

Multi-scale, Multi-material, and Multi-functional Additive Manufacturing of Bio-inspired Structures and Smart Devices

Dr. Yong Chen

Department of Aerospace and Mechanical Engineering
Epstein Department of Industrial and Systems Engineering
University of Southern California

March 7th, 2023, 11:00 am to 11:45am, Black 2004

Abstract:

Many natural structures out-perform conventional synthetic counterparts due to the specially evolved multi-scale, multi-material, and multi-functional architectures. However, most current 3D printing systems are designed to fabricate parts using a single material on a single scale, mainly for structural purposes. Such complex yet beautiful designs existing in natural structures are far beyond the fabrication capability of current 3D printing systems. This talk will report some of our recent work on developing new multi-scale, multi-material, and multi-functional additive manufacturing processes to fabricate bio-inspired structures and devices, including the lobster structure, the nacre shell structure, the *Salvinia Molesta* leave structure, the limpet tooth structure, etc. After a brief overview of current 3D printing technology, several additive manufacturing (AM) processes to fabricate complex reinforcement architectures, controlled material distribution, and functional surfaces will be presented. Some novel designs and promising applications enabled by the 3D-printed materials and structures will also be discussed. The talk will conclude with remarks and thoughts on future AM developments and potential opportunities for mechanical engineers.

Biography:

Dr. Yong Chen is a professor of Aerospace and Mechanical Engineering and Industrial and Systems Engineering at the University of Southern California (USC). His research focuses on additive manufacturing (3D printing) in micro- and meso-scales. He has published more than 190 publications in refereed journals and conferences and 19 issued and pending U.S. patents. He received over ten Best/Outstanding Paper Awards in major design and manufacturing conferences. Other major awards he received include the NSF CAREER Award and USC's Innovation Commercialization Awards. Dr. Chen is a Fellow of the American Society of Mechanical Engineers (ASME). He has served as conference/program chairs and keynote speakers in several international design and manufacturing conferences.

***This seminar counts towards the ME 600 seminar requirement
for Mechanical Engineering graduate students.**

me.iastate.edu