performance of a Toroidal Grating Monochromator,” B. Tonner and E. W. Plummer, *Nucl. Instrum. Technol.* **177**, 153 (1980).
78. “Evaluation of Angle-Resolved Electron Energy Analyzers,” E. W. Plummer, *Nucl. Instrum. Technol.* **177**, 179 (1980).
79. “Temperature-Dependent UPS Line Widths of Molecular Solids: Isopropyl Benzene, W. R. Salaneck, C. B. Duke, W. Eberhardt, E. W. Plummer, and H. J. Freund, *Phys. Rev. Lett.* **45**, 280 (1980).
80. “Photoelectron Spectra of Conducting Polymers—Molecularly Doped Polyacetylene,” H. R. Thomas, W. R. Salaneck, C. B. Duke, E. W. Plummer, A. J. Heeger, and A. G. MacDiarmid, *Polym.* **21**, 1238 (1980).
81. “Explanation of the Satellite Structure Observed in Photoemission Spectra of Coordinated CO,” H. J. Freund and E. W. Plummer, *Phys. Rev. B* **23**, 4859 (1981).
82. “The Bonding of H to Ni, Pd, and Pt Surfaces,” W. Eberhardt, F. Greuter, and E. W. Plummer, *Phys. Rev. Lett.* **46**, 1085 (1981).
- 82a. Summary Abstracts: “H Bonding to Ni, Pd, and Pt: An Angle-Resolved Photoemission Study,” F. Greuter, W. Eberhardt, J. DiNardo, and E. W. Plummer, *J. Vac. Sci. Technol.* **18**, 433 (1981).
83. “Vibrational Bands in the Photoemission of an Adsorbate: O₂ on Graphite,” W. Eberhardt and E. W. Plummer, *Phys. Rev. Lett.* **47**, 1476 (1981).
84. “The Surface Photoeffect,” H. J. Levinson and E. W. Plummer, *Phys. Rev. B* **24**, 628 (1981).
85. “An XPS Study of Intensity Borrowing in Core Ionization of Free and Coordinated CO,” H. J. Freund, E. W. Plummer, W. R. Salaneck, and R. W. Bigelow, *J. Chem. Phys.* **75**, 4275 (1981).
- 85a. Summary Abstract: “An XPS Study of ‘Intensity Borrowing’ in Core Ionizations of CO upon Coordination of Transition-Metal Atoms,” H. J. Freund, E. W. Plummer, and W. R. Salaneck, *J. Vac. Sci. Technol.* **18**, 464 (1981).
86. “X-Ray Photoelectron Spectroscopy of Gaseous and Solid I₂: Ion-State-Enhanced Intermolecular Interactions,” W. R. Salaneck, R. W. Bigelow, H. J. Freund, and E. W. Plummer, *Phys. Rev. B* **24**, 2403 (1981).
87. “Angle-Resolved Photoemission as a Tool for the Study of Surfaces,” E. W. Plummer and W. Eberhardt, *Advances in Chemical Physics* **49**, ed. by I. Prigogine and S. A. Rice, John Wiley and Sons, New York, 1982, p. 533.

88. "H on Tungsten (110): Studied by Angle-Resolved Photoemission and Inelastic Electron Scattering," Graciela B. Blanchet, N. J. DiNardo, and E. W. Plummer, *Surf. Sci.* **118**, 496 (1982).
89. "The Adsorption of N₂: Chemisorbed on Ni(110)/and Physisorbed on Pd(111)," K. Horn, J. DiNardo, W. Eberhardt, H. J. Freund, and E. W. Plummer, *Surf. Sci.* **118**, 465 (1982).
90. "Characterization of Surface Acetylene and Ethylene Species on Pt(111) by Angle-Resolved Photoemission Using Synchrotron Radiation," M. Albert, L. Sneddon, W. Eberhardt, F. Greuter, T. Gustafsson, and E. W. Plummer, *Surf. Sci.* **120**, 19 (1982).
91. Summary Abstract: "Vibrational Spectroscopy of H on Ni(110)," N. J. DiNardo and E. W. Plummer, *J. Vac. Sci. Technol.* **20**, 890 (1982).
92. "Magnetic Surface States Studied by Angle-Resolved Photoelectron Spectroscopy," E. W. Plummer, *J. Appl. Phys.* **53**, 2002 (1982).
93. Summary Abstract: "Angle-Resolved Photoemission Study of CO/Co(0001)," D. Heskett, F. Greuter, H. J. Freund, and E. W. Plummer, *J. Vac. Sci. Technol.* **20**, 623 (1982).
94. "Ultraviolet Spectroscopy of Optically Excited States in Trans-Polyacetylene," W. R. Salaneck, H. W. Gibson, E. W. Plummer, and B. Tonner, *Phys. Rev. Lett.* **49**, 801 (1982).
95. "Photoemission from Condensed Layers on H₂ on Cu and Au," W. Eberhardt, R. A. Cantor, F. Greuter, and E. W. Plummer, *Solid State Commun.* **42**, 799 (1982).
96. "Experimental Band Structure of Aluminum," H. J. Levinson, F. Greuter, and E. W. Plummer, *Phys. Rev. B* **27**, 727 (1983).
97. "Influence of Multielectron Excitations on the Band Structure of Adsorbate Overlayers," H. J. Freund, W. Eberhardt, D. Heskett, and E. W. Plummer, *Phys. Rev. Lett.* **50**, 768 (1983).
98. "The Interaction of Hydrogen with a Pd(111) Surface," W. Eberhardt, S. G. Louie, and E. W. Plummer, *Phys. Rev. B* **28**, 465 (1983).
99. "The Chemisorption of CO on Co(0001): I. Structure and Electronic Properties," F. Greuter, D. Heskett, E. W. Plummer, and H. J. Freund, *Phys. Rev. B* **15**, 7117 (1983).
100. "Chemisorption of CO on Cobalt: II. Multielectron Excitations," H. J. Freund, F. Greuter, D. Heskett, and E. W. Plummer, *Phys. Rev. B* **28**, 1727 (1983).
101. "Three-Dimensional Energy Band in Graphite and Lithium-Intercalated Graphite," Th. Fauster, F. J. Himpsel, J. E. Fischer, and E. W. Plummer, *Phys. Rev. Lett.* **51**, 430 (1983).
102. "Interaction of CO and N₂ with the Cu(111) Surface," W. Eberhardt and E. W. Plummer, *Phys. Rev. B* **28**, 3605 (1983).
103. "Intermolecular Screening in Core-Level Photoemission from the Nitric Oxide Dimer," B. P. Tonner, C. M. Kao, E. W. Plummer, T. C. Caves, R. P. Messmer, and W. R. Salaneck, *Phys. Rev. Lett.* **51**, 1378 (1983).
104. "Chemisorption of Atomic Hydrogen on Cu(111)," F. Greuter and E. W. Plummer, *Solid State Commun.* **48**, 37 (1983).
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