

DEPARTMENT OF MECHANICAL ENGINEERING

WILLIAM MAXWELL REED SEMINAR SERIES

“Nanoscale to Megascale Thermal Engineering: A Path to Sustainable Energy”

Bikram Bhatia, Ph.D.
University of Louisville

Abstract: Heat transfer processes serve as the backbone of our energy systems. The key to efficient, sustainable energy conversion relies on delivering heat at a higher temperature, rejecting heat at a lower temperature and utilizing renewable energy resources to do so. In this talk, I will present our work on multiscale engineering of thermal processes to achieve high-efficiency energy conversion from ambient sources including waste heat, low-temperature upper atmosphere and the sun. At the nanoscale, I will describe our work enabling high-power-density thermal-to-electric energy conversion using pyroelectric thin films. At the centimeter-scale, I will present a novel directional approach to achieving passive cooling below ambient temperature using commonly available materials by exploiting the high transparency of earth’s atmosphere in mid-infrared wavelengths and the angular confinement of the sun. At the meter-scale, I will demonstrate high-efficiency solar-to-thermal energy conversion using custom-fabricated thermally insulating silica aerogels with record-high solar-transparency. These advances in thermal engineering, from the nanoscale to megascale, offer compelling solutions to the problems of waste heat harvesting, solid-state cooling and solar-thermal energy conversion – significant challenges on our path towards a sustainable energy future.

Bio: Bikram Bhatia is an Assistant Professor in the Department of Mechanical Engineering at the University of Louisville. Prior to joining UofL in August 2019, he was a research scientist at Massachusetts Institute of Technology where he worked on opto-thermal systems for concentrated solar power and radiative cooling applications. During his graduate studies, he investigated waste heat harvesting in nanoscale pyroelectric films. Bikram received his B.Tech. from the Indian Institute of Technology Guwahati in 2008, and Ph.D. in mechanical engineering from the University of Illinois Urbana Champaign in 2014.

Date: Friday, Sep. 20th

Place: CB 106

Time: 3PM

Contact: Dr. Alexandre Martin 257-4462

Meet the speaker and have refreshments
Attendance open to all interested persons