Sina Jafari Ghalekohneh

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Academic Qualifications

University of Houston **Houston, USA**

Ph.D. of Mechanical Engineering, GPA: 3.88/4 *2021-Present*

- *Nanomaterials and Solar Energy, A*
- *Method of Applied Math I, A*
- *Conduction and Radiation, A-*
- *Fluid Dynamics I, A*
- *Convective Heat Transfer, B+*
- *Semiconductor Materials, A*
- *Engineering Heat Transfer, A*
- *Photonics for Renewable Energy, A*

University of Tehran **Tehran, Iran**
M.Sc. of Mechanical Engineering, GPA: 3.65/4 *2016-2019*
Isfahan University of Technology **Isfahan, Iran**
B.Sc. of Mechanical Engineering, GPA: 3.84/4 *2012-2016*
NOET(National Organization of Exceptional Talents) High School **Yazd, Iran**
Diploma In Physics and Mathematics, GPA: 4/4 *2008-2012*

Research Interests

- Radiative Heat Transfer
- Optics and Photonics
- Solar Energy Harvesting Systems
- Energy Storage
- Micro/Nanotechnology

Journal Publication

- **Jafari Ghalekohneh, Sina**., Bo Zhao, 2025, “Perfect Heat Circulation and Rectification”, *Under Review.* (2025).
- **Jafari Ghalekohneh, Sina**., Bo Zhao, 2025, “Asymmetric Thermal Conductivity Mediated by Nonreciprocal Polaritons”, *Under Review*.

- **Jafari Ghalekohneh, Sina**., Bo Zhao, 2025, “Nonreciprocal Hyperbolic Surface Plasmon Polariton Propagation”, To be submitted soon.

- **Jafari Ghalekohneh, S**.*, Noh, B.*, Chen, M., Shen, J., Janzen, E., Zhou, L., Chen, P., Edgar, J., Zhao, B.^, and Dai, S.^, 2025, “Mode Conversion of Hyperbolic Phonon Polaritons in Engineered van der Waals structures,” *Under review (Nature Communication)*.
- Bardia Nabavi, **Sina Jafari Ghalekohneh**, Hervé Ness, Dimitar Pashov, Mark van Schilfgaarde, Ian Leahy, Anthony Rice, Kirstin Alberi, and Bo Zhao, 2025, “Observing Strong Optical Nonreciprocity from Magnetically Doped Dirac Semimetals”, To be submitted soon.

- Nabavi, B**., Jafari Ghalehkohne, S**., Shayegan, K., Tervo, E., Atwater, H., and Zhao, B., 2025, “High-Temperature Strong Nonreciprocal Thermal Radiation from Semiconductors”, *ACS Photonics*, Vol. 12, p. 2767.

- **Jafari Ghalekohneh, S**.*, Do, B.*, Adebiyi, T., Zhao, B.^, and Zhang, R.^, 2024, “Automated Design of Nonreciprocal Thermal Emitters via Bayesian Optimization,” *Journal of Quantitative Spectroscopy and Radiative Transfer*, Vol. 331, p. 109260.

- **Jafari Ghalekohneh, S.**, Changkang, D., Zhao, B., 2024, "Controlling The Contrast Between Absorptivity and Emissivity in Nonreciprocal Thermal Emitters", ***Applied Physics Letter***. **[Editor's Pick] [Featured Article]**

- **Jafari Ghalekohneh, S.**, Zhao, B., 2022, "Nonreciprocal Solar Thermophotovoltaics", ***Physical Review Applied.*** Priority application number US 63/330,426, **Worldwide Media Report** from Interesting Engineering, Aljazeera.net, PVbuzz Media, eeDesignIt, AZO CleanTech, Mirage News, Innovation News Network, Bioengineer.org, Science Daily, Techi AI, BusinessNews, Houston News, The Science Times, Innovation News Network, List Solar, TechiAzi, Smartech Energy, New Jersy Updates, TechNewsBoy, Engineers Forum, My Crush, Technology Networks, The Brighter Side, Atlantis Rising, Mercom India, Lab Roots, Innovation Toronto, Brightly News, India Education Diary, Innovation Map, Nasdaq, BusinessNews, HydrogenFuelNews, List Solar, PV Magazine,UH news, and Optics.org

Patent

- U.S. Patent application 63/330,426, "Nonreciprocal Solar Thermophotovoltaics", April 13, 2022

- "Perfect Heat Rectification and Circulation", 2025

Conference and Presentations

- MRS Spring Meeting and Exhibit (2025)
- ASME IMECE (2024, Best Presentation Award)
- ASME Summer Heat Transfer Conference (2024)
- RE+ Renewable Energy (2023)
- 14th World Conference on Thermophotovoltaic Generation (2023)
- ASME Summer Heat Transfer Conference (2023)

Research Experience

- Member of Thermal PhotoniX Lab, School of Mechanical Engineering, University of Houston
  - Implemented Finite-Difference Frequency-Domain (FDFD) analysis to study the electromagnetic mode conversion in a waveguide system.
  - Implemented Rigorous Coupled-Wave Analysis (RCWA) to design high performance nonreciprocal thermal emitter and also design emitters for radiative cooling.
  - Developed a numerical method to solve complex dispersion relations.
  - Developed a physics-based optimization algorithm to optimize the performance of radiative thermal systems, improving solar thermophotovoltaic system efficiency to 93.3%.
  - Applied Bayesian optimization techniques for design and process improvements in thermal emitters.
  - Conducted hands-on, high-impact research in emissivity and reflectivity, leveraging Fourier Transform Infrared (FTIR) and Ultraviolet-Visible (UV-vis) Spectroscopy to enhance process control in thermal systems.
  - Designed a Heat Circulator and Heat Rectifier by creating a new code package using ray tracing technology in thermal systems.

- Member of NEMS/MEMS Lab, School of Electrical Engineering, University of Tehran
  'Photolithography, Using SEM measurement equipment, Physical Vapor Deposition, Soft-Lithography'

Technical and Personal skills

- **Programming Languages:** Proficient in: Matlab
- **Software Skills:** Comsol , Matlab, Most MS Office products including Word, Excel, and PowerPoint

Awards and Honors

- Entrepreneur lead of **NSF I-CORPS** program
- **TEX-E** Fellow
- Ranked in the top 10% in GPA among all undergraduate students of the Mechanical Engineering Department, Isfahan University of Technology
- Admitted to the NODET high school (National Organization for Development of Exceptional Talents), (Reputed as the best high school in Iran), (2008)
- Ranked 86 among all participants in the Wide National University Entrance Exam for graduate program in Iran. (2016)
- Accepted at University of Tehran (reputed as the best university in Iran) in master degree (2016)
- Accepted at Isfahan University of Technology (reputed as one of the best universities in Iran) in bachelor degree (2012)
- Full scholarship to study undergraduate program at Isfahan University of Technology
- Head of Student Association of Nanotechnology of Yazd University (2014-2015)