

Zherui Han

Postdoctoral Scholar, Electrical Engineering

Bio

BIO

Zherui Han received his Ph.D. (2024) in Mechanical Engineering from Purdue University, and B.S. (2019) in Energy and Power Engineering from Huazhong University of Science and Technology in China. He is a recipient of Purdue's Ross Fellowship and Bilsland Dissertation Fellowship. He is now a postdoc at Stanford developing theory for thermal and electronic transport in 2D systems and devices. His prior works include first-principles modeling of phonon dynamics.

PROFESSIONAL EDUCATION

- Ph.D., Purdue University , Mechanical Engineering (2024)
- B. E., Huazhong University of Science and Technology , Energy and Power Engineering (2019)

STANFORD ADVISORS

- Eric Pop, Postdoctoral Faculty Sponsor

LINKS

- Research website: <http://zrhan.notion.site>

Publications

PUBLICATIONS

- **Effects of four-phonon scattering on phonon hydrodynamics in monolayer graphene** *PHYSICAL REVIEW B*
Li, X., Han, Z., Ruan, X., Shi, L.
2025; 112 (10)
- **High-Order Anharmonicities Shape Phonon Hydrodynamic Effects in Graphene.** *Nano letters*
Tur-Prats, J., Han, Z., Beardo, A., Ruan, X., Alvarez, F. X.
2025
- **Phonon local non-equilibrium at Al/Si interface from machine learning molecular dynamics** *JOURNAL OF APPLIED PHYSICS*
Khot, K., Xiao, B., Han, Z., Guo, Z., Xiong, Z., Ruan, X.
2025; 137 (11)
- **Anisotropic anharmonicity dictates the thermal conductivity of β -Ga₂O₃** *PHYSICAL REVIEW B*
Alkandari, A., Han, Z., Guo, Z., Beechem, T. E., Ruan, X.
2025; 111 (9)
- **FOS: A fully integrated open-source program for Fast Optical Spectrum calculations of nanoparticle media** *COMPUTER PHYSICS COMMUNICATIONS*
Carne, D., Peoples, J., Guo, Z., Feng, D., Han, Z., Liu, X., Ruan, X.
2025; 307
- **First-principles prediction of zone-center optical phonon linewidths and IR spectra of hexagonal boron nitride** *APPLIED PHYSICS LETTERS*

Guo, Z., Sokalski, P., Han, Z., Cheng, Y., Shi, L., Taniguchi, T., Watanabe, K., Ruan, X.

2024; 125 (23)

● **First-principles prediction of thermal conductivity of bulk hexagonal boron nitride** *APPLIED PHYSICS LETTERS*

Guo, Z., Han, Z., Alkandari, A., Khot, K., Ruan, X.

2024; 124 (16)

● **Near-field radiation in BAs and BSb dominated by four-phonon scattering** *PHYSICAL REVIEW B*

Feng, D., Yang, X., Han, Z., Ruan, X.

2024; 109 (8)

● **Sampling-accelerated prediction of phonon scattering rates for converged thermal conductivity and radiative properties** *NPJ COMPUTATIONAL MATERIALS*

Guo, Z., Han, Z., Feng, D., Lin, G., Ruan, X.

2024; 10 (1)

● **Machine Learning Designed and Experimentally Confirmed Enhanced Reflectance in Aperiodic Multilayer Structures** *ADVANCED OPTICAL MATERIALS*

Chowdhury, P., Khot, K., Song, J., He, Z., Kortge, D., Han, Z., Bermel, P., Wang, H., Ruan, X.

2024; 12 (4)

● **Predictions and measurements of thermal conductivity of ceramic materials at high temperature** *PHYSICAL REVIEW B*

Han, Z., Xiong, Z., Riffe, W. T., Schonfeld, H. B., Segovia, M., Song, J., Wang, H., Xu, X., Hopkins, P. E., Marconnet, A., Ruan, X.

2023; 108 (18)

● **Thermal conductivity of monolayer graphene: Convergent and lower than diamond** *PHYSICAL REVIEW B*

Han, Z., Ruan, X.

2023; 108 (12)

● **Fast and accurate machine learning prediction of phonon scattering rates and lattice thermal conductivity** *NPJ COMPUTATIONAL MATERIALS*

Guo, Z., Chowdhury, P., Han, Z., Sun, Y., Feng, D., Lin, G., Ruan, X.

2023; 9 (1)

● **Temperature-dependent full spectrum dielectric function of semiconductors from first principles** *PHYSICAL REVIEW B*

Han, Z., Lee, C., Song, J., Wang, H., Bermel, P., Ruan, X.

2023; 107 (20)

● **Prediction of hot zone-center optical phonons in laser-irradiated molybdenum disulfide with a semiconductor multitemperature model** *PHYSICAL REVIEW B*

Han, Z., Sokalski, P., Shi, L., Ruan, X.

2023; 107 (4)

● **Effects of hot phonons and thermal stress in micro-Raman spectra of molybdenum disulfide** *APPLIED PHYSICS LETTERS*

Sokalski, P., Han, Z., Fleming, G., Smith, B., Sullivan, S. E., Huang, R., Ruan, X., Shi, L.

2022; 121 (18)

● **Abnormal in-plane thermal conductivity anisotropy in bilayer a-phase tellurene** *INTERNATIONAL JOURNAL OF HEAT AND MASS TRANSFER*

Cheng, Y., Yang, X., Han, Z., Wu, W., Luo, X., Ruan, X.

2022; 192

● **Raman Linewidth Contributions from Four-Phonon and Electron-Phonon Interactions in Graphene** *PHYSICAL REVIEW LETTERS*

Han, Z., Yang, X., Sullivan, S. E., Feng, T., Shi, L., Li, W., Ruan, X.

2022; 128 (4): 045901

● **FourPhonon: An extension module to ShengBTE for computing four-phonon scattering rates and thermal conductivity** *COMPUTER PHYSICS COMMUNICATIONS*

Han, Z., Yang, X., Li, W., Feng, T., Ruan, X.

2022; 270