Tyler Bruce Williams

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Education

Brigham Young University **Provo, UT**
B.S. Chemical Engineering *2022*
Ph.D. Chemical Engineering *Anticipated – 2026*

Research Experience

Pyrochemical Research and Operations Lab **Provo, UT**
Ph.D. Student *June 2022 - Present*
- Developed foundational semi-differentiation theory for soluble-insoluble cyclic voltammetry
- Designed and tested a thin-cell electrode for highly concentrated measurements in molten salts
- Investigated *in-situ* electrochemical Cl_2 generation for the purification of lanthanide and actinide elements

Pyrochemical Research and Operations Lab **Provo, UT**
Undergraduate Research Assistant *August 2020 – June 2022*
- Won a national award for a review of electrochemical concentration measurements in molten chloride salts
- Refined and tested square-wave voltammetry theory for soluble-insoluble reactions
- Started up an electrochemical lab, purchased and installed instrumentation, materials, and equipment

Molten Salt Simulations Group **Provo, UT**
Undergraduate Research Assistant *September 2018 – June 2021*
- Created the pair proximity and dynamic radial distribution functions (RDFs) to visualize billions of trajectory data points
- Optimized CP2K parameters, resulting in computed AIMD densities for FLiNaK within 1% of expected literacy values
- Automated the production of RDF and density plots, building onto an existing system that used 3 programming languages

Electrochemical Toxic Agent Detection Group **Provo, UT**
Undergraduate Research Assistant *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
- Wrote code to read and store data from an air quality sensor using Python Java on an Arduino IDE

U.S. Army Dugway Proving Grounds - Chemical Test Division **Dugway, UT**
Physical Science Technician *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 the test space
- 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) **North Salt Lake, UT**
Technician (2015-2018), Assistant Integrator (2019) *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*

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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. Electrochemica 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 Cl_2 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*
Religious Youth Camp Counselor	*2019*
Religious Youth Group Advisor	*2017*
Minister and Missionary – Bulgaria	*2015-2017*
Eagle Scout	*2011*