

Brian B. Anderson

Oak Ridge National Laboratory
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Professional Preparation

Ph.D., Analytical Chemistry, University of Washington, Seattle, WA, 1996
Dissertation title: Grating Light Reflection Spectroscopy
Advisor: Professor Bruce R. Kowalski
B.S., Chemistry, Central Washington University, Ellensburg, WA, 1992, *Summa Cum Laude*

Professional Appointments

Associate Professor, University of Tennessee Joint Faculty appointment to the Bredesen Center for Interdisciplinary Research and Graduate Education (November 2015–Present)

Group Leader, Nuclear Security Advanced Technologies, Oak Ridge National Laboratory (ORNL), Nuclear Security and Isotope Technology Division (October 2013–Present)

Nuclear Security Scientist and Program Manager/Research Manager, ORNL, Nuclear Security and Isotope Technology Division (June 2011–Present)

Adjunct Associate Professor, Department of Nuclear Engineering, University of Tennessee (July 2010–Present)

Nuclear Security Scientist and Senior R&D Staff Member, ORNL, Global Nuclear Security Technology Division (March 2010–June 2011)

Senior Fellow Scientist, Savannah River National Laboratory (SRNL), Nonproliferation Technologies Section (July 2006–March 2010)

Principal Research Scientist, Cargill Scientific Resources Center, Cargill Incorporated, Cordova, TN (December 2005–June 2006)

Senior Research Scientist, Cargill Scientific Resources Center, Cargill Incorporated, Cordova, TN (May 2001–December 2005)

Emeritus Researcher, Oak Ridge Institute for Science and Education, Aiken, SC (May 2002) (Consultant for Savannah River Technology Center)

Senior Scientist A, Westinghouse Savannah River Company, Aiken, SC (November 1998–April 2001)

Senior Scientist, Westinghouse Savannah River Company, Aiken, SC (September 1996–November 1998)

Consultant, LM Manufacturing, Marysville, WA (December 1994)

Research Assistant, Center for Process Analytical Chemistry, University of Washington, Seattle, WA (December–1992–August 1996)

Graduate Students Supervised

1. Steven Jones, University of Tennessee Bredesen Center for Interdisciplinary Research and Graduate Education, Committee Member, 2014–Present
2. Marie Kirkegaard, University of Tennessee Bredesen Center for Interdisciplinary Research and Graduate Education, Research Supervisor and Advisor, June 2015–Present
3. Stephanie Bruffey, University of Tennessee Bredesen Center for Interdisciplinary Research and Graduate Education, Committee Member, June 2016–Present
4. Roger J. Kapsimalis, Ph.D. in Nuclear Engineering, May 18, 2013, University of Texas Department of Mechanical Engineering, Dissertation Committee Member and Research Supervisor

Expertise and Accomplishments

Manager, ORNL Ultra-trace Forensic Science Center

- Established the Ultra-trace Forensic Science Center in 2011
- Developed laboratory and facility plan for installation operation of numerous high-resolution mass spectrometry systems and supporting infrastructure
- Managed construction and renovation scope of \$3.2M
 - >6,000 square feet of new laboratory space
 - Class 100 to class 10,000 clean room operations
 - Chemistry laboratories and support systems development

Principal Investigator or Co-Principal Investigator (major contributor) for Department of Energy (DOE) research programs at ORNL and SRNL

- In fiscal year (FY) 2017 procured and installed Cameca NanoSIMS 50L and completed laboratory renovations supporting installation and operation. Completed 18-month scope within 9 months and secured funding for commissioning through FY 2018
- Led the Nuclear Forensic Science Thrust Area at ORNL that contributed to an increase in forensics-related budget authority from \$11M in FY 2011 to over \$37 M in FY 2016
- Awarded \$6.6M in funding in FY 2016 to procure, install, and operate a Cameca NanoSIMS 50L secondary ion mass spectrometer supporting DOE mission R&D
- Principal investigator for a Laboratory Directed Research and Development project awarded at ORNL in 2014 probing the basic chemistry and physics of hydrated uranyl compounds
- Proposed and executed multiple R&D projects supporting DNN R&D programs
- Developed concepts and was awarded \$3.0M in FY 2008–2009 in state of the art instrumentation grants for application to Proliferation Detection and Nuclear Forensics Programs at SRNL; funding awarded from DOE/National Nuclear Security Administration (NNSA) and external customers

- Developed advanced analytical characterization methods for nuclear materials of interest, including high-resolution electron microscopy (TEM and SEM), optical spectroscopy, and secondary ion mass spectrometry (SIMS)
- New forensics approach demonstrated combining FE-SEM, Raman spectroscopy, and NanoSIMS for complete chemical and physical characterization of solid samples
- Developed advancements in aerosol science and engineering of electrostatic precipitation devices
- Advancements in aerosol science and engineering of electrostatic precipitation devices

Principal Investigator at Cargill's Scientific Resources Center

- Technical leadership in development of multiyear, corporate basic research and development project (one of two such projects within Cargill worldwide at the time):
 - Real-time, in-vivo imaging of cellular dynamics in live tissue
 - Multiphoton fluorescence lifetime microscopy to measure cellular response via intracellular calcium signaling
- Chemical and biological sensor development and application
 - Internal consultant to Cargill business units for sensor and spectroscopic system evaluation, deployment, and utilization.
 - Member of Cargill Biosensors Working Group
- Advanced microscopy method development for food and agricultural systems, using materials characterization principles and approaches: Bright field, dark field, fluorescence optical microscopy, confocal microscopy systems, quantitative microscopy using scanning electron and transmission electron microscopy, and x-ray micro tomography
- Hyperspectral imaging (chemical imaging)
 - Mega pixel ultraviolet fluorescence imaging (hyperspectral)
 - Fourier transform infrared spectroscopy and imaging
 - Raman spectroscopy: application of line, point, and global imaging systems

Senior Research Scientist at Westinghouse Savannah River Company

- Development of intrinsically safe, ultra-sensitive optical vapor phase moisture fiber optic sensor system based on surface plasmon resonance spectroscopy
 - Thin film vacuum deposition techniques
 - Spectroscopic ellipsometric characterization of thin films
 - DC and RF planar magnetron sputter coating of multilayer systems
- Chemometric methods for remote, spectroscopic determination of plutonium and uranium in various matrices
- Physical optics, including optical design and construction of optical systems
- Development of novel surface plasmon resonance-based methods

Patents

1. Method for Determining Cellular Response to Stimuli (2007) **B. B. Anderson**, J. T. McDonald, S. Smith, A. R. Muroski, V. St. Jeor, US Patent No. 7,279,338.
2. Processes for Evaluating Agricultural and/or Food Materials; Applications; and Products 2003, (2004), J. T. McDonald, **B. B. Anderson**, R. G. Kaercher and Sean A. Smith, US Patent No. WO 02084262 A2, EP 1381849 A2.
3. Surface Plasmon Resonance Spectroscopy Sensor and Methods for Using Same (2002), **B. B. Anderson** and S. E. Nave, US Patent No. 6,466,323 (licensed for commercial development).
4. Analytical Sensor Using Grating Light Reflection Spectroscopy (1997), **B. B. Anderson**, A. M. Brodsky, and L. W. Burgess, US Patent No. 5,610,708.
5. Analytical Sensor Using Grating Light Reflection Spectroscopy (1996), **B. B. Anderson**, A. M. Brodsky, and L. W. Burgess, US Patent No. 5,502,560.

Publications

1. Vibrational Properties of Anhydrous and Partially Hydrated Uranyl Fluoride, M. C. Kirkegaard, J. Langford, J. Steill, **B. B. Anderson**, and A. J. Miskowiec, *Journal of Chemical Physics*, 2017, 146, 024502 (doi: <http://dx.doi.org/10.1063/1.4973430>).
2. Quasielastic Neutron Scattering with in-situ Humidity Control: Water Dynamics in Uranyl Fluoride. A. J. Miskowiec, M. C. Kirkegaard, E. Mamontov, K. Herwig, L. D. Trowbridge, **B. B. Anderson**, 2016, *Journal of Applied Physics*, 19 (9) (doi: 10.1063/1.4943164).
3. Time-dependent Water Dynamics in Hydrated Uranyl Fluoride. A. Miskowiec, **B. B. Anderson**, A. Huq, E. Mamontov, K. Herwig, L. D. Trowbridge, A. Rondinone 2016, *Molecular Physics*, 114, 61–71 (doi: 10.1080/00268976.2015.1084056).
4. Structural Phase Transitions and Water Dynamics in Uranyl Fluoride Hydrates A. J. Miskowiec, M. C. Kirkegaard, A. Huq, E. Mamontov, K. Herwig, L. D. Trowbridge, A. Rondinone, **B. B. Anderson**, 2015, *Journal of Physical Chemistry A*, 119 (49), 11900–10 (doi: 10.1021/acs.jpca.5b09296).
5. The Simultaneous Determinations of ^{235}U and ^{239}Pu Using Delayed Neutron Activation Analysis, R. J. Kapsimalis, D. C. Glasgow, **B. B. Anderson** S. Landsberger, 2013, *Journal of Radioanalytical and Nuclear Chemistry*, 298 (3), 1721–26.
6. Process Analytical Chemistry, J. Workman, D. J. Veltkamp, S. Doherty, **B. B. Anderson**, K. E. Creasy, M. Koch, J. F. Tatera, A. L. Robinson, L. Bond, L. W. Burgess, G. N. Bokerman, A. H. Ullman, G. P. Darsey, F. Mozayeni, J. A. Bamberger, and M. S. Greenwood, *Analytical Chemistry*, 1999, 71 (12), 121R–80R.
7. Grating Light Reflection Spectroscopy of Colloids and Suspensions, **B. B. Anderson**, A. M. Brodsky, and L. W. Burgess, *Langmuir*, 1997, 13 (16), 4273–79.

8. Grating Light Reflection Spectroscopy for Determination of Bulk Refractive Index and Absorbance, **B. B. Anderson**, A. M. Brodsky, and L. W. Burgess, *Analytical Chemistry*, 68 (7), 1996, 1081–88.
9. Threshold Effects in Light Scattering from a Binary Diffraction Grating, **B. B. Anderson**, A. M. Brodsky, and L. W. Burgess. *Phys. Rev. E* 1996, 54, 912–23.
10. Analytical Sensor Using Grating Light Reflection Spectroscopy, **B. B. Anderson**, A. Brodsky, L. W. Burgess - *Process Control and Quality*, 1996, 4 (8), N68.
11. Application of Grating Light Reflection Spectroscopy in Analytical Sensors, **B. B. Anderson**, A. Brodsky, L. W. Burgess, 1994 Proceedings-SPIE The International Society for Optical Engineering, 2293, 80–86.

Presentations

1. Phase Transitions and Water Interactions in Uranyl Fluoride, A. J. Miskowiec, M. Kirkegaard, J. Langford, and **B. B. Anderson**, *Bulletin of the American Physical Society*, (2017) 62. APS March Meeting 2017, New Orleans, LA.
2. Density Functional Theory for Neutron Scattering: Water Mobility in UO_2F_2 , M. C. Kirkegaard, A. J. Miskowiec, J. D. Steill, and **B. B. Anderson**, American Conference on Neutron Scattering, Long Beach, CA, July 10–14, 2016.
3. Quasielastic Neutron Scattering with In Situ Humidity Control, **B. B. Anderson**, A. J. Miskowiec, E. Mamontov, M. C. Kirkegaard, J. D. Steill, L. D. Trowbridge, K. W. Herwig, American Conference on Neutron Scattering, Long Beach, CA, July 10–14, 2016.
4. Simultaneous Quantification of Fissile U and Pu Nuclides Using Delayed Neutron Activation Analysis, R. J. Kapsimalis, D. C. Glasgow, **B. B. Anderson** S. Landsberger, 2013, 245th American Chemical Society (ACS) National Meeting and Exposition Conference.
5. The Simultaneous Determination of Fissile U and Pu Nuclides Using Delayed Neutron Activation Analysis, R. J. Kapsimalis, D. C. Glasgow, **B. B. Anderson** S. Landsberger, 2013 SAAGAS 24 Conference.
6. Comparison of Active and Passive Environmental Sampling for Safeguards Applications, P. R. Cable-Dunlap, L. D. Trowbridge, D. A. Bostick, D. L. Lee, **B. B. Anderson**, A. Harter, R. J. Kapsimalis, L. Sexton, J. DeGange, D. Radford, 2012 International Conference on Methods and Applications of Radioanalytical Chemistry Conference.
7. Comparison of Active and Passive Environmental Sampling for Safeguards Applications P. R. Cable-Dunlap, L. D. Trowbridge, D. A. Bostick, D. L. Lee, **B. B. Anderson**, A. Harter, R. J. Kapsimalis, L. Sexton, J. DeGange, D. Radford, 2012, Methods and Applications of Radioanalytical Chemistry Conference.
8. Survey of Collection Techniques for Environmental Sampling, **B. B. Anderson**, W. Bostick, C. R. Hexel, H. B. Fontenot, A. K. Kennedy, J. A. Carter, 2011 Institute of Nuclear Materials Management Conference Poster.

9. Survey of Collection Techniques for Environmental Sampling, **B. B. Anderson**, W. Bostick, C. R. Hexel, H. B. Fontenot, J. A. Carter, H. J. Hall, 2011, Institute of Nuclear Materials Management 52nd Annual Meeting.
10. Environmental Sampling Using Location Specific Air Monitoring in Bulk Handling Facilities, L. Sexton, D. Hanks, P. R. Cable-Dunlap, J. DeGange, **B. B. Anderson** 2011 Institute of Nuclear Materials Management 52nd Annual Meeting.
11. Advanced Collection and Analysis Techniques, 2009, P. R. Cable-Dunlap*, **B. B. Anderson**, E. Ramon, Urenco's International Safeguards Conference 2009.
12. Particle Depletion Dynamics for Improved Particle Collection, **B. B. Anderson**, A. Harter*, P. R. Cable-Dunlap, J. E. Halverson, R. Dimenna, S. Y. Lee, D. Tamburello, 2009, American Association of Aerosol Research Annual Meeting.
13. Taste Profiling Utilizing Multi-photon Fluorescence Lifetime Imaging (FLIM) in Intact Taste Tissue, J. Satumba*, **B. B. Anderson**, S. Smith, V. St. Jeor, J. McDonald, B. Guthrie, A. R. Muroski, J. McLean, N. Rawson, J. Teeter, 2008, The Association for Chemoreception Sciences International Symposium on Olfaction and Taste.
14. Response Properties of Taste Cells in Intact Fungiform Taste Buds, J. Teeter*, J. McLean, **B. B. Anderson**, J. Satumba, S. Smith, V. St. Jeor, J. McDonald, B. Guthrie, A. R. Muroski, N. Rawson, 2008, The Association for Chemoreception Sciences International Symposium on Olfaction and Taste.
15. Investigating Structure-Function Relationships in Food Protein using Infrared, Raman, and Fluorescence Spectroscopy, **B. B. Anderson**, D. L. Elmore*, C. A. Lendon, A. R. Muroski, and S. A. Smith, 2005 Federation of Analytical Chemistry and Spectroscopy Societies.
16. Application of Hyperspectral Imaging to Food Systems, **B. B. Anderson**, D. L. Elmore, C. A. Lendon*, A. R. Muroski, and S. A. Smith, 2005 Federation of Analytical Chemistry and Spectroscopy Societies.
17. FT-IR Imaging of Micro-structural Crustacean Feed, **B. B. Anderson**, D. L. Elmore, C. A. Lendon, C. L. Leverette, A. R. Muroski*, and S. A. Smith, Eastern Analytical Symposium, 2004.
18. Mid-Infrared Spectroscopic Imaging: From Thin Films to Food Systems, **B. B. Anderson**, D. L. Elmore*, C. A. Lendon, C. L. Leverette, A. R. Muroski, and S. A. Smith, Invited Paper, 2004 Gordon Research Conference.
19. A Sampling Methodology to Overcome Optical Anomalies and Thickness Dependence in FT-IR Imaging and Combined Automated Polarized Light/Raman Microscopy, **B. B. Anderson**, D. L. Elmore*, C. L. Leverette, A. R. Muroski, S. A. Smith, and V. St. Jeor, 2004 Federation of Analytical Chemistry and Spectroscopy Societies Conference.
20. Cargill Advanced Food Analysis Technology, M. Blackburn*, J. McDonald*, C. Leverette, S. Hansen, J. Dalluge, S. Smith, and **B. B. Anderson**, 2004, President's Office of Science and Technology Policy, Washington, DC.

21. Chemical Imaging of Food Systems, **B. B. Anderson**, D. L. Elmore, R. G. Kaercher, A. D. Lape, C. L. Leverette*, J. T. McDonald, A. R. Muroski, S. A. Smith, and V. St. Jeor, 2003 Federation of Analytical Chemistry and Spectroscopy Societies Conference.
22. Use of Chemical-Imaging Technology to Determine Chemical-Substitution Patterns in Modified Starches, **B. B. Anderson***, J. T. McDonald Jr., K. R. Anderson, S. Smith, D. Elmore, and C. Leverette, 2003, 225th ACS National Meeting, Cellulose Division.
23. Demonstration of a Small Tank Tetraphenylborate Precipitation Process Using Savannah River Site High Level Nuclear Waste, T. B. Peters*, M. J. Barnes, F. F. Fondeur, S. D. Fink, R. W. Blessing, R. E. Norcia, K. W. Kennell, T. R. Tipton, **B. B. Anderson**, 2002, 223rd ACS National Meeting, Analytical Chemistry in Nuclear Technology.
24. Development of a Novel Surface Plasmon Resonance Probe for Gas and Liquid Phase Sensing, **B. B. Anderson***, J. E. McCarty, M. A. Sanders, 2001 International Forum for Process Analytical Chemistry.
25. Development and Characterization of a New Surface Plasmon Resonance Probe for High Sensitivity Optical Hygrometry, **B. B. Anderson***, J. E. McCarty, M. A. Sanders, 2000, The Pittsburgh Conference, Optical Sensors II.
26. Utilization of a Novel Surface Plasmon Resonance Probe for Gas- and Liquid-Phase Chemical Sensing, **B. B. Anderson***, S. M. Serkiz, K. R. Powell, J. E. McCarty, M. A. Sanders, 2000, 220th ACS National Meeting, Analytical Chemistry in Nuclear Technology.
27. Simultaneous UV-Visible Spectroscopic Determination of Plutonium and Uranium in Mixed Oxides, **B. B. Anderson***, R. N. Mahannah, V. C. Sharma, M. A. Sanders, 2000, 220th ACS National Meeting, Analytical Chemistry in Nuclear Technology.

Awards and Professional Honors

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| 2015 | NNSA Certificate of Appreciation from the office of Defense Nuclear Nonproliferation Research and Development for exceptional service to NNSA test campaign support |
| 2009 | SRNL Significant Contributor Award, Proliferation Detection Program Research and Development |
| 2006 | Nominated to Cargill Leadership Academy |
| 2004 | Cargill Recognition Conference Attendee-Leadership |
| 2003 | Nominated for Cargill Research Achiever's Circle Award, Cargill Paper Analysis Center |
| 2003 | Nominated for Cargill Research Achiever's Circle Award in recognition of \$1.2M cost savings in FY 2003 |
| 2002 | Nominated for Cargill Chairman's Innovation Award |
| 2001 | Westinghouse President's Award |
| 2000 | George Westinghouse Signature Award of Excellence, Simultaneous Spectroscopic Determination of Plutonium and Uranium in Mixed Oxides |

- 1999 George Westinghouse Signature Award of Excellence, Fiber Optic Sensors
1997 George Westinghouse Innovation Award, Vapochromic Fiber Optic Humidity Sensor

Professional Activities

- 2016–Present Member, American Chemical Society
2004–2007 Member, Association of Chemosensory Scientists
2004–2006 Cargill Biosensors Working Group Member
2004–2005 President, Bolls and Ears Toastmasters Club, Cordova, TN
2002–2003 President, Graceland Toastmasters Club, Memphis, TN
2001 Session Chair, Process Spectroscopy/NMR session at the International Forum for Process Analytical Chemistry
2000 Chair, Savannah River Section of the American Chemical Society
1998–2001 Member, Center for Process Analytical Chemistry Industrial Advisory Board Steering Committee
1996–2009 Member, American Chemical Society
1992–1996 Security Pacific Bank University of Washington Minority Graduate Student Fellow