Polymer Program

INSTITUTE OF MATERIALS SCIENCE

Seminar: 11:10 am Friday, October 13

Science 1: Room 1002

Host: Luyi Sun

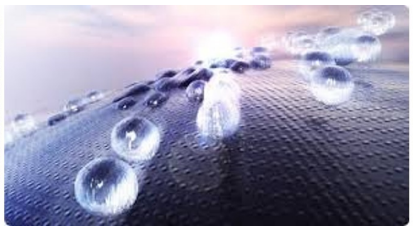
Kenan Song

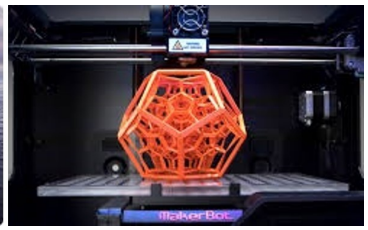
School of Engineering

Arizona State University

Advanced Composite Processing for Defense, Energy, and Biomedical Applications

Abstract: Advanced composite materials (ACMs), particularly those reinforced with nanoparticles (NpRPCs), boast a remarkable array of physical and chemical properties. The key to manufacturing high-performance nanocomposites lies in precise control over several processing factors. These factors encompass ensuring uniform dispersion of nanoparticles, fostering effective molecular-level interactions between the matrix and fillers, and orchestrating nanoparticle and polymer chain alignment. In this presentation, we delve into the intricacies of multilayer structures across various scales, ranging from the nano to the macro. We focus on their profound impact on the processing-structure relationship, with a particular emphasis on how nanoparticles assemble through different mechanisms. Our exploration encompasses both thermoplastic and thermoset polymer composites, as well as nanoparticles of diverse morphologies, such as one-dimensional fibers, two-dimensional coatings, and three-dimensional architectures facilitated by cutting-edge 3D printing technologies. We showcase a spectrum of applications, ranging from structural support systems and thermal dissipation solutions to electrical conductors, plastics recycling processes, stimuli-responsive systems, and tissue scaffolds. These applications hold immense promise in critical sectors such as national defense, space exploration, energy storage, and advancements in human healthcare.





Bio: Kenan Song is currently an Associate Professor at the University of Georgia (UGA). Before joining UGA in 2023, he was an Associate/Assistant Professor at Arizona State University (2017-2022) and finished his postdoc training at MIT (2015-2017). Dr. Song obtained his Ph.D. degree in Mechanical Engineering from Northeastern University (Boston, MA) in 2014 and his B.S. in Engineering Mechanics in 2010. Dr. Song's research interest includes the processing-structure-property relationships, especially the manufacturing, characterization, simulation, and application of polymer-based nanoparticle-filled composites, aiming for high performance in structural and functional utilization. Kenan Song's research is funded by the National Science Foundation (NSF), Department of Defense (DoD) AFOSR & ONR, Binational Science Foundation (BSF), Qatar National Research Fund (QNRF), American Chemistry Society (ACS) Petroleum Research Fund (PRF), Department of Health Services (DHS), philanthropic foundations, and industrial partners. In addition, Kenan Song has been the recipient of the NSF CAREER Award (2022), ACS PMSE Young Investigator Award (2022), SAMPE North America Young Professionals Emerging Leadership Award (YPELA) (2022), DHS New Investigator Award (NIA) and a few others.