

February 29, 2024

# Nanophotonic and Optoelectronic Control of Thermal Radiation for Heat Transfer and Energy Conversion



## Bo Zhao

*Kalsi Assistant Professor  
Department of  
Mechanical Engineering*

*University of Houston*

## ABSTRACT:

Radiative energy transport process plays a fundamental role in advanced heat transfer and energy conversion systems. Conventionally, the performance of these systems is subject to the fact that thermal radiation is broadband, the transport must obey reciprocity, and its intensity must be lower than the blackbody limit. In this talk, I will discuss how nanophotonics and optoelectronics enable us to overcome these constraints and control thermal radiation effectively. I will show how to manipulate thermal plasmon and phonon polaritons in nanostructures to control the spectrum and reciprocity of thermal radiation, and how to utilize near-field techniques and optoelectronic approaches to respectively control the density of state and the chemical potential of photons for super-Planckian thermal radiation. I will talk about the applications that can be enabled by controlling photon transport in heat transfer, energy conversion, and power electronics.

## BIOGRAPHY:

Bo Zhao is Kalsi Assistant Professor in the Mechanical Engineering at University of Houston. He received his Ph.D. in Mechanical Engineering from the Georgia Institute of Technology, and was a postdoctoral research associate at Stanford University in Electrical Engineering before joining the University of Houston. His research interests are photonics and its applications in advanced thermal and energy systems. He received the best poster award in the 2013 ASME International Mechanical Engineering Congress & Exposition and the 2023 Elsevier/JQSRT Raymond Viskanta Young Scientist Award. Several of his work has been recognized as highly-cited, cover, or featured articles.