Austin J. Minnich

Professor of Mechanical Engineering and Applied Physics

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Professional Preparation

2006	B.S.	University of California, Berkeley
2008	S.M.	Massachusetts Institute of Technology
2011	Ph.D.	Massachusetts Institute of Technology

Appointments

2017 - Present	Professor, California Institute of Technology
2011 - 2017	Assistant Professor, California Institute of Technology

Awards and Honors

2017	ONR Director of Research Award
2015	ONR Young Investigator Award
2013	NSF CAREER Award

Research Interests

Micro/nano-scale heat transfer, energy conversion and storage; thermoelectricity; semiconductor physics; nanoscale electron and phonon transport; ultrafast optical techniques

Citation Indices (Google Scholar)

- **Total citations:** 6515
- **h-index:** 21
- **i10-index:** 30
- **Highly cited papers:** Minnich et al., EES (2009): 1033 citations; Minnich et al., PRL (2011): 293 citations; Minnich et al., APL (2007): 181 citations; Minnich, PRL (2012): 95 citations.

Publications

Submitted papers

1. Chen, X., C. Hua, and A. J. Minnich. Thermal response of materials to extreme thermal gradients and the role of the spatial frequency. *(submitted)* (2017).
2. Kim, T. and A. J. Minnich. Elastic and thermal properties of free-standing Molybdenum Disulfide Membranes measured using Ultrafast Transient Grating Spectroscopy. *(submitted)* (2017).
3. Moon, J. and A. J. Minnich. Propagating elastic vibrations dominate thermal conduction in amorphous silicon. *(submitted)* (2017).
4. Shulumba, N. and A. J. Minnich. Thermal conductivity of polyethylene from first principles. *(submitted)* (2017).
5. Thomas, N. and A. J. Minnich. Semiconductor-based Multilayer Selective Solar Absorber for Unconcentrated Solar Thermal Energy Conversion. *(submitted)* (2017).

Refereed Journal Publications

1. Hua, C., X. Chen, N. K. Ravichandran, and A. J. Minnich. Experimental metrology for measurement of thermal phonon transmission coefficients at solid interfaces. *(accepted to PRB)* (Apr. 2017).
2. Kou, J.-l., Z. Jurado, Z. Chen, S. Fan, and A. J. Minnich. Daytime Radiative Cooling Using Near-Black Infrared Emitters. *ACS Photonics* (Feb. 2017). http://dx.doi.org/10.1021/acsphotonics.6b00991.
3. Shulumba, N., O. Hellman, and A. J. Minnich. Intrinsic localized mode and low thermal conductivity of PbSe. *Physical Review B* **95**(1) (Jan. 2017), 014302. http://link.aps.org/doi/10.1103/PhysRevB.95.014302.
4. Yang, L. and A. J. Minnich. Thermal transport in nanocrystalline Si and SiGe by ab initio based Monte Carlo simulation. en. *Scientific Reports* **7** (Mar. 2017), 44254. http://www.nature.com/srep/2017/170314/srep44254/full/srep44254.html.
5. Ding, D., T. Kim, and A. J. Minnich. Active Thermal Extraction and Temperature Sensing of Near-field Thermal Radiation. *Scientific Reports* **6** (Sept. 2016), 32744. http://www.nature.com/articles/srep32744.
6. Ding, D., T. Kim, and A. J. Minnich. Active thermal extraction of near-field thermal radiation. *Physical Review B* **93**(8) (Feb. 2016), 081402. http://link.aps.org/doi/10.1103/PhysRevB.93.081402.
7. Dou, N. G. and A. J. Minnich. Heat conduction in multifunctional nanotrusses studied using Boltzmann transport equation. *Applied Physics Letters* **108**(1) (Jan. 2016), 011902. http://scitation.aip.org/content/aip/journal/apl/108/1/10.1063/1.4939266.
8. Minnich, A. J. Exploring the extremes of heat conduction in anisotropic materials. *Nanoscale and Microscale Thermophysical Engineering* **20**(1) (Mar. 2016), 1. http://www.tandfonline.com/doi/abs/10.1080/15567265.2016.1170080.
9. Moon, J. and A. J. Minnich. Sub-amorphous thermal conductivity in amorphous heterogeneous nanocomposites. en. *RSC Advances* **6**(107) (2016), 105154–105160. http://pubs.rsc.org/en/Content/ArticleLanding/2016/RA/C6RA24053D.
10. Ravichandran, N. K. and A. J. Minnich. Role of thermalizing and nonthermalizing walls in phonon heat conduction along thin films. *Physical Review B* **93**(3) (Jan. 2016), 035314. http://link.aps.org/doi/10.1103/PhysRevB.93.035314.
11. Zhang, H., X. Chen, Y.-D. Jho, and A. J. Minnich. Temperature-Dependent Mean Free Path Spectra of Thermal Phonons Along the c-Axis of Graphite. *Nano Letters* **16**(3) (Feb. 2016), 1643–1649. http://dx.doi.org/10.1021/acs.nanolett.5b04499.
12. Ding, D. and A. J. Minnich. Selective radiative heating of nanostructures using hyperbolic metamaterials. *Optics Express* **23**(7) (Apr. 2015), A299–A308. https://www.osapublishing.org/oe/abstract.cfm?uri=oe-23-7-A299.
13. Hua, C. and A. J. Minnich. Semi-analytical solution to the frequency-dependent Boltzmann transport equation for cross-plane heat conduction in thin films. *Journal of Applied Physics* **117**(17) (May 2015), 175306. http://scitation.aip.org/content/aip/journal/jap/117/17/10.1063/1.4919432.
14. Minnich, A. J. Advances in the measurement and computation of thermal phonon transport properties. *Journal of Physics: Condensed Matter* **27**(5) (Feb. 2015), 053202. http://iopscience.iop.org/0953-8984/27/5/053202.
15. Minnich, A. J. Multidimensional quasiballistic thermal transport in transient grating spectroscopy. *Physical Review B* **92**(8) (Aug. 2015), 085203. http://link.aps.org/doi/10.1103/PhysRevB.92.085203.
16. Minnich, A. J. Phonon heat conduction in layered anisotropic crystals. *Physical Review B* **91**(8) (Feb. 2015), 085206. http://link.aps.org/doi/10.1103/PhysRevB.91.085206.

17. Minnich, A. J. Thermal phonon boundary scattering in anisotropic thin films. *Applied Physics Letters* **107**(18) (Nov. 2015), 183106. http://scitation.aip.org/content/aip/journal/apl/107/18/10.1063/1.4935160.
18. Robbins, A. B. and A. J. Minnich. Crystalline polymers with exceptionally low thermal conductivity studied using molecular dynamics. *Applied Physics Letters* **107**(20) (Nov. 2015), 201908. http://scitation.aip.org/content/aip/journal/apl/107/20/10.1063/1.4936195.
19. Schleeh, J., J. Mateos, I. Íñiguez-de-la Torre, N. Wadefalk, P. A. Nilsson, J. Grahn, and A. J. Minnich. Phonon black-body radiation limit for heat dissipation in electronics. *Nature Materials* **14**(2) (Feb. 2015), 187–192. http://www.nature.com/nmat/journal/v14/n2/full/nmat4126.html.
20. Zhang, H., C. Hua, D. Ding, and A. J. Minnich. Length Dependent Thermal Conductivity Measurements Yield Phonon Mean Free Path Spectra in Nanostructures. *Scientific Reports* **5** (Mar. 2015). http://www.nature.com/srep/2015/150313/srep09121/full/srep09121.html.
21. Zhang, H. and A. J. Minnich. The best nanoparticle size distribution for minimum thermal conductivity. en. *Scientific Reports* **5** (Mar. 2015). http://www.nature.com/srep/2015/150311/srep08995/full/srep08995.html.
22. Ding, D., X. Chen, and A. J. Minnich. Radial quasiballistic transport in time-domain thermoreflectance studied using Monte Carlo simulations. *Applied Physics Letters* **104**(14) (Apr. 2014), 143104. http://scitation.aip.org/content/aip/journal/apl/104/14/10.1063/1.4870811.
23. Hua, C. and A. J. Minnich. Analytical Green's function of the multidimensional frequency-dependent phonon Boltzmann equation. *Physical Review B* **90**(21) (Dec. 2014), 214306. http://link.aps.org/doi/10.1103/PhysRevB.90.214306.
24. Hua, C. and A. J. Minnich. Importance of frequency-dependent grain boundary scattering in nanocrystalline silicon and silicon–germanium thermoelectrics. *Semiconductor Science and Technology* **29**(12) (Dec. 2014), 124004. http://iopscience.iop.org/0268-1242/29/12/124004.
25. Hua, C. and A. J. Minnich. Transport regimes in quasiballistic heat conduction. *Physical Review B* **89**(9) (Mar. 2014), 094302. http://link.aps.org/doi/10.1103/PhysRevB.89.094302.
26. Maasilta, I. and A. J. Minnich. Heat under the microscope. *Physics Today* **67**(8) (Aug. 2014), 27–32. http://scitation.aip.org/content/aip/magazine/physicstoday/article/67/8/10.1063/PT.3.2479.
27. Ravichandran, N. K. and A. J. Minnich. Coherent and incoherent thermal transport in nanomeshes. *Physical Review B* **89**(20) (May 2014), 205432. http://link.aps.org/doi/10.1103/PhysRevB.89.205432.
28. Minnich, A. J. Thermal transport: Naturally glassy crystals. *Nature Nanotechnology* **8**(6) (June 2013), 392–393. http://www.nature.com/nnano/journal/v8/n6/full/nnano.2013.106.html.
29. Minnich, A. J. Determining Phonon Mean Free Paths from Observations of Quasiballistic Thermal Transport. *Physical Review Letters* **109**(20) (Nov. 2012), 205901. http://link.aps.org/doi/10.1103/PhysRevLett.109.205901.

Refereed Journal Publications (prior to Caltech)

1. Hu, Y., L. Zeng, A. J. Minnich, M. S. Dresselhaus, and G. Chen. Spectral mapping of thermal conductivity through nanoscale ballistic transport. en. *Nature Nanotechnology* **10**(8) (Aug. 2015), 701–706. http://www.nature.com/nnano/journal/v10/n8/full/nnano.2015.109.html.
2. Johnson, J. A., A. A. Maznev, J. Cuffe, J. K. Eliason, A. J. Minnich, T. Kehoe, C. M. S. Torres, G. Chen, and K. A. Nelson. Direct Measurement of Room-Temperature Nondiffusive Thermal Transport Over Micron Distances in a Silicon Membrane. *Physical Review Letters* **110**(2) (Jan. 2013), 025901. http://link.aps.org/doi/10.1103/PhysRevLett.110.025901.
3. Luckyanova, M. N., J. Garg, K. Esfarjani, A. Jandl, M. T. Bulsara, A. J. Schmidt, A. J. Minnich, S. Chen, M. S. Dresselhaus, Z. Ren, E. A. Fitzgerald, and G. Chen. Coherent Phonon Heat Conduction in Superlattices. *Science* **338**(6109) (Nov. 2012), 936–939. http://www.sciencemag.org/content/338/6109/936.

4. Minnich, A. J., G. Chen, S. Mansoor, and B. S. Yilbas. Quasiballistic heat transfer studied using the frequency-dependent Boltzmann transport equation. *Physical Review B* **84**(23) (Dec. 2011), 235207. http://link.aps.org/doi/10.1103/PhysRevB.84.235207.
5. Minnich, A. J., J. A. Johnson, A. J. Schmidt, K. Esfarjani, M. S. Dresselhaus, K. A. Nelson, and G. Chen. A thermal conductivity spectroscopy technique to measure phonon mean free paths. *Physical Review Letters* **107** (Aug. 2011). Chosen as Editor's suggestion., 095901. http://prl.aps.org.clsproxy.library.caltech.edu/abstract/PRL/v107/i9/e095901.
6. Zebarjadi, M., G. Joshi, G. Zhu, B. Yu, A. Minnich, Y. Lan, X. Wang, M. Dresselhaus, Z. Ren, and G. Chen. Power Factor Enhancement by Modulation Doping in Bulk Nanocomposites. *Nano Letters* **11**(6) (June 2011), 2225–2230. http://dx.doi.org/10.1021/nl201206d.
7. Hao, Q., G. Zhu, G. Joshi, X. Wang, A. Minnich, Z. Ren, and G. Chen. Theoretical studies on the thermoelectric figure of merit of nanograined bulk silicon. *Applied Physics Letters* **97**(6), 063109 (2010), 063109. http://link.aip.org/link/?APL/97/063109/1.
8. Schmidt, A. J., K. C. Collins, A. J. Minnich, and G. Chen. Thermal conductance and phonon transmissivity of metal–graphite interfaces. *Journal of Applied Physics* **107**(10), 104907 (2010), 104907. http://link.aip.org/link/?JAP/107/104907/1.
9. Lan, Y., A. Minnich, G. Chen, and Z. Ren. Enhancement of Thermoelectric Figure-of-Merit by a Bulk Nanostructuring Approach. *Advanced Functional Materials* **20** (2009), 357 –376. http://dx.doi.org/10.1002/adfm.200901512.
10. Minnich, A. J., M. S. Dresselhaus, Z. F. Ren, and G. Chen. Bulk Nanostructured Thermoelectric Materials: Current Research and Future Prospects. *Energy & Environmental Science* **2**(5) (2009). (Invited, peer-reviewed. Among the top 10 downloaded articles in EES for July, August, December 2009, January-May, July-December 2010, January 2011)., 466 –479. http://pubs.rsc.org/en/Content/ArticleLanding/2009/EE/b822664b.
11. Minnich, A. J., H. Lee, X. W. Wang, G. Joshi, M. S. Dresselhaus, Z. F. Ren, G. Chen, and D. Vashaee. Modeling study of thermoelectric SiGe nanocomposites. *Physical Review B* **80**(15) (Oct. 2009), 155327. http://link.aps.org/abstract/PRB/v80/e155327.
12. Yang, J., Q. Hao, H. Wang, Y. C. Lan, Q. Y. He, A. J. Minnich, D. Z. Wang, J. A. Harriman, V. M. Varki, M. S. Dresselhaus, G. Chen, and Z. F. Ren. Solubility study of Yb in n-type skutterudites $Yb_xCo_4Sb_{12}$ and their enhanced thermoelectric properties. *Physical Review B* **80**(11) (2009), 115329. http://link.aps.org/abstract/PRB/v80/e115329.
13. Poudel, B., Q. Hao, Y. Ma, Y. Lan, A. Minnich, B. Yu, X. Yan, D. Wang, A. Muto, D. Vashaee, X. Chen, J. Liu, M. S. Dresselhaus, G. Chen, and Z. Ren. High-Thermoelectric Performance of Nanostructured Bismuth Antimony Telluride Bulk Alloys. *Science* **320**(5876) (2008), 634–638. http://www.sciencemag.org.clsproxy.library.caltech.edu/content/320/5876/634.
14. Minnich, A. and G. Chen. Modified effective medium formulation for the thermal conductivity of nanocomposites. *Applied Physics Letters* **91**(7) (2007). (also in August 27, 2007 issue of Virtual Journal of Nanoscale Science & Technology)., 073105. http://link.aip.org/link/?APL/91/073105/1.

Invited Book Chapters

1. Minnich, A. J. "Measuring phonon mean free paths using thermal conductivity spectroscopy". In: ed. by G. Chen. Annual Review of Heat Transfer. Belsevere, 2012.

Conference presentations

1. Chen, X. and A. J. Minnich. "Exploring quasiballistic transport in nanoline arrays". In: *Materials Research Society Spring Meeting*. San Francisco, CA, 2015.
2. Hua, C., X. Chen, N. K. Ravichandran, and A. J. Minnich. "Fresnel transmission coefficients for thermal phonons at solid interfaces". In: *Materials Research Society Spring Meeting*. San Francisco, CA, 2015.
3. Ravichandran, N. K. and A. J. Minnich. "Direct measurement of phonon specularity parameter in silicon membranes". In: *Phonons2015*. Nottingham, England, 2015.

4. Ravichandran, N. K. and A. J. Minnich. "Direct measurement of phonon specularity parameter in silicon membranes". In: *Materials Research Society Spring Meeting*. San Francisco, CA, 2015.
5. Chen, X., C. Hua, and A. J. Minnich. "Connections between Time Domain Thermoreflectance and Broadband Frequency Domain Thermoreflectance for Measuring Phonon Mean Free Paths". In: *11th AIAA/ASME Joint Thermophysics and Heat Transfer Conference*. Atlanta, GA, 2014.
6. Chen, X. and A. J. Minnich. "Quasiballistic Thermal Transport from Nanoline Arrays Studied Using Monte Carlo Simulations". In: *ASME 2014 International Mechanical Engineering Conference and Exhibition*. Montreal, Canada, 2014.
7. Ding, D. and A. J. Minnich. "Thermal Conductivity Spectroscopy: Analysis of Spot Size Suppression Using Monte Carlo Simulations". In: *11th AIAA/ASME Joint Thermophysics and Heat Transfer Conference*. Atlanta, GA, 2014.
8. Dou, N. and A. J. Minnich. "Thermal Characterization of Ultralight Multifunctional Nanotrusses". In: *ASME 2014 International Mechanical Engineering Conference and Exhibition*. Montreal, Canada, 2014.
9. Hua, C. and A. J. Minnich. "Measuring Mean Free Path Distribution Using Nanoline Arrays". In: *ASME 2014 International Mechanical Engineering Conference and Exhibition*. Montreal, Canada, 2014.
10. Hua, C. and A. J. Minnich. "Understanding Quasiballistic Thermal Transport in Broad-band Frequency-domain Thermoreflectance". In: *11th AIAA/ASME Joint Thermophysics and Heat Transfer Conference*. Atlanta, GA, 2014.
11. Ravichandran, N. K. and A. J. Minnich. "Coherent and Incoherent Thermal Transport in Nanomeshes". In: *11th AIAA/ASME Joint Thermophysics and Heat Transfer Conference*. Atlanta, GA, 2014.
12. Robbins, A. and A. J. Minnich. "Thermal Conductivity in Polymer Brushes". In: *ASME 2014 International Mechanical Engineering Conference and Exhibition*. Montreal, Canada, 2014.
13. Schleeh, J., J. Mateos, N. Wadefalk, J. Grahn, and A. J. Minnich. "Ballistic phonon transport in cryogenic InP transistors". In: *11th AIAA/ASME Joint Thermophysics and Heat Transfer Conference*. Atlanta, GA, 2014.
14. Chen, X. and A. J. Minnich. "Connections between TDTR and FDTR". In: *ASME 2013 International Mechanical Engineering Conference and Exhibition*. San Diego, CA, 2013.
15. Hua, C. and A. J. Minnich. "Importance of Frequency-dependent Grain Boundary Scattering in Nanocrystalline Silicon Thermoelectrics". In: *Materials Research Society Spring Meeting*. San Francisco, CA, 2013.
16. Hua, C. and A. J. Minnich. "Importance of Frequency-dependent Grain Boundary Scattering in Nanocrystalline Silicon Thermoelectrics". In: *ASME 2013 Summer Heat Transfer Conference*. Minneapolis, MN, 2013.
17. Hua, C. and A. J. Minnich. "Measuring Phonon Mean Free Paths through Quasiballistic Transport". In: *ASME 2013 Summer Heat Transfer Conference*. Minneapolis, MN, 2013.
18. Ravichandran, N. K. and A. J. Minnich. "Coherent Thermal Transport in Nanomeshes". In: *ASME 2013 Summer Heat Transfer Conference*. Minneapolis, MN, 2013.
19. Hua, C. and A. J. Minnich. "Thermal Conductivity of Nanocrystalline Silicon with Frequency-dependent Grain Boundary Scattering". In: *ASME International Mechanical Engineering Conference and Exhibition*. Houston, TX, 2012.
20. Minnich, A. J. "Analysis of quasiballistic heat transfer in thermal conductivity spectroscopy". In: *Phonons 2012*. Ann Arbor, MI, 2012.
21. Zeng, L., Y. Hu, G. Chen, and A. J. Minnich. "Thermal Conductivity Spectroscopy at the Nanoscale Using Lithographically Patterned Metallic Dot Arrays". In: *ASME International Mechanical Engineering Conference and Exhibition*. Houston, TX, 2012.
22. Minnich, A. J. *ASME/JSME Thermal Engineering Joint Conference*. Honolulu, HI. 2011.
23. Minnich, A. J. *Materials Research Society Spring Meeting*. San Francisco, CA. 2011.

24. Minnich, A. J. *ASME International Mechanical Engineering Conference and Exhibition*. Vancouver, Canada. 2010.
25. Minnich, A. J. *Materials Research Society Fall Meeting*. Boston, MA. 2010.
26. Minnich, A. J. *Materials Research Society Fall Meeting*. Boston, MA. 2009.

Conference proceedings

1. Johnson, J. A., A. Maznev, J. K. Eliason, A. Minnich, K. C. Collins, G. Chen, J. Cuffe, T. Kehoe, C. M. S. Torres, and K. A. Nelson. Experimental Evidence of Non-Diffusive Thermal Transport in Si and GaAs. In: *Proceedings of the MRS Spring Meeting*. 2011.
2. Minnich, A. and G. Chen. Quasiballistic heat transfer from metal nanostructures on sapphire. In: *Proceedings of the 8th ASME/JSME Thermal Engineering Joint Conference*. 2011, pp.44094.
3. Minnich, A. J. and G. Chen. Modeling the Thermoelectric Properties of Nanocomposites. In: *Proceedings of the 3rd ASME Energy Nanotechnology International Conference*. Jacksonville, Aug. 2008.
4. Minnich, A. J., D. Vashaee, and G. Chen. Modeling Grain Boundary Scattering in Nanocomposites. In: *Proceedings of the 2008 ASME International Mechanical Engineering Congress & Exposition*. Boston, Nov. 2008, pp.IMECE2008–67385.

Invited Seminars and Presentations

1. Materials Research Society Spring Meeting, "Real-time probing of strain enhancement of thermal conductivity in polyethylene films ," Phoenix, AZ; April 23, 2017.
2. UC Santa Barbara Mechanical Engineering Department, "Heat under the microscope: understanding the microscopic processes that govern thermal transport," Santa Barbara, CA; November 7, 2016.
3. Army Research Office Workshop on The Future of Vibration Energy Transfer in Solids and Structures: Needs and Opportunities, "Thermal conductivity and lattice instabilities," Seattle, WA; October 18, 2016.
4. **Keynote talk** in 2016 Society of Engineering Sciences Conference, "Thermal phonon scattering at interfaces and boundaries: linking atomistic structure and the phonon spectrum," College Park, MD; October 2, 2016.
5. 2016 Society of Engineering Sciences Conference, "Manipulating near-field and far-field thermal radiation," College Park, MD; October 2, 2016.
6. Thermal Transport at the Nanoscale Workshop, "The importance of interfaces for thermoelectric energy conversion," Telluride, CO; June 22, 2016.
7. Purdue University Mechanical Engineering Department, "Heat under the microscope: understanding the microscopic processes that govern thermal transport," West Lafayette, IN; May 13, 2016.
8. Northwestern University Materials Science Department, "Heat under the microscope: understanding the microscopic processes that govern thermal transport," Evanston, IL; April 19, 2016.
9. UIUC Mechanical Science and Engineering Department, "Heat under the microscope: understanding the microscopic processes that govern thermal transport," Urbana-Champaign, IL; April 18, 2016.
10. Rensselaer Polytechnic Institute Materials Science Department, "Heat under the microscope: understanding the microscopic processes that govern thermal transport," Troy, NY; March 30, 2016.
11. Hume-Rothery Award Symposium, TMS 2016 Annual Meeting, "Experimental Studies of Mode-resolved Thermal Phonon Transport Properties," Nashville, TN; February 16, 2016.

12. Stanford University Materials Science Department, "Heat under the microscope: understanding the microscopic processes that govern thermal transport," Stanford, CA; January 8, 2016.
13. Materials Research Society Fall Meeting, "The importance of interfaces for thermoelectric energy conversion," Boston MA; December 3, 2015.
14. UC Riverside Electrical Engineering Department, "Heat under the microscope: understanding the microscopic processes that govern thermal transport," Riverside, CA; Oct 19, 2015.
15. **Keynote lecture** in thermal management session, Materials Science and Technology 2015, "Exploring the limits of heat dissipation in electronic devices," Columbus, OH; October 5, 2015.
16. University of Minnesota Mechanical Engineering Department, "Heat under the microscope: understanding the microscopic processes that govern thermal transport," Minneapolis, MN; September 30, 2015.
17. Carnegie Mellon Mechanical Engineering Department, "Heat under the microscope: understanding the microscopic processes that govern thermal transport," Pittsburgh, PA; September 11, 2015.
18. American Chemical Society Meeting, Physics Division, "The importance of interfaces for thermoelectric energy conversion," Boston, MA; August 17, 2015.
19. Northrop Grumman Nanomaterials Workshop, "Nanotrusses as multifunctional materials," Redondo Beach, CA; July 6, 2015.
20. Northrop Grumman Photonics group, "Photonic structures for engineering thermal radiation," Redondo Beach, CA; June 25, 2015.
21. Toyota Research Institute North America Thermal Management workshop, "Multilayer thermal switch," Ann Arbor, MI; June 9, 2015.
22. Massachusetts Institute of Technology Mechanical Engineering Department, "Heat under the microscope: understanding the microscopic processes that govern thermal transport," Cambridge, MA; May 6, 2015.
23. "Nanomaterials for Energy" Gordon Conference, "Exploring heat conduction in nanomaterials for energy," Ventura, CA; February 25, 2015.
24. Rutgers University Mechanical Engineering Department, "Heat under the microscope: understanding the microscopic processes that govern thermal transport," New Brunswick, NJ; January 21, 2015.
25. Materials Research Society Fall Meeting, "Understanding and engineering the MFP spectrum," Boston MA; December 1, 2014.
26. ASME International Conference and Exhibition, Panel on measuring phonon MFPs, Montreal, Canada, November 19, 2014.
27. Northrop Grumman Nanophotonics workshop, "Photonic structures for engineering thermal radiation," Redondo Beach, CA; October 14, 2014.
28. University of California, Berkeley Mechanical Engineering Department, "Heat under the microscope: understanding the microscopic processes that govern thermal transport," Berkeley, CA; September 11, 2014.
29. 8th US-Japan Joint Seminar on Nanoscale Transport Phenomena, "Understanding and measuring the phonon MFP spectrum," Santa Clara, CA; July 14, 2014.
30. University of California, Santa Barbara Materials Science Department, "Heat under the microscope: understanding the microscopic processes that govern thermal transport," Santa Barbara, CA; June 6, 2014.

31. Center for Phononics and Thermal Energy Science, Tongji University, Shanghai, China; "Heat under the microscope: understanding the microscopic processes that govern thermal transport," May 31, 2014.
32. University of California, San Diego Mechanical Engineering Department, "Heat under the microscope: understanding the microscopic processes that govern thermal transport," La Jolla, CA; May 12, 2014.
33. Boeing Research and Technology, El Segundo, CA; "Heat under the microscope: understanding the microscopic processes that govern thermal transport," March 27, 2014.
34. APS March Meeting, Denver, CO; "Heat under the microscope: uncovering the microscopic processes of phonon heat conduction," March 7, 2014.
35. University of California, Irvine Mechanical Engineering Department, "Heat under the microscope: understanding the microscopic processes that govern thermal transport," Los Angeles, CA; February 28, 2014.
36. Yonsei University, "Heat under the microscope: understanding the microscopic processes that govern thermal transport," Seoul, South Korea; February 13, 2014.
37. University of Southern California Electrical Engineering Department, "Heat under the microscope: understanding the microscopic processes that govern thermal transport," Los Angeles, CA; January 22, 2014.
38. University of California, Los Angeles Mechanical Engineering Department, "Heat under the microscope: understanding the microscopic processes that govern thermal transport," Los Angeles, CA; January 10, 2014.
39. University of California, Santa Barbara Thermoelectrics group, "Understanding and Engineering Phonons for Thermoelectric Energy Conversion," Santa Barbara, CA; December 10, 2013.
40. University of Washington Mechanical Engineering Department, "Heat under the microscope: understanding the microscopic processes that govern thermal transport," Seattle, WA; November 5, 2013.
41. University of Oregon Chemistry Department, "Heat under the microscope: understanding the microscopic processes that govern thermal transport," Eugene, OR; November 4, 2013.
42. WE Heraus Invited Seminar, "Understanding and Engineering Phonons for Thermoelectric Energy Conversion," Bad Honnef, Germany; April 10, 2013.
43. Materials Research Society Spring Meeting, Symposium V, "The Theory and Practice of Measuring Phonon Mean Free Paths," San Francisco, CA; April 4, 2013.
44. Boeing Research and Technology, El Segundo, CA; "Understanding and Engineering Phonons for Thermoelectric Energy Conversion," March 29, 2013.
45. Dow Chemical, "Exploring Nanoscale Heat Transfer for Energy Applications," Midland, MI; February 21, 2013.
46. UC Riverside Materials Science and Engineering Department, "Understanding and Engineering Phonons for Thermoelectric Energy Conversion," Riverside, CA; Jan 16, 2013.

Professional Affiliations

Materials Research Society (MRS), American Society of Mechanical Engineers (ASME), American Physical Society (APS)

Professional Activities and Service

- **Reviewer:** Science, Nature Materials, Nature Nanotechnology, Nature Communications, Scientific Reports, Physical Review Letters, RSC Advances, ACS Nano, Nano Letters, Journal of Applied Physics, Applied Physics Letters, Journal of Electronic Materials, Physical Review B, Journal of Materials Chemistry, Journal of Materials Chemistry A, Journal of Materials Chemistry C, Physica Status Solidi B, Materials Horizons, Physical Chemistry Chemical Physics, Journal of the Mechanics and Physics of Solids
- **Professional Service:** Symposium organizer, 2017 MRS Spring Meeting; NSF Panel Reviewer (2015); Session chair, Materials Research Society Fall Meeting (2014); Session chair, ASME IMECE (2014); Session chair, US-Japan Joint Seminar on Nanoscale Transport Phenomena (2014); Session chair, American Physical Society March Meeting (2014); Session chair, Materials Research Society Spring Meeting (2013); Co-organizer and session chair, Thermoelectrics session, American Physical Society March Meeting (2013); Session chair, Phonons 2012 (July 2012); Participant, ARPA-E Topping Cycles Workshop (March 2012)

Present Thesis Advisees

Nicholas Dou, Andrew Robbins, Nate Thomas, Jaeyun Moon, Taeyong Kim, Junlong Kou, Zoila Quiroga, Peishi Cheng, Erika Yang

Present Postdoctoral Scholar Advisees

Xiangwen Chen, Lina Yang, Nina Shulumba, Benoit Latour, Ruiqiang Guo, Bo Sun

Former Advisees

Member	**Prior position**	**Current position**
Hang Zhang	Postdoctoral Scholar	Assistant Professor, Institute of Thermophysics, Beijing
Ding Ding	Graduate Student	Postdoctoral Scholar, University of Colorado, Boulder
Chengyun Hua (Winner of best thesis award in department)	Graduate Student	Russell Postdoctoral Scholar, Oak Ridge National Laboratory
Navaneetha Ravichandran	Graduate Student	Postdoctoral Scholar, Boston College

Campus Service

- Committees: Resnick Fellowship Committee (2013), Demetriades Prize Committee (2013, 2012)
- Thesis Committees/Candidacy Exams: Yinglu Tang (2015), Zachary Gibbs (2015), Asghar Aryanfar (2015), Cindy Wang (2015), Joseph Lydon (2014), David Brown (2014), Heng Wang (2014), Lincoln Collins (2013), Ana Brown (2013), Krista Langeland (2012), Chen Li (2012), David Brown (2011)

Outreach activities

Formed partnerships with local girl's high schools, Marlborough School and Westridge School for Girls, to host high school juniors and seniors for their senior thesis project, provide career advice, and assist in college applications. Prior students have matriculated at schools including MIT and UC Berkeley.

Courses taught

- ME 117 (Nano-to-macro Transport Processes), Fall 2016
- ME 119b (Heat and Mass Transfer), Winter 2016
- ME 119a (Heat and Mass Transfer), Fall 2015
- ME 117 (Nano-to-macro Transport Processes), Winter 2015
- ME 11a (Thermodynamics), Fall 2014
- ME 119b (Heat and Mass Transfer), Spring 2014
- ME 18a (Thermodynamics), Winter 2013
- ME 117 (Nano-to-macro Transport Processes), Fall 2012
- ME 119a (Heat and Mass Transfer), Fall 2011