

William Forrest Drayer

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EDUCATION

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

UNIVERSITY OF PENNSYLVANIA

2023–PRESENT

School of Engineering and Applied Science; Materials Science and Engineering

Postdoctoral Researcher

- Investigating hydroxide solvation and transport in precise polymers for applications as ionic exchange membranes
- Refined calculations of structure factor to obtain experimental agreement
- Created a forcefield for simulating new precise polymers with experimental analogues
- Supervised two undergraduate researchers (Summer 2024)

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 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

PUBLICATIONS AND CONFERENCE PRESENTATIONS

PUBLICATIONS

- In Prep Enhanced Transport and Mechanical Properties of Fluorine-Free Random Copolymers Achieved at Optimal Sulfonation Levels; Sol Mi Oh, Victoria Lee, William F. Drayer, Max S. Win, Courtney M. Leo, Emily Grumbles, Justin G. Kennemur, Amalie L. Frischknecht, Karen I. Winey
- In Prep Evidence for Two Mechanisms for Molecular Weight Effects on the Glass Transition Temperature; William F. Drayer and David S. Simmons
- 2024 Is the Molecular Weight Dependence of the Glass Transition Temperature Caused by a Chain End Effect?; William F. Drayer and David S. Simmons; DOI: 10.1021/acs.macromol.4c00419
- 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; DOI: 10.1063/5.0165650
- 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., 2024. Evidence for Two Mechanisms Driving Molecular Weight Dependence of the Glass Transition Temperature in Linear Polymers. In APS March Meeting Abstracts (Vol. 2024, pp. D32.00007).
- 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).

TECHNICAL PROFICIENCIES

Programming Languages:

Julia	Python	Bash	Powershell
C++	Mathematica	MATLAB	Java

Technical Software Experience:

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

AWARDS AND OTHER WORK EXPERIENCE

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)