

Multiresponsive MXene Soft Robotics

Haozhe "Harry" Wang
Electrical and Computer Engineering Department
Duke University
Durham, NC 27708, USA

MXenes, a class of two-dimensional materials including transition metal carbides, nitrides, and carbonitrides, have garnered widespread interest for their exceptional characteristics. This presentation will cover the development of MXene-based actuators, highlighting their responses to thermal, optical, and moisture stimuli. We will showcase origami-inspired soft robotics utilizing MXene actuators and delve into our innovative fabrication of $\text{Ti}_2\text{C}_3\text{Tx}$ /cellulose soft robots. By examining nanocrystal, nanofiber, and microfiber cellulose phases, we aim to enhance actuation performance. Our findings reveal that the $\text{Ti}_2\text{C}_3\text{Tx}$ /cellulose actuators exhibit robust reactions to light, heat, and humidity, making them ideal for soft robotics and sensing technologies. Additionally, we will explore the underlying mechanisms of these multi-responsive actuators.