

Pierre Kawak, Ph.D.

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- Quantitative researcher with expertise in mathematical modeling, high-performance computing (HPC), and large-scale data analysis.
- Skilled in Python, C++, and CUDA for developing statistical models, optimization techniques, and machine learning algorithms to solve complex real-world problems.
- Experienced in analyzing large datasets, identifying predictive patterns, and optimizing computational workflows.
- 7 years of computational expertise and 4 years of experimental expertise doing impactful research in molecular modeling and drug delivery.
- Authored 5 peer-reviewed articles, contributing to advancements in copolymer theory, polymer dynamics modeling, filled rubber mechanics, & cancer drug delivery.
- Presented at 27 institutional, national, & intl. conferences (e.g., APS, ACS, AIChE, USE, AUS, GRC, IoP, etc.) to diverse audiences from industry, govt., & academia.
- Passionate about leveraging quantitative techniques for data-driven decision-making in financial markets.

Research Experience

Postdoctoral Researcher	University of South Florida (USF)	2022 – Present
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- Developed and implemented large-scale stochastic simulations using Python, C++, and CUDA to model complex system dynamics, securing an NSF Discover ACCESS Compute Resource Grant (2023) and leveraging high-performance computing (HPC) to process multi-terabyte datasets efficiently.
- Designed statistical models and optimization algorithms to analyze nonlinear system behaviors and high-dimensional parameter estimation, accelerating simulations by 100× through parallel computing.
- Applied machine learning techniques to extract predictive insights from complex datasets, improving model performance and decision-making.
- Built and automated data analysis pipelines using Python, C++, bash, and R, streamlining large-scale computational workflows.
- Mentored & trained 11 researchers in HPC, version control, & algorithm development, boosting collaboration, productivity, & earning APS Career Mentor Fellowship (2023).
- Presented findings at 17 institutional, industrial, & academic conferences, highlighting advancements in rubber & copolymer technology, as well as polymer theory, & earning the Outstanding Poster Award at the Gordon Research Conference (2024) & the USF Annual Postdoctoral Research Symposium Best Poster Award (2023).

Doctoral Researcher	Brigham Young University	2017 – 2022
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- Developed and optimized GPU-accelerated Monte Carlo simulations in C++/CUDA, achieving a 100× speedup in large-scale probabilistic modeling and enabling efficient high-dimensional parameter estimation.
- Automated high-throughput simulations using Python, C++, bash, MATLAB, & R, sweeping multi-dimensional parameters & accelerating property predictions.

- Constructed the first-ever 3D free energy landscapes for polymer crystallization, differentiating order-formation pathways inaccessible to classical simulations.
- Visualized & analyzed large datasets of 3D molecular configurations using VMD & OVITO, extracting key structural & kinetic insights.
- Wrote 2 journal articles with 2 mentored undergraduates, supporting their careers.
- Secured research awards, e.g., APS Forum on Intl. Physics Distinguished Student Award (2022) & BYU Grad. Student Society Professional Presentation Award (2021).
- Presented at 6 conferences & directly contributed to an NSF CAREER Award (\$500,000) for continued crystallization research by producing critical preliminary findings.

Masters Researcher American University of Sharjah 2015 – 2017

- Developed ultrasound-sensitive drug delivery systems to improve chemotherapy efficiency, winning the AUS Biomedical Engineering Symposium Best Talk Award (2016).
- Designed & synthesized tumor-targeting liposomal drug carriers by functionalizing phospholipids with estrone ligands, improving breast cancer drug delivery precision.
- Formulated & optimized self-assembling chemotherapy nanoparticles using the dry film method, enhancing drug stability & controlled release kinetics.
- Validated encapsulation efficiency & nanoparticle integrity through NMR & DLS assays, ensuring high drug-loading capacity & structural robustness.
- Characterized & optimized ultrasound-triggered drug release kinetics, determining the ideal ultrasound frequency & intensity for future clinical applications.
- Standardized lab protocols to improve reproducibility, collaboration, & data integrity, increasing research efficiency across teams.
- Published findings in a peer-reviewed journal & presented at 3 conferences, disseminating contributions to biomedical engineering & drug delivery research.

Leadership & Community Engagement

President Early Career Researchers in Polymer Physics 2022 – Present

- Led a 550-member global Slack community, organizing networking, technical, self-development, & conference prep events, improving belonging of polymer researchers.
- Organized the 2023 Virtual Polymer Physics Symposium, a 2-day intl. event with 150+ attendees, 4 technical sessions, a DEI discussion, & a diverse career panel.

President and Founder USF Postdoctoral Scholar Association 2023 – Present

- Served 200+ postdocs through career programming, networking events, & advocacy, e.g., ELEVATE Talk Series, funded by NPA IMPACT Fellowship (2023, 6% acc. rate).

President and Founder BYU Chem. Eng. Graduate Student Council 2019 – 2022

- Organized dept. recruitment, social & outreach events, social content, & financial well-being initiatives, e.g., Recruitment Poster Event (2019–2021) & BBQ Socials (2018–2021).
- Administered a financial health survey to assess graduate student well-being, influencing department policy discussions (2021).

Education

Ph.D.	Chemical Engineering	Brigham Young University	2022
M.S.	Chemical Engineering	American University of Sharjah	2017
B.S.	Chemical Engineering (Econ. Minor)	American University of Sharjah	2015