

# Alec Glisman — Curriculum Vitae

Pasadena, CA

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## Summary

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I am a Ph.D. candidate at Caltech specializing in the study of aqueous polyelectrolyte and ion complexation through multiscale simulations, machine learning, and theoretical approaches. With a robust skill set encompassing transport phenomena, statistical mechanics, and polymer physics, I excel at deconstructing complex scientific problems and making independent progress toward solutions. In fast-paced, innovative environments, I am adept at rapidly learning new concepts and applying them effectively, driven by my passion for physics-based modeling.

## Education

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### California Institute of Technology

Pasadena, CA

*Ph.D. in Chemical Engineering, GPA: 4.0*

*Sep. 2019 – Jun. 2024 (expected)*

Honorable Mention: National Science Foundation Graduate Research Fellowship Program

### University of California, Berkeley

Berkeley, CA

*B.S. in Chemical Engineering, GPA: 3.91*

*Aug. 2015 – May 2019*

Graduated with Highest Honors

Tau Beta Pi Honor Society

Phi Kappa Beta Honor Society

Regents' and Chancellor's Scholarship

## Skills

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**Programming Languages:** Python, C/C++, CUDA, MATLAB, Mathematica, SQL, Bash

**Machine Learning:** Scikit-Learn, PyTorch, RDKit (regression, unsupervised, clustering)

**Data Analysis:** NumPy, SciPy, Pandas, Matplotlib (preprocessing, statistics, visualization)

**Molecular Simulation:** GROMACS, PLUMED, ORCA, AutoDock Vina (MD, QM, docking)

**Linux & DevOps:** Git, SSH, Slurm, Ansible, Docker, GitHub Actions, Codecov

## Experience

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Academic Research.....

### California Institute of Technology

Pasadena, CA

*Graduate Researcher, Advisor: Prof. Zhen-Gang Wang*

*Jan. 2022 – Present*

Leveraged enhanced sampling molecular dynamics simulations to generate phase diagrams of model polyelectrolyte and ion complexes, enabling accurate predictions of optimal scale prevention conditions. Designed and implemented machine learning models to decode ion-polyelectrolyte interactions, uncovering underlying precipitation mechanisms and finding structure-activity relationships for scale control strategies. Led high-performance computing (HPC) resource management (40 GPUs, 600 CPU threads, 1,100 GB of RAM) with Slurm and Ansible, optimizing resource allocation and increasing computational throughput.

## California Institute of Technology

Pasadena, CA

Graduate Researcher, Advisor: Prof. John F. Brady

Sep. 2019–Dec. 2021

Conducted in-depth theoretical modeling of hydrodynamic interactions between self-propelling entities like bacteria and fish, unveiling symmetry across various low and high Reynolds numbers and discovering crucial relationships between body articulation and swimming efficiency. Implemented highly parallelized C++ simulations utilizing the Eigen and OpenMP libraries to analyze many-body hydrodynamic interactions, assessing collective behaviors in potential flow.

## University of California, Berkeley

Berkeley, CA

Research Assistant, Advisor: Prof. Kranthi K. Mandadapu

Aug. 2017–May 2019

Explored phospholipid bilayer membrane dynamics using differential geometry and a unique balance law formulation to precisely decipher coupling between surface geometry and in-plane flow behaviors. Introduced a novel dimensionless number comparing out-of-plane bending and in-plane viscous forces, enhancing the understanding of lipid membrane dynamics and stability in different geometries.

## Lawrence Berkeley National Lab

Berkeley, CA

Research Assistant, Advisor: Prof. Nitash P. Balsara

May. 2016–May. 2017

Fabricated solid-state polymer pouch cells to investigate ionic transport and conductivity properties. Tested cells via electrochemical impedance spectroscopy, and analyzed large data sets with MATLAB using numerical differentiation to find relationship between electrolyte concentration and cell performance.

## Industry.....

### Nissan: Automotive Energy Supply Corporation

Smyrna, TN

Battery Cell Intern

May 2018–Aug. 2018

Engineered an advanced automated system for daily assessment and quality control of 25,000 battery cells, focusing on electrochemical stability, leading to enhanced efficiency and annual savings of \$50,000. Diagnosed misalignment issues within battery electrode layers that significantly contributed to cell failures and proposed tolerance revisions that cut \$55,000 in annual scrap costs, improving production quality.

### Bosch Research & Technology Center

Palo Alto, CA

Battery Research Intern

May 2017–Aug. 2017

Assessed the stabilization of electrode additive materials in electric vehicle (EV) batteries by investigating their dissolution under conditions corresponding to expected EV usage. Applied ICP-OES techniques to precisely quantify lithium content in various cycled battery components, thereby contributing essential insights to the advancement of battery management systems.

## Teaching.....

### California Institute of Technology Chemical Engineering Department

Pasadena, CA

Teaching Assistant: Graduate Transport (Fluids, Heat, & Mass), ChE 151 a/b

Jan. 2021–Jun. 2021

The foundations of heat, mass, and momentum transfer for single and multiphase fluids will be developed. Governing differential equations; laminar flow of incompressible fluids at low and high Reynolds numbers; forced and free convective heat and mass transfer, diffusion, and dispersion. Emphasis will be placed on physical understanding, scaling, and formulation and solution of boundary-value problems. Applied mathematical techniques will be developed and used throughout the course.

## Publications

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**Alec Glisman**, Sriteja Mantha, Zhen-Gang Wang, and Decai Yu “Multi-valent Ion Mediated Polyelectrolyte Association and Structure”, *Manuscript in review* (2023)

Sriteja Mantha, **Alec Glisman**, Zhen-Gang Wang, and Decai Yu Sriteja Mantha, **Alec Glisman**, Zhen-Gang Wang, and Decai Yu “Adsorption isotherm and mechanism of  $\text{Ca}^{2+}$  binding to polyelectrolyte”, *Manuscript in review* (2023)

**Alec Glisman** and John F. Brady, "Swimming in potential flow", *J. Fluid Mech.* **952** (2022) R5

Amareesh Sahu, **Alec Glisman**, Joël Tchoufag and Kranthi K. Mandadapu, "Geometry and dynamics of lipid membranes: The Scriven-Love number", *Phys. Rev. E* **101.5** (2020) 05240

## Conference Presentations

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**Alec Glisman**, Sriteja Mantha, Zhen-Gang Wang, Decai Yu, Thomas Kalantar, Christopher Tucker, Eric Wasserman, Scott Backer, Larisa Reyes, and Dipti Singh "Divalent cation-mediated polyanion attraction in an aqueous solution", American Physical Society March Meeting (2023)

Sriteja Mantha, **Alec Glisman**, Zhen-Gang Wang, Decai Yu, Thomas Kalantar, Christopher Tucker, Eric Wasserman, Scott Backer, Larisa Reyes, and Dipti Singh "Structure of polyelectrolyte and multi-valent ion complexes", American Physical Society March Meeting (2023)

## Awards

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### 2019: NSF GRFP Honorable Mention

The NSF accords Honorable Mention to meritorious applicants who do not receive Fellowship awards. This is considered a significant national academic achievement and provides access to computational resources.

### 2015 – 2019: Regents' and Chancellor's Scholarship

The most prestigious scholarship offered by U.C. Berkeley, awarded to the top 2% of entering undergraduates.

## Interests

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**Coffee Brewing:** Exploration on different brew parameters with espresso, pour-over, and Aeropress.

**Running:** Engagement in moderate distance running, including completion of multiple half-marathons.

**Pickling and Fermentation:** Experience with canning and fermentation of various fruits and vegetables.