

## **“On-Demand Assembly of Reconfigurable Architected Nanomaterials for Nanophotonics”**

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### Abstract:

Nanomaterials have dimensions below the wavelength of light and a variety of new optical phenomena can emerge when they are arranged into architected assemblies. In this talk, I present our progress in developing new optical manipulation techniques to assemble discrete colloidal nanoparticles into architected superstructures (also known as architected nanomaterials) for nanophotonics. Our opto-thermoelectric nanotweezers, bubble-pen lithography, and optothermally-gated photo nudging technique enable on-demand assembly of nanoparticles into various architected superstructures in solutions, on solid substrates, and in bulky solids. With their reconfigurability in particle spatial arrangement and their diversity in particle size, shape, and composition, these optically assembled superstructures serve as an ideal platform to explore emergent optical phenomena arising from the inter-particle coupling, opening a window of new opportunities for light control and applications. For example, by arranging semiconducting nanomaterials nearby to metal or dielectric nanoparticles, we direct energy and electron migration to enhance light absorption or emission processes, which are fundamental to solar energy conversion and optical communications. By exploiting chiral arrangement of nanoparticles to generate superchiral fields, we demonstrate surface-enhanced chiroptical spectroscopy for label-free enantiodiscrimination of chiral molecules. Challenges and opportunities of implementing the optically assembled architected nanomaterials in industrial products are also discussed.

### Biography:

Yuebing Zheng is an Associate Professor at the University of Texas at Austin. He is also holding the William W. Hagerty Endowed Faculty Fellowship in Engineering. Yuebing did postdoctoral research in Chemistry and Biochemistry (with Prof. Paul S. Weiss) at the University of California, Los Angeles from 2010 to 2013. He received his Ph.D. in Engineering Science and Mechanics (with Prof. Tony Jun Huang) from the Pennsylvania State University in 2010. His research group (<http://zheng.engr.utexas.edu>) innovates optical manipulation and measurement for nanoscale, biological and extraterrestrial world.