

VITA

NAME: David S. Ballantine, Jr. RANK: Associate Professor
DEPARTMENT: Chemistry and Biochemistry

DATE OF BIRTH: January 31, 1955

EDUCATION: B.Sc., 1977, College of William and Mary, Williamsburg, VA.
Ph.D., 1983, University of Maryland, College Park, MD.

RESEARCH AREA AND INTERESTS:

Development of chemical microsensors for basic and applied research. Use of microsensor technologies, including the surface acoustic wave (SAW) device, and optical waveguides for materials characterization; use of inverse gas chromatography to investigate interaction mechanisms between film materials and vapors; quantitative structure solubility relationships

PROFESSIONAL EXPERIENCE:

Senior Scientist/Group Supervisor, Geo-Centers, Inc. (at the Naval Research Laboratory in Washington, DC),	1984-1989.
Assistant Professor, Chemistry, Northern Illinois University,	1989-1994.
Associate Professor, Chemistry, Northern Illinois University,	1994-present.
Introductory and General Chemistry Lab Coordinator	1998-present
Undergraduate Program Coordinator	2006-2008
Director of Undergraduate Studies	2008-present
Faculty Advisor to Honors House	2012-present

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS: American Chemical Society (25+ years)

GRANTS & AWARDS:

Alan Berman Research Publication Award - NRL (1986)
ACS-PRF Grant (Type G) +\$18,000 (1989-90)
Society of Analytical Chemists of Pittsburgh (1990) Grant-in- Aid - \$5,000
NIU Graduate School Summer Research & Artistry Grant (1990) - \$8,000
Sandia National Labs/DOE Grant-in-Aid (1992-1996) - \$36,000
Sandia National Labs/DOE In-Place Gift/Equipment Transfer - \$42,285
NIU Excellence in Undergraduate Teaching Award (1998)
Mortar Board (Honorary Member) 2006

PUBLICATIONS: (Publications not refereed are marked with an asterisk)

1. "Airborne Aerosol Measurements in the Quiescent Plume of Mt. St. Helens: September, 1980," J. M. Phelan, D. L. Finnegan, D. S. Ballantine, W. H. Zoller, M. A. Hart, J. L. Moyers, *Geophys. Res. Lett.*, **1982**, *9*(9), 1093.

2. "Collection and Determination of Volatile Organic Mercury Compounds in the Atmosphere by Gas Chromatography with Microwave Plasma Detection," D. S. Ballantine, Jr. and W. H. Zoller, Anal. Chem., **1984**, 56, 1288.
- *3. "Selective Detection of Vapors Using Surface Acoustic Wave Devices," H. Wohltjen, A. Snow, and D. Ballantine, Proc. Int'l. Conf. Solid State Sens. Actuators - Transducers, **June 1985**, p. 66.
4. "Optical Waveguide Humidity Detector," D. S. Ballantine, Jr. and H. Wohltjen, Anal. Chem., **1986**, 58, 2883.
5. "Correlation of Surface Acoustic Wave Coating Responses with Solubility Properties and Chemical Structure Using Pattern Recognition," D. S. Ballantine, Jr., S. L. Rose, J. W. Grate, H. Wohltjen, Anal. Chem., **1986**, 58, 3058.
6. "An Automated Vapor-Generation and Data Collection Instrument for the Evaluation of Chemical Microsensors," J. W. Grate, D. S. Ballantine, Jr., and H. Wohltjen, Sensors and Actuators, **1987**, 11, 173.
7. "Trace Chemical Vapor Detection Using SAW Delay Line Oscillators," H. Wohltjen, A. W. Snow, W. R. Barger, D. S. Ballantine, IEEE Trans. Ultrasonics, Ferroelectrics, and Frequency Control, **1987**, 34(2), 172.
- *8. "The Use of Partition Coefficients and Solubility Properties to Understand and Predict SAW Vapor Sensor Behavior," Proc. Int'l. Conf. Solid State Sens. Actuators - Transducers, **June 1987**, p. 579.
- *9. "Surface Acoustic Wave Sensors, Chemiresistor Sensors and Hybrids Using Both Techniques Simultaneously to Detect Vapors," W. R. Barger, M. A. Klusty, A. W. Snow, J. W. Grate, D. S. Ballantine, and H. Wohltjen, Proc. Symposium on Sensor Science and Technology: Electrochem. Soc., **April 1987**, 87(15), 198.
10. "Determination of Partition Coefficients from SAW Vapor Sensor Responses and Correlation with Gas-liquid Chromatographic Partition Coefficients," J. W. Grate, A. W. Snow, D. S. Ballantine, H. Wohltjen, M. H. Abraham, R. A. McGill, P. Sasson, Anal. Chem., **1988**, 60, 869.
11. "Detection of Hazardous Vapors Including Mixtures Using Pattern Recognition Analysis of Responses from SAW Devices," S. L. Rose-Pehrsson, J. W. Grate, D. S. Ballantine, P. C. Jurs, Anal. Chem., **1988**, 60, 2801.
12. "Use of SAW Devices to Monitor Viscoelastic Properties of Materials," A. S. Ballantine, H. Wohltjen, IEEE Ultrasonics Symp. Proc., **1988**, 559.
13. "An Optical Waveguide Acid Vapor Sensor," D. Ballantine, D. Callahan, J. Maclay, J. Stetter, Talanta, **1992**, 39(12), 1657.
14. "Effects of Film Morphology on the Frequency and Attenuation of a Polymer-Coated SAW Device Exposed to Organic Vapors," D.S. Ballantine, Anal. Chem., **1992**, 64, 3069.

15. "Investigation of Relative Humidity Effects on the Response Behavior of a pH Indicator-Based OWG Vapor Sensor," D. Callahan, D.S. Ballantine, Talanta, **1993**, 40(3), 431.
16. "QSRR Approach to Prediction of LSER Coefficients I. H-Bond Acceptor Capability of GC Stationary Phases in McReynold's Data Set," D.S. Ballantine, J. Chromatogr., **1993**, 628, 247.
17. "Influence of Porous Oxide Films on Acoustic Plate Mode Device Response to Ionic Solutions," A.A. Russell, D.H. Doughty, D.S. Ballantine, R. Hart, Proc. Electrochem. Soc.-Chem. Sensors II, **1993**, PV 93-7, 732.
18. "Evaluation of Frequency and Attenuation Response of Acoustic Plate Mode Device Coated with Porous Oxide Films," A. A. Russell, D. H. Doughty, D. S. Ballantine, R. Hart, Anal. Chem. **1994** 66, 3108-3116.
19. "Characterization of Cyano-Functionalized Stationary GC Phases by Linear Solvation Energy Relationships," W. Tian and D.S. Ballantine, J. Chromatogr. A **1995** 718, 357-369.
20. "Development and Application of an Automated GC Sampling System for Verification of Test Vapor Stream Concentrations for Chemical Sensor Studies", T. Torkelson and D. S. Ballantine, The Analyst **1998** 123, 209-215.
21. "Characterization of Olefinic Gas Chromatographic Stationary Phases by Linear Solvation Energy Relationships" B. K. Callihan, D.S. Ballantine, J. Chromatogr. A **1999** 836, 261-270.
22. "Characterization of Amine Functionalized Stationary Phases Using Linear Solvation Energy Relationships", M. M. McCann, D. S. Ballantine, J. Chromatogr. A **1999** 837, 171-185.
23. "Revised Linear Solvation Energy Relationship Coefficients for the 77-Phase McReynolds Data Set Based on Updated Solute Descriptors", M. H. Abraham, D. S. Ballantine, B. K. Callihan, J. Chromatogr. A , 878 (2000), 115-124
24. "Calculation of Abraham Solute Descriptors from McReynolds gas chromatographic retention data", B. K. Callihan and D. S. Ballantine, J. Chromatogr. A, 893 (2000), 339-346.
25. "Characterization of Phosphorus Containing Stationary Phases Using LSERs", C. Graffis and D. S. Ballantine, J. Chromatogr. A **946**, 185-197. (2002)
26. "Quantitation of Phenol Levels in Oil of Wintergreen Using Gas Chromatography-Mass Spectrometry with Selected Ion Monitoring: A Quantitative Chemistry Laboratory Experiment", R. M. Sobel, V. Ryzhov, and D. S. Ballantine. J. Chem. Ed. **2005** 82(4), 601.
27. "2-D Bitmapping Approach for Identification and Quantitation of Common Base Flavor Adulterants Using Surface Acoustic Wave Arrays and Artificial Neural Network Data Analysis", R. M. Sobel and D. S. Ballantine, Analy. Chim. Acta **2008** 608, 79.
28. "Electrical Impedance Response of a Thick-Thin Film Hybrid Anodic Nanoporous Alumina Sensor to Methanol Vapors", C. Radzik, G. M. Kocanda, M. Haji-Sheikh, D. S. Ballantine. International Journal on Smart Sensing and Intelligent Systems **2008** 1, 470.
29. "Detection of Cyclic Volatile Organic Compounds Using Single-Step Anodized Nanoporous Alumina Sensors", M. Kocanda, M. Haji-Sheikh, D. S. Ballantine, IEEE Sensors Journal **2009** 9(7), 836.

30. "Using LEGO Mindstorms NXT™ Robotics Kits as a Spectrophotometric Instrument", M. Kocanda, B. M. Wilke and D. S. Ballantine, International Journal on Smart Sensing and Intelligent Systems **2010** 3(3), 400.
31. "Oxygen Detection Using Nanoporous Anodized Aluminum Oxide Sensors", Suresh Vunnam, Alekha Andolu, Martin Kocanda, Michael Haji-Sheikh, David S. Ballantine, Anima Bose. In Proceedings of ICST 2011.

REVIEWS:

1. "Surface Acoustic Wave Devices for Chemical Analysis," D.S. Ballantine and H. Wohltjen, Anal. Chem., **1989**, 61, 704A (invited).

BOOKS (*Chapters):

- *1. "Investigation of Elastic Properties of Thin Polymer Films Using SAW Device," D.S. Ballantine, H. Wohltjen, in ACS Symposium Series: Chemical Sensors and Microinstrumentation, **1989**, 403, pp. 222.
- *2. "Vapor Detection with SAW Microsensors," H. Wohltjen, D.S. Ballantine, N.L. Jarvis, in ACS Symposium Series: Chemical Sensors and Microinstrumentation, **1989**, 403, pp. 157.
3. *Acoustic Wave Sensors: Theory, Design and Physico-Chemical Applications* by D. S. Ballantine, R. M. White, S. J. Martin, A. J. Ricco, G. C. Frye, E.T. Zellers. Academic Press: Boston (**1997**)
4. *General, Organic, and Biological Chemistry (5th ed.)*, by J. McMurry, M. Castellion, and D. Ballantine. Prentice Hall: Upper Saddle River NJ (**2007**).
5. *General, Organic, and Biological Chemistry (6th ed.)*, by J. McMurry, M. Castellion, D. Ballantine, C. Hoeger, and V. Peterson. Prentice Hall: Upper Saddle River NJ (**2010**).

BOOK REVIEWS:

1. "Environmental Sampling for Trace Analysis", B. Markert, Ed. J. Am. Chem. Soc. , **1995**, 117, 7852.

POSTERS/PRESENTATIONS:

1. "Hydrogen Sensing using Impedance Measurements of Nanocrystalline Palladium", M.J. Haji-Sheikh, M. Kocanda, R. M. Syaifudin, S. Mukhopadhyay, D. Ballantine, C. Johnson, E. King. 2013 IEEE International Instrumentation and Measurement Technology Conference. (Minneapolis, MN; May 2013)

OTHER PROFESSIONAL ACTIVITIES:

1. "Fundamentals of General, Organic, and Biological Chemistry (7e)", McMurry, Ballantine, Hoeger, and Peterson. Pearson/Prentice Hall (**2013**).
2. Developed Power Point ancillary materials for "Chemistry (4e)", Gilbert, Kirss, Foster, and Davies. Norton (2014).