Hyungseok (Hyu) Kim

Massachusetts Institute of Technology
400 Main St., Room E19-580
Cambridge, MA 02142

Email hskimm@mit.edu
Web hyu-kim.github.io

EDUCATION

Massachusetts Institute Of Technology 2023
Ph.D. in Mechanical Engineering and Statistics, GPA: 4.8/5.0
Advisor: Cullen R. Buie

Massachusetts Institute Of Technology 2020
S.M. in Mechanical Engineering, GPA: 4.9/5.0
Advisor: Cullen R. Buie

Seoul National University 2017
B.S. in Mechanical and Aerospace Engineering, *summa cum laude*
Advisor: Ho-Young Kim

EXPERIENCE

Massachusetts Institute of Technology, Cambridge, MA
Postdoctoral associate, Department of Chemical Engineering 01/2024 -

- Professor Richard D. Braatz, Professor Allan S. Myerson, PI
- Center for Continuous mRNA Manufacturing

Postdoctoral associate, Department of Mechanical Engineering 07/2023 - 12/2023
Research assistant, Department of Mechanical Engineering 09/2017 - 06/2023

- Professor Cullen R. Buie, PI
- Bioreactor systems development for studying microbial CO_2 fixation

Graduate student, Institute of Data, Systems, and Society 05/2021 - 06/2023

- Statistics and Data Science Center
- Developed statistical dimension reduction in multivariate analysis

Lawrence Livermore National Laboratory, Livermore, CA
Visiting student 09/2022

- µBiospheres Scientific Focus Area (Dr. Xavier Mayali)

PrognomiQ, Inc., San Mateo, CA
Summer intern, Data Science Team 05/2022 - 08/2022

- Dr. Chinmay Belthangady, Supervisor
- Deep learning implementation for protein mass spectrometry analytics

Seoul National University, Seoul, South Korea
Undergraduate researcher, Department of Mechanical Engineering 2015 - 2017

- Microfluids and Soft Matter Laboratory (Professor Ho-Young Kim)

PUBLICATIONS

∗ co-first, † co-corresponding

S Chen, P-H Huang, **H Kim**, CR Buie, "MCount: An automated colony counting tool for high-throughput microbiology," *submitted*.

H Kim*, VL Brisson*, JR Casey, C Swink, KA Rolison, JA Kimbrel, AN Golini, TR Northen, PK Weber, D Veličković, CR Buie, X Mayali, RK Stuart, "Spatially structured competition and cooperation alters algal carbon flow to bacteria," *bioRxiv* (2024).

H Kim*, S Kim*, MM Morris, JA Kimbrel, X Mayali and CR Buie, "Self-supervised multidimensional scaling with F-ratio: Improving microbiome visualization," *arXiv* (2023).

Q Wang*, **H Kim***, TM Halvorsen, S Chen, CS Hayes and CR Buie, "Leveraging microfluidic dielectrophoresis to distinguish compositional variations of lipopolysaccharide in *Escherichia coli*," *Frontiers in Bioengineering and Biotechnology* **11**:991784 (2023).

CA Vaiana, **H Kim**, J Cottet, K Oai, Z Ge, K Conforti, AM King, AJ Meyer, H Chen, CA Voigt† and CR Buie†, "Characterizing chemical signaling between engineered "microbial sentinels" in porous microplates," *Molecular Systems Biology* **18**:e10785 (2022).

H Kim, JA Kimbrel, CA Vaiana, JR Wollard, X Mayali† and CR Buie†, "Bacterial response to spatial gradients of algal-derived nutrients in a porous microplate," *The ISME Journal* **16**, 1036–1045 (2022). **Editor's choice.** Appeared in: Phys.org, F1000, AZO Life Sciences, LLNL News.

C Yun*, JW Choi*, **H Kim***, D Kim and H-Y Kim, "Sliding on ice: real contact area, melted film thickness, and friction force," *International Journal of Heat and Mass Transfer* **160**, 120166 (2020). Appeared in: Advances in Engineering.

H Kim, NM Stover, CP Royo, S Ahmadi, A Hatas, AS Myerson and RD Braatz, "Immobilization of plasmid DNA and enzymes for synthesizing messenger RNA: A review," *in preparation.*

H Kim et al., "Single-cell imaging reveals surface mediated attachment between algae and bacteria," *in preparation.*

PATENTS

M Liu, C Belthangady, B Wilcox, P Ma, J-Y Lee, H Kim (2023). Direct classification of raw biomolecule measurement data, PrognomiQ, Inc.

CONFERENCE PRESENTATIONS

H Kim, Q Wang, RK Stuart, X Mayali and CR Buie, "Single-cell electrokinetics reveals surface-mediated attachment between algae and bacteria," presented at the 27th International Conference on Miniaturized Systems for Chemistry and Life Sciences (MicroTAS), Katowice, Poland, October 15-19, 2023.

V Brisson, H Kim, C Swink, X Mayali, TR Northen, CR Buie and RK Stuart, "Resource partitioning of algal exometabolites among phycosphere bacteria," presented at the 2023 Joint Genome Institute (JGI) Annual Genomics of Energy & Environment Meeting, Berkeley, CA, August 21-23, 2023.

V Brisson, H Kim, CR Buie, X Mayali and RK Stuart, "Diatom-bacteria interactions: the role of diatom exometabolites in shaping the microbiome," presented at the Molecular Life of Diatoms 7, San Diego, CA, July 16-20, 2023.

M Morris, V Brisson, H Kim, J Kimbrel, A Wessel, A Navid, C Buie, P Weber, T Northen, R Stuart and X Mayali, "Identifying genomic and metabolic underpinnings of algal-bacterial interactions," presented at the 2023 Genomic Sciences Program Annual Principal Investigator (PI) Meeting, Washington, DC, April 17-19, 2023.

H Kim, M Morris, T Samo, R Stuart, CR Buie and X Mayali, "Microscale characterization tools for algal-bacterial interaction and cell sinking," presented at the 2022 Genomic Sciences Program Annual Principal Investigator (PI) Meeting, Virtual, February 28-March 2, 2022.

H Kim, JA Kimbrel, CA Vaiana, JR Wollard, X Mayali and CR Buie, "Porous co-culture microplate for studying bacterial responses to host-derived resource gradients," presented at the 2021 Engineering Biology Research Consortium (EBRC) Annual Meeting, Virtual, April 26-27, 2021.

H Kim, JA Kimbrel, T Samo, J Wollard, C Ramon, R Stuart, PK Weber, CR Buie and X Mayali, "Impacts of physical proximity and metabolite diffusion on algal-bacteria interactions," presented at the 2021 Genomic Sciences Program Annual Principal Investigator (PI) Meeting, Virtual, February 22-24, 2021.

H Kim, JA Kimbrel, JR Wollard, X Mayali and CR Buie, "A hydrogel co-culture platform reveals community responses to bacteria to algal host and nutrients under diffusion-controlled environment," presented at the 24th International Conference on Miniaturized Systems for Chemistry and Life Sciences (MicroTAS), Virtual, October 4-9, 2020.

H Kim, JA Kimbrel, T Samo, R Stuart, J Wollard, D Veličković, C Anderton, CR Buie and X Mayali, "Examining the role of physical proximity and diffusion of metabolites in algal-bacterial interactions," presented at the 2020 Genomic Sciences Program Annual Principal Investigator (PI) Meeting, Washington, DC, February 24-26, 2020.

Q Wang, H Kim and CR Buie, "Microfluidic dielectrophoresis enables rapid characterization of lipopolysaccharide glycoforms in gram-negative bacteria," presented at the 2019 Gordon Research Seminar on Physics and Chemistry of Microfluidics, Hong Kong, China, June 15-16, 2019.

H Kim, C Yun, D Kim and H-Y Kim, "Interfacial melting of ice under a high-speed slider: real-time visualization and friction modeling," presented at 69th Annual Meeting of the APS Division of Fluid Dynamics, Portland, OR, November 20-22, 2016.

INVITED TALKS

Massachusetts Institute of Technology, Advanced Manufacturing Systems	October 2023
Massachusetts Institute of Technology, Physics of Living Systems	September 2023
Lawrence Livermore National Laboratory, µBiospheres Scientific Focus Area	July 2023
Massachusetts Institute of Technology, Statistics and Data Science Center	May 2023
Lawrence Livermore National Laboratory, µBiospheres Scientific Focus Area	March 2022

FELLOWSHIPS AND AWARDS

Kwanjeong Educational Foundation Fellowship	2019
Kwanjeong Educational Foundation Fellowship	2017
Thesis Presentation Award, Seoul National University	2016
Achievement Awards, Republic of Korea Marine Corps	2015
National Scholarship for Science and Engineering, South Korea	2011

SERVICE AND PROFESSIONAL ACTIVITIES

Reviewer, Frontiers in Marine Science	2023
Reviewer, Marine Pollution Bulletin	2023
Reviewer, The 5th International Workshop on Environment and Geoscience	2022
President,, MIT Korean Graduate Student Association in Mechanical Engineering	2020
Board Member, External Affairs Coordination, MIT Korean Graduate Student Association	2018
Co-chair, Kwanjeong Educational Foundation Student Association	2017
Sergeant (veteran), 2nd Marine Corps Division, Republic of Korea Marine Corps	2015
Violinist, 39th Concert by Seoul National University Philharmonic Orchestra	2011

SELECTED COURSEWORK

MIT 2.122	Stochastic Systems	MIT 2.168	Learning Machines
MIT 2.25	Fluid Mechanics	MIT 2.795	Fields, Forces and Fluids: Biol Syst
MIT 6.036	Intro to Machine Learning	MIT 6.265	Discrete Prob & Stoch Process
MIT 6.436	Fundamentals of Probability	MIT 6.437	Inference and Information
MIT 7.05	Biochemistry	MIT 7.58	Molecular Biology
MIT 18.6501	Fundamentals of Statistics	MIT 18.656	Mathematical Statistics
Harvard	Advanced Regr & Stat Learning	Coursera	Deep Learning Specialization
SNU	Numerical Analysis	SNU	Turbulent Flows

SKILLS AND PROGRAM LANGUAGES

Hands-on. Cell culture, flow cytometry, bioassays, microscopy, microfluidics, machine tools.
Languages. Python (PyTorch, TensorFlow), R, Unix shell; some use of MATLAB, Fortran.
Others. Git, AWS, TeX, Adobe Illustrator, SolidWorks.