

# EML WEBINAR

ZOOM DISCUSSION: 271 079 684

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WEDNESDAY, 4 NOVEMBER 2020

9:30 AM BOSTON, 2:30 PM LONDON

3:30 PM PARIS, 10:30 PM BEIJING



# ZHIGANG SUO

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## TOPOLOGICAL ADHESION, WET AND ELASTIC

A soft biological tissue consists of water molecules and a polymer network. This molecular architecture enables two basic functions: wetness and elasticity. The water molecules provide liquid-like wetness to enable molecules and ions to react and migrate. The polymer network provides solid-like elasticity to enable large and reversible deformation. Since the 1960s, this molecular architecture has been mimicked with synthetic hydrogels. The integration of wet and elastic materials—biological and synthetic—underpins many technologies of our time, including wound closure, drug delivery, and bioelectronics. The integration poses a fundamental challenge: create tough adhesion that preserves wetness and elasticity. The liquid-like water molecules readily change neighbors, and contribute negligibly to tough adhesion. A tough adhesion must interlink the polymer networks of the two materials. Prior to the breakthrough in recent years, no wet, elastic, tough adhesion had been reported. For instance, cyanoacrylate forms a plastic, which blocks the permeation of water and other mobile species, and limits elasticity. Various protein-based tissue adhesives are fragile. This webinar describes the recent breakthrough in achieving wet, elastic, tough adhesion through the synergy of mechanics, chemistry, and topology.

**Zhigang Suo** is the Allen E. and Marilyn M. Puckett Professor of Mechanics and Materials at Harvard University. He grew up on the campus of Xian Jiaotong University, and graduated from its affiliated kindergarten, elementary school, middle school, and high school. He wrote his undergraduate thesis on coupled boundary and finite element methods, under Professor Xing Ji, at Xian Jiaotong University, in 1985. He wrote his PhD thesis on interfacial fracture mechanics, under Professor John Hutchinson, at Harvard University, in 1989. Suo joined the faculty of the University of California at Santa Barbara in 1989, Princeton University in 1997, and Harvard University in 2003. He writes papers under students and collaborators. His research centers on mechanics and materials

Discussion leader: **Professor Jimmy Hsia**, Nanyang Technological University

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