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Designing nanomaterials and biomaterials for precision diagnostics



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ABSTRACT:

Achieving precision diagnostics requires better probing tools to capture disease signatures at the biomolecular level. Proteins can be the root cause of a disease, and they can be used to detect and cure it. However, the gap in protein sensing is the difficulty of simultaneously realizing high sensitivity (depth) and high multiplexity (breadth). The complex test procedures, along with bulky instruments, make such methods even less accessible. In this presentation, I will discuss recent breakthroughs in advanced materials design aimed at addressing these challenges. Specifically, I will demonstrate how plasmonic nanostructures and biomaterials have significantly enhanced both the depth and breadth of protein sensing and imaging. Moreover, I will discuss the application of novel materials for interstitial fluid sensing, a development that opens the door for precision diagnostics within the convenience of a patient's home. In the concluding part of the talk, I will outline future plans leveraging these innovative materials to tackle diagnostic challenges in precision health, specifically focusing on cancer and neurological disorders.

BIOGRAPHY:

Dr. Jingyi Luan is a postdoc at the Wyss Institute of Biologically Inspired Engineering at Harvard Medical School. She earned her Ph.D. degree in the Department of Mechanical Engineering and Materials Science at Washington University in St. Louis in 2020. She is the recipient of multiple awards, such as the McDonnell International Scholars Fellowship. Her research interests include plasmonic materials, biomaterials, polymers, and their integration for precision diagnostics. She has published over 25 journal articles, including two in *Nature Biomedical Engineering*, *Light: Science & Applications*, *Nano Letters*, and *Chemical Society Reviews*. Her research has resulted in five patents and the founding of a start-up company (Auragent Bioscience).