

# William Forrest Drayer

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## EDUCATION

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UNIVERSITY OF SOUTH FLORIDA

2018–2023

- Ph.D., Chemical Engineering
  - Dissertation title: Dynamical Polymer Chain Heterogeneities and Their Impacts on the Glass Transition

UNIVERSITY OF AKRON

2013–2018

- B.A., Multidisciplinary Studies
  - Primary concentration: Mathematics
  - Secondary concentration: Physical Chemistry
  - Minors: Polymer Science and Engineering; Music

## WORK

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UNIVERSITY OF PENNSYLVANIA

2023–PRESENT

**School of Engineering and Applied Science; Materials Science and Engineering**

Postdoctoral Researcher

- Investigating hydroxide solvation and transport in precise cationic polymers for applications in anionic exchange membranes (AEMs) using molecular dynamics
- Developed a novel forcefield for simulating a novel precise polymer for use in AEMs

UNIVERSITY OF SOUTH FLORIDA

2018–2023

**Department of Chemical, Biological, and Materials Engineering**

Teaching Associate; Research and Teaching Assistant

- Lead instructor for Thermodynamics I (Fall 2022)
- Teaching assistant for three semesters of thermodynamics (I and II)
- Molecular dynamic simulation of glasses (primarily polymers) investigating mechanistic sources of and theories surrounding the glass transition
  - Extensive use of distributed computing (SLURM, Bash, C++)
  - LAMMPS simulation of systems such as bead-spring and all-atom (co-)polymers
  - Data analysis and visualization using Excel, Python, Julia, MATLAB, Mathematica, and others
  - Project development and management with Git/Github

UNIVERSITY OF AKRON

2015–2018

**Department of Polymer Engineering;** Undergraduate Research

- Simulated and analyzed relaxation behavior of bead-spring copolymers (primary software: LAMMPS, Python)

**Department of Corrosion Engineering;** Research Assistant

- Developed a capsule-embedded coating simulation code in Python (Anaconda)
- Simulated coating damage and analyzed self-healing performance for use in anti-corrosive coatings

**Ballistic Impact Lab;** Research Assistant

- Refabricated Hopkinson tube for high-speed impact measurements
- Selected and installed strain gauge and appropriate adhesive
- Prepared ballistic gelatin for impact testing
- Operated high-speed impact data collection

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**PUBLICATIONS AND CONFERENCE PUBLICATIONS**

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**PUBLICATIONS**

- In Prep Evidence for Two Mechanisms for Molecular Weight Effects on the Glass Transition Temperature; William F. Drayer and David S. Simmons
- In Rev Is the Molecular Weight Dependence of the Glass Transition Temperature Caused by a Chain End Effect?; William F. Drayer and David S. Simmons; DOI: 10.48550/arXiv.2303.15399
- 2023 Interplay between Dynamic Heterogeneity and Interfacial Gradients in a Model Polymer Film; Austin D. Hartley, William F. Drayer, Asieh Ghanekarade, and David S. Simmons
- 2022 Sequence Effects on the Glass Transition of a Model Copolymer System; William F. Drayer and David S. Simmons; Macromolecules 2022 55 (14), 5926-5937; DOI: 10.1021/acs.macromol.2c00664

**PRESENTATIONS**

- Drayer, W. and Simmons, D., 2023. Mechanistic Origins of Glass Transition Dependence on Molecular Weight in Linear Homopolymers. In APS March Meeting Abstracts (Vol. 2023, pp. K23.00005).
- Drayer, W. and Simmons, D., 2022. Computational Insights into the Molecular Origins of the Chain Length Dependence of Polymers' Glass Transition. In APS March Meeting Abstracts (Vol. 2022, pp. Y16.008).
- Drayer, W. and Simmons, D., 2021. Sequence Effects on the Glass Transition-Suppression from Block to Alternating Copolymers. In APS March Meeting Abstracts (Vol. 2021, pp. S08-005).
- Drayer, W. and Simmons, D., 2019. Polymer chain sequence effects on the glass transition. In APS March Meeting Abstracts (Vol. 2019, pp. P54-001).

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**TECHNICAL EXPERIENCE, AWARDS, AND OTHER EXPERIENCE**

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**Programming Languages:**

Julia	Python	Bash	Powershell
C++	Mathematica	MATLAB	Java

**Technical Software Experience:**

Git (Github) | CUDA (C & Julia) | LAMMPS | SLURM | VMD | Anaconda (Python Suite)

**Selected Awards:**

- USF Outstanding Teaching Assistant Award (2022)
- USF Outstanding Departmental Contribution Award (2021)
- University of Akron President's List (6 semesters)
- University of Akron Dean's List (10 semesters)
- Richard L. Waldman, Jr. Scholarship (Fall 2018)
- Greater Cleveland Automobile Dealers Association Scholarship Recipient (thrice; 2014-2016)

**Professional Bassoonist:**

- Canton Concert Band, 2012-2018
- Alliance Symphony Orchestra, Spring 2012-Spring 2014, Spring 2018
- University of Akron, Fall 2013-Spring 2017
- Ohio Band Director's Conference, Spring 2016
- Kent State Stark Band, Spring 2012-Spring 2014

**Laborer:**

- Groundskeeping (2012-2014)
  - Sanctuary Golf Course (bunker maintenance and repair, mowing, edge-trimming, greenskeeping, etc.)
  - University of Akron (landscape maintenance)
- Farmhand (Summer 2011)