

Dong Liu, Ph.D.

Associate Professor

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Department of Mechanical Engineering
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Professional Preparation

Tsinghua University, China	Thermal Engineering	B. S.	1996
Tsinghua University, China	Thermal Engineering	M. S.	1999
Purdue University	Mechanical Engineering	Ph.D.	2006

Appointments

Associate Professor, University of Houston	2013-present
Assistant Professor, University of Houston	2007-2013
Post-doctoral Research Associate, Purdue University	2006-2007

Research Interests

Micro/nanoscale thermal transport, boiling heat transfer enhancement, micro/nanofluidics, convective heat transfer, electrokinetics

Teaching

MECE 4364 Heat Transfer
MECE 4371 Thermal Fluids Laboratory
MECE 6334 Convection Heat Transfer
MECE 6335 Heat Transfer with Phase Change
MECE 7341 Introduction to Micro/nanofluidics
MECE 7397 Microscale Thermal Transport Phenomena

Service

Chair, ASME Heat Transfer Division K-9 Nanoscale Transport Phenomena, 2019-present
Vice Chair, ASME Heat Transfer Division K-9 Nanoscale Transport Phenomena, 2016-2019
Guest Editor, ASME Journal of Electronic Packaging, 2017-2018
Co-Chair, Faculty Search Committee for Thermal Science and Fluid Mechanics, 2016-2020
Chair, Faculty Search Committee for Biophysics, 2014-2015
Chair, Faculty Search Committee for Thermal Science, 2013-2014
Faculty Search Committee for Thermal Science, 2011-2012
Undergraduate Advising Director, 2015-present
Undergraduate Lab Reform Committee, 2014-present

Current Students

Yu Deng (Ph.D.), Vishal Talari (Ph.D.), Hamid Ziyadee (Ph.D.), Saket Kavishwar (M.S.)

Students Advised

Yi Lu (Ph.D.), Guliang He (Ph.D.), Aritra Sur (Ph.D.), Leyuan Yu (Ph.D.), Feng Chen (Post-doctoral research associate), Abhinay Sivuni (M.S.), Prakhar Behar (M.S.), Xiaoxiang Wang (M.S.), Da Lin (M.S.), Vani Aparna Peri (M.S.), Ravi Teja (M.S.), Yu Deng (Undergraduate), Yang Sun (Undergraduate), Yingjie Tang (Post-doctoral research associate)

Professional Societies

ASME

Proposal Review

1. NSF, Chemical Bioengineering, Environmental and Transport Systems (CBET), 2009, 2015, 2018.
2. Netherlands Foundation for Fundamental Research on Matter, Dr. Michel van den Hout, 2014.
3. DOE, Office of Workforce Development for Teachers and Scientists (WDTS), Office of Science, Graduate Fellowship Program, 2012.
4. American Institute of Biological Sciences (AIBS), external reviewer, “New Biomimetic Technology for “Just-In-Time” Delivery of Anti-Convulsants Following Traumatic Brain Injury”, June, 2009.

Conference Organization

1. Topic co-organizer on “Nanoscale Thermal Transport”, ASME *2018 International Mechanical Engineering Congress & Exposition (IMECE)*, Pittsburg, PA, 2018
2. Topic co-organizer on “Nanoscale Thermal Transport”, ASME *2017 International Mechanical Engineering Congress & Exposition (IMECE)*, Tampa, FL, 2017
3. Topic co-organizer on Track 4 “Nanoscale Thermal Transport”, ASME *Summer Heat Transfer Conference (SHTC)*, Washington, DC, 2017
4. Topic organizer on Track 4 “Nanoscale Thermal Transport”, ASME *Summer Heat Transfer Conference (SHTC)*, Washington, DC, 2016
5. Session organizer on "Symposium on Phase Change Heat Transfer", ASME *2014 International Mechanical Engineering Congress & Exposition (IMECE)*, Montreal, Canada, 2014.
6. Topic co-organizer on "Engineered Surfaces of Phase Change Heat Transfer", ASME *2013 International Mechanical Engineering Congress & Exposition (IMECE)*, San Diego, California, 2013.
7. Topic co-organizer on "Fundamentals of Phase Change Heat Transfer", ASME *2011 International Mechanical Engineering Congress & Exposition (IMECE)*, Houston, Texas, 2012.
8. Session chair on “Single-Phase Liquid Cooling”, *13th Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems (ITHERM)*, San Diego, California, 2012.
9. Session co-chair on “Microchannels and Heat Pipes II”, ASME *2011 International Mechanical Engineering Congress & Exposition (IMECE)*, Denver, Colorado, 2011.
10. Session chair on “Interfacial Thermal Behavior at Micro/Nano Scales”, *11th Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems (ITHERM)*, Orlando, Florida, 2008.

Invited Presentations

Rice University, Department of Mechanical Engineering, Houston, Texas, USA, April 2015.

Tianjin University, Dept. Power Engineering and Engineering Thermophysics, Tianjin, China, June 2012 and June 2013.
Tsinghua University, Beijing, Dept. Thermal Engineering, China, July 2010 and May 2011.
Beijing Jiaotong University, School Mechanical, Electronic and Control Engineering, Beijing, China, July 2010, May 2011, June 2012, June 2013 and July 2014.
Huawei Technologies, Plano, TX, October 2010.
University of Colorado, Boulder, Co, Dept. Mechanical Engineering, September 2010.
University of Texas, Depart. Material Science and Engineering, Arlington, TX, October 2008.
University of Houston, Dept. Mechanical Engineering, Houston, TX, April 2007.
Binghamton University, Dept. Mechanical Engineering, Binghamton, NY, April 2007.
Rutgers University, Dept. Mechanical Engineering and Aerospace, Piscataway, NJ, March 2007.
Stony Brook University, Dept. Mechanical Engineering, Stony Brook, NY, March 2007.
University of Missouri, Dept. Mechanical Engineering and Aerospace, Rolla, MO, March 2007.
University of Arizona, Dept. Aerospace and Mechanical Engineering, Tucson, AZ, April 2006.
University of Illinois, Dept. Mechanical and Industrial Engineering, Urbana Champaign, IL, Feb 2006.
Clemson University, Dept. of Mechanical Engineering, Clemson, SC, Feb 2006.
Purdue University, School of Mechanical Engineering, West Lafayette, IN, Nov 2005.

Journal Review

Journal of Heat Transfer, International Journal of Heat and Mass Transfer, PNAS, Nature Communications, Nanoscale, Applied Physics Letters, Scientific Reports, PLOS ONE, Experiments in Fluids, Journal of Micromechanics and Microengineering, Journal of Physics, Nanotechnology, Experimental Thermal and Fluid Science, Microfluidics and Nanofluidics, International Journal of Thermal Sciences, Heat Transfer Engineering, IEEE Transaction on Components and Packaging Technologies, International Journal of Refrigeration, Journal of Thermophysics and Heat Transfer, Journal of Enhanced Heat Transfer, Energy and Fuels, Journal of Biomicrofluidics, Journal of Thermal Science and Engineering Applications, ASHRAE Journal, Waste Management Research, Journal of Natural Gas Science and Engineering

Patent

1. Liu, D., and Cao, Q. L., Magnetic Directed Alignment of Stem Cell Scaffolds for Neuron Regeneration, UHOU.P005US.P1
2. Liu, D., and Garimella, S. V., Microfluidic Pumping based on Dielectrophoresis, U.S. patent No. 20130075259

Book

Liu, D., and Garimella, S. V., *Thermal Transport in Microchannels: Single-Phase and Two-Phase Fluid Flow and Heat Transfer*, ISBN: 3639117034, VDM Verlag, 2009.

Book Chapters

1. Liu, D., and Garimella, S. V., "Electromechanical Actuation of Nanofluids", in *Nanoparticles: Synthesis, Characterization and Applications*, Ramesh S. Chaughule (ed.), American Scientific Publishers, 2009.

Journal Publications

1. Sim, K., Shi, L., He, G., Chen, S., Liu, D., and Yu, C., Flexible microfluidics for microparticle dispensing based on traveling wave dielectrophoresis, *Journal of Micromechanics and Microengineering*, in review (2019).
2. Yue, S., Gamage, G., Moheibinia, M., Mayerich, D., Talari, V., Deng, Y., Tian, F., Dai, S., Sun, H., Hadjiev, V., Zhang, W., Feng, G., Hu, J., Liu, D., Wang, Z., Ren, Z., Bao, J. M., Photoluminescence mapping and time-domain thermo-photoluminescence for rapid measurement of thermal conductivity of boron arsenide, *Nature Materials*, in review (2019).
3. Lu, Y., Bao, J.M., and Liu, D., Suppression of Leidenfrost state using electrically induced interfacial instabilities, *International Journal of Heat and Mass Transfer*, to be submitted (2019)
4. Yue, S., Lin, F., Zhang Q., Epie, N., Dong, S., Shan, X., Liu, D., Chu W., Wang, Z., and Bao, J., Gold implanted plasmonic quartz plate as a launch pad for laser driven photoacoustic microfluidic pumps, *Proceedings of the National Academy of Sciences*, 116(14): 6580-6585 (2019)
5. Li, J.T., Zhao, F.S., Deng, Y., Liu, D., Chen, C. H., and Shih, W.H., Photothermal generation of programmable microbubble array on nanoporous gold disks, *Optics Express*, 26(13):16893-16902 (2018).
6. Talari, V., Behar, P., Lu, Y., Haryadi, E. and Liu, D., Leidenfrost drops on micro/nanostructured surfaces, *Frontiers in Energy*, 12(1): 22-42, (2018).
7. Qi, B., Kong, Q., Qian, H., Patil, D., Lim, I., Li, M., Liu, D., Song, G., Study of impact damage in PVA-ECC beam under low-velocity impact loading using piezoceramic transducers and PVDF thin-film transducers, *Sensors*, 18(2): 671 (2018).
8. Sur, A., Lu, Y., Pascente, C., Ruchhoeft, P., and Liu, D., Nucleate boiling heat transfer enhancement with electrowetting, *International Journal of Heat and Mass Transfer*, 120: 202-217, (2018).
9. Wang, Y., Zhang, Q. H., Zhu, Z., Lin, F., Deng, J. D., Ku, G., Song, S., Alam, M. D., Liu, D., Wang, Z., and Bao, J. M., Laser streaming: turning a laser beam into a liquid jet, *Science Advances*, 3:e1700555, (2017).
10. Yi, L., Bao, J. M., and Liu, D., Dynamics of a Leidenfrost droplet modulated by electrowetting, *Journal of Heat Transfer*, 139(8):080902, (2017).
11. Wang, H. X., Liu, D., and Liu, L.P., Equilibrium shapes of a heterogeneous bubble in an electric field: a variational formulation and numerical verifications, *Proceedings of Royal Society A*, 473:20160494, (2017).
12. Wang, Y., Tang, Y. J., Cheng, P. H., Zhou, X. F., Zhu, Z., Liu, Z. P., Liu, D., Wang, Z. M., and Bao, J. M., Distinguishing thermal lens effect from electronic third-order nonlinear self-phase modulation in liquid suspensions of 2D nanomaterials, *Nanoscale*, 9:3547-3554, (2017).
13. Lu, Y., Sur, A., Pascente, C., Annapragada, S., Ruchhoeft, P., and Liu, D., Dynamics of droplet motion induced by electrowetting, *International Journal of Heat and Mass Transfer*, 106(3): 920-931, (2017).
14. Ebrahimi, B., He, G. L., Tang, Y. J., Franchek, M., and Liu, D., Characterization of high-pressure cavitating flow through a thick orifice plate, *International Journal of Thermal Sciences*, 114(4): 229-240, (2017).
15. Yang, L.X., Guo, A., and Liu, D., Experimental investigation of subcooled vertical upward flow boiling in a narrow rectangular channel, *Experimental Heat Transfer*, 29(2): 221-243, (2016)
16. Yu, L. Y., Sur, A., and Liu, D., Flow boiling heat transfer and two-phase flow instability of nanofluids in a minichannel, *Journal of Heat Transfer*, 137(5): 051502, (2015)

17. Sur, A., Lu, Y., Pascente, C., Ruchhoeft, P., and Liu, D., Bubble ebullition on a hydrophilic surface, *Journal of Heat Transfer*, 137(2): 020905, (2015)
18. Yang, L. X., Zhao, N., and Liu, D., Dynamics of ferromagnetic nanowires in a rotating magnetic field, *Advances in Mechanical Engineering*, 7(7): 1-11, (2015)
19. Yin, L., Jia, L., Guan, P., and Liu, D., Experimental investigation on bubble confinement and elongation in microchannel flow boiling, *Experimental Thermal and Fluid Science*, 54(2): 290-296, (2014)
20. He, G. L., and Liu, D., Coupled electrohydrodynamic-dielectrophoretic pumping of colloidal suspensions in a microchannel, *International Journal of Micro-Nanoscale Thermal Fluid Transport Phenomena*, 4(1): 1-21, (2013)
21. Yu, L. Y., and Liu, D., A study of thermal transport of nanofluids and their suitability for electronics cooling, *IEEE Transactions on Components and Packaging Technologies*, 3(10): 1693-1704 (2013)
22. Gadogbe, M., Ansar, S. M., He, G. L., Collier, W. E., Rodriguez, J., Liu, D., Chu, I. W., and Zhang, D., Determination of colloidal gold nanoparticle surface areas, concentrations and sizes through quantitative ligand adsorption, *Analytical and Bioanalytical Chemistry*, 405(1): 413-422, (2013)
23. Li, D., Wu, G. S., Wang, W., Wang, Y. D., Liu, D., Zhang, D. C., Chen, C. F., Peterson, G. P., and Yang, R. G., Monolithic silicon-nanowire coatings for enhancing flow boiling heat transfer in microchannels, *Nano Letters*, 12(7): 3385-3390, (2012)
24. Vangala, K., Ameer, F., Salomon, G., Le, V., Lewis, E., Yu, L. Y., Liu, D. and Zhang, D., Studying protein and gold nanoparticle interaction using organothiols as molecular probes, *Journal of Physical Chemistry*, 116(5): 3645-3652, (2012)
25. Yu, L. Y., Liu, D., and Botz, F., Laminar convective heat transfer of alumina-Polyalphaolefin nanofluids containing spherical and non-spherical nanoparticles, *Experimental Thermal and Fluid Science*, 37(2): 72-83, (2012)
26. Sur, A., and Liu, D., Adiabatic air-water two-phase flow in circular microchannels, *International Journal of Thermal Sciences*, 53(3): 18-34, (2012)
27. Ansar, S., Haputhanthri, R., Edmonds, B., Liu, D., Yu, L. Y., Sygula, A. and Zhang, D., Determination of the binding affinity, packing, and conformation of thiolate and thione ligands on gold nanoparticles, *Journal of Physical Chemistry*, 115(3): 653-660 (2011)
28. Liu, D., and Yu, L. Y., Single-phase thermal transport of nanofluids in a minichannel, *Journal of Heat Transfer*, 133(3): 031009 (2011)
29. Liu, D., and Garimella, S. V., Microfluidic pumping based on traveling-wave dielectrophoresis, *Nanoscale and Microscale Thermophysical Engineering*, 13(2): 109-133 (2009)
30. Garimella, S. V., and Liu, D., Microscale thermal transport and electromechanical microfluidic actuation, *Journal of Enhanced Heat Transfer*, 16(3): 1-30 (2009)
31. Liu, D., and Garimella, S. V., Flow boiling heat transfer in microchannels, *Journal of Heat Transfer*, 129(10): 1321-1331 (2007)
32. Garimella, S. V., Singhal, V., and Liu, D., On-chip thermal management with microchannel heat sinks and integrated micropumps, *Proceedings of the IEEE* (invited paper), 94(8): 1534-1548 (2006)
33. Liu, D., Lee, P. S., and Garimella, S. V., Prediction of the onset of nucleate boiling in microchannel flow, *International Journal of Heat and Mass Transfer*, 48(25): 5134-5149 (2005)
34. Liu, D., Lee, P. S., and Garimella, S. V., Nucleate boiling in microchannels, *Journal of Heat Transfer*, 127(8): 803 (2005)

35. Liu, D., Garimella, S. V., and Wereley, S. T., Infrared micro-particle velocimetry in silicon-based microdevices, *Experiments in Fluids*, 38(3): 385-392 (2005)
36. Lee, P. S., Garimella, S. V., and Liu, D., Investigation of heat transfer in rectangular microchannels, *International Journal of Heat and Mass Transfer*, 48(9): 1688-1704 (2005)
37. Liu, D., and Garimella, S. V., Analysis and optimization of the thermal performance of microchannel heat sinks, *International Journal of Numerical Methods for Heat and Fluid Flow*, 15(1): 7-26 (2005)
38. Liu, D., and Garimella, S. V., Investigation of fluid flow in microchannels, *AIAA Journal of Thermophysics and Heat Transfer*, 18(1): 65-72 (2004)
39. Peng, X. F., Liu, D., and Lee, D. J., Dynamic characteristics of microscale boiling, *Heat and Mass Transfer*, 37: 81-86 (2001)
40. Peng, X. F., Liu, D., Lee, D. J., Yan, Y., and Wang, B. X., Cluster dynamics and fictitious boiling in microchannels, *International Journal of Heat and Mass Transfer*, 43(23): 4259-4266 (2000)

Conference Publications

1. Lu, Y., Bao, J. M., and Liu, D., Dynamics of a Leidenfrost droplet modulated by electrowetting, *ASME International Mechanical Engineering Congress & Exposition (IMECE)*, Phoenix, Arizona, 2016.
2. Lu, Y., Sur, A, Pascente, C., Ruchhoeft, P., and Liu, D., Dynamics of droplet motion induced by electrowetting, *ASME Summer Heat Transfer Conference*, Washington, DC, 2016.
3. Sur, A, Lu, Y., Pascente, C., Ruchhoeft, P., and Liu, D., Bubble dynamics in electrowetting-modulated pool boiling, *ASME Summer Heat Transfer Conference*, Washington, DC, 2016.
4. Liu, D., Nucleate boiling heat transfer enhanced by electrowetting (invited), *7th International Electronics Cooling Technology Workshop*, Redwood City, California, 2015.
5. Liu, D., Nucleate boiling heat transfer enhancement with electrowetting (invited), *International Microelectronics and Packaging Society (IMAPS) Advanced Technology Workshop on Thermal Management*, Los Gatos, California, 2014.
6. Sur, A, Lu, Y., Pascente, C., Ruchhoeft, P., and Liu, D., Bubble dynamics in AC electrowetting-enhanced nucleate boiling, *11th AIAA/ASME Joint Thermophysics and Heat Transfer Conference*, Atlanta, Georgia, 2014
7. Sur, A, Lu, Y., Pascente, C., Ruchhoeft, P., and Liu, D., AC electrowetting-modulated nucleate boiling heat transfer, *11th AIAA/ASME Joint Thermophysics and Heat Transfer Conference*, Atlanta, Georgia, 2014
8. He, G. L., Pan, T. W., and Liu, D., Numerical investigation of dielectrophoresis directed assembly of nanoparticles and nanowires, *ASME International Mechanical Engineering Congress & Exposition (IMECE)*, San Diego, California, 2013.
9. Yu, L. Y. and Liu, D., Flow boiling heat transfer and two-phase flow instability of nanofluids in a minichannel, *ASME Summer Heat Transfer Conference*, Minneapolis, Minnesota, 2013
10. Yu, L. Y. and Liu, D., A study of thermal effectiveness of laminar forced convection of nanofluids, *ASME International Mechanical Engineering Congress & Exposition (IMECE)*, Houston, Texas, 2012.
11. Yu, L. Y., and Liu, D., A study of thermal transport of nanofluids and their suitability for electronic cooling (invited), *International Microelectronics and Packaging Society (IMAPS) Advanced Technology Workshop on Thermal Management*, Palo Alto, California, 2011.
12. Yu, L. Y., Liu, D., and Botz, F., Laminar convective heat transfer of alumina-Polyalphaolefin nanofluids containing spherical and non-spherical nanoparticles, *ASME 2011 Pacific Rim*

Technical Conference & Exposition on Packaging and Integration of Electronic and Photonic Systems (InterPACK), Portland, Oregon, 2011.

13. He, G. L., and Liu, D., Coupled electrohydrodynamic-dielectrophoretic pumping of colloidal suspensions in a microchannel, *9th International Conference on Nanochannels, Microchannels, and Minichannels*, Edmonton, Canada, 2011.
14. Sur, A., and Liu, D., Adiabatic air-water two-phase flow in circular microchannels, *9th International Conference on Nanochannels, Microchannels, and Minichannels*, Edmonton, Canada, 2011.
15. Liu, D., and Yu, L. Y., Experimental investigation of single-phase convective heat transfer of nanofluids in a minichannel, *14th International Heat Transfer Conference*, Washington, D. C., 2010.
16. Sur, A., and Liu, D., Experimental and numerical investigation of two-phase patterns in a cross-junction microfluidic chip, *8th International Conference on Nanochannels, Microchannels, and Minichannels*, Montreal, Canada, 2010.
17. Yu, L. Y., and Liu, D., Single-phase thermal transport of nanofluids in a minichannel, *ASME International Mechanical Engineering Congress and Exposition*, Orlando, Florida, 2009.
18. Liu, D., and Sur, A., Two-phase flow with surfactants in a microchannel, *ASME Summer Heat Transfer Conference*, San Francisco, California, 2009.
19. Liu, D., and Garimella, S. V., Microfluidic pumping based on dielectrophoresis for thermal management of microelectronics, *11th Intersociety Conference on Thermal and Thermomechanical Phenomena in Electronic Systems (ITHERM)*, Orlando, Florida, 2008.
20. Garimella, S. V. and Liu, D., Microscale thermal transport and electromechanical microfluidic actuation, (Keynote), *19th National and 8th ISHMT-ASME Heat and Mass Transfer Conference*, Hyderabad, India, 2008.
21. Liu, D., and Garimella, S. V., Flow boiling in a microchannel heat sink, *ASME International Mechanical Engineering Congress and Exposition*, Orlando, Florida, 2005.
22. Liu, D., Lee, P. S., and Garimella, S. V., Nucleate boiling in microchannels, Photogallery in *ASME International Mechanical Engineering Congress and Exposition*, Anaheim, California, 2004.
23. Liu, D., Garimella, S. V., and Wereley, S. T., Infrared micro-particle velocimetry of fluid flow in silicon-based microdevices, *ASME Heat Transfer/Fluids Engineering Summer Conference*, Charlotte, North Carolina, 2004.
24. Singhal, V., Liu, D., and Garimella, S. V., Analysis of pumping requirements for microchannel cooling systems, *International Electronic Packaging Technical Conference and Exhibition*, Maui, Hawaii, 2003.
25. Liu, D. and Garimella, S. V., Optimization of the thermal performance of microchannel heat sinks, *International Electronic Packaging Technical Conference and Exhibition*, Maui, Hawaii, 2003.
26. Liu, D., and Garimella, S. V., Experimental investigation of fluid flow in microchannels, *the 8th AIAA/ASME Thermophysics and Heat Transfer Conference*, St. Louis, Missouri, June 2002.

Funded Research

1. Project: Enabling Light-Creating Microfluidics with Laser Streaming
Role: **PI** (Co-PI: J. M. Bao)
Source: CBET, National Science Foundation (NSF)
Amount: \$378,386, 2019-2022
2. Project: Creating Tunable Adaptive Boiling Heat Transfer Surfaces with Electrowetting
Role: **PI** (Co-PI: P. Ruchhoeft)
Source: CBET, National Science Foundation (NSF)

- Amount: \$299,997, 2012-2016
3. Project: Magnetic Directed Alignment of Injectable Neural Stem Cell Scaffold for Regeneration after Spinal Cord Injury
Role: **PI** (Co-PIs: Q. L. Cao and L. Sun)
Source: CBET, National Science Foundation (NSF)
Amount: \$390,000 (UH share: \$263,301), 2011-2015
 4. Project: Magnetic Self-Assembly of Linear Chain Lattices of Neural Stem Cells Labeled with Magnetic Cationic Liposome for in vivo Spinal Cord Nerve Regeneration without Using Scaffold
Role: **PI** (Co-PIs: Q. L. Cao and L. Sun)
Source: U. S. Army Medical Research and Material Command's Telemedicine and Advanced Technology Research Program (TATRC) through Methodist Hospital Research Institute
Amount: \$150,000 (UH share: \$119,998), 2011-2013
 5. Project: Study of Colloidal Electrohydrodynamics for Dielectrophoresis-Directed Fluidic Assembly of Nanostructures
Role: **PI**
Source: CMMI, National Science Foundation (NSF)
Amount: \$175,000, 2009-2012.
 6. Project: Design and Develop Magnetic Nanostructures for Multiplexing MRI Diagnostics
Role: **Co-PI** (PI: L. Sun)
Source: Alliance for Nanohealth (ANH)
Amount: \$120,000 (UH share: \$100,000), 2009-2012.
 7. Project: Electromechanical transport of nanofluids: microfluidic pumping and heat transfer enhancement
Role: **PI** (Co-PI: S. Garimella)
Source: NSF Cooling Technologies Research Center (CTRC)
Amount: \$80,000 (UH share: \$80,000), 2008-2009.
 8. Project: Magnetically-Assisted Fabrication of Thin Film Nanocomposites with Tunable Thermal Conductivity as Thermal Interface Materials
Role: **PI** (Co-PI: L. Sun)
Source: Texas Center for Superconductor at University of Houston (TcSUH)
Amount: \$20,000, 2008-2009.
 9. Project: Flow Boiling and Two-Phase Flow of Surfactant Solutions in microchannel Heat Sinks: Heat Transfer Enhancement and Drag Reduction
Role: **PI**
Source: New Faculty Award
Amount: \$6,000, UH, 2007-2008
 10. Project: Dielectrophoresis-based Microfluidic pumping and Heat Transfer Enhancement
Role: **PI**
Source: Small Grant
Amount: \$6,000, UH, 2007-2009