



Jingyi Luan, Ph.D.

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Department of Mechanical Engineering

Date Friday, August 29, 2025

Time 12:00 to 1:00 PM

Location SEC 203

Title: *Designing functional nanoprobes for ultrasensitive and multiplexed biomarker detection*

Abstract: Fluorescent probes are the workhorse of fundamental and translational biomedical research as well as clinical diagnostics. However, low fluorescent signal-to-noise ratios and limitations in multiplexing capabilities remain persistent barriers to biomarker detection. The reliance on bulky readout instruments further limits their application in point-of-care settings.

In this presentation, I will highlight the development of nanoengineered fluorescent probes that achieve a 7,000-fold increase in brightness compared to conventional fluorophores, with minimal nonspecific binding. These advancements have enabled ultrasensitive sensing and imaging across a variety of biomarkers, analytical platforms, and clinical sample types. Additionally, I will demonstrate the design of programmable DNA nanoprobes for highly multiplexed biomarker detection and their application in advancing biomarker discovery for neurological diseases. Finally, I will introduce the use of cutting-edge nanotechnologies to measure disease biomarkers in dermal interstitial fluid, offering a minimally invasive alternative to traditional blood tests for point-of-care diagnostics.

Bio: Dr. Jingyi Luan is an Assistant Professor in the Department of Mechanical Engineering at the University of Houston. She earned her Ph.D. in Mechanical Engineering and Materials Science from Washington University in St. Louis in 2020. After completing her doctoral studies, she joined the Wyss Institute as a postdoctoral researcher in 2021. Her research at the University of Houston focuses on designing nanomaterials, biomaterials, and polymers, and integrating them to develop innovative biotechnologies aimed at advancing research and clinical diagnostics for cancer and neurological diseases. Dr. Luan has published over 25 journal articles, including *Nature Biomedical Engineering*, *Light: Science & Applications*, and *Nano Letters*, and has received multiple awards, including the McDonnell International Scholars Fellowship. Her research has also resulted in five patents and the founding of a start-up company, Auragent Bioscience.