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Energy Transfer and Conversion in Nanoscale Gaps



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ABSTRACT:

Understanding radiative heat transfer in nanoscale gaps and devices is of considerable interest for creating novel energy conversion devices. In this talk, I will first describe ongoing efforts in our group to experimentally elucidate nanoscale radiative heat transfer. Specifically, I will present our recent experimental work where we have addressed the following questions: Can existing theories accurately describe radiative heat transfer in single nanometer sized gaps? Can radiative thermal conductances that are orders of magnitude larger than those between blackbodies be achieved? In order to address these questions we have developed a variety of instrumentation including novel nanopositioning platforms and microdevices, which will also be described. Further, I will discuss possible applications of near-field thermal radiation for energy conversion and photonic cooling. Finally, I will briefly outline how these technical advances can be leveraged for future investigations of nanoscale heat transport and near-field thermophotovoltaic energy conversion.

BIOGRAPHY:

Prof. Pramod Reddy received a B. Tech and M. Tech in Mechanical Engineering from the Indian Institute of Technology, Bombay in 2002, and a Ph.D. in Applied Science and Technology from the University of California, Berkeley in 2007. He was a recipient of the NSF CAREER award in 2009, the DARPA Young Faculty Award in 2012, the Young Alumnus Achiever Award from IIT Bombay in 2017 and the University Distinguished Faculty Achievement Award from the University of Michigan in 2020. He is currently a professor in the departments of Mechanical Engineering and Materials Science and Engineering at the University of Michigan, Ann Arbor.