



Advancing Optical Manipulation and Measurement at the Nanoscale

Jingang Li

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Wednesday, Feb. 25th @ 2:00 pm in BRK 1001

Coffee and snacks served before seminar

also on [MS Teams](#)

Abstract: The exploitation of light has enabled key breakthroughs in many areas, including energy, manufacturing, imaging and sensing, and biology. Continuing development of these fields requires a deeper understanding of light-matter interactions across diverse time and length scales. In this talk, I will present novel optical technologies for versatile manipulation of nanomaterials and advanced characterization with high spatiotemporal resolution. First, I developed optothermal manipulation techniques to overcome the limitations of optical tweezers. Specifically, opto-refrigerative tweezers exploit laser cooling and thermophoresis to mitigate common optical heating damages, enabling non-invasive analysis of cells and biomolecules. Then, extending from fluid environments, I pioneered optical manipulation at solid surfaces, enabling optical assembly and nanomotors for next-generation lab-on-a-chip systems. Apart from those, I will show the implementation of an ultrafast optical nanoscopy by integrating pump-probe optics with near-field imaging. This platform reveals unprecedented insights into intriguing carrier dynamics and energy transport in various functional materials with nanoscale heterogeneity. Along the way, I will highlight the potential of these optical innovations to provide solutions to disease diagnosis, nanomanufacturing, and energy-efficient optoelectronic devices, as well as discuss their future improvement directions.

Bio: Jingang Li joined Purdue University as an assistant professor in School of Mechanical Engineering and School of Materials Engineering in Fall 2025. Prior to this, he completed postdoctoral training with Prof. Costas P. Grigoropoulos's in the Department of Mechanical Engineering at University of California, Berkeley. He received Ph.D. from the Department of Mechanical Engineering with Prof. Yuebing Zheng at The University of Texas at Austin and his B.Sc. in applied physics from University of Science and Technology of China. His research aims to understand fundamental opto-thermal processes and light-matter interactions and to develop novel laser processing and diagnostic technologies for nanotechnology, energy, electronics, and health.