

MAE Seminar SERIES

THURSDAY,
FEBRUARY 17
3:30 PM
OBRIAN 112

ABSTRACT

Soft materials are materials of choice in diverse modern technologies ranging from soft robots, stretchable electronics, and water harvesting. In all these applications, the mechanical and physical properties of soft materials play an important role. My research is to leverage molecule design and theoretical modeling to understand the structure-property relationship of soft materials, thereby developing high-performing soft materials for long-term healthcare and sustainable water harvesting. In the first part of the talk, I will focus on fundamental problems associated with mechanical failures of soft materials and longevity of soft machines. First, I will explain three methods to toughen soft materials through bulk hysteric dissipation, near-crack dissipation by chain entanglement, and extreme toughening mechanism. Second, I will discuss the design of fatigue-resistant hydrogels by introducing intrinsically high-energy phases such as nanocrystalline domains. In the second part of the talk, I will focus on rational polymer-network design to achieve desired sorption properties of hydrogels for low-cost family-scale freshwater production. Specifically, I will discuss two molecular engineering approaches: plasticizer introduction and defect manipulation. I will conclude the talk with a perspective on future efforts in long-term healthcare and sustainable water harvesting enabled by extreme soft materials.

BIO SKETCH

Dr. Shaoting Lin holds the position of Postdoctoral Associate at MIT. He earned his Ph.D. degree (2019) at MIT and got his M.S. degree (2013) and B.S. degree (2010) at Tsinghua University. His Ph.D. focused on fundamental problems associated with mechanical failures of soft materials and longevity of soft machines. His research mission is to leverage molecular design and theoretical modeling to develop high-performing soft materials for long-term healthcare and sustainable water harvesting. As the first/co-first author, he published 17 papers in leading journals such as Sci. Adv., Nat. Commun., PNAS, JMPS, including 4 ESI Highly Cited Papers. His research work was featured in Nature, MIT News, BBC, Bloomberg, etc. He was the recipient of the Chinese Government Award for Outstanding Self-Financed Students Abroad (2018), the Den Hortog Travel Award in Mechanics (2015), Kaifeng Scholarship (Top 10 at Tsinghua University, 2008), and National Scholarship (Top 5% at Tsinghua University, 2007). In addition, he was the co-founder of the EASF forum, an online platform for graduate students, postdocs, and young faculties.



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