

JAMES F. BROWNING, PhD

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PERSONAL PROFILE

- 25 years of experience leading and mentoring multi-disciplinary research teams and projects.
- Expert in reflectometry applied to physics, chemistry, and biology studies.
- Experienced scientist with extensive experience developing experimental capabilities.

POSITIONS

Oak Ridge National Laboratory – Oak Ridge, TN

Group Leader, Reflectometry, 2021 - present

Team Lead, Reflectometry, 2019 - 2021

Senior Research Staff, 2007 - 2023

Distinguished Research Staff, 2023 - present

- Group leader for neutron reflectometry responsible for line management of staff, post-docs and students assigned to the reflectometry suite within the Neutron Scattering Division.
- Responsible for growing and expanding scientific collaborations across the instrument suite and pursuing potential funding opportunities supporting those efforts.
- Responsible for developing a team dynamic among all staff involved with the reflectometry instruments across multiple groups, including performance management and conflict resolution.
- Mentor junior staff and support the career development of reflectometry team members.
- Neutron Scattering Scientist responsible for developing collaborative research programs that exploit the capabilities of the Liquids Reflectometer (LR) and to support and enable user-based research on the LR.
- Responsible for the development, implementation and maintenance of sample environments used on the LR.
 - Led junior staff and post-docs in the development of an electrochemical cell that is now one of the most requested sample environments from our users. The cell, which was designed as an electrochemical cell, is frequently used for the study of liquid-solid interfaces, and can be used in experiments with fluid exchange.
 - Led the development and implementation of two multi-environment vacuum chambers 1) ultra-high vacuum with sample heating to 600 °C and precision gas aliquoting capability and 2) to accommodate both

temperature and electric field. These chambers are now part of the user program at LR.

- Led the development of a new high-temperature cell for corrosion studies of molten salt / alloy interfaces.

Sandia National Laboratories, Albuquerque, NM

Distinguished Member of Technical Staff, 2004 – 2007

- Responsible for a multi-disciplinary research program with the goal of elucidating the structure--property relationships of metal tritide thin films of importance to neutron generator technology. This program involved researchers with various backgrounds and skill sets including neutron and ion scattering techniques, transmission electron microscopy, x--ray diffraction, surface science and nanoindentation. These collaborative efforts extended across both organizational lines within Sandia and to Los Alamos and involved the Materials Science department at New Mexico Tech. My responsibilities included the development and nurturing of a cohesive inter--group research program, thus encompassing coordination of efforts, compilation of results as they were obtained and dissemination of results among team members and lab management. Administrative responsibilities included oversight of these research activities and their supporting budgets, which were on the order of \$4M per year.

Principal Member of Technical Staff, 1997 - 2004

- Established materials research programs in areas of interest to the neutron generator community at Sandia and Los Alamos National Laboratories. This included the development of a time-of-flight / energy spectroscopy technique for determining ion species, charge state and energies of ions emanating from arc discharge plasmas. Of particular importance was the development, in partnership with others, of a high-energy ion beam analysis technique for the quantitative determination of metal hydride chemistries of metal hydride thin films containing each of the hydrogen isotopes. The technique was also capable of measuring other elements such as oxygen, thereby enabling the study of oxide growth and its effect on hydride formation. This work ultimately led to the design and implementation of two dedicated beamlines at Sandia's Ion Beam Laboratory for materials research related to neutron tube design and development.
- Responsible for the technical oversight and direction of the Gas Dynamics and Mass Spectrometry (GDMS) laboratory, which included supervision of two staff members and a laboratory technician.

Senior Member of Technical Staff, 1994 - 1997

- Responsible for the development and implementation of a mass spectrometric capability for the performance of hydrogen isotope analysis of War Reserve (WR) neutron tube components following the DOE's Quality Criteria 1 (QC--1).

General Electric Neutron Devices, Department of Energy Pinellas Facility, Largo, FL

Senior Physicist, 1991 – 1994

- Responsible for the oversight and operation of the Ion Accelerator Lab in support of the High Energy Density Physics group at Sandia National Laboratories. The primary focus of this work was the development of activation foils used as diagnostics in D-T fusion experiment on the Particle Beam Fusion Accelerator (the predecessor to the Z-machine at Sandia).
- Oversight of the Radio- and Nuclear Chemistry laboratory, including the supervision of four technicians.

PROFESSIONAL ACTIVITIES

- Topical Editor for the Conference on the Application of Accelerators in Research and Industry.
- Serve as reviewer for Elsevier and ACS Journals
- Materials Research Society Publications Committee, 2017 – 2019.
- Sample Environment Steering Committee (Chair), Neutron Science Directorate, 2015 - 2019
- Served as a reviewer for the USDoS/USAID LAUNCH Program, 2013
- Neutron Sciences Directorate LDRD review committee, 2008 – 2010
- Adjunct Professor, Department of Materials and Metallurgical Engineering, New Mexico Institute of Mining and Technology, Socorro, NM, 2006 – 2009.
- Founder and chair for the international conference on Hydrogen and Helium Isotopes in Materials, 2004 - 2009
- Executive Committee Los Alamos Neutron Science Center User Group, 2004 - 2006

AWARDS

- Oak Ridge National Laboratory Significant Event Award (2013)
- DOE Defense Program's Award of Excellence for "Leading Investigations of the Basic Questions and Fundamental Behaviors in Stockpile Systems" (2007)
- Sandia National Laboratories Employee Recognition Award for Exceptional Achievements (2003)
- DOE Defense Program's Award of Excellence for "Significant Contributions to the Stockpile Stewardship Program" (2001)
- Sandia National Laboratories Employee Recognition Award for Exceptional Achievements (2001)
- Sandia National Laboratories Employee Recognition Award for Exceptional Achievements (1999)

PROFESSIONAL SOCIETIES

- Materials Research Society
- Neutron Scattering Society of America

EDUCATION

- Doctor of Philosophy, Materials Science and Engineering, New Mexico Institute of Mining and Technology
Dissertation title: “Structural Evolution of β -Phase Erbium Tritide”
- Master of Science, Physics, University of Georgia Thesis title: “Orientation Effects in Proton-H₂ Collisions”
- Bachelor of Science, Physics, Augusta College

PATENTS

- “A System for Studying a Sample of Material Using a Heavy Ion Induced Mass Spectrometer Source”, D.P. Fries, J.F. Browning, US Patent No. 5,784,424, 1999.
- “A Method for Studying a Sample of Material Using a Heavy Ion Induced Mass Spectrometer Source”, D.P. Fries, J.F. Browning, US Patent No. 5,872,824, 1999.

PUBLICATIONS

1. Browning, Katie L., Andrew S. Westover, James F. Browning, Mathieu Doucet, Robert L. Sacci, and Gabriel M. Veith (2023) “*In Situ* Measurement of Buried Electrolyte–Electrode Interfaces for Solid State Batteries with Nanometer Level Precision”, *ACS Energy Letters*, 8, 1985–1991
2. Ankner, JF, R Ashkar, JF Browning, TR Charlton, M Doucet, CE Halbert, F Islam, A Karim, E Kharlampieva, SM Kilbey, JYY Lin, MD Phan, GS Smith, SA Sukhishvili, R Thermer, GM Veith, EB Watkins, D Wilson, (2023), “Cinematic reflectometry using QIKR, the quite intense kinetics reflectometer”, *Review of Scientific Instruments* 94 (1), 013302.
3. Blair, Sarah J, Mathieu Doucet, James F Browning, Kevin Stone, Hanyu Wang, Candice Halbert, Jaime Avilés Acosta, José A Zamora Zeledón, Adam C Nielander, Alessandro Gallo, Thomas F Jaramillo, (2022), “Lithium-mediated electrochemical nitrogen reduction: Tracking electrode–electrolyte interfaces via time-resolved neutron reflectometry”, *ACS Energy Letters* 7 (6), 1939-1946.
4. Klein, JM, H Wang, RL Sacci, JF Browning, B Gurkan, (2022), “Smooth modified surfaces of silicon for the study of ionic liquid interfaces by neutron reflectometry”, *ACS Applied Electronic Materials* 4 (5), 2217-2226.
5. Feng, Jingxing, James F Browning, MR Fitzsimmons, Qiang Wang, Jaroslaw Majewski, Peng Wang, and Dale W Schaefer, (2022), “Impact of ferromagnetism on neutron reflectometry of passivated iron”, *Thin Solid Films*, 759, 139464.
6. Mazza, A, Q. Lu, G. Hu, H. Li, J.F. Browning, T. Charlton, M. Brahlek, P. Ganesh, T. Ward, N.H. Lee, and G. Eres, (2022). “Reversible Hydrogen-Induced Phase Transformations in La_{0.7}Sr_{0.3}MnO₃ Characterized by In Situ Neutron Reflectometry.” *ACS Applied Materials and Interfaces*, 14 (8), 10898-10906.
7. Doucet, M., J.F. Browning, B.L. Doyle, T.R. Charlton, H. Ambaye, J. Seo, A.R. Mazzo, J.F. Wenzel. G.R. Burns, R.R. Wixom, and G.M. Veith, (2022). “Study of Chromium Migration in Nickel-based Alloy using Polarized Neutron Reflectometry and Rutherford Backscattering Spectrometry.” *J. Phys. Chem., C* 126 (1), 605-610.

8. Browning, J.F., J. Seo, J.F. Wenzel, G.M. Veith, M. Doucet, A.S. Ivanov, P. Halstenberg, G. Lynn, and S. Dai, (2021). "A High Temperature Cell for Investigating Interfacial Structure on the Molecular Scale in Molten Salt/Alloy Systems." *Rev. Sci. Instr.*, 92(12), 123903.
9. Veith, G.M., K.L. Browning, M. Doucet, and J.F. Browning, (2021). "Solid Electrolyte Interphase Architecture Determined Through In Situ Neutron Scattering." *J Electrochem. Soc.* 168 060523.
10. Chen, J., S. Das, S. Ming, L. Guoliang, H. Lian, J. Qin, J.F. Browning, J.K. Keum, D. Uhrig, G. Gu, and K. Xiao, (2021). "Phase segregation mechanisms of small molecule-polymer blends unraveled by varying polymer chain architecture." *SmartMat.* 1–11.
11. Li, M., M. Zhang, Y. Lai, Y. Liu, C. E. Halbert, J. F. Browning, D. Liu and P. Yin (2020). "Solvated and Deformed Hairy Metal–Organic Polyhedron." *The Journal of Physical Chemistry C.* 124, 28, 15656–15662.
12. Browning, K. L., R. L. Sacci, M. Doucet, J. F. Browning, J. R. Kim, and G. M. Veith (2020). "The Study of the Binder Poly (acrylic acid) and Its Role in Concomitant Solid–Electrolyte Interphase Formation on Si Anodes." *ACS Applied Materials & Interfaces* 12(8): 10018-10030.
13. Wang, H., A. Johs, J. F. Browning, D. A. Tennant and L. Liang (2019). "Electrochemical properties of the interaction between cytochrome c and a hematite nanowire array electrode." *Bioelectrochemistry* 129: 162-169.
14. Phan, M. D., K. Y. Lee, H. Wang, J. F. Browning, S. K. Satija and J. F. Ankner (2019). "Membrane-Bound Structures and Associated Electron Transport Functions of Cytochrome C." *Biophysical Journal* 116(3): 519a.
15. Osti, N. C., E. Mamontov, L. Daemen, J. F. Browning, J. Keum, H. C. Ho, J. Chen, K. Hong and S. O. Diallo (2019). "Side chain dynamics in semiconducting polymer MEH-PPV." *Journal of Applied Polymer Science* 136(14): 47394.
16. Fies, W. A., J. T. First, J. W. Dugger, M. Doucet, J. F. Browning and L. J. Webb (2019). "Quantifying the Extent of Hydration of a Surface-Bound Peptide Using Neutron Reflectometry." *Langmuir* 36(2): 637-649.
17. Fies, W. A., J. W. Dugger, J. E. Dick, L. M. Wilder, K. L. Browning, M. Doucet, J. F. Browning and L. J. Webb (2019). "Direct Measurement of Water Permeation in Submerged Alkyl Thiol Self-Assembled Monolayers on Gold Surfaces Revealed by Neutron Reflectometry." *Langmuir* 35(16): 5647-5662.
18. Browning, K. L., J. F. Browning, M. Doucet, N. L. Yamada, G. Liu and G. M. Veith (2019). "Role of conductive binder to direct solid–electrolyte interphase formation over silicon anodes." *Physical Chemistry Chemical Physics* 21(31): 17356-17365.
19. Yang, B., M. A. Kolaczowski, M. A. Brady, J. K. Keum, J. F. Browning, T. L. Chen and Y. Liu (2018). "Enhancing the Efficiency of Organic Photovoltaics by a Photoactive Molecular Mediator (Solar RRL 1/2018)." *Solar RRL* 2(1): 1770149.
20. Yang, B., M. A. Kolaczowski, M. A. Brady, J. K. Keum, J. F. Browning, T. L. Chen and Y. Liu (2018). "Enhancing the efficiency of organic photovoltaics by a photoactive molecular mediator." *Solar RRL* 2(1): 1700208.

21. Shen, B. H., B. L. Armstrong, M. Doucet, L. Heroux, J. F. Browning, M. Agamalian, W. E. Tenhaeff and G. M. Veith (2018). "Shear thickening electrolyte built from sterically stabilized colloidal particles." *ACS applied materials & interfaces* 10(11): 9424-9434.
22. Islam, S. Z., A. Reed, S. Nagpure, N. Wanninayake, J. F. Browning, J. Strzalka, D. Y. Kim and S. E. Rankin (2018). "Hydrogen incorporation by plasma treatment gives mesoporous black TiO₂ thin films with visible photoelectrochemical water oxidation activity." *Microporous and Mesoporous Materials* 261: 35-43.
23. Dugger, J. W., W. Li, M. Chen, T. E. Long, R. J. Welbourn, M. W. Skoda, J. F. Browning, R. Kumar and B. S. Lokitz (2018). "Nanoscale Resolution of Electric-field Induced Motion in Ionic Diblock Copolymer Thin Films." *ACS applied materials & interfaces* 10(38): 32678-32687.
24. Dugger, J. W., L. Collins, R. J. Welbourn, M. W. Skoda, N. Balke, B. S. Lokitz and J. F. Browning (2018). "Ion movement in thin Nafion films under an applied electric field." *Applied Physics Letters* 113(11): 113105.
25. Chen, M., J. W. Dugger, X. Li, Y. Wang, R. Kumar, K. M. Meek, D. W. Uhrig, J. F. Browning, L. A. Madsen and T. E. Long (2018). "Polymerized ionic liquids: Effects of counter-anions on ion conduction and polymerization kinetics." *Journal of Polymer Science Part A: Polymer Chemistry* 56(13): 1346-1357.
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27. Veith, G. M., M. Doucet, R. L. Sacci, B. Vacaliuc, J. K. Baldwin and J. F. Browning (2017). "Determination of the solid electrolyte interphase structure grown on a silicon electrode using a fluoroethylene carbonate additive." *Scientific reports* 7(1): 1-15.
28. Sacci, R. L., M. L. Lehmann, S. O. Diallo, Y. Q. Cheng, L. L. Daemen, J. F. Browning, M. Doucet, N. J. Dudney and G. M. Veith (2017). "Lithium transport in an amorphous Li x Si anode investigated by quasi-elastic neutron scattering." *The Journal of Physical Chemistry C* 121(21): 11083-11088.
29. Nagpure, S., J. F. Browning and S. E. Rankin (2017). "Incorporating poly (3-hexyl thiophene) into orthogonally aligned cylindrical nanopores of titania for optoelectronics." *Microporous and Mesoporous Materials* 240: 65-72.
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32. Herath, N., S. Das, J. Zhu, R. Kumar, J. Chen, K. Xiao, G. Gu, J. F. Browning, B. G. Sumpter and I. N. Ivanov (2016). "Unraveling the fundamental mechanisms of

- solvent-additive-induced optimization of power conversion efficiencies in organic photovoltaic devices." *ACS applied materials & interfaces* 8(31): 20220-20229.
33. Fears, T., M. Doucet, J. Browning, J. Baldwin, J. G. Winiarz, H. Kaiser, H. Taub, R. Sacci and G. Veith (2016). "Evaluating the solid electrolyte interphase formed on silicon electrodes: a comparison of ex situ X-ray photoelectron spectroscopy and in situ neutron reflectometry." *Physical Chemistry Chemical Physics* 18(20): 13927-13940.
 34. Veith, G. M., M. Doucet, J. K. Baldwin, R. L. Sacci, T. M. Fears, Y. Wang and J. F. Browning (2015). "Direct determination of solid-electrolyte interphase thickness and composition as a function of state of charge on a silicon anode." *The Journal of Physical Chemistry C* 119(35): 20339-20349.
 35. Kumar, R., B. S. Lokitz, S. W. Sides, J. Chen, W. T. Heller, J. F. Ankner, J. F. Browning, S. M. Kilbey II and B. G. Sumpter (2015). "Microphase separation in thin films of lamellar forming polydisperse di-block copolymers." *RSC Advances* 5(27): 2133621348.
 36. Jin, Y., J. K. Keum, K. Hong, J. F. Browning, G. S. Smith and V. K. Kuppa (2015). "Allpolymer photovoltaics: Correlating Efficiency and Morphology." *Bulletin of the American Physical Society* 60.
 37. Hu, N., X. Dong, X. He, J. F. Browning and D. W. Schaefer (2015). "Effect of sealing on the morphology of anodized aluminum oxide." *Corrosion Science* 97: 17-24.
 38. Herath, N., S. Das, J. K. Keum, J. Zhu, R. Kumar, I. N. Ivanov, B. G. Sumpter, J. F. Browning, K. Xiao and G. Gu (2015). "Peculiarity of two thermodynamically-stable morphologies and their impact on the efficiency of small molecule bulk heterojunction solar cells." *Scientific reports* 5: 13407.
 39. Das, S., J. K. Keum, J. F. Browning, G. Gu, B. Yang, O. Dyck, C. Do, W. Chen, J. Chen and I. N. Ivanov (2015). "Correlating high power conversion efficiency of PTB7: PC 71 BM inverted organic solar cells with nanoscale structures." *Nanoscale* 7(38): 15576-15583.
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