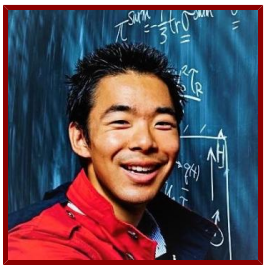
Stanford



Sho Takatori

Associate Professor of Chemical Engineering

CONTACT INFORMATION

- **Administrative Contact**

  Thao Nhin - Administrative Associate

  Email thao89@stanford.edu

  Tel 6504981648

Bio

BIO

People say that a picture is worth a thousand words. We think that an equation is worth a thousand pictures. Literally. By collecting and processing data-rich images of complex fluids and matter, we develop “picture-perfect” equations to learn structure-property relationships for new material innovation.

In the Takatori lab, we combine theory, simulation, and experiment to discover mathematical models for complex fluids in engineered and natural environments. We use advanced microscopy and analyze pictures with data-driven methods to understand material properties that bridge the microscopic-to-continuum scales. Our research encompasses soft squishy materials like polymers and liquid crystals, as well as granular matter like sand, powders, and foams.

Outside of research, I have had a strong passion for public speaking since high school, taking speech courses in college and competing in speech contests in Toastmasters International (a professional organization to improve public speaking and leadership skills) for several years as a PhD student. More recently, as a professor and educator, I have channeled my passion for speaking towards science education and technical communication. I have always believed that effective science communication can make broad impacts to society by building public trust in science, promoting data-driven decisions in government and industry, and improving the accessibility of science to all communities. I look forward to continue working on effective science communication skills and storytelling techniques with Stanford graduate students and researchers.

ACADEMIC APPOINTMENTS

- Associate Professor, Chemical Engineering

HONORS AND AWARDS

- Young Faculty Award (YFA), Defense Advanced Research Projects Agency (DARPA) (2025)
- NSF CAREER, National Science Foundation (2025)
- Packard Fellowship for Science and Engineering, The David and Lucile Packard Foundation (2022)
- Doctoral New Investigator, American Chemical Society (2022)
- Miller Research Fellowship, Miller Institute for Basic Research in Science (UC Berkeley) (2017-2020)

- Milton and Francis Clauser Doctoral Prize, California Institute of Technology (2017)
- Graduate Research Fellowship, National Science Foundation (2013-2016)
- University Medal Finalist, University of California, Berkeley (2012)
- Gates Millennium Scholar, Bill & Melinda Gates Foundation (2008-2017)

PROFESSIONAL EDUCATION

- Miller Research Fellow, Miller Institute for Basic Research in Science, University of California, Berkeley (2020)
- PhD, California Institute of Technology , Chemical Engineering (2017)
- BS, University of California, Berkeley , Chemical Engineering (2012)

Teaching

COURSES

2026-27

- Applied Mathematics in Chemical Engineering B: CHEMENG 105B (Spr)
- Applied Mathematics in the Chemical and Biological Sciences: CHEMENG 300, CME 330 (Aut)

2025-26

- Applied Mathematics in Chemical Engineering: CHEMENG 105 (Spr)
- Applied Mathematics in the Chemical and Biological Sciences: CHEMENG 300, CME 330 (Aut)

2024-25

- Applied Mathematics in Chemical Engineering: CHEMENG 105 (Spr)

STANFORD ADVISEES

Elias Mathews

Doctoral Dissertation Reader (AC)

Selena Chiu, Cody Moose, Yuejun Shen

Postdoctoral Faculty Sponsor

Pragya Arora, Kyu Hwan Choi, Takuya Kobayashi

Doctoral Dissertation Advisor (AC)

Jaja Chamlongrath, Aakanksha Gubbala, Sofia Rivalta Popescu

Doctoral Dissertation Co-Advisor (AC)

Saksham Malik

Publications

PUBLICATIONS

- **Learning continuum-level closures for control of interacting active particles.** *The Journal of chemical physics*
  Quah, T., Takatori, S. C., Rawlings, J. B.
  2026; 164 (4)
- **Colloidal hydrodynamic interactions in viscoelastic fluids.** *Soft matter*
  Kim, D. Y., Nagella, S. G., Malik, S., Park, N., Nam, J., Shaqfeh, E. S., Takatori, S. C.
  2025

- **Motility Modulates the Partitioning of Bacteria in Aqueous Two-Phase Systems.** *Physical review letters*
  Cheon, J., Choi, K. H., Modica, K. J., Mitchell, R. J., Takatori, S. C., Jeong, J.
  2025; 135 (12): 128401
- **Motility Modulates the Partitioning of Bacteria in Aqueous Two-Phase Systems** *PHYSICAL REVIEW LETTERS*
  Cheon, J., Choi, K., Modica, K. J., Mitchell, R. J., Takatori, S. C., Jeong, J.
  2025; 135 (12)
- **Phase field model for viscous inclusions in anisotropic networks.** *Soft matter*
  Gubbala, A., Jena, A. M., Arnold, D. P., Takatori, S. C.
  2025
- **Direct experimental measurement of many-body hydrodynamic interactions with optical tweezers** *PHYSICAL REVIEW FLUIDS*
  Kim, D., Nagella, S. G., Choi, K., Takatori, S. C.
  2025; 10 (6)
- **Feedback Control of Active Matter** *ANNUAL REVIEW OF CONDENSED MATTER PHYSICS*
  Takatori, S. C., Quah, T., Rawlings, J. B.
  2025; 16: 319-341
- **Lipid Membrane Domains Control Actin Network Viscoelasticity** *LANGMUIR*
  Arnold, D. P., Takatori, S. C.
  2024; 40 (50): 26570-26578
- **Model predictive control of non-interacting active Brownian particles** *SOFT MATTER*
  Quah, T., Modica, K. J., Rawlings, J. B., Takatori, S. C.
  2024; 20 (43): 8581-8588
- **Dynamic surfactants drive anisotropic colloidal assembly** *JOURNAL OF CHEMICAL PHYSICS*
  Xu, Y., Jandhyala, P., Takatori, S. C.
  2024; 161 (6)
- **Dynamic swarms regulate the morphology and distribution of soft membrane domains** *PHYSICAL REVIEW E*
  Gubbala, A., Arnold, D. P., Jena, A., Anujarerat, S., Takatori, S. C.
  2024; 110 (1): 014410
- **Surface Topography Induces and Orients Nematic Swarms of Active Filaments: Considerations for Lab-On-A-Chip Devices** *ACS APPLIED NANO MATERIALS*
  Barakat, J. M., Modica, K. J., Lu, L., Anujarerat, S., Choi, K., Takatori, S. C.
  2024; 7 (10): 12142-12152
- **Soft confinement of self-propelled rods: simulation and theory** *SOFT MATTER*
  Modica, K. J., Takatori, S. C.
  2024; 20 (10): 2331-2337
- **Nonequilibrium interactions between multi-scale colloids regulate the suspension microstructure and rheology** *SOFT MATTER*
  Xu, Y., Takatori, S. C.
  2023; 19 (44): 8531-8541
- **Active Surface Flows Accelerate the Coarsening of Lipid Membrane Domains** *PHYSICAL REVIEW LETTERS*
  Arnold, D. P., Gubbala, A., Takatori, S. C.
  2023; 131 (12): 128402
- **Colloidal transport phenomena in dynamic, pulsating porous materials** *AICHE JOURNAL*
  Nagella, S. G., Takatori, S. C.
  2023; 69 (12)
- **Dynamic interfaces for contact-time control of colloidal interactions** *SOFT MATTER*
  Xu, Y., Choi, K., Nagella, S. G., Takatori, S. C.
  2023; 19 (30): 5692-5700

- **Bio-enabled Engineering of Multifunctional "Living" Surfaces** *ACS NANO*
  Arnold, D. P., Takatori, S. C.
  2023; 17 (12): 11077-11086
- **Antibody binding reports spatial heterogeneities in cell membrane organization** *NATURE COMMUNICATIONS*
  Arnold, D. P., Xu, Y., Takatori, S. C.
  2023; 14 (1): 2884
- **Engineered molecular sensors for quantifying cell surface crowding** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Takatori, S. C., Son, S., Lee, D. S. W., Fletcher, D. A.
  2023; 120 (21): e2219778120
- **Boundary design regulates the diffusion of active matter in heterogeneous environments** *SOFT MATTER*
  Modica, K. J. J., Omar, A. K. K., Takatori, S. C. C.
  2023; 19 (10): 1890-1899
- **Enhanced dispersion in an oscillating array of harmonic traps** *PHYSICAL REVIEW E*
  Barakat, J. M., Takatori, S. C.
  2023; 107 (1): 014601
- **Porous Media Microstructure Determines the Diffusion of Active Matter: Experiments and Simulations** *FRONTIERS IN PHYSICS*
  Modica, K. J., Xi, Y., Takatori, S. C.
  2022; 10
- **Molecular height measurement by cell surface optical profilometry (CSOP)** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
  Son, S., Takatori, S. C., Belardi, B., Podolski, M., Bakalar, M. H., Fletcher, D. A.
  2020; 117 (25): 14209-14219
- **Active Contact Forces Drive Nonequilibrium Fluctuations in Membrane Vesicles** *PHYSICAL REVIEW LETTERS*
  Takatori, S. C., Sahu, A.
  2020; 124 (15): 158102
- **Inertial effects on the stress generation of active fluids**
  Takatori, S. C., Brady, J. F.
  AMER PHYSICAL SOC.2017
- **Superfluid Behavior of Active Suspensions from Diffusive Stretching** *PHYSICAL REVIEW LETTERS*
  Takatori, S. C., Brady, J. F.
  2017; 118 (1): 018003
- **Acoustic trapping of active matter** *NATURE COMMUNICATIONS*
  Takatori, S. C., De Dier, R., Vermant, J., Brady, J. F.
  2016; 7: 10694
- **Forces, stresses and the (thermo?) dynamics of active matter** *CURRENT OPINION IN COLLOID & INTERFACE SCIENCE*
  Takatori, S. C., Brady, J. F.
  2016; 21: 24-33