Austin Merritt Shotwell

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Education

Colorado School of Mines, PhD in Applied Chemistry — August 2021 - Current
- Expected completion Fall 2026
- Advisor: Dr. Annalise Maughan

Centre College, BS in Chemistry and Politics (*summa cum laude*) — August 2017 - May 2021

Research Experience

Li_6PS_5X (X = Cl^-, Br^-, I^-) Solid State Electrolytes, Colorado School of Mines — June 2022 – Current
- Designed and executed systematic DOEs to develop a microwave-assisted synthesis, reducing annealing time by >95% relative to standard methods without need for ball milling or pellet pressing
- Established structure–property relationships between rotationally disordered PS_4^{3-} units and electrochemical performance
- Reconciled a long-standing disconnect between local and average structure
- Routinely handled hazardous sulfide powders using glovebox and PPE protocols
- Mentored undergraduate students in synthesis, safety, and characterization methods

Molecularly Imprinted Polymers (MIPs), Centre College — August 2019 – May 2021
- Utilized MIPs to capture biological metabolites of drugs
- Determined binding capacity of various MIPs for aspirin metabolites
- Gained experience with polymer synthesis and characterization using FTIR and related methods

Bourbon Analysis, Centre College — August 2018 – May 2019
- Developed a GC–MS method for analyzing bourbon distillates
- Determined identity and concentrations of congeners in distillation samples

Core Competencies

Synthesis
- Solid-state synthesis
- Microwave-assisted synthesis
- Air-free techniques
  - Glovebox
  - Schlenk line
- Process development

Characterization
- X-ray scattering
  - X-ray powder diffraction
  - Pair distribution function
  - Rietveld refinement
- Raman and IR spectroscopy
- Electrochemical impedance spectroscopy

Software/Data
- Python for data analysis and workflow optimization
- Developed code for temperature-dependent EIS analysis
- Structural characterization with TOPAS v6

Publications

Tetrahedral Tilting and Lithium-Ion Transport in Halide Argyrodites Prepared by Rapid, Microwave-Assisted Synthesis — February 2025

Austin M. Shotwell, Maxwell C. Schulze, Philip Yox, Cade Alaniz, Annalise E. Maughan
Advanced Functional Materials, 35, 2500237
10.1002/adfm.202500237

Perspective on Complex Dynamics in Argyrodite Solid-State Ion Conductors — In preparation

Austin M. Shotwell, Annalise E. Maughan