“Multifunctional 3D Structures in Smart Polymers and Their Heterogeneous Integration with Other Functional Materials: From Assembly to Application”

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Abstract: Lightweight, multifunctional materials and thin structures that can not only carry loads, but also sense and reconfigure their shape in response to external stimuli are of increasing interest for many applications, including deployable structures, robotics, and biomedical devices. In this talk, I will discuss exploiting structural buckling to create flexible, multifunctional 3D mesoscale structures and electronics from thin-film materials, including polymers and their heterogeneous combination with metals and electronics. Both the fundamental buckling mechanics and a wide range of assembled 3D functional thin structures, including shape-programmable 3D structures, will be presented. In addition, reconfigurable 3D polymer structures that can actively change their geometries and thereby their functionalities upon external stimuli (magnetic fields and temperature) will be further discussed. The multifunctional, reconfigurable structures provide important insights for the development of adaptive structures and functional systems that can be applied in various fields.

Bio: Dr. Xueju “Sophie” Wang is currently an Assistant Professor in the Materials Science and Engineering and the Institute of Materials Science at the University of Connecticut (UConn). She obtained her Ph.D. degree in Mechanical Engineering at the Georgia Institute of Technology in 2016 and earned her bachelor’s degree in Chemical Engineering at the Dalian University of Technology in 2011. Before joining UConn, she was an Assistant Professor in Mechanical and Aerospace Engineering at the University of Missouri from 2018 to 2020 and a postdoctoral researcher in Materials Science and Engineering at Northwestern University from 2016 to 2018. Her research interests include structure-property-process relationships of advanced materials and functional structures for applications ranging from energy storage to flexible electronics. She is the recipient of the ASME Haythornthwaite Research Initiation Award, 1907 Women in Engineering Faculty Award, Coulter Program Award, Richard Wallace Faculty Incentive Grant Award, and Gary L. Cloud Scholarship Award (from Society for Experimental Mechanics).

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