

Tyler Bruce Williams

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Education

Brigham Young University

B.S. Chemical Engineering

Ph.D. Chemical Engineering

Provo, UT

2022

Anticipated – 2026

Research Experience

Pyrochemical Research and Operations Lab

Ph.D. Student

Provo, UT

June 2022 - Present

- Investigated *in-situ*, electrochemical Cl₂ generation for lanthanide and actinide element purification
- Developed foundational semi-differentiation theory for soluble-insoluble cyclic voltammetry
- Designed and tested a thin-cell electrode for highly concentrated measurements in molten salts

Pyrochemical Research and Operations Lab

Undergraduate Research Assistant

Provo, UT

August 2020 – June 2022

- Published a first-author review of electrochemical concentration measurements in molten chloride salts
- Refined square-wave voltammetry theory for soluble-insoluble reactions
- Started up an electrochemical lab; purchased and installed instrumentation, materials, and equipment

Molten Salt Simulations Group

Undergraduate Research Assistant

Provo, UT

September 2018 – June 2021

- Optimized CP2K parameters, resulting in computed AIMD densities for FLiNaK within 1% of expected literacy values
- Created the pair proximity and dynamic radial distribution functions (RDFs) to visualize billions of trajectory data points
- Automated the production of RDF and density plots, building onto an existing system that used 3 programming languages

Electrochemical Toxic Agent Detection Group

Undergraduate Research Assistant

Provo, UT

December 2020 – January 2021

- Conducted a study investigating electrosynthesis of metal organic frameworks
- Implemented U.S. Army chemical safety practices in electrochemical experiments with chemical warfare simulants

U.S. Army Dugway Proving Grounds - Chemical Test Division

Physical Science Technician, Level II Chemical Weapons Handler

Dugway, UT

June 2020 - September 2020

- Worked directly with chemical warfare agents (CWAs), performing 20+ hours of experiments with nerve and blister agents
- Operated the control systems and monitored environmental sensors to regulate and decontaminate test spaces
- Earned the certification to work with diluted and non-recoverable CWAs solo and with pure CWAs alongside a Level III

Industry Experience

Advanced Process and Control Optimization (APCO)

Technician (2015-2018), Assistant Integrator (2019)

North Salt Lake, UT

Various periods from June 2015 – September 2019

- Improved control strategy and upgraded 5 separate Allen-Bradley CompactLogix PLCs for a wastewater treatment facility
- Modified, assembled, and wired 100+ industrial control panels with integrated control for a wide variety of applications
- Wired and mounted hundreds of pumps, valves, flow/temperature meters, along with radio, ethernet, and fiber-optic networks

Awards and Honors

DOE University Nuclear Leadership Program Graduate Research Fellowship

2023-2026

First Place for Technical Feasibility – 2023 BYU ANS Symposium on Nuclear Applications in Medicine

2023

Fulton Fellowship – Brigham Young University

2022

Innovations in Nuclear Technology R&D Award – Universities with Less than \$600 Million in Research Expenditures

2022

Achievement Rewards for College Scientists Fellowship (Offered) – University of Utah

2022

First Place Nuclear Design – Alpha Tech Research Corporation Student Competition

2022

Tyler Bruce Williams

Peer-Reviewed Publications

T. Williams, R. Fuller, C. Vann, D. Rappleye. *Semi-Differentiation of Reversible, Soluble-Insoluble Potential Sweep Voltammograms.* *Journal of the Electrochemical Society*, 170, 042502 (2023).

R. Fuller, T. Williams, M. Schvaneveldt, D. Rappleye. *A comparison of square-wave voltammetry models to determine the number of electrons exchanged in metal deposition.* *Electrochimica Acta*, 414, 140220 (2022).

T. Williams, R. Shum, D. Rappleye. *Review - Concentration Measurements in Molten Chloride Salts Using Electrochemical Methods.* *Journal of the Electrochemical Society*, 168, (12), 123510 (2021).

A.D. Clark, W.L. Lee, A.R. Solano, T.B. Williams, G.S. Meyer, G.J. Tait, B.C. Battraw, S.D. Nickerson. *Complexation of Mo in FLiNaK Molten Salt: Insight from Ab Initio Molecular Dynamics.* *The Journal of Physical Chemistry B*, 215, 1, 211-218 (2021).

Technical Presentations

T. Williams, R. Fuller, C. Vann, D. Rappleye. *A Semi-Differentiated Model for the Potential Sweep Voltammograms of Electrochemical Deposition Reactions.* 243rd ECS Meeting, 169439 (2023).

T. Williams, M. Schvaneveldt, D. Rappleye. *In-Situ Generation of Cl₂ via Molten Salt Electrolysis for Chloride Volatility Separations.* 46th Actinide Separations Conference (2023).

T. Williams, D. Rappleye, G. Chipman, R. Fuller, M. Schvaneveldt, J. Torrie. *Blind Identification and Quantification of Analytes in Molten LiCl-KCl Eutectic.* *High Temperature Electrochemistry V*, 2023 TMS Annual Meeting & Exhibition (2023).

C. Vann, T. Williams, D. Rappleye. *Demonstration and Analysis of Thin-Cell Electrochemical Measurements in Molten LiCl-KCl Eutectic.* *High Temperature Electrochemistry V*, 2023 TMS Annual Meeting & Exhibition (2023).

D. Rappleye, J. Torrie, T. Williams, R.G. Fuller. *Towards Electroanalytical Measurements in the Elemental Soup of Molten Salts Bearing Nuclear Fuel.* *ECS Meeting Abstracts*, 2193 (2022).

T. Williams, D. Rappleye. *High-concentration electroanalytical measurements using a thin-layer electrode in molten chloride salts.* *ACS Fall* (2022).

R.G. Fuller, D. Rappleye, T. Williams, M. Schvaneveldt. *Analysis on Methods for Determining the Number of Electrons Exchanged in a Metal Deposition Reaction through Square-Wave Voltammetry.* *ECS Meeting Abstracts*, 1921 (2021).

A. Clark, W.L. Lee, A.R. Solano, T. Williams, G. Meyer, G.J. Tait, B.C. Battraw, A.H. Hansen, S.D. Nickerson. *Speciation of Fuel and Fission Products in Molten Salt Solutions from Ab Initio Molecular Dynamics.* *AIChE Annual Meeting*, 489c, (2019).

A. Clark, W.L. Lee, A.R. Solano, T. Williams, G. Meyer, G.J. Tait, B.C. Battraw, A.H. Hansen, S.D. Nickerson. *Oxidation State of Solutes in Molten Salts from Ab Initio Molecular Dynamics Simulations.* *AIChE Annual Meeting*, 376bh, (2019).

Citizenship Activities

BYU ANS Public Relations Officer	2023-Present
STEM Outreach Presentation - Viewmont High School (Bountiful, UT)	2021-2022
STEM Outreach Presentation - Centerville Jr. High School (Centerville, UT)	2022
Religious Youth Group Advisor	2021-2023
Translator for "Ромско Образование: Светло Бъдеще" (Roma Education: A Bright Future)	2020
Bulgarian Speaking Volunteer for a language training center	2017-2020
Minister/Missionary – Bulgaria	2015-2017
Eagle Scout	2011