

BME Spring 2024 Seminar Series

Mechanobiology: Tension to Function

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Thursday March 28, 2024 11am–12pm in UTEB 150



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Abstract: The tensegrity theory offers a foundational structural framework for understanding the hierarchical organization of living systems and the transmission of mechanical signals in cells and tissues. Yet, the dynamic assembly of tensegrity structures by living organisms remains a critical yet unresolved question at the heart of mechanobiology. In my talk, I will begin by exploring how cells sense mechanical force signals and how cellular forces are generated and transmitted within cells and tissues. I will then illustrate how cellular forces drive and guide directional molecular flows, essential to the formation of tensegrity structures. Through specific examples, I will further illuminate the dynamic exchange between mechanical and biochemical signals during growth and repair and discuss how this vital communication is disrupted in disease. Emphasis will be placed on the fundamental mechanics that is intertwined with the biochemical pathways, foundational for normal development, therapeutic intervention, and nanomedicine innovation.

Biography: Sulin Zhang received his PhD from the University of Illinois, Urbana-Champaign in 2002 from Theoretical and Applied Mechanics. He then worked as a postdoctoral fellow in the Department of Mechanical Engineering, Northwestern University. He is currently a Professor in the Department of Engineering Science and Mechanics at Penn State University, with courtesy appointments in Department of Biomedical Engineering and Department of Materials Science and Engineering. His research interests lie in the roles of mechanical forces and stresses in materials, chemistry, and biology. He is the recipient of the Early Career Development Award from National Science Foundation in 2007, the PSEAS Outstanding Research Award in 2016 from Penn State. Dr. Zhang is the founding Editor for Extreme Mechanics Letters, and an editorial board member for NPJ-Computational Materials.