

Hyeongjoo Row

THEORY AND SIMULATION OF SOFT LIVING MATTER

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Education

California Institute of Technology

PHD CHEMICAL ENGINEERING, MINOR APPLIED AND COMPUTATIONAL MATHEMATICS

• Advisor: John F. Brady

Pasadena, CA

2017 - 2022

California Institute of Technology

MS CHEMICAL ENGINEERING

• Advisors: John F. Brady and Zhen-Gang Wang

Pasadena, CA

2017 - 2019

Seoul National University

BS CHEMICAL AND BIOLOGICAL ENGINEERING

• Summa cum laude

Seoul, South Korea

2011 - 2017

Research Experience

Postdoctoral Scholar

DEPARTMENT OF CHEMICAL & BIOMOLECULAR ENGINEERING AND

CALIFORNIA INSTITUTE FOR QUANTITATIVE BIOSCIENCES, QB3, UNIVERSITY OF CALIFORNIA, BERKELEY

• Advisors: Karthik Shekhar and Kranthi K. Mandadapu

• Research Topic: "Microscopic Basis of Bioelectricity"

Berkeley, CA

2022 - current

Graduate Research Assistant

DIVISION OF CHEMISTRY AND CHEMICAL ENGINEERING, CALIFORNIA INSTITUTE OF TECHNOLOGY

• Advisors: John F. Brady and Zhen-Gang Wang

• Thesis: "Mechanical Approach to Active Matter: Reverse Osmotic Effect and Motility-Induced Phase Separation"

Pasadena, CA

2017 - 2022

Undergraduate Researcher

SUPERCritical FLUID PROCESS LABORATORY

SCHOOL OF CHEMICAL & BIOLOGICAL ENGINEERING, SEOUL NATIONAL UNIVERSITY

• Advisor: Youn-Woo Lee

• Thesis: "Deasphaltenation of Extra Heavy Oil Using Supercritical Water"

Seoul, South Korea

2016 - 2017

Papers and Preprints

* INDICATES EQUAL CONTRIBUTIONS, † INDICATES PUBLICATION AS A CORRESPONDING AUTHOR

1. **Hyeongjoo Row***, Jafar Farhadi*, Joshua B. Fernandes, Kranthi K. Mandadapu, and Karthik Shekhar, Electrochemical response of cylindrical membranes to single ion channel currents. *Manuscript in preparation*, 2026.
2. Jonghyun Shin, Cho-Hee Yang, Young Jun Kim, Hye-Seong Cho, Sung-Woo Park, **Hyeongjoo Row**, Carlo Carraro, Sang Hun Lee, Roya Maboudian, Luke P. Lee, and Bong-Hyun Jun, A capture-sensing-recovery hydrogel for monitoring toxic analytes in agricultural water. Submitted for review, 2026.
3. Joshua B Fernandes*, **Hyeongjoo Row***, Kranthi K Mandadapu, and Karthik Shekhar, Bioelectrical phase transitions. Submitted for review, 2026. ([bioRxiv preprint](#)).
4. **Hyeongjoo Row***, Brandon J Wallace*, Joshua B Fernandes, Kevin R Wilson, and Kranthi K Mandadapu, Interfacial mass transfer resistance at fluid-fluid interfaces. Submitted for review, 2026. ([arXiv preprint](#)).
5. Joshua B Fernandes*, **Hyeongjoo Row***, Kranthi K Mandadapu, and Karthik Shekhar, Electrochemical response of biological membranes to localized currents and external electric fields. *Physical Review Research*, 8(1):013137, 2026.
6. Akinlade Akintunde, Parvin Bayati, **Hyeongjoo Row**, and Stewart A Mallory, Single-file diffusion of active brownian particles. *The Journal of Chemical Physics*, 162(16), 2025.
7. **Hyeongjoo Row***, Joshua B. Fernandes*, Kranthi K. Mandadapu, and Karthik Shekhar, Spatiotemporal dynamics of ionic reorganization near biological membrane interfaces. *Physical Review Research*, 7(1):013185, 2025.
8. Elijah Schiltz-Rouse, **Hyeongjoo Row**[†], and Stewart A. Mallory[†], Kinetic temperature and pressure of an active tonks gas. *Phys. Rev. E*, 108:064601, 2023.

9. Ahmad K Omar*, **Hyeongjoo Row***, Stewart A Mallory*, and John F Brady, Mechanical theory of nonequilibrium coexistence and motility-induced phase separation. *Proceedings of the National Academy of Sciences*, 120(18):e2219900120, 2023.
10. **Hyeongjoo Row** and John F. Brady, Reverse osmotic effect in active matter. *Physical Review E*, 101(6):062604, 2020.

Awards & Honors

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| 2019 | CCE Teaching Assistantship Award , Chemistry and Chemical Engineering Division
Caltech, Awarded yearly to division's most exceptional teaching assistants |
| 2019 | Excellent Teaching Assistant Award , The Office of Graduate Studies and the Registrar's Office
Caltech, Awarded to the highest rated teaching assistants |
| 2018 | Constantin G. Economou Memorial Prize , Chemistry and Chemical Engineering Division
Caltech, Awarded to a chemical engineering graduate student distinguished by outstanding research accomplishments and exemplary attitude |
| 2017–2021 | Kwanjeong Overseas Scholarship
Kwanjeong Educational Foundation, Graduate Research Scholarship Program |
| 2016 | Undergraduate Independent Study Fund , Student Directed Education Program
Seoul National University, Awarded to undergraduate student performing outstanding research |
| 2011–2017 | The Presidential Science Scholarship , Korea Student Aid Foundation
Republic of Korea, Scholarship awarded to undergraduate students with academic excellence |
| 2010 | Second Prize , Chemistry Frontier Festival
Korea Petrochemical Industry Association, Chemistry research competition |
| 2008–2011 | Korea Science Academy Foundation Scholarship
Korea Science Academy, Scholarship awarded to students with academic excellence |
| 2007 | Member of Korean National Team , Asian Pacific Astronomy Olympiad
Korean Astronomical Society, Participant of Asian Pacific Astronomy Olympiad |

Teaching Experience

Fall 2026	CHMENG 250: Transport Processes , Guest Lecturer	UC Berkeley
Fall 2025	CHMENG 250: Transport Processes , Guest Lecturer	UC Berkeley
Winter 2019	Ch/ChE 164: Introduction to Statistical Thermodynamics , Teaching Assistant	Caltech
Winter 2018	Ch/ChE 164: Introduction to Statistical Thermodynamics , Teaching Assistant	Caltech
Fall 2016	458.202: Physical Chemistry II , Peer Tutor, College of Engineering	SNU
Fall 2016	033.015: Engineering Mathematics II , Peer Tutor, College of Engineering	SNU
Spring 2016	458.303: Chemical Reaction Engineering I , Peer Tutor, College of Engineering	SNU
Spring 2016	458.305: Process Fluid Mechanics , Peer Tutor, College of Engineering	SNU

Presentations

TALKS

1. Bioelectric phase transitions: From single to multiple ion channels, *AIChE Annual Meeting 2026*, Minneapolis, MN, Nov 2026.
2. Multiscale theory of bioelectric dynamics in soft and living systems, *AIChE Annual Meeting 2025*, Boston, MA, Nov 2025.
3. Mass and charge transfer resistance at interfaces, *AIChE Annual Meeting 2025*, Boston, MA, Nov 2025.
4. Ion transport near biological membranes, *Chemical Engineering for Global Sustainability*, Palo Alto, CA, Feb 2025. **(Invited)**.
5. Ion transport near biological membranes, *AIChE Annual Meeting 2024*, San Diego, CA, Oct 2024.
6. Spatiotemporal dynamics of ionic reorganization near biological membrane interfaces, *QB3-Berkeley Post-doc Seminar*, University of California, Berkeley, CA, Oct 2024.
7. Mechanical approach to active matter, *Pitzer Seminar for Theoretical Chemistry*, University of California, Berkeley, CA, Oct 2023. **(Invited)**.
8. Mechanical approach to active matter, *Zia Group*, Stanford University, Palo Alto, CA, Feb 2022.
9. A mechanical theory of nonequilibrium phase coexistence and its application to motility-induced phase separation, *AIChE Annual Meeting 2021*, Boston, MA, Nov 2021.

10. Reverse osmotic effect in active matter, *AIChE Annual Meeting 2020*, Virtual, Nov 2020.
11. Spatial variation of transport properties of active brownian particles, *SoCal Fluids 2019*, Santa Barbara, CA, Apr 2019.
12. Spatial variation of transport properties of active brownian particles, *APS March Meeting 2019*, Boston, MA, Mar 2019.

POSTERS

1. Single-channel currents to cable theory: a boundary layer framework for ionic transport near membranes, *Biophysical Society Annual Meeting 2026*, San Francisco, CA, Feb 2026.
2. Rapid signal propagation at biological membrane interfaces during ionic currents: the role of long-range electric fields, *Biophysical Society Annual Meeting 2025*, Los Angeles, CA, Feb 2025.
3. Diffuse charge dynamics near biological membranes, *11th Annual Neuroscience Conference*, Tahoe City, CA, Oct 2023.

Additional Experience _____

2013-2015 **Korean Augmentation to the United States Army (KATUSA)**
United States Forces Korea, Mandatory military service