

Department of Biomedical Engineering

Seminar Series

Multiscale Computational Design of Functional Materials: from nature to engineer

Dr. Zhao Qin

PhD, Research Scientist
Civil and Environmental Engineering, MIT

Date:	April 10, 2019 (Wednesday)
Time:	3:00pm - 4:00pm
Venue:	Rm G7603, 7/F, Yeung Kin Man Academic Building

Abstract

Natural materials exhibit many fascinating functions (e.g., strength, low density, self-assembly, toughness, impact isolation) that take place at multiple scale levels. It is useful to decipher the mechanisms hidden behind and summarize design principles that has potential to improve the material functions of engineering materials such as steel, rubber and many synthetic composites for biomedical applications. In this talk, I will briefly introduce my recent study in multiscale computational modeling of several biological materials of mechanical advantages including silks, cytoskeleton networks, butterfly wings and lobster membranes. I will demonstrate how to use multiscale computational models to investigate their unique structure-mechanics relationships in a bottom-up manner. I will also discuss the opportunities of integrating computational modeling

with experimental characterizations and scanning for bio-mimicking designs, as well as development of 3D printing techniques for fast prototyping and interactive designs. I will illustrate how these different techniques can work collectively for innovative designs with bio-inspired functionalities for biomedical applications.

Biography

Dr. Zhao Qin graduated from the Department of Engineering Mechanics at Tsinghua University with Bachelor and Master Degrees in 2006 and 2008, respectively. He then went to MIT and received his PhD degree from Civil and Environmental Engineering department in 2012. After that he worked as a postdoc associate and teaching fellow. He has been working as a research scientist in the same department since 2013. His study focuses on material by design which generally covers advanced mechanical properties of nano and biological materials. By revealing how the chemical structures relate to mechanical and biological functions of biological materials via multiscale computational modeling, he designs functional materials accordingly for engineering applications. Besides computational modeling, He has been working on developing methods for additive manufacturing of materials with desired microstructures, associated with lightweight and high strength and toughness. He is also enthusiasm in class teaching and has incorporated things learned from research to lectures.

Enquiry: 3442 8420

All are Welcome!