

Sangwoo Shin

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CURRENT POSITION **University at Buffalo, The State University of New York**, Buffalo, NY
Assistant Professor, Department of Mechanical and Aerospace Engineering

EDUCATION **Yonsei University**, Seoul, Korea
Ph.D., Mechanical Engineering, 2012

- Heat/mass transfer, Energy management, Nanomaterials, Nanofluidics
- Thesis: *Thermal Management of Energy Devices using Nanostructured Materials*
- Advisor: Hyung Hee Cho

B.S., Mechanical Engineering, 2005

PROFESSIONAL EXPERIENCE **Assistant Professor** 2021–current
Department of Mechanical and Aerospace Engineering,
University at Buffalo, The State University of New York
Assistant Professor 2017–2021
Department of Mechanical Engineering,
University of Hawaii at Manoa
Postdoctoral Research Associate 2013–2016
Department of Mechanical and Aerospace Engineering,
Princeton University (Supervisor: Howard A. Stone)
Postdoctoral Research Associate 2012–2013
Low Observable Research Center,
Yonsei University (Supervisor: Hyung Hee Cho)

REFEREED JOURNAL PUBLICATIONS **Google Scholar profile:** <https://scholar.google.com/citations?user=ZNZtyqcAAAAJ>
(* denotes equal contribution; underline denotes advisees)

1. V. S. Doan & **S. Shin**, Formation of a colloidal band via pH-dependent electrokinetics, *Electrophoresis*, in press. DOI: 10.1002/elps.202100125
2. 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).
3. S. Yasmeen, J. Yoon, C. H. Moon, R. Khan, H. Gaiji, **S. Shin**, I.-K. Oh & H.-B.-R. Lee, Self-formation of superhydrophobic surfaces through interfacial energy engineering between liquid and particles, *Langmuir*, **37** 5356–5363 (2021).
4. S. w. Park, H. Yoon, J. Lee & **S. Shin**, Microfluidic investigation of salinity-induced oil transport in porous media during chemical flooding, *Energy Fuels*, **35** 4885–4892 (2021).
5. T.-H. Kim, M. Cho & **S. Shin**, Constrained mixed-variable design optimization based on particle swarm optimizer with a diversity classifier for cyclically neighboring subpopulations, *Mathematics*, **8** 2016 (2020).

6. V. S. Doan, P. Saingam, T. Yan & **S. Shin**, A trace amount of surfactants enables diffusiophoretic swimming of bacteria, *ACS Nano*, **14** 14219–14227 (2020).
7. **S. Shin**, Diffusiophoretic separation of colloids in microfluidic flows, *Phys. Fluids*, **32** 101302 (2020). (*Invited*)
8. V. Kumar, **S. Shin** & J. Feng, Light-induced explosion of lipid vesicles, *Soft Matter*, **16** 8904–8911 (2020).
9. T. J. Shimokusu, V. G. Maybruck, J. T. Ault & **S. Shin**, Colloid separation by CO₂-induced diffusiophoresis, *Langmuir*, **36** 7032–7038 (2020). (*Invited*)
10. **S. Shin**, J. T. Ault, K. Toda-Peters & A. Q. Shen, Particle trapping in merging flow junctions by fluid–solute–colloid–boundary interactions, *Phys. Rev. Fluids*, **5** 024304 (2020).
11. **S. Shin**, V. S. Doan & J. Feng, Osmotic delivery and release of lipid-encapsulated molecules via sequential solution exchange, *Phys. Rev. Appl.*, **12** 024014 (2019).
12. S. Battat, J. T. Ault, **S. Shin**, S. Khodaparast & H. A. Stone, Particle entrainment in dead-end pores by diffusiophoresis, *Soft Matter*, **15** 3879–3885 (2019).
13. J. T. Ault, **S. Shin** & H. A. Stone, Characterization of surface-solute interactions by diffusioosmosis, *Soft Matter*, **15** 1582–1596 (2019).
14. P. B. Warren, **S. Shin** & H. A. Stone, Diffusiophoresis in ionic surfactants: effect of micellization, *Soft Matter*, **15** 278–288 (2019).
15. J. T. Ault, **S. Shin** & H. A. Stone, Diffusiophoresis of colloidal particles in narrow channel flows, *J. Fluid Mech.*, **854**, 420–448 (2018).
16. **S. Shin**^{*}, G. Choi^{*}, B. Rallabandi, D. Lee, D. I. Shim, B. S. Kim, K. M. Kim & H. H. Cho, Enhanced boiling heat transfer using self-actuated nano-bimorphs, *Nano Lett.*, **18**, 6392–6396 (2018). (*Featured in **Phys.org***)
17. F. Yang, **S. Shin** & H. A. Stone, Diffusiophoresis of a charged drop, *J. Fluid Mech.* **852**, 37–59 (2018).
18. Z. Zheng^{*}, M. A. Fontelos^{*}, **S. Shin** & H. A. Stone, Universality in the nonlinear leveling of capillary films, *Phys. Rev. Fluids (Rapid Commun.)* **9** 032001(R) (2018).
19. **S. Shin**, P. B. Warren & H. A. Stone, Cleaning by surfactant gradients: Particulate removal from porous materials and the significance of rinsing in fabric cleaning, *Phys. Rev. Appl.* **9** 034012 (2018). (*Featured in **Physics, Cosmos, Physics World, New Scientist***.)
20. N. A. Hynson, K. L. Frank, R. A. Alegado, A. S. Amend, M. Arif, G. M. Bennett, A. J. Jani, M. C. I. Medeiros, Y. Mileyko, C. E. Nelson, N. H. Nguyen, O. D. Nigro, S. Priscic, **S. Shin**, D. Takagi, S. T. Wilson & J. Y. Yew, Synergy among microbiota and their hosts: Leveraging the Hawaiian archipelago and local collaborative networks to address pressing questions in microbiome research, *mSystems* **3**, e00159-17 (2018).
21. Z. Zheng^{*}, M. A. Fontelos^{*}, **S. Shin**, M. C. Dallaston, D. Tseluiko, S. Kalliadasis & H. A. Stone, Healing capillary films, *J. Fluid Mech.* **838**, 404–434 (2018).
22. D. Lee, B. S. Kim, H. Moon, N. Lee, **S. Shin** & H. H. Cho, Enhanced boiling heat transfer on nanowire-forested surfaces under subcooling conditions, *Int. J. Heat Mass Transf.* **120** 1020–1030 (2018).

23. J. T. Ault, **S. Shin**, P. B. Warren & H. A. Stone, Diffusiophoresis in one-dimensional solute gradients, *Soft Matter* **13** 9015–9023 (2017).
24. **S. Shin**, J. T. Ault, P. B. Warren & H. A. Stone, Accumulation of colloidal particles in flow junctions induced by fluid flow and diffusiophoresis, *Phys. Rev. X* **7** 041038 (2017). (*Featured in Phys.org.*)
25. F. Boulogne, **S. Shin**, J. Dervaux, L. Limat & H. A. Stone, Diffusiophoretic manipulation of particles in a drop deposited on a hydrogel, *Soft Matter* **13** 5122–5129 (2017).
26. **S. Shin**, J. T. Ault, J. Feng, P. B. Warren & H. A. Stone, Low-cost zeta potentiometry using diffusiophoresis, *Adv. Mater.* **29** 1701516 (2017).
27. **S. Shin***, O. Shardt*, P. B. Warren & H. A. Stone, Membraneless water filtration using CO₂, *Nature Commun.* **8** 15181 (2017). (*Highlighted in Nature, Nature Reviews Chemistry. Featured in The Economist.*)
28. J. Lee, **S. Shin**, Y. Jiang, C. Jeong, H. A. Stone & C.-H. Choi, Oil-Impregnated nanoporous oxide layer for corrosion protection with self-healing, *Adv. Funct. Mater.* **27** 1606040 (2017). (*Selected as the front cover*)
29. **S. Shin**, E. Um, B. Sabass, J. T. Ault, M. Rahimi, P. B. Warren & H. A. Stone, Size-dependent control of colloid transport in dead-end channels via solute gradients, *Proc. Natl. Acad. Sci. U.S.A.* **113**, 257–261 (2016).
30. J. T. Ault, A. Fani, K. K. Chen, **S. Shin**, F. Gallaire & H. A. Stone, Vortex-breakdown induced particle capture in branching junctions, *Phys. Rev. Lett.* **117**, 084501 (2016).
31. J. Feng, J. K. Nunes, **S. Shin**, J. Yan, S. D. Stoyanov, L. N. Arnaudov, Y. L. Kong & H. A. Stone, A scalable platform for functional nanoemulsions via bubble bursting, *Adv. Mater.* **28**, 4047 (2016).
32. **S. Shin**, I. Jacobi & H. A. Stone, Bénard-Marangoni instability driven by moisture absorption, *EPL* **113**, 24002 (2016).
33. B. S. Kim, G. Choi, **S. Shin**, T. Gemming & H. H. Cho, Nano-inspired fluidic interactivity for boiling heat transfer: impact and criteria, *Sci. Rep.* **6**, 34348 (2016).
34. Z. Zheng, **S. Shin** & H. A. Stone, Converging gravity currents over a permeable substrate, *J. Fluid Mech.* **778**, 669–690 (2015).
35. **S. Shin***, J. T. Ault* & H. A. Stone, Flow-driven rapid vesicle fusion via vortex trapping, *Langmuir* **31**, 7178–7182 (2015).
36. B. S. Kim, K. M. Yang, **S. Shin**, G. Choi & H. H. Cho, Local nucleation propagation on heat transfer uniformity during subcooled convective boiling, *Heat Mass Transf.* **51**, 1–9 (2015).
37. C.-S. Park, M.-H. Hong, **S. Shin**, H. H. Cho & H.-H. Park, Synthesis of mesoporous La_{0.7}Sr_{0.3}MnO₃ thin films for thermoelectric materials, *J. Alloy Compd.* **632**, 246–250 (2015).
38. H. Moon, K. M. Kim, Y. H. Jeon, **S. Shin**, J. S. Park & H. H. Cho, Effect of thermal stress on creep lifetime for a gas turbine combustion liner, *Eng. Fail. Anal.* **47**, 34–40 (2015).

39. **S. Shin***, T. T. Al-Housseiny*, B. S. Kim, H. H. Cho & H. A. Stone, The race of nanowires: morphological instabilities and a control strategy, *Nano Lett.* **14**, 4395–4399 (2014). (*Highlighted in Science – Editors’ Choice*)
40. G. Choi, B. S. Kim, H. Lee, **S. Shin** & H. H. Cho, Jet impingement in a crossflow configuration: Convective boiling and local heat transfer characteristics, *Int. J. Heat Fluid Flow* **50**, 378–385 (2014).
41. B. S. Kim, H. Lee, **S. Shin**, G. Choi & H. H. Cho, Interfacial wicking dynamics and its impact on critical heat flux of boiling heat transfer, *Appl. Phys. Lett.* **105**, 191601 (2014).
42. **S. Shin***, G. Choi*, B. S. Kim & H. H. Cho, Flow boiling heat transfer on nanowire-coated surfaces with highly wetting liquid, *Energy* **76**, 428–435 (2014).
43. B. S. Kim, **S. Shin**, D. Lee, G. Choi, K. M. Kim & H. H. Cho, Stable and uniform heat dissipation by nucleate-catalytic nanowires for boiling heat transfer, *Int. J. Heat Mass Transf.* **70**, 23–32 (2014).
44. **S. Shin** & H. H. Cho, Self-formed platform for in situ measurement of electrical resistance of individual Cu nanowires, *Electrochim. Acta* **117**, 120–126 (2014).
45. H. Choi, J. H. Baek, T. H. Kim, J. Y. Song, **S. Shin**, H. H. Cho, D.-H. Ko, J. Kim, K. H. Jeong & M.-H. Cho, Effect of phonon scattering by atomically aligned Te layers in self-ordered Sb₂Te₂ films, *J. Mater. Chem. C* **1**, 7043–7053 (2013).
46. S. Cho, J. H. Kim, H. K. Cho, **S. Shin** & H. H. Cho, All-solution-processed InGaO₃(ZnO)_m thin films with layered structure, *J. Nanomater.* **2013**, 909786 (2013).
47. T.-J. Ha, **S. Shin**, H. K. Kim, M.-H. Hong, C.-S. Park, H. H. Cho, D. J. Choi & H.-H. Park, Use of ordered mesoporous SiO₂ as protection against thermal disturbance in phase-change memory, *Appl. Phys. Lett.* **102**, 144102 (2013).
48. M.-H. Hong, C.-S. Park, **S. Shin**, H. H. Cho, W.-S. Seo, Y. S. Lim, J.-K. Lee & H.-H. Park, Effect of surfactant concentration on the thermoelectric properties of mesoporous ZnO thin films, *J. Nanomater.* **2013**, 172504 (2013).
49. M.-H. Hong, S.-Y. Jung, T.-J. Ha, W.-S. Seo, Y. S. Lim, **S. Shin**, H. H. Cho & H.-H. Park, Thermoelectric properties of mesoporous TiO₂ thin films through annealing temperature and ratio of surfactant, *Surf. Coat. Technol.* **231**, 370–373 (2013).
50. J. Song, J. W. Lee, M. S. Yu, **S. Shin**, B. S. Kim & H. H. Cho, Thermal characteristics of inclined plate impinged by underexpanded sonic jet, *Int. J. Heat Mass Transf.* **62**, 223–229 (2013).
51. S.-Y. Jung, T.-J. Ha, C.-S. Park, W.-S. Seo, Y. S. Lim, **S. Shin**, H. H. Cho & H.-H. Park, Improvement in the conductivity ratio of ordered mesoporous Ag-TiO₂ thin films for thermoelectric materials, *Thin Solid Films* **529**, 94–97 (2013).
52. **S. Shin**, B. S. Kim, G. Choi, H. Lee & H. H. Cho, Double-templated electrodeposition: simple fabrication of micro-nano hybrid structure by electrodeposition for efficient boiling heat transfer, *Appl. Phys. Lett.* **101**, 251905 (2012).
53. T.-J. Ha, H. K. Kim, D. J. Choi, **S. Shin**, H. H. Cho, H. W. Jang, S.-J. Yoon & H. H. Park, Application of ordered mesoporous SiO₂ film for low power consumption in phase-change memory, *Microporous Mesoporous Mater.* **163**, 321–325 (2012).

54. J. H. Kim, D. K. Seo, C. H. Ahn, **S. Shin**, H. H. Cho & H. K. Cho, Hybrid solution processed $\text{InGaO}_3(\text{ZnO})_m$ thin films with periodic layered structures and thermoelectric properties, *J. Mater. Chem.* **22**, 16312–16317 (2012).
55. **S. Shin**, B. S. Kim, J. Song, H. Lee & H. H. Cho, A facile route to the fabrication of large-scale gate-all-around nanofluidic field-effect transistor with low leakage current, *Lab Chip* **12**, 2568–2574 (2012).
56. **S. Shin**, B. S. Kim, K. M. Kim & H. H. Cho, Multi-variable thermal design of T-structured phase-change memory cell using advanced response surface method, *Microelectron. Eng.* **91**, 1–8 (2012).
57. T.-J. Ha, H.-H. Park, H. W. Jang, S.-J. Yoon, **S. Shin** & H. H. Cho, Study on the thermal stability of ordered mesoporous SiO_2 film for thermal insulating film, *Microporous Mesoporous Mater.* **158**, 123–128 (2012).
58. **S. Shin**, B. S. Kim, K. M. Kim, B. H. Kong, H. K. Cho & H. H. Cho, Tuning the morphology of copper nanowires by controlling the growth processes in electrodeposition, *J. Mater. Chem.* **21**, 17967–17971 (2011).
59. K. M. Kim, **S. Shin**, D. H. Lee & H. H. Cho, Influence of material properties on temperature and thermal stress of thermal barrier coating near a normal cooling hole, *Int. J. Heat Mass Transf.* **54**, 5192–5199 (2011).
60. J. Lee, H. G. Kwon, **S. Shin**, S. Han, J. Ha, H. Yoo & H. H. Cho, Thermal design of hot plate for 300-mm wafer heating in post-exposure bake, *Microelectron. Eng.* **88**, 3195–3198 (2011).
61. D. K. Seo, **S. Shin**, H. H. Cho, B. H. Kong, D. M. Whang & H. K. Cho, Drastic improvement of oxide thermoelectric performance using thermal and plasma treatments of the InGaZnO thin films grown by sputtering, *Acta Mater.* **59**, 6743–6750 (2011).
62. T.-J. Ha, S.-Y. Jung, J.-H. Bae, H.-L. Lee, H. W. Jang, S.-J. Yoon, **S. Shin**, H. H. Cho & H.-H. Park, Analysis of heat transfer in ordered and disordered mesoporous TiO_2 films by finite element analysis, *Microporous Mesoporous Mater.* **144**, 191–194 (2011).
63. B. S. Kim, **S. Shin**, S. J. Shin, K. M. Kim & H. H. Cho, Control of superhydrophilicity/superhydrophobicity using silicon nanowires via electroless etching method and fluorine carbon coatings, *Langmuir* **27**, 10148–10156 (2011). (*Most Read Article*)
64. **S. Shin**, B. H. Kong, B. S. Kim, K. M. Kim, H. K. Cho & H. H. Cho, Over 95% of large-scale length uniformity in template-assisted electrodeposited nanowires by subzero-temperature electrodeposition, *Nanoscale Res. Lett.* **6**, 467 (2011). (*Highly Accessed Article*)
65. T.-J. Ha, Y.-J. Choi, S.-Y. Jung, W.-S. Seo, Y. S. Lim, **S. Shin**, H. H. Cho & H.-H. Park, Study on the electrical and thermal conductivity of ordered mesoporous TiO_2 thin film incorporated with Pt nanoparticles, *Jpn. J. Appl. Phys.* **50**, 075001 (2011).
66. S.-Y. Jung, T.-J. Ha, W.-S. Seo, Y. S. Lim, **S. Shin**, H. H. Cho & H.-H. Park, Thermoelectric properties of Nb-doped ordered mesoporous TiO_2 , *J. Electron. Mater.* **40**, 652–656 (2011).
67. B. S. Kim, **S. Shin**, S. J. Shin, K. M. Kim & H. H. Cho, Micro-nano hybrid structures with manipulated wettability using a two-step silicon etching on a large area, *Nanoscale Res. Lett.* **6**, 333 (2011).

68. **S. Shin**, K. M. Kim, J. Song, H. K. Kim, D. J. Choi & H. H. Cho, Thermal stress analysis of $\text{Ge}_1\text{Sb}_4\text{Te}_7$ -based phase-change memory devices, *IEEE Trans. Electron Dev.* **58**, 782–791 (2011).
69. B. S. Kim, B. S. Kwak, **S. Shin**, S. Lee, K. M. Kim, H.-I. Jung & H. H. Cho, Optimization of microscale vortex generators in a microchannel using advanced response surface method, *Int. J. Heat Mass Transf.* **54**, 118–125 (2011).
70. T.-J. Ha, H.-H. Park, E. S. Kang, **S. Shin** & H. H. Cho, Variations in mechanical and thermal properties of mesoporous alumina thin films due to porosity and ordered pore structure, *J. Colloid Interface Sci.* **345**, 120–124 (2010).
71. **S. Shin**, H. K. Kim, J. Song, D. J. Choi & H. H. Cho, Phase-dependent thermal conductivity of $\text{Ge}_1\text{Sb}_4\text{Te}_7$ and $\text{N:Ge}_1\text{Sb}_4\text{Te}_7$ for phase change memory applications, *J. Appl. Phys.* **107**, 033518 (2010).
72. H. K. Kim, S. Y. Lee, D. J. Choi, **S. Shin**, H. H. Cho & J. S. Roh, Effects of nitrogen doping and working pressure on the crystallization of $\text{Ge}_1\text{Sb}_4\text{Te}_7$ thin films for PRAM applications, *J. Kor. Phys. Soc.* **55**, 1896–1900 (2009).
73. D. H. Lee, K. M. Kim, **S. Shin** & H. H. Cho, Thermal analysis in a film cooling hole with thermal barrier coating, *J. Thermophys. Heat Transf.* **23**, 843–846 (2009).
74. K. M. Kim, H. Lee, B. S. Kim, **S. Shin**, D. H. Lee & H. H. Cho, Optimal design of angled rib turbulators in a cooling channel, *Heat Mass Transf.* **45**, 1617–1625 (2009).
75. **S. Shin**, T.-J. Ha, H.-H. Park & H. H. Cho, Thermal conductivity of BCC-ordered mesoporous silica films, *J. Phys. D: Appl. Phys.* **42**, 125404 (2009).
76. S. G. Choi, T.-J. Ha, H.-H. Park, **S. Shin** & H. H. Cho, Effective heat conservation in a sandwich-structured microbolometer using mesoporous TiO_2 layers, *Sens. Actuators A* **155**, 131–135 (2009).
77. **S. Shin**, H. N. Cho, B. S. Kim & H. H. Cho, Influence of upper layer on measuring thermal conductivity of multilayer thin films using differential $3-\omega$ method, *Thin Solid Films* **517**, 933–936 (2008).
78. S. G. Choi, T.-J. Ha, B.-G. Yu, **S. Shin**, H. H. Cho & H.-H. Park, Application of mesoporous TiO_2 as a thermal isolation layer for infrared sensors, *Thin Solid Films* **516**, 212–215 (2007).

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. *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).
2. *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).
3. *Targeted delivery and release of drugs in tumors using sequential solution exchange*, Invention disclosure at the University of Hawaii at Manoa (2018).
4. *Rapid preconcentrator using flow-driven diffusiophoretic accumulation*, Invention disclosure at Princeton University with H. A. Stone, J. T. Ault & P. B. Warren (2017).

5. *Zeta potentiometer using diffusiophoresis and diffusioosmosis*, Invention disclosure at Princeton University with H. A. Stone, J. T. Ault, J. Feng & P. B. Warren (2017).
6. *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).
7. *Particle motion in suspensions driven by contact with gas*, Invention disclosure at Princeton University with H. A. Stone, P. B. Warren, O. Shardt & S. Shim (2016).
8. *A method for producing large lipid vesicles*, Invention disclosure at Princeton University with H. A. Stone & J. T. Ault (2015).
9. *A method for controlling growth instability in template-assisted electrodeposition of nanowires*, Invention disclosure at Princeton University with H. A. Stone, T. T. Al-Housseiny, H. H. Cho & B. S. Kim (2014).
10. *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).
11. *Highly efficient nanofluidic energy harvesting system and method using ionic field-effect transistor*, Korean Patent 10-1419742 with H. H. Cho & B. S. Kim (2014).
12. *Light-heat energy conversion module having nanostructured surface and method for fabricating the same*, Korean Patent 10-1374272 with H. H. Cho, B. S. Kim, J. Song & T. H. Kim (2014).
13. *Heat transfer element*, Korean Patent 10-1273365 with H. H. Cho, B. S. Kim, S. H. Lee & J. Song (2013).
14. *Method for Manufacturing Structure and Structure for Removing Bubble*, Korean Patent 10-1163639 with H. H. Cho, K. M. Kim, B. S. Kim, S. H. Lee & J. Song (2012).
15. *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).
16. *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).
17. *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 #1930691 (\$320,238), Role: PI, 2019-2022. *Colloid dynamics in porous media induced by fluid flow and solute transport.*
2. National Science Foundation, CMMI #1919539 (\$466,902), Role: Co-PI (PI: Joseph J. Brown, Co-PIs: Tyler Ray, Sangwoo Shin, Wochul Lee, Aaron Ohta), 2019-2022. *MRI: Acquisition of High-Speed Lithography Tool for Research and Education at the University of Hawaii.*
3. National Research Foundation of Korea, #2013R1A6A3A03020179 (\$30,000), Role: PI, 2013-2014. *Development of highly-efficient electrokinetic energy harvesting through surface engineering.*

AWARDS	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	IEEE NANOMED 2020, Virtual Conference	Dec. 2020
	Mini-symposium on Fluid-Structure Interactions, OIST	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
	UNIST Physics & IBS CSLM	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)	
	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	
	Viet Sang Doan	PhD student, 2021–current
	Thesis Committee Chair	
	Viet Sang Doan	MS, 2021
	Sung wan Park	MS, 2020
	Kyle Barefoot	MS, 2018
	Thesis Committee Member	

	Don Krasky	PhD, 2019
	Rintaro Hayashi	PhD, 2021
	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–current
	Conference Organizing Committee	
	Technical Program Committee, <i>12th IEEE International Conference on Nano/Molecular Medicine and Engineering (IEEE-NANOMED 2018)</i>	Dec. 2018
	Technical Program Committee, <i>15th IEEE International Conference on Nano/Molecular Medicine and Engineering (IEEE-NANOMED 2021)</i>	Nov. 2021
	Journal Reviewer	
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