

# Chemistry-Centered Flexible Sensing and Actuation Systems for Advanced Human-Machine Interfaces

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Date: 12 March 2025  
Time: 3:00 pm - 4:00 pm  
Venue: LT-13, 4/F  
Yeung Kin Man Academic Building

### Abstract

Sensors and actuators are fundamental building blocks of next-generation human-machine interfaces. This talk presents our recent efforts to establish closed-loop, bidirectional communication and feedback within living systems, with an emphasis on the chemical dimension. The first part of the talk introduces a novel class of flexible, miniaturized probes inspired by biofuel cells for monitoring synaptic release of glutamate in the central nervous system. The resulting sensors can detect real-time changes in glutamate within the biologically relevant concentration range. These advances could aid in basic neuroscience studies and translational engineering, as the sensors provide a diagnostic tool for neurological disorders. The second part of the talk presents our recent work on a bio-integrated gustatory interface, "e-Taste," which addresses the underrepresented chemical dimension in current VR/AR technologies. This system facilitates remote perception and replication of taste sensations through the coupling of physically separated sensors and actuators with wireless communication modules. Together, these efforts aim to advance the co-design of systems capable of capturing signals and providing feedback, addressing the relatively underexplored chemical aspect in many fields.

### Biography

Jinghua Li received her B.S. degree in Biological Sciences from Shandong University, China, in 2011. She earned her Ph.D. from Duke University, United States, in chemistry in 2016. She spent 2016–2019 as a postdoctoral fellow at Northwestern University before joining the Department of Materials Science and Engineering at The Ohio State University as an assistant professor in 2019. Her two focus areas are: 1) fundamental understandings on synthesis chemistry and interfacial properties of thin-film materials as bio-interfaces; and 2) engineering efforts on application of these materials for the next generation wearable/implantable biomedical devices to bridge the gap between rigid machine and soft biology. Her faculty position is funded, in part, by the Discovery Themes Initiative in the area of Chronic Brain Injury, which has promoted faculty hires and support of critical materials needs in the areas of imaging, diagnosis, and treatment of brain injury. Dr. Li supports the Center for Design and Manufacturing Excellence, Nanotech West, and the Center for Electron Microscopy and Analysis with her expertise in the function of biomaterials.