CURRICULUM VITAE

TASHIEMA LIXONA ULRICH, Ph.D.
Nuclear Fuel Element Performance Group
Oak Ridge National Laboratory
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RESEARCH INTERESTS AND EXPERIENCE

Advanced Nuclear Fuels and Materials; Post-irradiation Examination; Chemical Thermodynamics of Nuclear Materials; Materials engineering; Computational modeling with emphasis on thermodynamics of materials for nuclear applications. Experience CALPHAD, thermodynamic estimation techniques and experimental procedures of nuclear materials. Concentrated research interest in actinide oxides, silicides, carbides and nitrides.

EDUCATION

University of South Carolina — **5/16-11/19**

- Nuclear Engineering Ph.D.
- NRC Fellow
- Dissertation: Modeling the uranium-silicon phase equilibria based on computational and experimental analysis
- GPA 3.89/4.0

University of West Florida — **8/11-5/15**

- Chemistry B.S.
- American Chemical Society Scholar
- Chemistry Scholar

RESEARCH AND PROFESSIONAL EXPERIENCE

Research and Development Associate Staff — **4/21 – Present**

- Oak Ridge National Laboratory
- Uranium Fuel Performance Group
- Fabricate and characterize novel fuel forms
- Investigate the performance of irradiated novel fuel forms

Postdoctoral Research Associate — **2/20 - 4/21**

- Los Alamos National Laboratory
- Mentor: Dr. Joshua White (jtwhite@lanl.gov)
- CALPHAD method applied to the uranium-carbide ternary and quaternary systems
- Investigating materials and methods to improve uranium-nitride oxidation resistance
- Development of accident tolerant oxide fuel grain growth kinetic models

Ph.D. Research Student — **5/16 - 12/19**

- University of South Carolina-Nuclear Engineering Program
- Advisor: Prof. Theodore Besmann (besmann@cec.edu)
- CALPHAD method applied to the uranium-silicon and uranium-silicon-nitrogen systems
- Rietveld Refinement of X-ray and neutron powder diffraction data to study uranium-silicon system
- Fabrication of uranium containing compounds by arc melting process
- Measure phase stability of uranium silicide intermetallic phases
- Compound Energy Formalism model applied to oxygen interstitial clustering in UO_{2+x}

Graduate Research Assistant **5/17 - 8/17**

- Los Alamos National Laboratory-Materials Science and Technology Division (MST-8)
- Fuel Research Laboratory
- Mentors: Dr. Joshua White (jtwhite@lanl.gov), and Dr. Sven Vogel (sven@lanl.gov)
- Fabricate laboratory scale U_3Si_2 fuel by arc-melting for fuel-cladding interaction studies
- Solidification morphology study of U_3Si_2 fuel doped with fission product elements
- In-situ neutron diffraction study of U_3Si_{2+x}
- Member for the Los Alamos student committee executive board

Graduate Research Assistant **5/16 - 8/17**

- Los Alamos National Laboratory-Materials Science and Technology Division (MST-7)
- Fuel Research Laboratory
- Mentors: Dr. Joshua White and Dr. Elizabeth Sooby Wood (elizabeth.soobywood@utsa.edu)
- Fabricated uranium-silicon and uranium-silicon-nitrogen alloys by Arc-melting
- Identify unknown phase in the uranium-silicon and uranium-silicon-nitrogen system through X- ray diffraction and microstructure evaluation

Athletic Tutor **1/16 - 4/16**

- Florida State University
- Tutor freshmen to senior level NCAA division I athletes
- General chemistry I and II, calculus I, biology I, physics I, trigonometry, and precalculus
- Build tutoring lessons based on each student learning style and level of understating for a specific subject
- Provided study guidelines

General Chemistry Supplemental Instruction Leader **8/14 - 5/15**

- University of West Florida
- Created lesson plans and design activities that reinforced key concepts from class lectures
- Conducted 1-2 hour discussion sessions 3 times per week
- Provided students with problem solving strategies
- Mentored students beyond General Chemistry I

Analytical Chemistry Undergraduate Research Assistant **5/13 - 1/15**

- University of West Florida
- Mentor: Dr. Pam Benz (pvaughan@uwf.edu)
- Determined molar absorption coefficient of nitrate and nitrite using UV-Visible spectrometry
- Determine a xenon lamp radiant flux using nitrate/nitrate actinometry
- Generated HPLC calibration curves using salicylic acid solutions
- Quantify the quantum yield of Salicylic acid formed from photolysis of nitrate/nitrite actinometer solutions

Teaching Assistant and Grader **5/13 - 5/15**

- University of West Florida
- Provided laboratory assistance to multiple professors in General Chemistry I and II, Organic Chemistry I and II, Analytical Chemistry, Advance Laboratory Techniques, and Physical Chemistry Lab
- Supervised up to 20 students during lab sessions to ensure safe handling of chemicals
- Answered questions related to synthesis, purification, and analysis, often providing one on one instruction
- Operated the instruments (NMR, GC-MS, FT-IR, and UV-Vis) needed during experiments
- Provided students feedback about pre-laboratory write-up

- Provided grading support for final exams in General Chemistry I, and General Chemistry II

Chemistry Department Tutor **1/12 - 5/15**

- University of West Florida
- Assisted students with questions relating to General, Organic (I & II) and Physical Chemistry

PROFESSIONAL SKILLS

Instrumentation

Scanning Electron Microscopy	Optical and Electrical Microscopy	Differential Scanning Calorimetry	Dilatometer
Arc Melt Furnace	X-ray Diffraction	Simultaneous Thermal Analyzer	
Mass Spectroscopy	NMR (^{1}H, ^{13}C, ^{31}P)	GC-MS	
Gas Chromatography	High-Pressure Liquid Chromatography	Infrared and Ramon Spectroscopy	

Analytical Software/Modeling Tools

qchem	MAUD	GSAS/Expgui
Fullprof	GSAS II	Gsaslanguage
Origin	ImageJ	VESTA
Spartan	FactSage	Thermal Expansion Visualizing Software
Thermo-Calc		

Relevant Course Work

Nuclear Safeguards (Graduate)	Nuclear Fuel Materials and Behavior (Graduate)	Radiation Shielding (Graduate)
Nuclear Fuel Cycle (Graduate)	Selected Topics in Thermal Systems (Graduate)	Physical Metallurgy (Graduate)
Safety Analysis for Energy Systems (Graduate)	Nuclear Reactor System (Graduate)	Thermal Hydraulic Design of Nuclear Reactors (Graduate)
Statistical Thermodynamics (Graduate)	Quantum Chemistry (Graduate)	Solid State Physics (Graduate)
Calculus III	Inorganic Chemistry (undergraduate)	Industrial Chemistry
Organic Chemistry III	Inorganic Synthesis	Advance Organic Synthesis
Instrumental Analysis	Applied Statistics (SAP programing)	Radiation Worker 2 Training

HONORS, AWARDS AND ACCOMPLISHMENTS

Mentee in the TMS Leadership Development Initiative

Nominated by the University of California for participation in the 70th Lindau Nobel Laureate Meeting

Robert L. Snyder Student Travel Grant, August 2020

Co-Pi Seaborg Rapid Response Small Project, $40,000, May 2020

The first underrepresented minority female graduate from UofSC Nuclear Engineering PhD program

Robert L. Snyder Student Travel Grant, $500, August 2019

Best Poster Presentation in the Materials Science Division - Los Alamos National Laboratory Student Symposium, July 31-August 2, 2018

Best poster presentation in the Materials Science Division - Los Alamos National Laboratory Student Symposium, August 9, 2017

NRC Graduate Research Fellowship, May 2016-December 2019

2015 Jerome E. Gurst Scholar Award in Chemistry, April 2015

1 of 5 to be the first American Chemical Society Scholar at University of West Florida

Annual Biomedical Research Conference for Minority Students Travel Award, $1,500, Fall 2014

Recipient of Student Government Association Travel Award Fall 2014

Supplemental Instruction Fellowship (one of five), August 2014-May 2015

Nominated by faculties for the College of Science, Health and Engineering Scholars Student Advisory Board, August 2014-May 2015

Invited speaker at the Board of Governors State University System of Florida Meeting, UWF, September 2014

Chemistry Alumni Foundation Scholarship, August 2014-May 2015

Outstanding Student in Chemistry Department Award, May 2014

Merck Summer Research Scholarship, May 2014- August 2014

Department of Chemistry Scholarship, August 2013

American Chemical Society Scholar, August 2012-May 2015

American Chemical Society Scholar Program Renewable Scholarship, August 2012-May 2015

University of West Florida Chemistry Scholar, January 2012-May 2015

Dean's List, UWF College of Arts and Science, 2011-2012, 2012-2013, 2014-2015 Academic Years

Represented University of West Florida at LeaderShape Institute (Florida), Summer 2012

Chi Alpha Epsilon Honors Society - Zeta Alpha Chapter, October 2012

Delphi Certificate of Excellence, Fall 2011

Student Government Freshmen Committee (20 freshmen selected from 300), August 2011-August 2012

University of West Florida Achievement Scholarship, August 2011-May 2015

Florida Academic Scholars Award, Florida Bright Futures, August 2011-May 2015

National Honors Society, 2011

PROFESSIONAL SOCIETIES

American Nuclear Society

American Ceramic Society

Materials Research Society

The Minerals, Metals & Materials Society

PUBLICATIONS

1. The U_3Si_2-H system. A.P. Shivprasad, V. Kocevski, **T.L. Ulrich**, J.R. Wermer, D.A. Andersson, J.T. White. Journal of Nuclear Materials, DOI: https://doi.org/10.1016/j.jnucmat.2021.153278.
2. Phase Relationships in the Carbon–Titanium–Uranium System for Ultra-High Temperature Nuclear Fuels. Najeb M. Abdul-Jabbar, **Tashiema L. Ulrich** and Joshua T. White. JOM 73, 3519–3527 (2021). https://doi.org/10.1007/s11837-021-04892-8
3. Heat Capacity, Entropy, Formation Energy and Spin-Fluctuation Behavior of U_3Si_5 from 2.4 to 397.4 K. Jason L. Baker, Josh T. White, Aiping Chen, **Tasheima Ulrich**, Robert R. Roback, and Hongwu Xu. Journal of Nuclear Materials, DOI: https://doi.org/10.1016/j.jnucmat.2021.153282
4. Phase Stability of U_5Si_4, USi, and U_2Si_3 in the Uranium-Silicon System. **Tashiema L. Ulrich**, Sven C. Vogel, Denise A. Lopes , Vancho Kocevski, Joshua T. White, Elizabeth S. Sooby, Theodore M. Besmann. Journal of Nuclear Materials, DOI: https://doi.org/10.1016/j.jnucmat.2020.152353.
5. Impact of Fission Product Inclusion on Phase Development in U_3Si_2 Fuel. Kaitlin E. Johnson, Denise L. Adorno, Vancho Kocevski, **Tashiema L. Ulrich**, Joshua T. White, Antoine Claisse, Jacob W. McMurrary, Theodore M. Besmann. Journal of Nuclear Materials, 537, 152235, 2020.
6. High-Pressure Structural Behavior and Elastic Properties of U_3Si_5: A Combined Synchrotron XRD and DFT Study. Jason L. Baker, Gaoxue Wang, **Tashiema L. Ulrich**, Josh T. White, Enrique R. Batista, Ping Yang, Robert C. Roback, Changyong Park, Hongwu Xu. Journal of Nuclear Materials, DOI: https://doi.org/10.1016/j.jnucmat.2020.152373.
7. High Temperature Neutron Diffraction Investigation of U_3Si_2. **Tashiema L. Ulrich**, Sven C. Vogel, Joshua T. White, David A. Andersson, Elizabeth Sooby Wood, Theodore M. Besmann. Materialia, 9, 100580, 2020.

8. Temperature-Dependent Crystal Structure of U3Si2 by High-Temperature Neutron Diffraction, Sven C. Vogel, **Tashiema L. Wilson**, Elizabeth Sooby Wood, Joshua T. White, Theodore M. Besmann. Accepted for publication in Proceedings of Global/Top Fuel 2019, September 22-26, 2019, Seattle, WA.

9. Crystal Structure Characterization of Uranium- Silicides Accident Tolerant Fuel by High Temperature Neutron Diffraction. **Tashiema L. Wilson**, T.M. Besmann, S.C. Vogel, J.T. White. Advances in X-ray Analysis, 63, 2019 Proceedings of the 68th Denver X-ray Conference, Lombard, Illinois, U.S.A. 8/5 – 8/9 2019.

10. Enthalpies of Formation and Phase Stability Relations of USi, U_3Si_5 and U_3Si_2. C-K Chung, X. Guo, G. Wang, **T. L. Wilson**, J. T. White, A. T. Nelson, A. Shelyug, H. Boukhalfa, P. Yang, E. R. Batista, A. A. Migdisov, R. C. Roback, A. Navrotsky, H. Xu. Journal of Nuclear Materials, 523 101-110 2018.

11. Experimental and Computational Assessment of U-Si-N Ternary Phases. D. A. Lopes, **T. L. Wilson**, V. Kocevski, E. E. Moore, T. M. Besmann, E. Sooby Wood, J. T. White, A. T. Nelson, S. C. Middleburg, A. Claisse. Journal of Nuclear Materials, 516, 194-201, 2019.

12. Stability of U5Si4 Phase in U-Si system: Crystal Structure Prediction and Phonon Properties Using First-Principles Calculations. D. A. Lopes, V. Kocevski, **T.L. Wilson**, T. M. Besmann. Journal of Nuclear Materials, 510, 331-336, 2018.

13. Uranium Nitride-Silicide Advanced Nuclear Fuel: Higher Efficiency and Greater Safety. T.L. Wilson, E. Moore, D.A. Lopes, V. Kocevski, J.T. White, E. Sooby Wood, and T.M. Besmann. Advances in Applied Ceramics, 117(1), s76-s81, 2018.

14. Uranium Silicide and Uranium Silicide-Nitride Fuels: Assessing Phase Behavior for Fabrication and In-Reactor Behavior. **T. L. Wilson**, D. A. Lopes, V. Kocevski, E. E. Moore, J. T. White. E. Sooby Wood, A. T. Nelson, P. Xu, S. C. Middleburg, J. W. McMurray, T. M. Besmann. Transaction of American Nuclear Society, 118, 1318-1320, 2018.

15. Photochemical Changes in Water Accommodated Fractions of MC252 and Surrogate Oil Created during Solar Exposure as determined by FT-ICRMS. P. P. Vaughan, **T. Wilson**, R. Kamerman, M.E. Hagy, A. McKenna, H. Chen, W. H. Jeffrey. Marine Pollution Bulletin, 104 (1-2), 262-268, 2016.

PRESENTATIONS/POSTERS/TECHNICAL REPORTS

1. (Technical Report) Phase 1 Postirradiation Examination Results for Hatch-1 ARMOR Segments. October 2021. Jason M. Harp, **Tashiema L. Ulrich**, Zachary T. Burns, Tyson L. Jordan, Jesse W. Werden. Report number ORNL/SPR-2021/2326.

2. (Technical Report) The Integrated Experimental and Modeling Approach to Enhanced Grain Size UO_2. Arjen van Veelen, Brandon S. Battas, **Tashiema L. Ulrich**, Michael W.D. Cooper, Joshua T. White. Milestone (M2FT-21LA020201031), LA-UR-21-28187, Los Alamos Natl. Lab.

3. (Technical Report) Fabrication of UO_2 Pellets with Standard and Large Grain Size for Accelerated BU Testing. October 30, 2020. J. T. White, **T. L. Ulrich,** D. M. Frazer, J. T. Dunwoody, C. Grote. Milestone (M3FT-20LA020201041), Los Alamos National Lab.

4. (Technical Report) Development of Accident Tolerant Oxide Fuel Grain Growth Kinetic Models. September 11, 2020. **T. L. Ulrich**, D. M. Frazer, J. T. White, Tarik Saleh. Advance Fuel Campaign program highlight 2020. LA-UR-20-27119.

5. (Technical Report) Crystal Structure Characterization of U-Si Accident Tolerant Fuels. September 11, 2020, S. C. Vogel, **T. L. Ulrich**, J. T. White. Advance Fuel Campaign program highlight 2020. LA-UR-20-27172.

6. (Technical report) Development of Accident Tolerant Oxide Fuel Grain Growth Kinetic Models. September 4, 2020. **T. L. Ulrich**, D. M. Frazer, J. T. White. Milestone (M3FT-20LA020201037), LA-UR-20-26960, Los Alamos Natl. Lab.

7. (Oral Presentation) Crystal Structure of Uranium Monosilicide: A High Temperature Time-of-Flight Neutron Diffraction Study. **T. L. Ulrich**, S. C. Vogel, J. T. White, E. S. Sooby, T. M. Besmann. Denver X-ray Conference, Virtual, August 3-7, 2020.

8. (Technical Report) Phase Equilibria and Thermochemistry of Advanced Fuels: Modeling Burnup Behavior. March 31, 2020, Kaitlin E. Johnson, Denise L. Adorno, Vancho Kocevski, **Tashiema L. Ulrich**, Joshua T. White, Antoine Claisse, Jacob W. McMurrary, Andrew Nelson, Edward J. Lahoda, Simon Middleburgh, Theodore M. Besmann.

9. (Invited Poster) Modeling the Uranium Silicon Phase Equilibria. February 24, 2020, T. L. Ulrich, J. T. White, S. C. Vogel, D. A. Andersson, D. A. Lopes, V. Kocevski, T. M. Besmann. TMS 2020, San Diago, CA 2020.

10. (Technical report) Compatibility of U_3Si_2 Fuel with Zr, FeCrAl and SiC/SiC Based Cladding. January 1, 2019. D. A.

Lopes, E. M. Moore, V. Kocevski, **T. L. Wilson**, and T. M. Besmann, University of South Carolina; J.T. White, Los Alamos National Laboratory; J. W. McMurray, Oak Ridge National Laboratory; Antoine Claisse, Peng Xu, Westinghouse Electric Company.

11. (Technical report) Modeling the U-Si and U-Si-N Systems Based on Computed Experimental Phase Analysis, July 30, 2017, **T. L. Wilson**, T. M. Besmann, E. M. Moore, D. A. Lopes, and V. Kocevski, University of South Carolina; J.T. White; Los Alamos National Laboratory; J. W. McMurray and D. Shin Oak Ridge National Laboratory; E. J. Lahoda and S. C. Middleburgh, Westinghouse Electric Company.
12. (Technical report) Crystal Structure Evolution of U-Si Nuclear Fuel Phases as a Function of Temperature, Sven C. Vogel, **Tashiema Lixona Wilson**, and Joshua Taylor White. Report No. LA-UR-18-28584. Los Alamos National Lab. (LANL), Los Alamos, NM (United States), 2018.
13. (Abstract accepted) Determination of Phase Equilibria in Uranium Silicide Fuel. **Tashiema L. Ulrich**, Theodore M. Besmann, Joshua T. White, Sven C. Vogel. MiNES, Baltimore, MD 2019.
14. (Abstract accepted) Phase Equilibria for Uranium- Silicide Nuclear Fuel. **Tashiema L. Wilson**, Denise A. Lopes, and Theodore M. Besmann, Joshua T. White, Sven C. Vogel. MS&T Meeting, Portland, OR 2019.
15. (Oral Presentation) Crystal Structure Characterization of Uranium-Silicides Accident Tolerant Fuel by High Temperature Neutron Diffraction. **Tashiema L. Wilson**, Sven C. Vogel, Joshua T. White, Theodore M. Besmann. Denver X-ray Conference, Lombard, IL 2019.
16. (Oral Presentation) Phase Equilibria of Advanced Technology Uranium Silicide-Based Nuclear Fuel. **T. L. Wilson**, D. A. Lopes, T. M. Besmann, E. Sooby Wood, J. T. White, A. T. Nelson, S. C. Middleburgh, J. W. McMurray. MRS, Spring 2018.
17. (Poster) Understanding Uranium Silicide Fuel and the Effects of Fission Products. **T. L. Wilson**, J.T White, S.C Vogel, D.A. Lopes, and T.M. Besmann. Presentation at Los Alamos National Laboratory Student Symposium, Aug. 2018.
18. (Poster) Experimental Characterization of the U_3Si_5-USi_2 Phase Region. **T. L. Wilson**, J. T. White, E. Sooby Wood, M. R. Bogala, E.E. Moore, A. T. Nelson, and T. M. Besmann. MS&T Meeting, Pittsburgh, PA, 2017.
19. (Poster) Experimental Analysis of Selected Uranium Silicide and Uranium-Silicide-Nitride Compositions. **T. L. Wilson**, T. M. Besmann, J. T. White, Christopher J. Grote, and Andrew T. Nelson, E. Sooby Wood. Presentation at Los Alamos National Laboratory Student Symposium, Aug. 9, 2017.
20. (Poster) Calibrating a HIMAS Linear Detector on a Matrix-Assisted Laser Desorption/Ionization Time-of-Flight Mass Spectrometer (MALDI), **T. L Wilson**, K. Reyes, C. Van Leeuwen, K. Molek, ACS, Denver, CO, March 2015.
21. (Poster) Transition Metal Oxides for use as Surfaces in Surface Assisted Laser Desorption/Ionization of Adsorbed Asphaltene. **T. L. Wilson**, Karl A. Reyes, Christopher J. Van Leeuwen, Dr. Karen S. Molek**,** ABRCMS, San Antonio, TX, November 2014.
22. (Poster) Environmental Factors Influencing the Photochemical Degradation of Triclosan. **T. L. Wilson**, Kyra Murrell, Jessica Haney, Dr. Pamela Vaughan. UWF Chemistry Symposium, Pensacola, FL, August 2014.