Tianli Feng

(as of Jan. 2025)

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Professional Appointments

08/2021 - Present	Assistant Professor, Mechanical Engineering, University of Utah, USA
11/2020 - 07/2021	R&D Associate Staff Scientist, Oak Ridge National Laboratory, USA
08/2017 - 10/2020	Postdoc, Oak Ridge National Laboratory, USA

Education

08/2017	Ph.D., Mechanical Engineering, Purdue University, West Lafayette, IN, USA
12/2013	M.S., Mechanical Engineering, Purdue University, West Lafayette, IN, USA
07/2011	B.S., Condensed Matter Physics, University of Science and Technology of China (USTC)

Selected Honors/Awards

- 2024 ASME Rising Star of Mechanical Engineering
- 2024 Assistant Professor of the Year Award, University of Utah
- 2024 NSF CAREER Award
- 2023 Brillouin Medal
  - This medal is awarded every two years to a single groundbreaking research breakthrough in the field of phononics worldwide.
- 2023 Ralph E. Powe Junior Faculty Enhancement Award
  - This award annually honors the 35 most promising junior faculty members, selected from a pool of diverse disciplines of over 150 universities in the US.
- 2016 Bilsland Dissertation Fellowship, Purdue University
  - The most prestigious fellowship awarded only to top ~3% PhD students at Purdue.

Research Interests

- **Ultrahigh-temperature materials and thermal transport**: fundamental thermodynamical and thermal transport properties of materials at ultra-high temperatures for thermal barrier coatings, thermal protection, high-temperature energy harvesting, heat transfer in Earth mantle
- **Electronics thermal management**: fundamental phonon and electron transport in semiconductors, interfacial thermal transport, thermal interface materials, ultra-high thermal conductivity materials
- **Building energy efficiency**: thermal insulation materials, building envelope air leakage detection, thermal energy storage, passive cooling, ultra-low thermal conductivity materials
- **Material properties after irradiation**: fundamental thermodynamical and thermal transport properties of materials under ion and neutron irradiation with impurities and defects
- **Photon transport:** first principles prediction of infrared properties of materials, radiative cooling, photon transport inside dense and porous materials

Major Media Exposure

1/2024 NSF CAREER Award! Prof. Feng received the 2024 NSF CAREER Award! https://www.price.utah.edu/2024/01/17/mechanical-engineerings-tianli-feng-earns-nsf-career-award-to-study-heat-transport-for-extreme-electronics

06/2023 Brillouin Medal! Prof. Feng, together with Prof. Xiulin Ruan, received the 2023 Brillouin Medal, which is awarded every 2 years to 1-3 people who make significant contributions to phonon research. Prof. Ruan will deliver a Brillouin talk at Phononics 2023 in Manchester, UK (June 12-16, 2023). More news will come out soon. https://www.mech.utah.edu/tianli-feng-receives-2023-brillouin-medal/ https://phononics2023.org/conf/index.php/phononics/2023/pages/view/Medals

05/2022 Our research work on Thermal Conductivity at Ultra-High Temperatures is reported by https://www.mech.utah.edu/thermal-conductivity-at-ultra-high-temperatures

03/2021 Our paper about finding new ultra-high thermal conductivity material tantalum nitride, published in Physical Review Letters, was reported by many new media: https://aps.altmetric.com/details/102012911/news

11/2020 Our paper that finds the heat transport ability of lithium-ion battery cathodes is much lower than previously determined, published in Nano Energy, was reported by news media: https://www.ornl.gov/news/batteries-catching-heat

04/2020 Our paper that demonstrated four-phonon scattering in infrared and Raman for the first time, published in Physical Review B, was reported by news media: https://engineering.purdue.edu/ME/News/2020/fourphonon-scattering-affects-materials-infrared-and-raman-spectra

03/2018 Our work that realized nanoscale temperature measurement using an electron probe for the first time, published in Physical Review Letters, was reported by many News Media: https://aps.altmetric.com/details/34290601/news

12/2017 Our breakthrough of four-phonon scattering thermal conductivity prediction, published in Physical Review B: rapid communications, was reported by many news media: https://aps.altmetric.com/details/28312669/news

Patents

[3] Som Shrestha, Shiwanka V. Wanasinghe, Zoriana Demchuk, Achutha Tamraparni, Catalin Gainaru, Tianli Feng, Janak Tiwari, Tomonori Saito, Diana Hun, "Design and fabrication of high-performance laminated Polyisocyanurate (PIR) foams" (2024).

[2]. Tianli Feng, Zhenglai Shen, Som S Shrestha, Provisional Patent Application "Building Air Leakage Detection and Quantification Using Transient Infrared Imaging" (2023).

[1]. Som S. Shrestha, Mikael Salonvaara, Emishaw D. Iffa, Niraj Kunwar, Diana Hun, Philip R. Boudreaux, and Tianli Feng, Non-Provisional Utility Patent Application, "Solid-State Thermal Switch Panel For Thermal Storage" (2023).

Developed Tools

[5]. **Tianli Feng**, Som Shrestha, Diana Hun, Daniel Howard, Amit Rai, ThermoPI is a Windows APP and Online tool that can calculate the thermal conductivity of porous thermal insulation materials given the structural information. This tool is to help researchers develop the next-generation thermal insulation materials used in building envelopes, pipeline thermal protection, food, drug, and vaccine transportation and storage, etc. (2022) https://thermopi.ornl.gov/about

[4]. Zherui Han, Xiaolong Yang, Wu Li, **Tianli Feng**, Xiulin Ruan, "FourPhonon: An extension module to ShengBTE for computing four-phonon scattering rates and thermal conductivity", Comp. Phys. Comm. 270, 108179 (2022). https://github.com/FourPhonon/FourPhonon

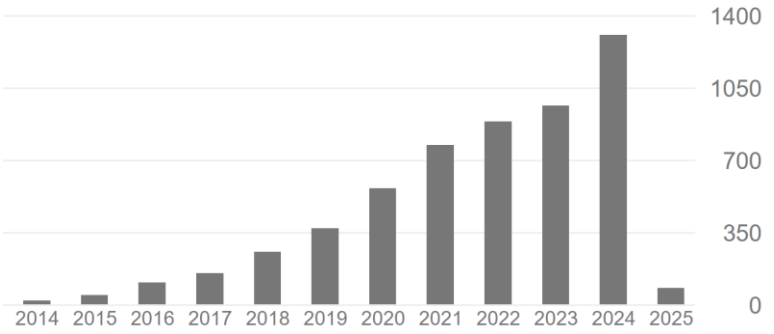
[3]. **Tianli Feng**, Divya Chalise, Xiulin Ruan (2015), Nanohub tool: Spectral phonon relaxation time calculation tool by using normal mode analysis based on molecular dynamics, https://nanohub.org/resources/phononlifetime/usage

[2]. **Tianli Feng**, Xiulin Ruan (2015), Nanohub tool: Lorentzian fitting tool for phonon spectral energy density, https://nanohub.org/resources/lorentzfit/usage

[1]. **Tianli Feng**, Yang Zhong, Divya Chalise, Xiulin Ruan, Nanohub tool: Spectral analysis of nonequilibrium molecular dynamics, https://nanohub.org/resources/spectralnemd

PUBLICATIONS

	All	Since 2020
Citations	5559	4579
h-index	41	37
i10-index	68	68



Google Scholar Profile: https://shorturl.at/jozJ0

Book Chapters / Review Articles

[5] Z. Cheng, Z. Huang, J. Sun, J. Wang, **T. Feng**, K. Ohnishi, J. Liang, H. Amano, R. Huang, "(Ultra)wide bandgap semiconductor heterostructures for electronics cooling", Appl. Phys. Rev. 11, 041324 (2024).

[4]. T. Feng*, H. Zhou, Z. Cheng, L. Larkin, M. Neupane, "A Critical Review of Thermal Boundary Conductance across Wide and Ultrawide Bandgap Semiconductor Interfaces", ACS Applied Materials & Interfaces, 15, 25, 29655 (2023).

[3]. T. Feng, X. Ruan*, "Higher-order phonon scattering: advancing the quantum theory of phonon linewidth, thermal conductivity and thermal radiative properties" in Nanoscale Energy Transport 2-1-2-44 (IOP Publishing, 2020). https://doi.org/10.1088/978-0-7503-1738-2ch2.

[2]. B. Xu, T. Feng, Z. Li, W. Zheng, Y. Wu*, "Large-Scale, Solution-Synthesized Nanostructured Composites for Thermoelectric Applications", Advanced Materials., 30, 1801904 (2018).

[1]. T. Feng, X. Ruan*, "Prediction of spectral phonon mean free path and thermal conductivity with applications to thermoelectrics and thermal management: a review", Journal of Nanomaterials 2014, 206370 (2014).

Peer-Reviewed Articles (underline: Feng group members; *corr. authors; #contributed equally)

2025:

[85] S. Zhou*, Z. Hua, K. K. Bawane, H. Zhou, T. Feng, "Impacts of Point Defects on Shallow Doping in Cubic Boron Arsenide: A First Principles Study", Comput. Mater. Sci., 247, 113483 (2025).

2024:

[84] Z. Cheng, Z. Huang, J. Sun, J. Wang, T. Feng, K. Ohnishi, J. Liang, H. Amano, R. Huang, "(Ultra)wide bandgap semiconductor heterostructures for electronics cooling", Appl. Phys. Rev. 11, 041324 (2024).

[83] R. Zhang, Z. Shen, B. Park, T. Feng, A. Aldykiewicz, A. Desjarlais, D. Hun, S. Shrestha, "Natural Fibers as Promising Core Materials of Vacuum Insulation Panels", Constr. Build. Mater., 453, 138890 (2024).

[82] H. Zhou, S. Zhou, Z. Hua, K. K. Bawane, T. Feng*, "Impact of classical statistics on thermal conductivity predictions of BAs and diamond using machine learning molecular dynamics", Appl. Rev. Lett. 125, 172202 (2024).

[81] K.Z. Adnan, M. Neupane, T. Feng*, Thermal boundary conductance of metal-diamond interfaces predicted by machine learning interatomic potentials, Int. J. Heat Mass Tran. 235, 126227 (2024).

[80] D. Howard, S. S. Shrestha, Z. Shen, T. Feng, and D. Hun, Thermally anisotropic building envelope for thermal management: finite element model calibration using field evaluation data, J. Build. Perform. Simul. 1-20 (2024)

[79] K.Z. Adnan, T. Feng*, Thermal boundary conductance and thermal conductivity strongly depend on nearby environment, Phys. Rev. B, 109, 245302 (2024).

[78] T. Feng*, Z. Shen, S. Shrestha, D. Hun, "A novel transient infrared imaging method for non-intrusive, low-cost, fast, and accurate air leakage detection in building envelopes", J. Build. Eng., 91, 109699 (2024).

[77] J. Tiwari, S. Shrestha, T. Feng*, "Computational design of isotropic and anisotropic ultralow thermal conductivity foams", J. Build. Eng., 92, 109717 (2024).

[76] H. Zhou, J. Tiwari, T. Feng*, "Understanding the flat thermal conductivity of $La_2Zr_2O_7$ at ultra-high temperatures", Phys. Rev. Mater., 8, 043804 (2024).

[75] J. Tiwari, T. Feng*, "Accurate prediction of thermal conductivity of Al_2O_3 at ultrahigh temperatures", Phys. Rev. B, 109, 075201 (2024).

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[74]. H. Zhou, S. Zhou, Z. Hua, K. Bawane, T. Feng*, "Extreme sensitivity of higher-order interatomic force constants and thermal conductivity to the energy surface roughness of exchange-correlation functionals", Appl. Phys. Lett. 123, 192201 (2023).

- *This work was selected as a Featured Article by Applied Physics Letters!*
- *This paper was selected in the 2024 APL Rising Stars virtual collection! This highly selective collection consists of 57 total papers, just under 2% of the journal's annual total volume.*

[73]. T. Feng*, H. Zhou, Z. Cheng, L. Larkin, M. Neupane, "A Critical Review of Thermal Boundary Conductance across Wide and Ultrawide Bandgap Semiconductor Interfaces", ACS Appl. Mater. Interfaces, 15, 25, 29655 (2023).

[72]. Y. Lou, X. Li, Z. Shi, H. Zhou, T. Feng, B. Xu*, "General Syntheses of High-Performance Thermoelectric Nanostructured Solids without Post-Synthetic Ligand Stripping", Nano Lett. 23, 11, 5317 (2023).

[71]. J. Tiwari, T. Feng*, "Intrinsic thermal conductivity of ZrC from low to ultra-high temperatures: A critical revisit", Phys. Rev. Mater. 7, 065001 (2023).

[70]. H. Zhou, T. Feng*, "Theoretical upper limits of the thermal conductivity of Si_3N_4", Appl. Phys. Lett., 122, 182203 (2023).

[69]. Y. Zhang, W. M. Postiglione, R. Xie, C. Zhang, H. Zhou, V. Chaturvedi, K. Heltemes, H. Zhou, T. Feng, C. Leighton, X. Wang*, Large tunability in thermal conductivity of $La_{0.5}Sr_{0.5}CoO_{3-d}$ films through electrolyte gating, Nat. Comm. 14, 2626 (2023).

[68]. Z. Shen, S Shrestha*, D. Howard, T. Feng, D. Hun, B. She, Machine learning–assisted prediction of heat fluxes through thermally anisotropic building envelopes, Build. Environ., 234, 110157 (2023).

[67]. S. Shrestha, J. Tiwari, A. Rai, D. E Hun, D. Howard, A. O Desjarlais, M. Francoeur, **T. Feng***, Solid and Gas Thermal Conductivity Models Improvement and Validation in Various Porous Insulation Materials, Int. J. Therm. Sci., 187, 108164 (2023).

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[66]. Z. Cheng, J. Liang, K. Kawamura, H. Zhou, H. Asamura, H. Uratani, J. Tiwari, S. Graham, Y. Ohno, Y. Nagai, T. Feng, N. Shigekawa, D. G. Cahill*, High Thermal Conductivity in Wafer-Scale Cubic Silicon Carbide Crystals, Nat. Commun., 13, 7201 (2022).

[65]. X. Li, Y. Lou, K. Jin, L. Fu, P. Xu, Z. Shi, T. Feng, B. Xu*, Realizing zT > 2 in environment-friendly monoclinic Cu_2S – tetragonal $Cu_{1.96}S$ nano phase junctions for Thermoelectrics, Angew. Chem. Int. Ed., 61, e202212885 (2022).

[64]. R. Xie, J. Tiwari, T. Feng*, Impacts of various interfacial nanostructures on spectral phonon thermal boundary conductance, J. Appl. Phys. 132, 115108 (2022).

[63]. W. Zhang, Y. Lou, H. Dong, F. Wu, J. Tiwari, Z. Shi, T. Feng, S. T. Pantelides, B. Xu*, Phase-engineered high-entropy metastable FCC $Cu_{2-y}Ag_y(In_xSn_{1-x})Se_2S$ nanomaterials with high thermoelectric performance, Chem. Sci., 13, 10461 (2022).

[62]. K. Jin, J. Tiwari, T. Feng*, Y. Lou*, B. Xu*, Realizing high thermoelectric performance in eco-friendly Bi_2S_3 with nanopores and Cl-doping through shape-controlled nano precursors, Nano Energy 100, 107478, (2022).

[61]. X. Yang, J. Tiwari, T. Feng*, Reduced anharmonic phonon scattering cross-section slows the decrease of thermal conductivity with temperature, Mater. Today Phys., 24, 100689 (2022).

[60]. X. Yang, T. Feng, J. Li, X. Ruan*, Evidence of five-order and higher-order phonon scattering entropy of zone-center optical phonons, Phys. Rev. B 105, 115205 (2022).

[59]. Z. Zhu, J. Tiwari, T. Feng, Z. Shi, Y. Lou*, B. Xu*, "High thermoelectric properties with low thermal conductivity due to the porous structure induced by the dendritic branching in n-type PbS", Nano Res. 15, 4739 (2022).

[58]. Z. Han, X. Yang, S.E. Sullivan, T. Feng, L. Shi, W. Li, X. Ruan*, "Raman Linewidth Contributions from Four-Phonon and Electron-Phonon Interactions in Graphene", Phys. Rev. Lett. 128, 045901 (2022).

[57]. Q. Guo, T. Feng, M.J. Lance, K.A. Unocic, S.T. Pantelides, E. Lara-Curzio*, "Evolution of the structure and chemical composition of the interface between multi-component silicate glasses and yttria-stabilized zirconia after 40,000-hour exposure in air at 800°C", J. Eur. Ceram. Soc. 42, 1576 (2022).

[56]. Y. Zhang, M. Eslamisaray, T. Feng, U. Kortshagen, X. Wang*, "Observation of Suppressed Diffuson and Propagon Thermal Conductivity of Hydrogenated Amorphous Silicon Films', Nanoscale Adv. 4, 87 (2022).

[55]. Z. Han, X. Yang, W. Li, T. Feng, X. Ruan*, "FourPhonon: An extension module to ShengBTE for computing four-phonon scattering rates and thermal conductivity", Comput. Phys. Commun. 270, 108179 (2022).

2021:

[54]. J. Xu, Y. Hu, X. Ruan, X. Wang, T. Feng*, H. Bao*, "Nonequilibrium phonon transport induced by finite sizes: the effect of phonon-phonon coupling", Phys. Rev. B, 104, 104310 (2021).

[53]. A. Kundu, X. Yang, J. Ma, T. Feng, J. Carrete, X. Ruan, G. K. H. Madsen, W. Li*, "Ultrahigh thermal conductivity in θ-phase tantalum nitride", Phys. Rev. Lett., 126, 115901 (2021).

- *This paper is covered by News Media: Heat conduction record with tantalum nitride*

[52]. A. Rai, T. Feng, D. Howard, D. Hun, M. Zhang, H. Zhou, S. S. Shrestha, "Conduction Heat Transfer through Solid in Porous Materials: A Comparative Study by Finite-Element Simulations and Effective Medium Approximations", Comp. Therm. Sci., 13, 19 (2021).

[51]. Q. Zheng#, T. Feng#, J. A. Hachtel#, R. Ishikawa, J. C. Idrobo, J. Yan, N. Shibata, Y. Ikuhara, B. C. Sales, S. T. Pantelides, M. Chi, "Direct Visualization of Anionic Electrons in an Electride Reveals Inhomogeneities", Sci. Adv. 7, eabe6819 (2021).

[50]. P. R. Chowdhury, J. Shi, T. Feng, X. Ruan, "Prediction of Bi_2Te_3/Sb_2Te_3 interfacial conductance and superlattice thermal conductivity using molecular dynamics simulations", ACS Appl. Mater. Interfaces, 13, 4636 (2021).

[49]. T. Feng, A. Rai, D. Hun, S. S Shrestha, "Molecular dynamics simulations of energy accommodation between gases and polymers for ultra-low thermal conductivity insulation", Int. J. Heat Mass Transf., 164, 120459 (2021).

[48]. T. Feng#, Y. Wang#, A. Herklotz, M. F. Chisholm, T. Z. Ward, P. C. Snijders, and S. T. Pantelides, "Determination of rutile transition metal oxide (110) surface terminations by scanning tunneling microscopy contrast reversal", Phys. Rev. B, 103, 035409 (2021).

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[47]. T. Feng, J. He, A. Rai, D. Hun, J. Liu, S. S Shrestha, "Size Effects in the Thermal Conductivity of Amorphous Polymers", Phys. Rev. Appl. 14, 044023 (2020).

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[45]. A. Dziaugys, K. Kelley, J. A. Brehm, L. Tao, A. Puretzky, T. Feng, A. O'Hara, S. Neumayer, M. Chyasnavichyus, E. A. Eliseev, J. Banys, Y. Vysochanskii, F. Ye, B. Chakoumakos, M. A. McGuire, S. V. Kalinin, G. Panchapakesan, N. Balke, S. T. Pantelides, A. N. Morozovska, P. Maksymovych, "Piezoelectric domain walls in van der Waals antiferroelectric $CuInP_2Se_6$", Nat. Commun. 11, 3623 (2020).

[44]. T. Feng*, A. O'Hara, S. T. Pantelides*, "Quantum prediction of the Ultra-Low Thermal Conductivity of Lithium Intercalation Materials", Nano Energy 75, 104916 (2020).

[43]. Y. Luo, X. Yang, T. Feng, J. Wang, X. Ruan, "Vibrational hierarchy leads to dual-phonon transport in low thermal conductivity crystals", Nat. Commun. 11, 2554 (2020).

[42]. Y. Hu#, T. Feng#, X. Gu, Z. Fan, X. Wang, M. Lundstrom, S. S. Shrestha, H. Bao, "Unification of nonequilibrium molecular dynamics and the mode-resolved phonon Boltzmann equation for thermal transport simulations", Phys. Rev. B 101, 155308 (2020).

[41]. X. Yang#, T. Feng#, J. S. Kang, Y. Hu, J. Li, X. Ruan*, "Observation of strong higher-order lattice anharmonicity in Raman and infrared response", Phys. Rev. B 101, 161202(R) (2020).

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[40]. Z. Tong, X. Yang, T. Feng, H. Bao, X. Ruan, "First-principles predictions of temperature-dependent infrared dielectric function of polar materials by including four-phonon scattering and phonon frequency shift", Phys. Rev. B 101, 125416 (2020).

[39]. P. R. Chowdhury, C. Reynolds, A. Garrett, T. Feng, S. P. Adiga,* X. Ruan,* "Machine learning maximized Anderson localization of phonons in aperiodic superlattices", Nano Energy 69, 104428 (2020).

[38]. T. Feng#, X. Wu#, X. Yang, P. Wang, L. Zhang, X. Du, X. Wang*, S. T. Pantelides*, "Thermal conductivity of HfTe5: a critical revisit", Adv. Funct. Mater., 30, 1907286 (2020).

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[36]. X. Yang, T. Feng, J. Li, X. Ruan, "Stronger role of four-phonon scattering than three-phonon scattering in thermal conductivity of III-V semiconductors at room temperature", Phys. Rev. B 100, 245203 (2019).

[35]. M. Dargusch, X. Shi, X. Tran, T. Feng, F. Somidin, X. Tan, W. Liu, K. Jack, J. Venezuela, H. Maeno, T. Toriyama, S. Matsumura, S. T. Pantelides, Z. Chen, "In-Situ Observation of the

Continuous Phase Transition in Determining the High Thermoelectric Performance of Polycrystalline Sn0:98Se", J. Phys. Chem. Lett. 10, 21, 6512 (2019).

[34]. Q.-Y. Li*, T. Feng, W. Okita, Y. Komori, H. Suzuki, T. Kato*, T. Kaneko, T. Ikuta, X. Ruan*, K. Takahashi, "Enhanced Thermoelectric Performance of As-Grown Suspended Graphene Nanoribbons", ACS Nano 13, 8, 9182 (2019).

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[32]. A. Oyedele#, S. Yang#, T. Feng#, A. V. Haglund, Y. Gu, A. A. Puretzky, D. Briggs, C. M. Rouleau, M. F. Chisholm, R. R. Unocic, D. Mandrus, H. M. Meyer, S. T. Pantelides, D. B. Geohegan, K. Xiao*, "Defect-mediated phase transformation in anisotropic 2D $PdSe_2$ crystals for seamless electrical contact devices", J. Am. Chem. Soc., 141, 22, 8928-8936 (2019).

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- *Highlighted by many News Media: Phys.org News, Purdue News, Engineer News, Machine Design News, ECN news, Science and Technology News*
- *Our prediction was directly verified by experiment in three Science papers: Kang et al. Science 2018; Tian et al. Science 2018; Li et al. Science 2018;*
- *This work is in the top 5% of all research outputs ever tracked by Altmetric.*
- *This work is honored as a "Highly Cited" paper by Web of Science (top 1%).*

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[13]. J. Kaiser*, T. Feng, J. Maassen, X. Wang, X. Ruan, M. Lundstrom, "Thermal transport at the nanoscale: A Fourier's law vs. phonon Boltzmann equation study", J. Appl. Phys., 121, 044302 (2017).

[12]. B. Xu, T. Feng, M. T Agne, L. Zhou, X. Ruan, G J. Snyder, Y. Wu*, "Highly Porous Thermoelectric Nanocomposite with Low Thermal Conductivity and High Figure of Merit from Large-Scale Solution-Synthesized $Bi_2Te_{2.5}Se_{0.5}$ Hollow Nanostructures", Angew. Chem. Int. Ed. 129, 3600-3605 (2017).

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[11]. B. Xu, M. Agne, T. Feng, T. C. Chasapis, X. Ruan, Y. Zhou, H. Zheng, J. Bahk*, M. G. Kanatzidis, J. G. Snyder*, Y. Wu*, "Nanocomposites from solution-synthesized PbTe-BiSbTe nano-heterostructure with unity figure of merit at low-medium temperatures (500-600 K)", Adv. Mater. 29, 1605140 (2017).

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Before 2016:

[10]. T. Feng and X. Ruan*, "Ultra-low thermal conductivity in graphene nanomesh", Carbon 101, 107-113 (2016).

[9]. T. Feng and X. Ruan*, "Quantum mechanical prediction of four-phonon scattering rates and reduced thermal conductivity of solids", Phys. Rev. B 93, 045202 (2016).

- *This work is honored as a "Highly Cited" paper by Web of Science (top 1%).*

[8]. H. Fang, J. Bahk, T. Feng, Z. Cheng, A. Mohammed, X. Wang, X. Ruan, A. Shakouri, Y. Wu*, "Thermoelectric properties of solution synthesized n-type Bi_2Te_3 nanocomposites modulated by Se: An experimental and theoretical study", Nano Res. 9, 117-127 (2016).

[7]. T. Feng, B. Qiu, X. Ruan*, "Coupling between phonon-phonon and phonon-impurity scattering: A critical revisit of the spectral Matthiessen's rule", Phys. Rev. B 92, 235206 (2015).

[6]. T. Feng, X. Ruan*, Z. Ye, B. Cao*, "Spectral phonon mean free path and thermal conductivity accumulation in defected graphene: The effects of defect type and concentration", Phys. Rev. B 91, 224301 (2015).

[5]. T. Feng, B. Qiu, X. Ruan*, "Anharmonicity and necessity of phonon eigenvectors in the phonon normal mode analysis", J. Appl. Phys. 117, 195102 (2015).

[4]. Z. Wang, T. Feng, X. Ruan*, "Thermal conductivity and spectral phonon properties of freestanding and supported silicene", J. Appl. Phys. 117, 084317 (2015).

[3]. Z. Ye, B. Cao*, W. Yao, T. Feng, X. Ruan*, "Spectral phonon thermal properties in graphene nanoribbons", Carbon 93, 915-923 (2015).

[2]. T. Feng, X. Ruan*, "Prediction of spectral phonon mean free path and thermal conductivity with applications to thermoelectrics and thermal management: a review", J. Nanomater. 2014, 206370 (2014).

[1]. H. Fang, T. Feng, H. Yang, X. Ruan, Y. Wu*, "Synthesis and Thermoelectric Properties of Compositional Modulated Lead Telluride-Bismuth Telluride Nanowire Heterostructures", Nano Lett. 13, 2058 (2013).

Under review:

[1] M. Hoque, E. Hoglund, B. Zhao, D. Bao, H. Zhou, S. Thakur, E. Osei-Agyemang, K. Hattar, E. Scott, M. Surendran, J. Tomko, J. Gaskins, K. Aryana, S. Makarem, G. Balasubramanian, A. Giri, T. Feng, J. Hachtel, J. Ravichandran, S. Pantelides, P. Hopkins*, "Ruddlesden-Popper chalcogenides push the limit of mechanical stiffness and glass-like thermal conductivity in crystals", arXiv:2312.02534

Peer-Reviewed Conference Papers

[5] Tianli Feng, Som Shrestha, Diana Hun, "ThermoPI—an Online Tool to Calculate Heat Transfer Through Foam Insulation", 2025 Buildings XVI Conference, Clearwater Beach, FL, Dec. 2025.

[4] Zhenglai Shen, Tianli Feng, Janak Tiwari, Philip Boudreaux, Som Shrestha, Diana Hun, "AI-Assisted Building Envelope Air Leakage Detection Using Transient Infrared Thermal Imaging", 2025 ASHRAE Winter Conference, Orlando, Feb. 2025.

[3] Shiwanka V. Wanasinghe, Zoriana Demchuk, Achutha Tamraparni, Catalin Gainaru , Tianli Feng, Janak Tiwari, Tomonori Saito, Diana Hun, Som Shrestha, "Opacification of PIR Foams to Enhance Thermal Resistivity", Center for the Polyurethanes Industry (CPI) conference, Atlanta, Oct. 2024.

[2]. Z. Shen, S. Shrestha, D. Howard, T. Feng, B. She, D. Hun, "A Machine Learning Assisted Framework to Control Thermally Anisotropic Building Envelopes in Residential Buildings", 2022 Buildings XV Conference, 2022.

[1]. S. Shrestha, A. Rai, T. Feng, M. Zhang, D. Hun, K. Biswas, A. Desjarlais, "Review of Models to Evaluate and Guide the Development of Low–Thermal-Conductivity Materials." ASHRAE Topical Conference Proceedings. American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc., 2019.

TEACHING & OUTREACH

Courses Taught at University of Utah

- Advanced Conduction, ME EN 7650 (Fall 23)

- Thermodynamics, ME EN 2300 (Spring 23, Spring 24)
- Intermediate Heat Transfer, ME EN 5560/6560 (Fall 22, Fall 21, Fall 24)

Ph.D. Students

- 2024-now, Qihao Xu, University of Utah
- 2023-now, Tanvirul Abedien, University of Utah
- 2023-now, Jacob Crossley, University of Utah
- 2023-now, Khalid Adnan, University of Utah
- 2022-now, Hao Zhou, University of Utah
- 2021-now, Janak Tiwari, University of Utah
- 2017-2018, Xiaolong Yang. Visiting scholar at Purdue University
- 2015-2016, Wenjun Yao. Visiting scholar at Purdue University

M.S. Students

- 2024-now, Garima Neupane, University of Utah
- 2021-2023, Rui Xie, University of Utah, Thesis: "Interfacial Phonon Transport by Molecular Dynamics Simulations Based on Classical and Machine Learning Potentials"
- 2013-2015, Vignesh Gouthaman, Purdue University. Now in Trelleborg Vibracoustic, MI.
- 2013-2015, Eshaan Mathew, Purdue University. Now in Digital Energy, CA.

Undergraduate Students

- 2023-2024, Brady Mccone, University of Utah
- 2023-2024, Wyatt Jones, University of Utah
- 2023-2024, Bryce Rundell, University of Utah
- 2023-2024, Yara Ahmed, University of Utah
- 2017, Yang Zhong, Purdue University. Position after graduation: Ph.D. student at MIT.
- 2017, Divya Chalise, Purdue University. Position after graduation: UC Berkeley.

K-12 Students

- 2023, Audrey Bradley, Summer Intern, Project: "First principles-based machine learning molecular dynamics simulations", University of Utah
- 2023, Adam Clark, Summer Intern, Project: "First principles-based machine learning molecular dynamics simulations", University of Utah

Short Courses Taught

- Half-day tutorial at Materials Research Society (MRS) conference, Boston, MA, November 2021. "Four-Phonon Scattering - A Critical Process Determining Thermal and Radiative Properties". The audience was expected to (1) be familiar with the background of three- and four-phonon scattering and their roles in thermal and radiative properties of materials, (2) understand the various characteristics of four-phonon scattering mechanism in different systems and scenarios, (3) understand the broad impact of four-phonon scattering on thermal transport and radiative properties in various materials, (4) be able to tell in which types of materials and scenarios will four-phonon scattering be critical, (5) be able to use the open-source code FourPhonon together with ShengBTE to calculate four-phonon scattering rates (linewidth) and thermal conductivities for materials. The outline of this tutorial is as follows.
  - 1:30-2:05 Overview, background, and formalism
  - 2:05-2:20 Characteristics of four phonon scattering
  - 2:20-2:30 First principles predictions

- 2:45-3:10 Materials with large acoustic optical phonon band gaps
- 3:10-3:30 Optical phonons and radiative properties
- 4:00-4:15 Two dimensional materials with reflection symmetry
- 4:15-4:30 Impact of phonon renormalization
- 4:30-4:50 Usage of FourPhonon with ShengBTE
- 4:50-5:00 Q&A

Lectures to K-12 Students:

11/2023	Three lectures (each 30 mins) on Engineering Day to the high school students in Utah to help them understand the significance of heat transfer in cutting-edge applications.
09/2023	Two lectures (each 60 mins) to high school students on the topic of "Control The Heat" in Farmington Bay Youth Center, Farmington, Utah.
02/2023	Three lectures (each 80 mins) to high school students on the topic of "Control The Heat" in the Decker Lake Youth Center, West Valley City, Utah.
11/2022	Three lectures (each 50 mins) on Engineering Day to the high school students in Utah to help them understand what research in engineering looks like. The students were well engaged.
11/2021	Two lectures (each 50 mins) on Engineering Day to the high school students in Utah to help them understand what research in engineering looks like. The students were well engaged.
10/2021	One lecture (50 mins) about my research to the high school students at Mill Creek Youth Center in Ogden. The activity was organized by STEM Community Alliance Program (STEMCAP), which forges novel connections through inquiry-based and interactive STEM programming to put scientists, artists and community educators inside Youth-In-Custody (YIC) facilities. https://stemcap.org/archive/past-presentations
10/2021	One lecture to undergraduate students at Brigham Young University (BYU), Provo, Utah, for the graduate recruitment of our ME department.

Mentored Capstone Projects

- The senior students mentored by Dr. Rao, Dr. Shiri, and Dr. Feng won the 2023 IEEE/EPS ASME K16 Student Heat Sink Design Challenge! Congratulations, Xander Lehnardt, Chandler Elliott, Preston Bodily, Taylor Cox, and Zachary Julien! This is a part of the capstone course.

Other Outreach Activities

- Participated in the Hi-GEAR (Girls Engineering Abilities Realized) summer camp in 2023. Showed high school female students the lab and research activities. Gave a talk.

PROFESSIONAL ACTIVITIES

Editorial Activities

- **Advisor** of Materials Research Letters (Impact Factor of 8.5), Article Collection: Micro and Nanoscale Thermal Transport in Materials, 2023.
- **Associate Editor**, Frontiers in Thermal Engineering, Micro- and Nano-Scale Heat Transfer section, 2022 – present
- **Editorial board member**, Energy and Environment Focus, American Scientific Publisher, 2021 - Present
- **Early-Career Editorial board member**, ES Energy & Environment, a journal of Engineered Science, 2021 – present

Conference Organizational Activities

- **Session Chair of**
  - IEEE ITherm Conference, May 2024
  - ASME Summer Heat Transfer conference (SHTC), Jul. 2024
  - ASME International Mechanical Engineering Congress and Exposition (IMECE) conference, 2018-now
  - 47th International Conference and expo on Advanced Ceramics and Composites (ICACC2023), Jan. 2023
  - Materials Research Society (MRS) Conference, 2021-now
- **Organizer of**
  - ASME International Mechanical Engineering Congress and Exposition (IMECE) conference, 2021-now
  - ASME Summer Heat Transfer conference (SHTC), 2024-now
  - Materials Research Society (MRS) Conference, 2024-now
- **Committee member of**
  - ASME K9 (Nanoscale Thermal Transport), 2021 – now
- **Secretary for**
  - ASME K9 (Nanoscale Thermal Transport) committee, 2025 - now

Reviewer and Judge Services:

- **Reviewer** for journals: ACS Applied Materials and Interfaces; Acta Materialia; Advanced Functional Materials; AIP Advances; Applied Physics Letters; Case Studies in Construction Materials; Ceramics International; Chemical Physics Letters; Computer Physics Communications; Crystals; Diamond and Related Materials; Energies; ES Energy & Environment; International Journal of Heat and Mass Transfer; International Journal of Thermophysics; International Heat Transfer Conferences; Journal of Applied Physics; Journal of Heat Transfer; Journal of Materials Chemistry A; Journal of Molecular Liquids; Materials; Materials Horizons; Materials Today Physics; Nano Energy; Nano Letters; Nanomaterials; Nanoscale; Nanoscale and Microscale; Thermophysical Engineering; Nature Communications; npj Computational Materials; Philosophical Magazine; Physica B; Physical Chemistry Chemical Physics; Physical Review Applied; Physical Review B; Physical Review Letters; Physical Review Materials; Proceedings of National Academic Science; Results in Physics; Scientific Reports; Science China; The Journal of Physical Chemistry C; The Journal of Physical Chemistry Letters.
- **Reviewer** for NSF Graduate Research Fellowship Program (GRFP)
- **Reviewer** for federal research grant proposals.
- **Judge** for the student poster competition at the ASME InterPACK (International Technical Conference and Exhibition on Packaging and Integration of Electronic and Photonic Microsystems), San Diego, CA, Oct. 2023.
- **Judge** for the NSF student poster competition at the ASME International Mechanical Engineering Congress and Exposition (IMECE), Columbus, Ohio, Nov. 2022.
- **Judge** for the NSF student poster competition at the ASME International Mechanical Engineering Congress and Exposition (IMECE), Pittsburgh, PA, November 2018.

INVITED TALKS & CONFERENCE PRESENTATIONS

Invited Talks

10. Tianli Feng, "Prediction and understanding of thermal transport at ultra-high temperatures", **ASME Summer Heat Transfer Conference** in Anaheim, CA, Jul. 2024.
9. Tianli Feng, "Accurate first-principles prediction of thermal and mechanical properties of ultra-high temperature ceramics", **47th International Conference and Exposition on Advanced Ceramics and Composites** in Daytona Beach, Florida, USA, Jan. 2023.
8. Tianli Feng, "Pushing the Frontiers of Thermal Transport Predictions", **University of California, Riverside,** ECE Colloquium, Oct. 2022.
7. Tianli Feng, "Four-Phonon Scattering - A Critical Process Ignored for Half Century", **University of Utah**, MSE seminar series, Mar. 2022.
6. Tianli Feng, "Progress in Four-Phonon Scattering Calculations", **Materials Quantum Characteristics and Computational Condensed Matter Physics Conference**, Chongqing, (Online) December 2021.
5. Tianli Feng, "Four-Phonon Scattering - A Critical Process Determining Thermal and Radiative Properties", **Materials Research Society** (MRS) Fall Meeting, Boston, MA, November 2021.
4. Tianli Feng (together with Prof. Xiulin Ruan) "Four-phonon scattering: an ignored phonon scattering mechanism for decades", **IMECE**, Pittsburgh, November 2018.
3. Tianli Feng, "Theoretical phonon spectroscopy using predictive atomistic simulations", **Condensed Matter & Optics Seminars**, Vanderbilt University, February 2018.
2. Tianli Feng, "Theoretical Phonon Spectroscopy Using Predictive Atomistic Simulations", **University of Minnesota Twin Cities**, August 2017.
1. Tianli Feng, "Theoretical Phonon Spectroscopy Using Predictive Atomistic Simulations", **Computational Material Online Seminar**, July 2017.

Conference Presentations

Feng group members' presentations:

- Hao Zhou, Khalid Adnan, Bryce Rundell, Tianli Feng, "Thermal Boundary Conductance in GaN/AlN Heterostructures Simulated by Machine Learning Interatomic Potentials", IMECE, Portland, OR, Nov. 2024.
- Hao Zhou, Shuxiang Zhou, Zilong Hua, Kaustubh Bawane, Tianli Feng, "Sensitivity of Higher-Order Interatomic Force Constants and Thermal Conductivity to the Energy Surface Roughness of Exchange-Correlation Functionals", IMECE, Portland, OR, Nov. 2024.
- Hao Zhou, Shuxiang Zhou, Zilong Hua, Kaustubh Bawane, Tianli Feng, "Effect of Classical Statistics on Phonon-Phonon and Phonon-Isotope Scattering and Thermal Conductivity of Bas and Diamond", IMECE, Portland, OR, Nov. 2024.
- Jacob Crossley, Tianli Feng, "Unified model for thermal conductivity of phonon and gas particles", SHTC, Anaheim, CA, Jul. 2024.
- Jacob Crossley, Tianli Feng, Poster "Unified model for thermal conductivity of phonon and gas particles", SHTC, Anaheim, CA, Jul. 2024.
- Hao Zhou, Tianli Feng, "Thermal conductivity of BAs under irradiation", IMECE, New Orleans, LA, Nov. 2023
- Janak Tiwari, Tianli Feng, "First-principles prediction of thermal conductivity of Al2O3 at ultra-high temperatures", IMECE, New Orleans, LA, Nov. 2023
- Hao Zhou, Tianli Feng, "On the flattening trend of thermal conductivity of La2Zr2O7 at ultra-high temperatures", IMECE, New Orleans, LA, Nov. 2023

Tianli Feng's Presentations

- Tianli Feng, Janak Tiwari, "First-Principles Prediction of Photon Thermal Conductivity in Crystals", IMECE, Portland, OR, Nov. 2024.

- Tianli Feng, "Career: Prediction and Understanding of Thermal Transport Across Successive Interfaces", IMECE, Rising Stars of Mechanical Engineering Celebration & Showcase, Portland, OR, Nov. 2024.
- Tianli Feng, Khalid Adnan, "Phonon thermal transport across successive interfaces", MRS Spring, Seattle, WA, Apr. 2024.
- Tianli Feng, Hao Zhou, Janak Tiwari, "High thermal conductivity of cubic SiC", ASME InterPACK International Technical Conference and Exhibition on Packaging and Integration of Electronic and Photonic Microsystems, San Diego, CA, Oct. 2023.
- Janak Tiwari, Xiaolong Yang, Tianli Feng, "First principles prediction of thermal conductivity at ultrahigh temperatures", Materials Research Society (MRS) Spring Meeting, San Francisco, CA, Apr. 2023.
- Rui Xie, Janak Tiwari, Tianli Feng, "Spectral Phonon Transport Across Interfaces: The Effects of Interfacial Engineering", Materials Research Society (MRS) Spring Meeting, San Francisco, CA, Apr. 2023.
- Rui Xie, Janak Tiwari, Tianli Feng, "Spectral Phonon Transport Across Interfaces: The Effects of Interfacial Engineering", IMECE, Columbus, Ohio, Nov. 2022
- Janak Tiwari, Tianli Feng, "First Principles Prediction of Thermal Conductivity at Ultra-High Temperatures", IMECE, Columbus, Ohio, Nov. 2022
- Janak Tiwari, Tianli Feng, "First principles prediction of thermal conductivity of ZrC and HfC at ultrahigh temperatures", Ultra-High Temperature Ceramics (UHTC): Materials for Extreme Environment Applications V, An ECI Conference Series, Snowbird, Utah, June 2022.
- Xiaolong Yang, Janak Tiwari, Tianli Feng, "First principles prediction of thermal conductivity of UO2 over a wide temperature range", Materials Research Society (MRS) Spring Meeting, Honolulu, Hawaii, May 2022.
- Tianli Feng, A. O'Hara, S. T. Pantelides, "Quantum prediction of ultra-low thermal conductivity in lithium intercalation materials", Materials Research Society (MRS) Fall Meeting, Boston, MA, November 2021.
- Tianli Feng, A. Rai, D. Hun, S. S Shrestha, "Revealing Energy Accommodation Between Gases and Polymers for High-Efficiency Thermal Insulation", ASME 2020 International Mechanical Engineering Congress & Exposition (IMECE), Virtual Conference.
- T. Feng, J. He, A. Rai, D. Hun, J. Liu, S. S Shrestha, "Discovering Size Effect of Thermal Conductivity of Amorphous Polymers", ASME 2020 International Mechanical Engineering Congress & Exposition (IMECE), Virtual Conference.
- Tianli Feng, Y. Zhong, J. Shi, X. Ruan, "Unexpected high inelastic phonon transport across solid-solid interface: Modal nonequilibrium molecular dynamics simulations and Landauer analysis", Materials Research Society (MRS) Spring Meeting, Phoenix, AZ, April 2019.
- Tianli Feng, X. Wu, X. Yang, P. Wang, L. Zhang, X. Du, X. Wang, S. T. Pantelides,"Ultra-Low and Anisotropic Thermal Conductivities of Quasi-1D ZrTe5 and HfTe5 Single Crystals", Materials Research Society (MRS) Spring Meeting, Phoenix, AZ, April 2019.
- Tianli Feng and Sokrates Pantelides, "Ultra-low and anisotropic thermal conductivity of quasi-1D single-crystalline ZrTe5", Materials Research Society (MRS) Fall Meeting, Boston, MA, November 2018.
- Tianli Feng, Xiaolong Yang, Xiulin Ruan and Sokrates Pantelides, "First-Principles Prediction of Temperature Dependent Phonon Energy Shifts of Boron Nitride", ASME 2018 International Mechanical Engineering Congress & Exposition (IMECE), Pittsburgh, PA, November 2018.
- Tianli Feng and Sokrates Pantelides, "Accurate First-Principles Prediction of Temperature-Dependent Phonon Energy Shifts", American Physical Society (APS) March Meeting, Los Angeles, CA, March 2018.

- Tianli Feng and Xiulin Ruan, “Phonon transport in defected graphene and graphene nanomesh”, ASME 2016 International Mechanical Engineering Congress & Exposition (IMECE), Phoenix, AZ, November 2016.
- Tianli Feng and Xiulin Ruan, “First principles prediction of importance of four-phonon scattering in Si and BAs”, ASME 2016 International Mechanical Engineering Congress & Exposition (IMECE), Phoenix, AZ, November 2016.
- Tianli Feng, Wenjun Yao, Zuyuan Wang, Jingjing Shi, Chuang Li, Bingyang Cao, and Xiulin Ruan, “Spectral phonon temperature as an effective tool to predict the ballistic and diffusive transport in nanomaterials and across interfaces”, ASME 2016 International Mechanical Engineering Congress & Exposition (IMECE), Phoenix, AZ, November 2016.
- Tianli Feng, Bo Qiu, and Xiulin Ruan, “Coupling between Phonon-Phonon and Phonon-Impurity Scattering: A Critical Revisit of the Spectral Matthiessen’s Rule”, ASME 2015 International Mechanical Engineering Congress & Exposition (IMECE), Houston, TX, November 2015.
- Tianli Feng and Xiulin Ruan, “Quantum mechanical prediction of four-phonon scattering rates and reduced thermal conductivity of solids”, ASME 2015 International Mechanical Engineering Congress & Exposition (IMECE), Houston, TX, November 2015.
- Tianli Feng, Bo Qiu, and Xiulin Ruan, “Coupling between Phonon-Phonon and Phonon-Impurity Scattering: A Critical Revisit of the Matthiessen Rule”, 32nd International Thermal Conductivity Conference (ITCC) & 20th International Expansion Symposium (IES), West Lafayette, IN, April 2014.