Dr. Hua Bao

*University of Michigan - Shanghai Jiao Tong University Joint Institute*

will present a seminar on

**Numerical Investigations of the Thermal Transport Properties at Micro/Nanoscale**

Thermal transport properties are key issues limiting many important energy transport and conversion applications, such as thermal management of electronic devices and thermoelectrics. It is thus highly desirable to develop a deeper understanding of the thermal transport in nanostructures, across materials interfaces, and in a composite material. Due to the mesoscopic nature of these heat transfer problems, simulations from the continuum scale down to atomistic scale need to be performed. In this presentation, a few recent works in my group on the topic of numerical simulation of micro/nanoscale heat transfer will be presented. The first part will cover a finite element simulation of heat transfer in a high filler loading particle filled composite materials. We find that the proximity effect between particles is the key issue to achieve high effective thermal conductivity. The second part will cover a molecular dynamics investigation of heat transfer across a confined thin film. We show that the thickness and atomic arrangement have strong effects on the heat transfer across this film. The third part will cover the atomistic scale simulation of thermal conductivity of solid materials from first principles and molecular dynamics simulations. The mode-resolved heat transfer properties of two-dimesional silicene and bismuth telluride quintuple layers be obtained.

**About the speaker:** Hua Bao received his B.S. in Department of Physics from Tsinghua University, China, in 2006. He then obtained his Ph.D. from Purdue University in 2012. He is now an assistant professor at University of Michigan-Shanghai Jiao Tong University Joint Institute in Shanghai. His research interest is micro/nanoscale energy transport and conversion, and the applications on thermal management and renewable energy. He has published 23 journal papers in relevant topics.