

Charles R. Anderson, Ph.D.
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Education

Brown University, Providence, R.I.	Sep 65	Jun 69	Sc.B. in Physics
Case Western Reserve University, Cleveland, OH	Sep 69	Jun 70	Interruption for US Army Service (Vietnam)
	Feb 72	Aug 78	Ph.D. in Physics

Professional Positions

1978-1979 NSF Energy-Related Postdoctoral Fellow, *Case Western Reserve University, Cleveland, OH*

Investigation of surface magnetization of Nickel single crystals using Mössbauer emission spectroscopy and Auger electron spectroscopy for surface analysis.

1979-1980 Research Associate in Physics, *Case Western Reserve University, Cleveland, OH*

Investigations of iron corrosion using Mössbauer emission spectroscopy, Auger electron spectroscopy for surface analysis, and extended x-ray absorption fine structure (EXAFS).

1980-1990 Research Physicist, GS-12, GM-13[1983], GM-14[1987], *Naval Surface Warfare Center, White Oak Laboratory, Silver Spring, MD*, Physics Panel Member for Review of Independent Research

Applications of surface analysis (x-ray photoelectron spectroscopy {XPS/ESCA} and Auger microprobe) to corrosion problems, battery system development, protective and functional coatings, amorphous metal alloys, composite & high temperature materials, energetic materials, field-emitters, and sensors; development of new XPS methods; Use of XPS, TGA, XRD, and EXAFS for silver oxide stabilization

1990-1995 Senior Scientist and Head of the Surface Analysis Laboratory, *Lockheed Martin Laboratories • Baltimore, Baltimore, MD*

Applications of surface analysis to surface contamination, adhesive bonding, corrosion in electronics, rocket engine failures, satellite electronics, sensors, power sources, thin film structures, biomedical devices, composite materials, environment-cleaning inorganic particles, high temperature reactions in multilayered films, and aerospace metal alloys and their surface treatments and coatings. Development of new XPS methods and algorithms for distortion elimination in an infra-red sensor system.

1995-Present President and Principal Scientist, Founder, *Anderson Materials Evaluation, Inc., Columbia, MD*

Provides materials characterization, failure analysis, quality control, materials and process development support, consulting, and expert witness services to companies, universities, and government. Applying surface analysis (XPS/ESCA), WD-XRF, LIBS, FTIR spectroscopy, GC-MS, UV-Vis spectrophotometry, 3-D optical microscopy, thermal analysis (TGA, DSC, TMA), mass spectroscopy, electrochemistry, SEM/EDX, reflectometry, surface contact angle measurements, and mechanical testing to solve materials, materials processing, quality, and product failure problems. Principal areas of interest are surface chemistry and contamination, including the detection and measurement of silicone contamination on surfaces or in airborne form in facilities; adhesive bonding failure analysis; thin film and coating characterization and failure analysis; elemental analysis; corrosion and degradation of materials, especially at surfaces and interfaces; analysis of satellite and military electronics and packaging; characterization and failure analysis of coating systems and surface modifications; aerospace materials and coatings; biomedical devices and diagnostics; chemical and compositional characterizations of engineering structural & building materials; thermal properties of materials; polymer properties and surface treatments; printing and packaging problems; characterization of pharmaceutical materials; qualification of surface cleaning techniques; infra-red and chemical sensor development; composite materials characterization; semiconductor superlattice materials; fibers and papers; pyrotechnic particles; energetic intermetallic materials; ceramic outgassing and contamination; plastic, adhesive, sealant, glass, gemstone, mineral, and ceramic compositional analysis; liquid residue analysis, filtering materials analysis; propellants; amorphous materials, reactions among small domain materials, and battery materials characterization.

Professional Service

- 1985-1987 Arrangements Secretary, ASTM Committee E-42 on Surface Analysis
- 1985-1986 Member of Local Arrangements Committee for the 10th International Vacuum Congress, the 6th International Conference on Solid Surfaces, and the 33rd National Symposium of the American Vacuum Society, 27-31 October 1986, Baltimore, MD
- 1988-1989 Membership Secretary, ASTM Committee E-42 on Surface Analysis
- 1985-1989 Executive Committee Member, ASTM Committee E-42 on Surface Analysis
- 1986-1990 Member of Independent Research Review Board, Naval Surface Warfare Center, Silver Spring, MD
- 1994-1998 U.S. Expert and Convener of Joint Working Group for Quantitative Analysis for Sub-Committees SC5 on Auger Electron Spectroscopy and SC7 X-ray Photoelectron Spectroscopy for the International Standards Organization Technical Committee 201 on Surface Chemical Analysis

Publications

- "Apparatus for Mossbauer Effect Emission and AES Study of Free Surfaces", C. R. Anderson, B. G. Richards and R. W. Hoffman, *Journal of Vacuum Science & Technology*, 16 (1979) 466-468.
- "Mossbauer Effect Emission Spectroscopy and Auger Electron Spectroscopy of the (111) Ni Surface", C. R. Anderson, B. G. Richards and R. W. Hoffman, *Thin Solid Films*, 58 (1979) 235-240.
- "Surface Analysis of Electrode Chemistry in the Li/SO₂ (LiAsF₆) Battery", C. R. Anderson, S. D. James, W. P. Kilroy and R. N. Lee, Extended Abstracts Volume 81-2 of the Fall Meeting of the Electrochemical Society, Denver, CO, 11-16 October 1981, p. 1474.
- "Surface Studies of Composite Nickel-Graphite Battery Electrodes", W. W. Lee, C. R. Anderson, W. A. Ferrando, R. A. Sutula and R. N. Lee, Extended Abstracts Volume 81-2 of the Fall Meeting of Electrochemical Society, Denver, CO, 11-16 October 1981, p. 106-108.
- "Surface Analysis of Li/SO₂ (LiAsF₆) Battery Electrodes", C. R. Anderson, S. D. James, W. P. Kilroy and R. N. Lee, *Applications of Surface Science* 9 (1981) 388-399.
- "Comparison of APS and FRESCA Core Level Binding Energy Measurements", C. R. Anderson, R. N. Lee, J. F. Morar and R. L. Park, *Journal of Vacuum Science and Technology* 20 (1982) 617-621.
- "Surface Studies of Nickel-Graphite Composite Battery Electrodes", W. W. Lee, R. A. Sutula, W. A. Ferrando, C. R. Anderson and R. N. Lee, Proceedings of the Nickel Electrode Symposium of the Fall Meeting of the Electrochemical Society, Denver, CO, 11-16 October 1981, edited by Ronald G. Gunther.
- "Surface Analysis of the Lithium Anode Film in the Li/SO₂ (LiBr) Battery System", C. R. Anderson and W. P. Kilroy, Extended Abstracts Volume 82-1 of the Spring Meeting of the Electrochemical Society, Montreal, Canada, 9-14 May 1982, p. 1085.
- "Characterization of the Chemistry of the Anode and Cathode in the Li/SO₂ Battery System", W. P. Kilroy and C. R. Anderson, Proceedings of the International Meeting on Lithium Batteries, Rome, Italy, 27-30 April 1982, *Journal of Power Sources*, 9 (1983) 397-407.
- "Surface Analysis of the Carbon Current Collector of the Li/SO₂ (LiBr) Battery System", C. R. Anderson and W. P. Kilroy, Extended Abstracts Volume 82-2 of the Fall Meeting of the Electrochemical Society, Detroit, MI, 17-22 October 1982, p. 507-508.
- "Surface Analysis of the Lithium Anode Film of the Li/SO₂ Battery System II. Temperature and Rate of Discharge Effects", C. R. Anderson and W. P. Kilroy, Extended Abstracts Volume 82-2 of the Fall Meeting of the Electrochemical Society, Detroit, MI, 17-22 October 1982, p. 509.
- "Surface and Mass Spectroscopic Analysis of Silver Oxide Electrodes", C. R. Anderson, S. Dallek, W. A. Parkhurst and B. F. Larrick, Extended Abstracts Volume 83-2 of the Fall Meeting of the Electrochemical Society, Washington, DC, 9-14 October 1983, p. 132-133.
- "Accurate Measurements of Electron Energies by Field-Emitter Referencing", C. R. Anderson and R. N. Lee, *Journal of Electron Spectroscopy & Related Phenomena*, 34 (1984) 173-198.
- "Silver Oxides: Chemistry and Morphology of Oxide Film Growth at Constant Current on Silver Foils in Aqueous KOH", C. R. Anderson, A. N. Mansour, W. A. West, D. G. Simons, S. Dallek, F. Santiago, B. F. Larrick and M. K. Norr, Extended Abstracts Volume 86-1 of the Spring Meeting of the Electrochemical Society, Boston, MA, 4-9 May 1986, p. 812.
- "Silver Oxides: Chemical and Morphological Comparison of Anodized Silver Foils and Sintered Silver Plates", C. R. Anderson, W. A. West, A. N. Mansour, M. K. Norr, F. Santiago and B. F. Larrick, Extended Abstracts Volume 86-2 of the Fall Meeting of the Electrochemical Society, San Diego, CA, 19-24 October 1986.
- "Oxygen-Deficiency in Anodically Formed AgO", A. N. Mansour, S. Dallek, K. M. O'Neill, C. R. Anderson, D. R. Glen and B. F. Larrick, Extended Abstracts Volume 87-2 of the 172nd Meeting of the Electrochemical Society, Honolulu, Hawaii, 18-23 October 1987.
- "Silver Oxide (AgO) Cathode Material: Decomposition Kinetics", S. Dallek, K. M. O'Neill, D. R. Glen, B. F. Larrick, A. N. Mansour and C. R. Anderson, Proceedings of the 33rd International Power Sources Symposium, Cherry

- Hill, NJ, 13-16 June 1988.
- "Silver Oxide Cathode Material: Structure and Stability", A. N. Mansour, C. R. Anderson, M. K. Norr, S. Dallek, D. R. Glen, K. M. O'Neill and B. F. Larrick, Proceedings of the 33rd International Power Sources Symposium, Cherry Hill, NJ, 13-16 June 1988.
- "Structure and Stability of AgO", A. N. Mansour, C. R. Anderson, M. K. Norr, S. Dallek, D. R. Glen, K. M. O'Neill and B. F. Larrick, Extended Abstracts Volume 88-2 of the 174th Meeting of the Electrochemical Society, Chicago, IL, 9-14 October 1988.
- "Thermal Stability/Structural Studies of Silver Oxide (AgO) Cathode Material", S. Dallek, K. M. O'Neill, D. R. Glen, B. F. Larrick, A. N. Mansour, C. R. Anderson and M. K. Norr, Proceedings of the 17th Annual Conference of the North American Thermal Analysis Society, Orlando, FL, 9-12 October 1988.
- "The Structure of Oxygen-Deficient Silver Oxide (AgO)", A. N. Mansour, S. Dallek and C. R. Anderson, *Physica B* 158 (1989) 519-520.
- "RBS and XPS Analyses of Phosphor Packages for Laser-Heat Thermoluminescence Dosimetry", S. H. Stern, J. L. Price, D. G. Simons, D. J. Land, V. K. Mathur, C. R. Anderson, and B. C. Beard, *J. Mater. Res.* 6 (1991) 1574-1579.
- "An Initial Analysis of Surface Morphology and Surface Chemistry of Retrieved Femoral Components", L. D. T. Topoleski, C. R. Anderson, K. A. Dwyer, R. Nakielny, and G. A. Engh, Transactions of the 19th Annual Meeting of the Society for Biomaterials, 28 Apr - 2 May 1993, Birmingham, AL.
- "Interfacial Reactions of Thin Titanium Aluminide Films with Al₂O₃ Films and with Sapphire", M. Nathan, C. R. Anderson, and J. S. Ahearn, *Materials Science and Engineering* A162 (1993) 107-113.
- "A Permanent, Retractable Screen for Charge Neutralization of Insulating Specimens during X-ray Photoelectron Spectroscopy Analysis", G. D. Davis, C. R. Anderson, and H. M. Clearfield, *J. Vac. Sci. Technol.* A11 (1993) 3135-3137.
- "Failure Analysis", C. R. Anderson, Chapter In *Characterization of Metals and Alloys*, ed. by P. H. Holloway and P. N. Vaidyanathan, in the Materials Characterization Series - Surfaces, Interfaces, and Thin Films, ed. by C. R. Brundle and C. A. Evans, Jr. (Butterworth-Heinemann & Manning, Greenwich, 1993) pp. 189-243.
- "Nanometer-Scale Chemical Compatibility between Nickel Aluminide and MgO Films", M. Nathan, C. R. Anderson, and J. S. Ahearn, *J. of Materials Science* 29 (1994), 5887-5891.
- "The Near-Surface Composition of Retrieved Cast CoCrMo Femoral Components", C. R. Anderson, L. D. Timmie Topoleski, and Gerard A. Engh, Transactions of the 21st Annual Meeting of the Society for Biomaterials in Conjunction with the 27th International Biomaterials Symposium, 18-22 March 1995, San Francisco, CA, p. 166.
- "Energy Calibration of X-ray Photoelectron Spectrometers. Part III: Location of the Zero Point of the Binding-energy Scale", A. C. Miller, C. J. Powell, U. O. Gelius, and C. R. Anderson, *Surface and Interface Analysis*, 26, (1998), 606-614.
- "A Comparison of Metal/Metal and Ceramic/Metal Taper-Trunnion Connections in Explanted Total Hip Replacements", Eileen S. Cadel, L.D. Timmie Topoleski, Oleg Vesnovsky, Charles R. Anderson, Robert H. Hopper Jr., Charles A. Engh Jr., and Matthew A. Di Prima, *J. of Biomedical Materials Research: Part B - Applied Biomaterials*, Vol.110, pages 135-143, June 2021.

Professional Organizations (Past and Present)

American Vacuum Society
 Materials Research Society
 ASM International
 ASTM (served as officer of E-42 Surface Analysis Technical Committee)
 American Physical Society
 American Chemical Society
 The Electrochemical Society
 SAMPE
 ISO (U.S. Expert, Surface Chemical Analysis Technical Committees)

Expert Witness and Investigations for Litigation Experience

Analysis of Eyeglass Lens to Determine Whether Safety Glass or Not
 Investigation of Cause of Yellowing in Sunlight of Cabinet Coatings
 Investigation of Aluminum Dump Truck Welds and Failures
 Analysis of Anodized Aluminum Swimming Pool Ladder to Determine Cause of Extraordinary Corrosion and to Assess Responsibility Among Five Companies Involved in Its Manufacture or as Suppliers
 Analysis to Determine Whether Out-gassing Foam Material was Manufactured by Accused Company
 Investigation of Etch Damage to Glass Windows and Crumbling of Building Facing Due to Cleaning Agent

Analysis of Camouflage Suit for Fire-Retardant and Proper Application
Analysis of Coloration Coatings on Sand in Grout in Intellectual Property Theft Dispute, Client Awarded
Largest Intellectual Property Theft Damages Ever in State of Connecticut, damages later reduced
Investigation of Interior Paint Peeling Problem to Assess Whether Properly Applied
Analysis of Cement Fiberboard Compositions from before and after 2009
Analysis of Delaminating Blast Resistant Windows
Analysis of Peeling Exterior Paint from Wood Substrate Surfaces
Analysis of Cabinet Finishes to Determine Composition and Cause of Degradation
Analysis of Asphalt Shingles for Cause of Bubbles and Material Shedding
Analysis of Inadequately Cured Whiteboard Coated Steel Sheet Materials
Determination of Static Coefficient of Friction of Coated Swimming Pool Deck Materials
Analysis of Adhesive Degradation Causing Delamination of Cabinet Laminates
Analysis of Pavement Marker Adhesion Failure to Roadbed Materials
Analysis of Marine Engine Fuel Hose Failure