Amir H. K. Ashkezari

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SUMMARY

Georgia Tech Ph.D. candidate with a focus in biophysics research. My research combines experimental and computational methods, including molecular biology, protein engineering, primary human immune and platelet cell work, super-resolution imaging, and quantitative and machine-learning analysis in Python, with applications in immuno-oncology and adoptive T-cell therapy, platelet signaling in myeloproliferative neoplasms, molecular diagnostics, and AI-enabled biophysics. I carry scientific questions from experiment and analysis through manuscripts, grant sections, and talks with collaborators and senior investigators.

EDUCATION

Georgia Institute of Technology — Atlanta, GA
Ph.D., Mechanical Engineering — Bioengineering direction (Expected May 2027) — 2021 – Present
M.Sc., Mechanical Engineering (GPA: 3.91/4.00) — May 2024
Coursework: Cellular Engineering, Protein Engineering, Macromolecular Structure, Biophysics, Biotransport, Biosurfaces

Sharif University of Technology — Tehran, Iran
B.Sc., Mechanical Engineering (Minor in Mathematics); GPA: 4.00/4.00; Ranked 7th/108 — 2016 – 2021

RESEARCH EXPERIENCE

Georgia Tech — Cellular & Molecular Biomechanics Lab — Atlanta, GA
Graduate Researcher / Project Lead — Sep 2021 – Present

- Lead multi-lab workstreams with partners at Georgia Tech and Emory: define open scientific questions, prioritize experiments and analyses, and take results through to publication and recommendations for senior investigators.
- **T cell / immuno-oncology:** characterized engineered p53R175H-specific TCRs for adoptive cell therapy; quantified how CD8/CD4 coreceptors govern TCR–pMHC catch and slip bonds and T-cell function (co-first author, *Frontiers in Immunology*); contributed analysis of tumor-microenvironment effects on antigen sensing, including statin-restored $CD8^+$ cytotoxicity.
- **Force reporting in vivo:** contributed to SynNotch receptors that visualize immunoreceptor force transmission and downstream signaling (*Advanced Science*).
- **B cell receptor mechanics:** studying how BCR isotypes and intracellular tails set mechanosensitivity, affinity, and catch-bond behavior; short talk at FASEB Immunoreceptors and Immunotherapy (2026). Related work on EZH2 Y641F epigenetic control of BCR force-dependent signaling (NIH PS-ON / Cancer TEC, 2025).
- **Platelet mechanobiology:** contributed to PI3K-dependent platelet priming and the intermediate-affinity αIIbβ3 state in myeloproliferative neoplasms (*Science Translational Medicine*, accepted) and to Lyn-mediated two-way GPIb-IX signaling (*Circulation Research*), connecting intracellular biochemistry to disease-relevant phenotypes.
- **Wet lab:** molecular biology and protein engineering (cloning, site-directed mutagenesis, protein labeling); primary human platelet and B-cell isolation, including phlebotomy-associated workflows; mammalian cell culture; flow cytometry; CRISPR-Cas9; single-molecule force spectroscopy (biomembrane force probe, adhesion frequency).
- **Imaging and computation:** confocal and SMLM / DNA-PAINT imaging; Python pipelines for high-dimensional imaging and simulation data; DynMoCo, a GCN + RNN framework for modular protein dynamics from molecular-dynamics trajectories (*Biophysical Journal*, cover art).
- Write and present for mixed audiences: manuscripts, NIH R01/R21 sections, figures for slides and spreadsheets, and talks at FASEB, GRC, and NIH/Emory meetings. Mentored four undergraduate and exchange researchers; one became a co-author.

Sharif University of Technology — Nano-Bioengineering Lab — Tehran, Iran
Undergraduate Researcher — 2019 – 2021

- Led design, modeling, and fabrication of molecular diagnostic devices, including a B.Sc. thesis on a microfluidic PCR platform and a real-time droplet PCR system with fluorescent detection.
- Developed a plasmonic gold-nanofilm microfluidic chip for rapid droplet-based photonic PCR (*Scientific Reports*) and a low-cost droplet PCR setup with micromixer analysis (*Sensors and Actuators Reports*).
- Performed numerical design of a hybrid hydrodynamic–acoustic cell-separation device (*Acta Mechanica*) and molecular-dynamics simulations of polymer adsorption (Materials Studio).

TEACHING

- Teaching Assistant, Cellular Engineering (Georgia Tech, Dr. Zhu), Fall 2022.
- Teaching Assistant, Fluid Mechanics I (Sharif, Dr. Shamloo), 2018–2020; Numerical Computations / MATLAB (Dr. Nourani), 2019–2020; Fundamentals of Biological Engineering (Dr. Shamloo), 2020–2021.

SKILLS

Experimental: mammalian cell culture; primary human platelet and B-cell isolation; flow cytometry; molecular biology (cloning, mutagenesis, protein purification); confocal and single-molecule localization microscopy; single-molecule force spectroscopy; microfluidic PCR and flow chambers; microfabrication
Computational: Python (NumPy, Pandas, PyTorch); statistical analysis; MATLAB; Julia; R; ImageJ; SnapGene; COMSOL; ANSYS Fluent; SolidWorks; LaTeX
Languages: English (professional), Persian/Farsi (native)

PUBLICATIONS

* *equal contribution.*

1. Martyanov AA, Paul DS, **Ashkezari AHK**, Seung A, Mikloscz J, Boggio F, Lee RH, Zhu C, Reeves B, Bergmeier W. PI3K-dependent platelet priming drives a pro-thrombotic intermediate-affinity αIIbβ3 state in MPN. *Science Translational Medicine*. Accepted, 2026.
2. Li M, Lyu J, Li K, Dravid A, Balasubramani D, **K. Ashkezari AH**, Choi HK, Kwong GA, Singh A, Zhu C. SynNotch receptors for visualizing immunoreceptor force transmission and downstream signaling in vivo. *Advanced Science*. 2026 Aug 25:e77318.
3. Mao L, Kwak M, **Ashkezari AH**, Li Z, Cong P, Chen Y, Phee JH, Kang S, Li J, Zhu C. DynMoCo: A novel AI framework to reveal modular substructures of protein from molecular dynamics. *Biophysical Journal*. 2026. (Cover art selected.)
4. **Kazemipour Ashkezari AH***, Travaglino S*, Li M, Watson VE, Cong P, Doudy L, Choi HK, Zhu C. Evaluating the effects of CD8/CD4 on T cell function in terms of TCR–pMHC–coreceptor catch and slip bonds. *Frontiers in Immunology*. 2026;17:1757198.
5. Zhang Y, Liang Y, **Kazemipour Ashkezari AH**, Wang C, Chang CW, Bai Y, Huang X, Mack A, Yang H, Cong P, Cheng N. Direct binding of Lyn to GPIbβ transmits 2-way GPIb-IX signaling to stimulate platelet activation and VWF binding. *Circulation Research*. 2025;137(12):1480–1497.
6. Pourghasemian MH, Barzoki AK, Dizani M, **Ashkezari AH**, Shamloo A. Rapid and low-cost droplet PCR using a novel microfluidic setup with a numerical study on micromixer effects. *Sensors and Actuators Reports*. 2025;9:100327.
7. **Ashkezari AHK***, Dizani M*, Shamloo A. Integrating hydrodynamic and acoustic cell separation in a hybrid microfluidic device: a numerical analysis. *Acta Mechanica*. 2022;233(5).
8. Yuan Z, O'Melia MJ, Li K, Lyu J, Rosado AM, Watson VE, **Ashkezari AH**, Zhou F, Kansal V, Kinney B, Travaglino S, et al. Tumor microenvironment impaired T cell antigen recognition and function were restored by Lovastatin therapy. *bioRxiv*. 2022.
9. Jalili A, Bagheri M, Shamloo A, **Kazemipour Ashkezari AH**. A plasmonic gold nanofilm-based microfluidic chip for rapid and inexpensive droplet-based photonic PCR. *Scientific Reports*. 2021;11(1):1–13.

SELECTED PRESENTATIONS

- Short talk. Structural and intracellular regulation of BCR affinity and catch bond. *FASEB Immunoreceptors and Immunotherapy*, 2026.
- Poster. Regulation of GPIb-IX inside-out signaling by 14-3-3 and Lyn. *Gordon Research Conference, Cell Biology of Megakaryocytes and Platelets*, 2025.
- Poster. Epigenetic control of B cell receptor mechanics (EZH2 Y641F). *NIH PS-ON / Cancer TEC*, 2025.
- Poster. Characterization and engineering of p53R175H-specific TCR for cancer adoptive cell therapy. *Winship Scientific Symposium*, Emory University, 2022.

AWARDS & LEADERSHIP

- $5,000 Woodruff School WoW Fellowship, Georgia Tech (2026), for mentoring undergraduate and exchange researchers in biophysical methods.
- $2,000 POOIA Student Excellence Award, Professional Organization of Iranian Americans (2026); organized AtlantaPCC 2026 Science Day outreach.
- Histochemical Society Travel Award for the Marine Biological Laboratory Analytic and Quantitative Light Microscopy course (2025).
- Directed the student committee for the Sharif Departmental Scientific Association seminar series.