

CURRICULUM VITAE

Name: Robert L. Park

Military Service: United States Air Force Electronics Officer, 1951-1956

Academic Qualifications:

1958 BS (Physics), University of Texas (high honors, Phi Beta Kappa)

1960 MA (Physics), University of Texas

1964 PhD (Physics), Brown University (Edgar Lewis Marston Fellow)

Positions:

Member of the Technical Staff, Sandia Laboratories, (1965-1969)

Director, Surface Physics Division, Sandia, (1969-1974)

Professor of Physics, University of Maryland, (1974-present)

Director, Center of Materials Research, University of Maryland,
(1975-1978)

Chairman, Department of Physics and Astronomy, University of Maryland
(1978-1982)

Director of Public Information, Washington Office of The American Physical Society,
(1982-present)

Honors:

1998 Joseph A. Burton Award of the American Physical Society

Professional Affiliations:

The American Physical Society (Fellow)

American Association for the Advancement of Science (Fellow)

American Vacuum Society (Fellow)

Professional Activities:

Chairman of the Surface Science Division of the AVS (1971)

Editor of the Proceedings of the 1971 International Conference on Solid Surfaces

Editorial Board of the *Journal of Vacuum Science and Technology* (1971-1974)

General Chairman of the Annual Conference on Physical Electronics
(1972-1976)

Board of Directors of the AVS (1976-1977)

Founding Editor of *Applications of Surface Science* (1977-1985)

More committees than I want to remember

Ph.D. Theses Supervised:

Theodore R. Lundquist, "The Ionization and Neutralization of Sputtered Atoms," (1979)

Marten L. denBoer, "Effects of Surface Structure on Secondary Electron Emission," (1979)

W. Timothy Elam, "Extended Appearance Fine Structure Analysis of titanium, Vanadium and Iron Surfaces,"
(1979)

Gary S. Chottiner, "Oxygen Adsorption on Metals Cooled to Liquid Helium Temperatures," (1980)

A. Refik Kortan, "Phase Transitions in the Chemisorbed 2-Dimensional System, Oxygen on (111) Ni," (1980)

John F. Morar, "the Local Environment of Near Surface Atoms Probed with Core Level Spectroscopy," (1981)

Yong Sung Chee, "The 2p_{3/2} Appearance Potential Spectra of the 4d Transition Elements," (1982)

David E. Taylor, "Critical Behavior of Chlorine on Ag(100)," (1983)

Berend T. Jonker, "Thin Film Quantum Size Effects: A Probe of the Film/Substrate and Vacuum/Film
Interfaces," (1985)

Robert Q. Hwang, "Critical Behavior of Roughening Transitions on Vicinal Silicon Surfaces," (1988)

Publications:

I. Physics Research - Chemisorption and Catalysis

INTERACTION OF OXYGEN WITH (111) NICKEL (with H. E. Farnsworth), Applied Physics Letters 3,167, (1963)

CO ADSORPTION AND INTERACTION WITH OXYGEN ON (110) NICKEL (with H. E. Farnsworth), Journal of Chemical Physics 40, 2354 (1964)

INTERACTION OF OXYGEN WITH (110) NICKEL (with H. E. Farnsworth), Journal of Applied Physics 35, 2220 (1964)

WORK FUNCTION CHANGES RESULTING FROM THE INTERACTION OF OXYGEN WITH CLEAN NICKEL SURFACES (with H. E. Farnsworth), Surface Science 3, 287 (1965)

ADSORPTION AND OXIDATION OF CARBON MONOXIDE ON (110) NICKEL (with H. E. Farnsworth), Journal of Chemical Physics 43, 2351 (1965)

ANNEALING CHANGES ON THE (100) SURFACE PALLADIUM AND THEIR EFFECT ON CO ADSORPTION (with H. E. Madden), Surface Science 11, 188 (1968)

INTERACTION OF OXYGEN, CARBON MONOXIDE, AND NITROGEN WITH (001) AND (110) FACES ON MOLYBDENUM (with K. Hayek and H. E. Farnsworth), Surface Science 10, 429 (1968)

CHROMIUM DEPLETION OF VACUUM ANNEALED STAINLESS STEEL SURFACES (with J. E. Houston and D. G. Shreiner), Journal of Vacuum Science and Technology 9, 1023 (1972)

OXIDATION OF CARBON MONOXIDE ON PALLADIUM (with D. G. Shreiner), Journal of Vacuum Science and Technology 11, 248 (1974)

FLOATATION RELATED ESCA STUDIES ON Pbs SURFACES (with A. S. Manocha), Applied Surface Science 1, 129 (1977)

NITROGEN, OXYGEN, AND CARBON MONOXIDE CHEMISORPTION ON POLYCRYSTALLINE TITANIUM SURFACES (with Y. Fukada and W. T. Elam), Applied Surface Science 1, 278 (1978)

ORDER-DISORDER TRANSITION OF OXYGEN ON (111) NICKEL (A. R. Kortan and P. I. Cohen), Journal on Vacuum Science and technology 16, 541 (1979)

ADLAYER INDUCED LEED BEAMS NEAR ORDER DISORDER TRANSITIONS (with L. D. Roelofs and T. L. Einstein), Journal of Vacuum Science and Technology 16, 478 (1979)

O/Ni (111): ADLAYER PHASES AND BINDING SITES (with L. D. Roelofs, P.E. Hunter, A.R. Kortan, R. M. Roberts and T. L. Einstein), Journal of Vacuum Science and Technology (1980)

THE PHASE DIAGRAM OF OXYGEN CHEMISORBED ON NICKEL (111) (with A.R. Kortan), Physical Review B 23, 6340 (1981)

TWO-DIMENSIONAL CHEMISORBED PHASES, (with L.D. Roelofs, A.R. Kortan and T.L. Einstein), Journal of Vacuum Science and Technology 18, 492 (1981)

CRITICAL EXPONENTS OF A 4-STATE POTTS CHEMISORBED OVERLAYER: $p(2 \times 2)$ OXYGEN ON Ni (111), (with L.D. Roelofs, A.R. Kortan and T.L. Einstein), Physical Review Letters 46, 1465 (1981)

SUMMARY ABSTRACT: SURFACE STATES ON Ti (0001), (with J.F. Morar and B.T. Jonker), Journal of Vacuum Science and Technology 18, 590 (1981)

SURFACE STATES AND OXYGEN CHEMISORPTION ON Ti (0001), (with B.T. Jonker and J.F. Morar), Physical Review B 24, 2951 (1981)

PHASE DIAGRAM OF OXYGEN ON Ni (100), (with D.E. Taylor), Surface Science, 125, L73-L79 (1983)

PHYSICAL REALIZATION OF THE HARD SQUARE MODEL: CHLORINE ON Ag(100) (with D.E. Taylor and E. D. Williams), Journal of Vacuum Science and Technology A 2, 895 (1984)

PRECURSOR ADSORPTION OF OXYGEN ON Ni (111) AND THE ACTIVATION ENERGY FOR CHEMISORPTION, (with M. Shayegan, J.M. Cavallo and R.E. Glover III), Physical Review Letters 53, 1578 (1984)

TWO-DIMENSIONAL ORDERING OF CHLORINE ON Ag(100) (with D.E. Taylor, E.D. Williams, N.C. Bartelt and T.L. Einstein), Physical Review B 32, 4653 (1985)

LOW TEMPERATURE ADSORPTION OF CO AND O₂ ON Ni(100) AND Ni (111): EVIDENCE FOR PRECURSORS, (with M. Shayegan and R.E. Glover III), Journal of Vacuum Science and Technology A 4, 1333 (1986)

THERMAL DISORDERING OF THE (3X3)R30 STRUCTURE OF Al ON Si (111), (with R. Q. Hwang and E.D. Williams), Surface Science , 193, L53 (1988)

II. Physics Research - Electronic Structure of Surfaces and Films

AUGER EXCITATION BY INTERNAL SECONDARY ELECTRONS, (with J.E. Houston), Applied Physics Letters 14, 358 (1969)

IONIZATION SPECTROSCOPY OF SURFACES (with R.L. Gerlach and J.E. Houston), Applied Physics Letters 16, 179 (1970)

ANOMALOUS FINE STRUCTURE IN THE SOFT X-RAY APPEARANCE POTENTIALS OF NON-METALS (with J.E. Houston), Journal of Vacuum Science and Technology 8, 91 (1971)

THE EFFECT OF OXYGEN ON THE SOFT X-RAY APPEARANCE POTENTIAL SPECTRUM OF CHROMIUM (with J.E. Houston), Journal of Chemical Physics 55, 4601 (1971)

EXPERIMENTAL EVIDENCE FOR STRONG PLASMON COUPLING IN THE SOFT X-RAY APPEARANCE POTENTIAL SPECTRUM OF GRAPHITE (with J.E. Houston), Solid State Commun 10, 91 (1972)

APPEARANCE POTENTIAL STUDY OF THE BAND STRUCTURE OF TRANSITION METALS ON TRANSITION METAL SURFACES (with J.E. Houston), Journal of Vacuum Science and Technology 9, 579 (1972)

DIFFERENCE IN THE CrL_{3/2} INTENSITY RATION MEASURED BY SOFT X-RAY AND AUGER ELECTRON APPEARANCE POTENTIAL SPECTROSCOPY (with J.E. Houston), Physical Review B 5, 3808 (1972)

L-SHELL SOFT X-RAY APPEARANCE POTENTIAL SPECTRA OF THE 3d TRANSITION METALS (with J.E. Houston), *Physical Review B* 6, 1073 (1972)

DIRECT COMPARISON OF CORE ELECTRON BINDING ENERGIES OF SURFACE AND BULK ATOMS OF Ti, Cr, AND Ni (with J.E. Houston and G.E. Laramore), *Physical Review Letters* 30, 846 (1973)

COMMENT ON "APPEARANCE POTENTIAL SPECTROSCOPY" (with J.E. Houston), *Journal of Applied Physics* 44, 3810 (1973)

ELECTRON BINDING ENERGIES OF URANIUM (with J.E. Houston), *Physical Review A* 7, 1447 (1973)

SURFACE ELECTRONIC PROPERTIES OF TUNGSTEN, TUNGSTEN CARBIDE AND PLATINUM (with G.E. Laramore and J.E. Houston), *Science* 19, 185 (1974)

ABSOLUTE 2p_{3/2} CORE BINDING ENERGIES AND WORK FUNCTION OF 3d TRANSITION METAL SURFACES (with Y. Fukuda and W.T. Elam), *Physical Review B* 16, 3322 (1977)

EXTENDED FINE STRUCTURE ABOVE VANADIUM L-SHELL APPEARANCE POTENTIAL THRESHOLDS (with P.I. Cohen, T.L. Einstein, W.T. Elam, and Y. Fukuda), *Applied Surface Science* 1, 538 (1978)

EXTENDED APPEARANCE POTENTIAL FINE STRUCTURE ANALYSIS: OXYGEN ON ALUMINUM (100), (with M.L. denBoer, W.T. Elam, T.L. Einstein, L.D. Roelofs and G.E. Laramore), *Physical Review Letters* 44, 496 (1980)

EXTENDED APPEARANCE POTENTIAL FINE STRUCTURE ANALYSIS OF OXIDIZED METAL SURFACES (with M.L. denBoer, W.T. Elam, T.L. Einstein, L.D. Roelofs and G.E. Laramore), *Journal of Vacuum Science and Technology* 17, 59 (1980)

EFFECTS OF THE CENTRAL ATOM POTENTIAL ON THE EXTENDED FINE STRUCTURE ABOVE APPEARANCE POTENTIAL THRESHOLDS (with G.E. Laramore, L.D. Roelofs and T.L. Einstein), *Physical Review B* 21, 2108 (1980)

EXTENDED APPEARANCE POTENTIAL FINE STRUCTURE (EAPFS) AS A TOOL FOR ANALYZING THE GEOMETRICAL PROPERTIES OF SOLID SURFACES (with G.E. Laramore and T.L. Einstein. Paper given at International Conference on X-ray Processes and Inner-Shell Ionization, held at University of Stirling, Scotland, August 1980. Proceedings published in *Inner Shell and X-ray Physics of Atoms and Solids*, D.J. Fabian, H. Kleinpoppen and L.M. Watson, eds., Plenum, NY, (1981)

OXIDATION STUDIES BY EXTENDED APPEARANCE POTENTIAL FINE STRUCTURE (EAPFS) (with T.L. Einstein, M.L. denBoer and J.F. Morar), *Journal of Vacuum Science and Technology* 18, 490 (1981)

ABSOLUTE CORE BINDING ENERGY MEASUREMENTS WITH A FIELD EMISSION SOURCE (with J.F. Morar), published in *Proceedings of the 28th International Field Emission Symposium*, Portland, Oregon, L. Swanson and A. Bell, eds., p. 48-50, (July 1981)

COMPARISON OF APS AND FRESCA CORE LEVEL BINDING ENERGY MEASUREMENTS (with C.R. Anderson, R.N. Lee and J. Morar), *Journal of Vacuum Science and Technology* 20, 617 (1982)

BASIC RESEARCH NEEDS AND OPPORTUNITIES AT THE SOLID-GAS INTERFACE (with M.B. Brodsky, J.V. Cathcart, R.S. Hansen, K.L. Kliewer, U. Landman and S.R. Shatynski), *Material Science and Engineering* 53, 113 (1982)

EXTENDED FINE STRUCTURE ANALYSIS OF OXYGEN ON TITANIUM (with J.F. Morar), *Journal of Vacuum Science and Technology A* 1, 1043 (1983)

QUANTUM SIZE EFFECT IN ELECTRON TRANSMISSION THROUGH COPPER FILMS ON TUNGSTEN, (with B.T. Jonker and N.C. Bartelt) *Surface Science* 127, 183 (1983)

SUMMARY ABSTRACT: QUANTUM SIZE EFFECT IN ELECTRON TRANSMISSION THROUGH COPPER FILMS ON TUNGSTEN, (with B.T. Jonker and N.C. Bartelt), *Journal of Vacuum Science and Technology A* 1, 1062 (1983)

QUANTUM SIZE EFFECT IN ELECTRON TRANSMISSION THROUGH Cu AND Ag FILMS ON W(110), *Surface Science* 127, 183 (1983)

THIN FILMS QUANTUM SIZE EFFECTS I. VACUUM/FILM INTERFACE (with B.T. Jonker), *Surface Science* 146, 93 (1984)

THIN FILM QUANTUM SIZE EFFECTS II. FILM/SUBSTRATE INTERFACE (with B.T. Jonker), *Surface Science*, 146, 511 (1984)

THE EPITAXIAL GROWTH OF COPPER ON W(110) STUDIED USING ELECTRON ENERGY LOSS SPECTROSCOPY (with J. Vahakangas, H. Iwasaki and E.D. Williams), *Surface Science* 148, 453 (1984)

INTERFACIAL EFFECTS IN ELECTRON TRANSMISSION THROUGH Ag FILMS ON Cu(111) (with B.T. Jonker), *Solid State Commun.* 51, 871 (1984)

QUANTUM SIZE EFFECTS IN THE REFLECTION OF SLOW ELECTRONS FROM THIN FILMS (with B.T. Jonker, H. Iwasaki and Q.G. Zhu), *Applied Surface Science* 22/23, 1 (1985)

LOW ENERGY-ELECTRON TRANSMISSION THROUGH EPITAXIAL FILMS: Ca(001) ON Ni(001) (with H. Iwasaki and B.T. Jonker), *Physical Review B* 32, 643 (1985)

SURFACE EXTENDED ELECTRON ENERGY LOSS FINE STRUCTURE (with Y.U. Idzerda, E.D. Williams and T.L. Einstein), *Surface Science* 160, 75 (1985)

SURFACE STATES IN THE EPITAXIAL GROWTH OF TITANIUM ON COPPER (111) (with J. Vahakangas and E.D. Williams), *Physical Review B* 33, 2281 (1986)

ON THE DETAILED GROWTH MODE OF THIN SILVER FILMS ON Si(111), (with Q.G. Zhu, A.D. Zhang and E.D. Williams), *Surface Science*, 172, 433 (1986)

FORMATION OF IRON SILICIDE THIN FILMS (with Q.G. Zhu, H. Iwasaki and E.D. Williams), *Journal of Applied Physics* 60, 2629 (1986)

INITIAL FORMATION OF TITANIUM SILICIDE (with Y.U. Idzerda, E.D. Williams and J. Vahakangas), *Surface Science* 177, L1028 (1986)

REACTION AND STRUCTURE OF Ti ON Si POOLED BY SURFACE EXTENDED ENERGY-LOSS FINE STRUCTURE AND EXTENDED APPEARANCE POTENTIAL FINE STRUCTURE (with Y.U. Idzerda, E.D. Williams and T.L. Einstein), *Journal of Vacuum Science and Technology A* 5, 847 (1987)

OBSERVATION OF RESONANT ELECTRON TRANSMISSION THROUGH A Ni/Cu/Ni(100) SANDWICH STRUCTURE, (with Q.G. Zhu, Y. Yang and E.D. Williams), *Physical Review Letters* 59, 835 (1987)

ELECTRON INDUCED EXTENDED FINE STRUCTURE MEASUREMENTS OF THIN FILM GROWTH AND REACTION (with Y.U. Idzerda, E.D. Williams and T.L. Einstein), *Physical Review B* 36, 5941 (1987)

TEMPERATURE DEPENDENCE OF THE PHASE DIAGRAM OF Cl/Ag(100) (with R.Q. Hwang, E.D. Williams and N.C. Bartelt), *Physical Review B* (March 1988, in press)

III. Physics Research - Surface Imperfections

STRUCTURES OF CLEAN NICKEL SURFACES (with H.E. Farnsworth), *Surface Science* 2, 527 (1964)

LEED BEAM BROADENING AS A RESULT OF SPUTTERED DAMAGE, *Journal of Applied Physics* 37, 295 (1966)

THE EFFECTS OF REGISTRY DEGENERACY ON LEED BEAM PROFILES (with J.E. Houston), *Surface Science* 18, 213 (1960)

LOW ENERGY ELECTRON DIFFRACTION FROM IMPERFECT STRUCTURES (with J.E. Houston), *Surface Science* 21, 209 (1970)

LEED FROM STATISTICAL STEP MODELS (with J.E. Houston), *Surface Science* 26, 269 (1971)

THE EFFECTS OF STEPS ON THE LEED INTENSITY DATA FOR THE (110) FACE OF ALUMINUM (with G.E. Laramore and J.E. Houston), *Surface Science* 34, 477 (1973)

EFFECTS OF STEPS ON LOW-ENERGY ELECTRON DIFFRACTION INTENSITY PROFILES (with G.E. Laramore and J.E. Houston), *Journal of Vacuum Science and Technology* 10, 196 (1973)

EXTENDED FINE STRUCTURE ANALYSIS USING ELECTRON BEAMS (with P.I. Cohen, T.L. Einstein and W.t. Elam), *Journal of Crys. Growth* 45, 435 (1978)

NEAREST NEIGHBOR SPACING OF CLEAN VANADIUM SURFACES FROM EXTENDED APPEARANCE POTENTIAL STRUCTURE (editorial), (with W.T. Elam, P.I. Cohen and L.D. Roelofs), *Applied Surface Science* 2, 636 (1979)

THE EFFECTS OF SURFACE AND INTERFACE ROUGHNESS ON THIN FILM QUANTUM SIZE EFFECTS (with B.T. Jonker), *Journal of Vacuum Science and technology A* 2, 813 (1984)

IV. Instrumentation or Techniques

PULSED BEAM LOW-ENERGY ELECTRON DIFFRACTION SYSTEM FOR RAPID PRECISION MEASUREMENTS (with H.E. Farnsworth), *Review of Science Instruments* 35, 1592 (1964)

ELECTRON REDUCTION OF TAPE RECORDED PARTIAL PRESSURE DATA, Review of Science Instruments 38, 562 (1967)

A SOFT X-RAY APPEARANCE POTENTIAL SPECTROMETER FOR THE ANALYSIS OF SOLID SURFACES (with J.E. Houston and D.G. Schreiner), Review of Science Instruments 41, 1810 (1970)

THE LEED INSTRUMENT RESPONSE FUNCTION (with J.E. Houston and D.G. Schreiner), Review of Science Instruments 42, 60 (1971)

APPEARANCE POTENTIAL SPECTROSCOPY ON AN AUSTERE BUDGET (with J.E. Houston), Surface Science 26, 664 (1971)

INSTRUMENT RESPONSE FUNCTIONS FOR POTENTIAL MODULATION DIFFERENTIATION (with J.E. Houston), Review of Science Instruments 43, 1437 (1972)

ELASTIC AND INELASTIC CONTRIBUTIONS TO SECONDARY ELECTRON YIELD STRUCTURE (with M.L. denBoer and P.I. Cohen), Journal of Vacuum Science and Technology 15, 502 (Mar/Apr 1978)

ELASTIC AND INELASTIC CONTRIBUTIONS TO THE AUGER ELECTRON APPEARANCE POTENTIAL SPECTRUM OF TITANIUM (with M.L. denBoer and P.I. Cohen), Surface Science 70, 643 (1978)

CORE LEVEL EXCITATION OF SIMPLE GASES (with A. Zhang and J.F. Morar), Journal of Vacuum Science and Technology A, 1461 (1983)

ELECTRON GUN AND DETECTOR FOR HIGH RESOLUTION LEED (with E.D. Williams and R.Q. Hwang), Journal of Vacuum Science and Technology A 2, 1004 (1984)

V. Review Papers

SURFACE STRUCTURE: AN EMERGING SPECTROSCOPY (with C.B. Duke), Physics Today 25, 23 (August 1972)

THE ELECTRONIC STRUCTURE OF SOLID SURFACES: CORE LEVEL EXCITATION TECHNIQUES (with J.E. Houston), Proceedings Issue, Journal of Vacuum Science and Technology 10, 176 (1973)

SOFT X-RAY APPEARANCE POTENTIAL SPECTROSCOPY (with J.E. Houston), Journal of Vacuum Science and Technology 11, 1 (1974)

COMPARISON OF MANY-BODY EFFECTS IN CORE LEVEL SURFACE SPECTROSCOPIES (Invited), (with J.E. Houston and G.E. Laramore), Proceedings of the 2nd International Conference on Solid Surfaces, Kyoto, Japan, Journal of Applied Physics, Supplement 2, Part 2, 757 (1974)

RECENT DEVELOPMENTS IN APPEARANCE POTENTIAL SPECTROSCOPY, *Surface Science* 48, 80 (1975)

INNER SHELL SPECTROSCOPY, *Physics Today* 28, 52 (April 1975)

SURFACE ANALYSIS USING ELECTRON BEAMS (with M.L. denBoer), *CRC Critical Reviews in Solid State Sciences*, eds. D.E. Schuele, R.W. Hoffman, 6, 275, Cleveland: CRC Press 1976. Reprinted in *Chemistry and Physics of Solid Surfaces*, eds. R.Vanselow and S.Y. Tong, pp. 191-205, Cleveland: CRC Press, (1977)

RECENT PROGRESS IN SURFACE ANALYSIS, *Surface Science*, 86, 504 (1979)

SURFACE SPACING FROM THE SECONDARY ELECTRON YIELD, *Applications of Surface Science*, 4, 250 (1980)

MULTI-CRITICAL PHASE DIAGRAM OF A CHEMISORBED LATTICE GAS SYSTEM-O/Ni(111) (with T.L. Einstein, A.R. Kortan and L.D. Roelofs), *Ordering in Two Dimensions*, ed. S.K. Sunhil, New York: North Holland (1980) pp 17-23

CORE-LEVEL SPECTROSCOPIES, *Methods of Experimental Physics Vol. 22*, ed. By Robert L. Park and Max G. Logally, Academic Press, (1985)

VI. Books or Contributions to Edited Books

"Isotopic Mixing in the Oxidation of Carbon Monoxide on Palladium," *Fundamentals of Gas-Surface Interactions*, New York: Academic Press, 1967

"LEED Studies of Surface Imperfections," *The Structure and Chemistry of Solid Surfaces*, G. Somorjai, ed. New York: John Wiley & Sons, 1969

"Analysis of Solid Surfaces by Soft X-Ray Appearance Potential Spectroscopy," *Advances in X-Ray Analysis*, Vol. 15, K. Heinrich, C. Barrett, J. Newkirk and C. Rudd, eds. New York: Plenum Publishing Corp., 1972

"Chemical Analysis of Surfaces," *Surface Physics of Crystalline Solids*, J.M. Blakely, ed., New York: Academic Press, 1974

"X-Ray Emissions from the Surface Region of Solids," *Radiation Effects on Solid Surfaces*, *Advances in Chemistry Series 158*, Manfred Kaminsky, ed., p. 200-218, Washington, DC: American Chemical Society, 1976

"Introduction to Surface Spectroscopies," *Experimental Methods in Catalytic research*, Vol. III, R.B. Anderson and P.T. Dawson, ed., New York: Academic Press, 1976

"Surface Characterization by X-Ray Techniques," *Advances in X-Ray Analysis*, Vol. 19, R.W. Gould, C.S. Barrett, J.B. Newkirk, and C.O. Rudd, ed. Kendall-Hunt, 1976

Review of Low Energy Electrons and Surface Chemistry, Monographs in Modern Chemistry, by Ertl and Kuppers, in Physics Today, March 1976

“Plenary Lecture: Low Energy Electrons as a Probe of Solid Surfaces,” (with M. denBoer and Y. Fukada), Characterization of Metal and Polymer Surfaces, Vol. 1, L.H. Lee, ed., New York: Academic Press, 1979

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VII. Science and Public Policy

“Secrecy versus Scientific Communication,” Communications of the ACM, Vol. 26, No. 9, September 1983, p. 621

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