

Sangwoo Shin

CONTACT INFORMATION	Department of Mechanical and Aerospace Engineering, University at Buffalo, SUNY Buffalo, NY 14260-4400	<i>E-mail:</i> sangwoos@buffalo.edu <i>Web:</i> www.sangwooshin.com <i>Phone:</i> 1-(716) 645-2593
CURRENT POSITION	University at Buffalo, The State University of New York , Buffalo, NY Associate Professor , Department of Mechanical and Aerospace Engineering	
EDUCATION	Yonsei University , Seoul, Korea Ph.D., Mechanical Engineering, 2012 <ul style="list-style-type: none">• Heat/mass transfer, Energy management, Nanomaterials, Nanofluidics• Thesis: <i>Thermal Management of Energy Devices using Nanostructured Materials</i>• Advisor: Hyung Hee Cho B.S., Mechanical Engineering, 2005	
PROFESSIONAL EXPERIENCE	Associate Professor Department of Mechanical and Aerospace Engineering, University at Buffalo, The State University of New York	2024–current
	Assistant Professor Department of Mechanical and Aerospace Engineering, University at Buffalo, The State University of New York	2021–2024
	Assistant Professor Department of Mechanical Engineering, University of Hawaii at Manoa	2017–2021
	Postdoctoral Research Associate Department of Mechanical and Aerospace Engineering, Princeton University (Supervisor: Howard A. Stone)	2013–2016
	Postdoctoral Research Associate Low Observable Research Center, Yonsei University (Supervisor: Hyung Hee Cho)	2012–2013
REFEREED JOURNAL PUBLICATIONS	Google Scholar profile: https://scholar.google.com/citations?user=ZNZtyqcAAAAJ (* denotes equal contribution; underline denotes advisees) <ol style="list-style-type: none">1. J. T. Ault & S. Shin, Physicochemical hydrodynamics of particle diffusiophoresis driven by chemical gradients, <i>Annu. Rev. Fluid Mech.</i>, 57 227–255 (2025). (<i>Invited</i>)2. H. Park, H. T. Nam, S. Shin, H. H. Cho & D. Lee, Surface roughening and hemiwicking: Synergistic impact on flow boiling, <i>Int. Commun. Heat Mass Transf.</i>, 160 108282 (2025).3. <u>V. S. Doan</u>, I. Alshareedah, A. Singh, P. R. Banerjee & S. Shin, Diffusiophoresis promotes transport and phase separation of biomolecular condensates, <i>Nature Commun.</i>, 15 7686 (2024).	

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6. G. Choi, B. S. Kim, M. Yun, N. Lee, **S. Shin** & H. H. Cho, Surface roughening and hemi-wicking: Synergistic impact on flow boiling, *Int. J. Mech. Sci.*, **268** 109021 (2024).
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13. V. S. Doan & **S. Shin**, Formation of a colloidal band via pH-dependent electrokinetics, *Electrophoresis*, **42** 2356–2364 (2021).
14. V. S. Doan, S. G. Chun, J. Feng, & **S. Shin**, Confinement-dependent diffusiophoretic transport of nanoparticles in collagen hydrogels, *Nano Lett.*, **21** 7625–7630 (2021).
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19. **S. Shin**, Diffusiophoretic separation of colloids in microfluidic flows, *Phys. Fluids*, **32** 101302 (2020). (*Invited*)

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BOOKS AND BOOK
CHAPTERS

1. **S. Shin** & A. S. Kim, (2018), Temperature Effect on Forward Osmosis, in H. Du, A. Thompson & X. Wang (Eds.), *Osmotically Driven Membrane Process – Approach, Development and Current Status*, InTech. (ISBN 978-953-51-5688-8)

INVENTION
DISCLOSURES AND
PATENTS

1. *Device and Methods for Continuous Flow Separation of Particles by Gas Dissolution*, European Patent No. EP3509727 / Chinese Patent No. ZL 201780054670.3, with H. A. Stone, P. B. Warren & O. Shardt (2023).
2. *Gradient induced particle motion in suspensions*, U.S. Patent No. 11,007,500 with H. A. Stone, P. B. Warren, O. Shardt & S. Shim (2021).
3. *Methods of particle manipulation and analysis*, U.S. Patent No. 10,697,931 with J. T. Ault, H. A. Stone, J. Feng & P. B. Warren (2020).
4. *Targeted delivery and release of drugs in tumors using sequential solution exchange*, Invention disclosure at the University of Hawaii at Manoa (2018).
5. *Rapid preconcentrator using flow-driven diffusiophoretic accumulation*, Invention disclosure at Princeton University with H. A. Stone, J. T. Ault & P. B. Warren (2017).

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7. *Device and methods for continuous flow separation of particles by gas dissolution*, Invention disclosure at Princeton University with H. A. Stone, P. B. Warren & O. Shardt (2016).
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9. *A method for producing large lipid vesicles*, Invention disclosure at Princeton University with H. A. Stone & J. T. Ault (2015).
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11. *Highly efficient desalination system and method using multi-stage ionic field-effect transistor*, Korean Patent 10-1592892 with H. H. Cho & B. S. Kim (2016).
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16. *Bipolar plate with nano and micro structures*, Korean Patent 10-1075518 with H. H. Cho, J. H. Yoon, H. G. Kwon, B. S. Kim & S. H. Lee (2011).
17. *PCR device which has a real-time monitoring function*, Korean Patent 10-1040489 with H. H. Cho, K. M. Kim, D. H. Lee, B. S. Kim, S. H. Lee & M. O. Lee (2011).
18. *Apparatus of PCR using constant temperature metal block and method thereof*, Korean Patent 10-0790004 with H. H. Cho, M. S. Yu, D. H. Lee, J. J. Yi & B. S. Kim (2007).

FUNDED GRANTS

1. National Science Foundation, CBET #2237177 (\$500,000), Role: PI, 2023-2028. *CAREER: Phoretic Transport of Membrane-Bound Biological Colloids in Complex Environments.*
2. National Science Foundation, CBET #2223737 (\$335,860), Role: PI, 2022-2025. *Diffusiophoretic Bioaugmentation: Boosting the Bacterial Motility in Soil Matrix by Chemical Gradients for Enhanced Bioremediation.*
3. National Science Foundation, CBET #1930691/2200882 (\$320,238), Role: PI, 2019-2023. *Colloid dynamics in porous media induced by fluid flow and solute transport.*

4. National Science Foundation, CMMI #1919539 (\$466,902), Role: Co-PI (PI: Joseph J. Brown, Co-PIs: Tyler Ray, Sangwoo Shin, Woonchul Lee, Aaron Ohta), 2019-2022. *MRI: Acquisition of High-Speed Lithography Tool for Research and Education at the University of Hawaii.*
5. National Research Foundation of Korea, #2013R1A6A3A03020179 (\$30,000), Role: PI, 2013-2014. *Development of highly-efficient electrokinetic energy harvesting through surface engineering.*

AWARDS	NSF CAREER Award (National Science Foundation)	2023
	Finalist, Falling Walls Lab 2017 (Falling Walls Foundation)	2017
	National Postdoctoral Fellowship (National Research Foundation)	2013
	Distinguished Thesis Award (Yonsei University)	2012
	Best Thesis Award (Energy & Power Engineering Division, KSME)	2012
	Outstanding Poster Award (Micro & Nano Engineering Division, KSME)	2012
	Outstanding Paper Award (Dept. of Mech. Eng., Yonsei University)	2012
	Nano Today 2011 Student Travel Award (2nd Nano Today Conference)	2011
	Outstanding Paper Award (Dept. of Mech. Eng., Yonsei University)	2011
	National Science and Technology Fellowship (National Research Foundation)	2008
	Seoul Science Fellowship (Seoul Metropolitan Government)	2007

INVITED TALKS	Carnegie Mellon University, Chemical Engineering	Sep. 2024
	NSF Workshop on Formulation Science and Engineering, Arlington, VA	May 2024
	Korea Institute of Science and Technology (KIST)	Aug. 2023
	Seoul National University, Mechanical Engineering	Aug. 2023
	SeoulTech, Mechanical and Automotive Engineering	Jul. 2023
	University at Buffalo, Civil, Structural and Environmental Engineering	Apr. 2023
	Ohio State University, Mechanical and Aerospace Engineering	Feb. 2023
	Brown University, Fluids Seminar	Apr. 2022
	Jeonbuk National University, Mechanical System Engineering	Jan. 2022
	IEEE NANOMED 2020, Virtual Conference	Dec. 2020
	Mini-symposium on Fluid-Structure Interactions, Okinawa, Japan	Jan. 2020
	Yonsei University, Mechanical Engineering	Jan. 2020
	Chungnam National University, Chemical Engineering	Jan. 2020
	UNIST, Mechanical Engineering	Dec. 2019
	TMS 2019, San Antonio, TX	Mar. 2019
	IEEE NANOMED 2018, Honolulu, HI	Dec. 2018
	Incheon National University, Materials Science and Engineering	Nov. 2018
	Korea Institute of Energy Research	Nov. 2018
	Chung-Ang University, Mechanical Engineering	Nov. 2018
	Okinawa Institute of Science and Technology (OIST)	Nov. 2018
	Falling Walls Lab 2017, Berlin, Germany	Nov. 2017
	Korea Institute of Science and Technology (KIST)	Jan. 2017
	Yonsei University, Mechanical Engineering	Jan. 2017
	Sungkyunkwan University, Mechanical Engineering	Jan. 2017
	Ulsan National Institute of Science and Technology (UNIST), Physics	Feb. 2016
	Yonsei University, Mechanical Engineering	Jan. 2016
	Stevens Institute of Technology, Mechanical Engineering	Mar. 2015
	New Jersey Institute of Technology, Mathematical Sciences	Apr. 2014

TEACHING EXPERIENCE	Course Instructor (University at Buffalo)	2021–current
	Thermodynamics (MAE204; Undergraduate)	
	Heat Transfer (MAE336; Undergraduate)	

	Microfluidics and Nanofluidics (MAE500; Graduate)	
	Biotransport and Biofluid Mechanics (MAE618; Graduate)	
	Course Instructor (University of Hawaii)	2017–2021
	Thermodynamics (ME311; Undergraduate)	
	Mechanics of Fluids and Lab (ME322; Undergraduate)	
	Introduction to Transport Phenomena (ME491; Undergraduate)	
	Introduction to Microfluidics (ME491; Undergraduate)	
	Microfluidics and Nanofluidics (ME624; Graduate)	
	Biotransport and Biofluid Mechanics (ME696; Graduate)	
STUDENTS ADVISED	Current Members	
	Ali Nikkhah	PhD student, 2022–current
	Seungsu Han	PhD student, 2024–current
	Dang Duong	PhD student, 2024–current
	Students Advised (Thesis Committee Chair)	
	Viet Sang Doan	PhD, 2024
	Dang Duong	MS, 2024
	Viet Sang Doan	MS, 2021
	Sung wan Park	MS, 2020
	Kyle Barefoot	MS, 2018
	Thesis Committee Member	
	Samira Safaripour	PhD, 2024
	Ruben Poehnl	PhD, 2023
	Rintaro Hayashi	PhD, 2021
	Don Krasky	PhD, 2019
	Shane Laibach	MS, 2023
	Myles Geise	MS, 2023
	Adam Macalalag	MS, 2021
	Matthew Nakamura	MS, 2021
	Postdocs and Visitors	
	Liangyu Wu	Visiting Postdoc, 2019-2020
	Cheng Yu	Visiting Postdoc, 2019-2020
	Tanja Riess	Visiting MS student, 2019
	Undergraduates	
	Jeffrey Zheng	2017-2018
	Trevor Shimokusu	2017-2019
	Kaytlynn Chun Fat-Ardren	2018-2019
	Penny Loo	2020-2021
OTHER PROFESSIONAL ACTIVITIES	Co-founder	
	Phoresis Inc., Princeton, NJ	2018
	Conference Organizing Committee	
	Session Organizer, <i>American Physical Society March Meeting 2025</i>	Mar. 2025
	Technical Program Committee, <i>16th IEEE International Conference on Nano/Molecular Medicine and Engineering (IEEE-NANOMED 2023)</i>	Dec. 2023
	Technical Program Committee, <i>15th IEEE International Conference on Nano/Molecular Medicine and Engineering (IEEE-NANOMED 2021)</i>	Nov. 2021
	Technical Program Committee, <i>12th IEEE International Conference on Nano/Molecular Medicine and Engineering (IEEE-NANOMED 2018)</i>	Dec. 2018

Journal Reviewer

Served as a reviewer for:

ACS Applied Materials & Interfaces, ACS Biomaterials Science & Engineering ACS Nano, ACS Omega, Advanced Functional Materials, Advanced Intelligent Systems, Analytical Chemistry, Analytical Methods, Applied Physics A, Applied Physics Letters, Applied Materials Today, Applied Mathematical Modelling, Applied Thermal Engineering, Biochip Journal, Biofabrication, Biomedical Physics & Engineering Express, Biomicrofluidics, Chemical Engineering and Processing, Chemical Reviews, Colloids & Surfaces A, Electrophoresis, Energy, Entropy, Experimental Thermal and Fluid Sciences, Heat and Mass Transfer, IEEE Transactions on Electron Devices, Industrial & Engineering Chemistry Research, International Journal of Heat and Mass Transfer, International Journal of Thermal Sciences, Journal of Chemical Physics, Journal of Cleaner Production, Journal of Colloid and Interface Science, Journal of Energy Storage, Journal of Engineering Mathematics, Journal of Environmental Chemical Engineering, Journal of Fluid Mechanics, Journal of Heat Transfer, Journal of Mechanical Science and Technology, Journal of Physical Chemistry B, Journal of Polymers and the Environment, Journal of The Royal Society Interface, Meccanica, Nanoscale, Nanotechnology, Optics and Lasers in Engineering, Physica Scripta, Physica Status Solidi A, Physical Review E, Physical Review Letters, Physical Review X, Physics of Fluids, PLOS ONE, Research, Reviews of Modern Physics, Science, Science Advances, Scientific Reports, Small Methods, Soft Matter.

Memberships

American Physical Society, Materials Research Society, American Chemical Society