Sullivan Fitz
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EDUCATION

The University of Chicago, Chicago, IL
Bachelor of Science in Molecular Engineering, with Honors, 2023
Thesis, "Cholesteric Liquid Crystals in Microfluidic Environments"
Minor in Computational Molecular Engineering

AWARDS AND HONORS

National Merit Scholarship (2019-2023)
University Scholar Award (2019-2023)

TECHNICAL SKILLS

- Python 3
- C++
- FORTRAN
- R
- Wolfram Mathematica
- Laboratory Training
- Pandas
- Scikit-Learn
- Pytorch
- Tensorflow
- hoomd-blue

INTERESTS

My main research interests lie in computational materials science and engineering, including the applications of molecular dynamics simulations and machine learning to novel materials and in developing predictive models for broad ranges of material properties. I also have an interest in material-based experiment, including liquid crystals and quantum materials.

EXPERIENCE

Franke Institute for the Humanities
Project Assistant, October 2019 – June 2023

- Provide support as needed to accomplish the institute's mission of advancing innovation and research in the arts and humanities
- Organize and coordinate ordering and display of Fellows' work for the front office
- Assist in the planning of Every Wednesday talks where Fellows and University faculty present their work and current research topics

White River Waterkeeper Alliance
Water Quality and Testing Intern, May 2019 – September 2019

- Sampled and tested general water quality for several rivers on the White River Watershed in Arkansas
- Performed public outreach and education about water quality and safety

Kraft Heinz Corporation
Food Science Intern, June 2022 – August 2022

- Prototyped and tested new products for the Kraft Heinz Corporation
- Worked across departments such as Marketing, Food Safety, and Analytical R&D to create and move forward a product development plan
- Learned methods of analyzing and creating food products in a lab environment

RESEARCH EXPERIENCE

The Art Institute of Chicago
Suzann Deal Boothe Summer Conservation Research Intern, June 2021 – August 2021

- Under Dr. Maria Kokkori, undertook a survey of the 3D printed artworks from the Art Institute's Collection
- Researched and tested degradation and conservation techniques for common 3D printing polymers
- Used techniques such as diffuse reflectance FTIR and Raman spectroscopy to analyze the material composition of art objects and determine their properties in terms of longevity and biodegradability

Juan de Pablo Lab
Undergraduate Researcher, November 2021 – Current

- Research flow properties of nematic and cholesteric liquid crystals in microfluidic capillaries
- Research the effects of applied pressure gradients, surface anchoring, confinement, size, and chiral strength on liquid crystal microfluidic systems
- Research into the induction of met-stable "band" states in highly chiral liquid crystal systems
- Apply dynamics simulations to the study of chiral liquid crystal systems

PROJECTS OF NOTE

Monte Carlo Simulation of the Nematic to Isotropic Phase Transition in Liquid Crystals – a Comparison of the Lattice Pass method and Wolff Cluster Algorithm for the Lebwohl-Lasher Model (Python)

- https://github.com/FitzSW/lq-mcLL

Hartree-Fock Self Consistent Field Simulation of HeH+ (FORTRAN, C++)

- https://github.com/FitzSW/HF_HeH

Digital Sharps Counter – a Digital Framework of in-surgery needle and sharps counting with needle-scanning hardware integration (Python, JavaScript)

PUBLICATIONS IN PREPARATION

Emersic, T., Bagchi, K., Fitz, S., Nealy, P., and de Pablo, J. "Generating and stabilizing non-equilibrium cholesteric structures using microfluidics."

Fitz, S., Emersic, T., Canas, N., Hernandez, J., and de Pablo, J. "Chiral Liquid Crystals in Microfluidic Environments" (Working Title)

CONFERENCE PRESENTATIONS

Fitz, S., Emersic, T. "Chiral Liquid Crystals in Microfluidic Environments." Midstates Symposium for the Physical Sciences, Computer Sciences, and Mathematics (2022).

Emersic, T., Bagchi, K., Fitz, S., Nealy, F., and de Pablo, J. "Optical modulations of cholesteric structures using microfluidics." American Physical Society March Meeting (2023).

SERVICE

University of Chicago United Against Inequities in Disease
Member, October 2019 – June 2023
Campus Awareness Director, February 2021 – October 2022

University of Chicago Society for Molecular Engineering
Member, October 2020 – June 2023
Community Outreach Head, May 2021 – October 2022

REFERENCES

Mark Stoykovich
Senior Lecturer in the Pritzker School of Molecular Engineering
University of Chicago
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Juan J. de Pablo
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