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Macromolecules Innovation Institute (MII)

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Prof. Zhiting Tian

"Thermal Transport in Polymers and Hybrid Materials"

Virginia Tech, Assistant Professor
Department of Mechanical Engineering

Host: John Matson

Abstract: Understanding and manipulating thermal transport to our advantages are essential to intentionally design energy-efficient devices and systems while limiting deleterious effects of adverse temperatures on system performance. Thermal transport in polymers and hybrid organic-inorganic composites, however, remains largely unexplored territory. Their structural complexity poses significant challenges on the fundamental understanding but also offers new opportunities to achieve intriguing thermal properties because of more tuning knobs. In this talk, I will focus on two novel phenomena we discovered in polymers – thermal rectification and thermal switching, which laid the groundwork for organic thermal diodes and switches. I will also present the effects of chain confinement as well as morphology and topology on thermal conductivity of polymers. Last but not least, I will share our latest results on hybrid perovskites where we identified key mechanisms for their ultralow thermal conductivity. The fundamental knowledge gained from our studies is essential to diverse applications, ranging from thermoelectric energy conversion and thermal insulation that demands ultralow thermal conductivity to micro-electronics cooling that, in contrast, desires ultrahigh thermal conductivity.

Virginia Tech
Department of Mechanical Engineering
Office: 313A Goodwin Hall
Phone: (540) 231-6803
E-mail: Zhiting@vt.edu

Bio: Dr. Zhiting Tian is an Assistant Professor of Mechanical Engineering and an affiliated faculty member of Macromolecules Innovation Institute at Virginia Tech. She received her Ph.D. in Mechanical Engineering at MIT in 2014. Zhiting's most recent awards include NSF CAREER Award, ACS Petroleum Research Fund Doctoral New Investigator Award, 3M Non-Tenured Faculty Award, and College of Engineering Outstanding New Assistant Professor at Virginia Tech.

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