Mechanical Engineering Department Seminar

3:35pm February 18, 2015
1130 Mechanical Engineering
111 Church Street SE, Minneapolis, MN 55455

Ultrafast Optical Characterization of Thermal Transport in Micro/Nanostructured Materials

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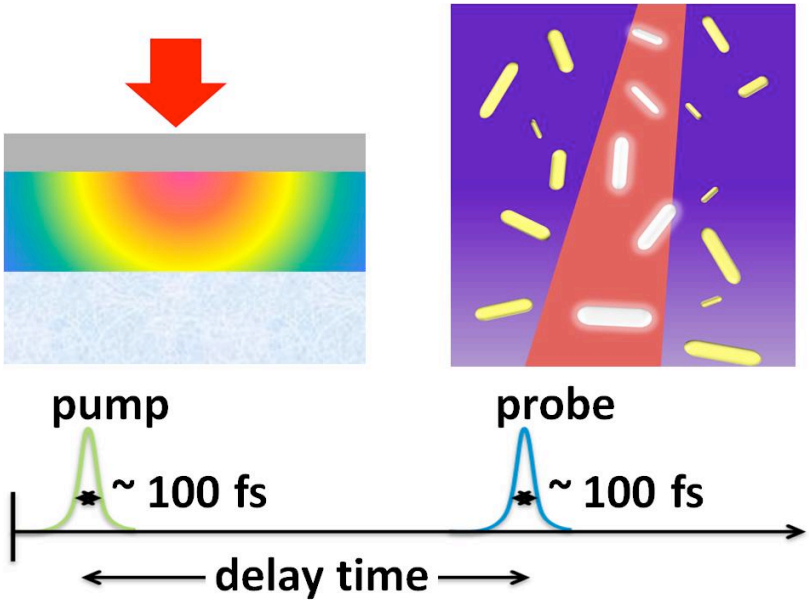
Micro/nanostructured materials behave differently from their macroscale counterparts with regards to thermal energy transport at short time and length scales. The study of micro/nanostructures with thermal properties engineered for energy conversion has emerged as a new frontier in thermal sciences. One of the grand challenges in this area is to achieve sufficient spatial and temporal resolutions for accurate thermal measurements of these materials. This seminar will emphasize how Time-Domain ThermoReflectance (TDTR), an ultrafast-laser-based technique, is used to probe thermal properties with microscale spatial resolution and subpicosecond temporal resolution. Examples include: 1) pushing the extremes of thermal transport in structurally engineered organic materials for better thermal management and isolation; 2) nanoparticle-assisted localized heating for photothermal therapy and bio-sensing; and 3) thermally induced magnetic Kerr rotation as a novel way to explore the dynamics of thermal transport with improved measurement sensitivity.



Bio: Xiaojia Wang became an assistant professor in the Department of Mechanical Engineering at the University of Minnesota, Twin Cities in 2014. Prior to this, she was a postdoctoral research associate in the Department of Materials Science and Engineering at the University of Illinois at Urbana-Champaign. She received her Ph.D. in Mechanical Engineering from the Georgia Institute of Technology in 2011, and her M.S. in 2007 and B.S. in 2004 from Xi'an Jiaotong University, China, all in Mechanical Engineering. Her current research focuses on utilizing ultrafast optical techniques to characterize thermal transport in micro/nanostructured materials and across material interfaces, and tailoring the radiative properties of micro/nanostructures for energy conversion and harvesting.