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
- Created a forcefield for simulating a new precise polymer with experimental analog
- 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 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

NASA Glenn Research Center   2015 Summer

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 Publications

Publications

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

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).

Technical Experience, Awards, and Other Work Experience

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)