

The Spring 2022 Seminar Series in Chemical Engineering Presents:

Extremes of Heat Conduction: Pushing the Limits of Thermal Transport

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Zoom Simulcast: <https://uri-edu.zoom.us/j/93044052368>



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Abstract: Rapid miniaturization and faster working speeds in electronic devices has led to mean-free-paths of energy carriers approaching or even surpassing typical length scales in materials, thus rendering the use of the macroscopic Fourier's law ineffective in describing the thermal conductivity in these devices. However, thermal conductivity of the constituent materials in the nano-devices, even though a very critical parameter in their design, is mostly an afterthought and the thermal performance of the device is mainly controlled through packaging techniques. It would be advantageous for a diverse spectrum of technologies, to control and tune their thermal properties at the submicron length scale and femto-to-picosecond time scales. Therefore, a comprehensive understanding of how heat flows across nanosystems and identifying the limits of thermal transport and what we can do to possibly approach them would prove to be quintessential for the design of the next generation of electronic devices. In this talk, I will focus on some of our works that have pushed the limits to heat transfer and drastically increased the understanding of heat conduction on the atomic and nanometer scales.

Bio: Ashutosh Giri received his B.S. degree in Physics from Adelphi University in 2010 and his M.S. degree in Mechanical Engineering from University of Pittsburgh in 2012. In 2016, he received his Ph.D. from University of Virginia. After his Ph.D. he worked as a senior scientist at University of Virginia focusing on developing a microscopic understanding of thermal transport at the nanoscale through developing novel experimental and computational methods to study electron and phonon thermal transport and coupling of different energy carriers across interfaces, thin films, and hybrid material systems. He recently won the ONR Young investigator Program award and has authored more than 70 peer-reviewed journal publications.