GALLOGLY COLLEGE OF ENGINEERING
STEPHENSON SCHOOL OF BIOMEDICAL ENGINEERING
The UNIVERSITY of OKLAHOMA

Leadership Lecture Series 2026-2027

MOLECULAR IMAGING WITH NANOSENSORS: WATCHING BIOLOGY IN ACTION



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Thurman J. White Forum
Conference Room B

ABSTRACT

My group works at the intersection of chemistry, biology, and bioengineering to develop nanoscale probes for chemical imaging in living systems. Our goal is real-time, deep-tissue imaging of molecular signals within the brain, central nervous system, and body, which demands high spatial and temporal resolution together with molecular specificity. Achieving this balance remains a central challenge in biological imaging, because the molecules that drive physiology and disease are often present at low concentrations, change rapidly, and sit deep within complex tissue. To meet this challenge, we engineer selective, sensitive nano contrast agents that integrate with advanced imaging modalities, including fluorescence, photoacoustics, and MRI, each of which offers a different balance of resolution, depth, and sensitivity. We also develop analytical methods to understand how these probes behave in vivo, including how stable they are and how they are processed once inside the body, so that measurements can be interpreted with confidence. In this talk, I will discuss recent examples of this work, with a focus on imaging neurotransmitters, and describe how combining sensor design with complementary imaging approaches can reveal chemical dynamics that were previously out of reach. We aim to push the boundaries of real-time molecular imaging, opening new avenues for studying brain function, monitoring disease progression, and evaluating response to therapeutics.

BIO

At Arizona State University, Heather Clark is the Director of the School for Biological and Health Systems Engineering in the Fulton Schools of Engineering, and the Senior Associate Dean for Engineering Integration in the Shufeldt School for Medicine and Medical Engineering. She is also an Associate Editor at ACS Sensors and serves on several scientific advisory boards. Previously, she was a Professor at Northeastern University, where she was the Founding Director of the Institute for Chemical Imaging of Living Systems. Before that, she was a Principal Member of the Technical Staff in the newly formed Biomedical Engineering Group at Draper Laboratory. She received her PhD in Analytical Chemistry from the University of Michigan and completed a postdoc in the Center for Cell Analysis & Modeling at the University of Connecticut Health Center. She is a Fellow of the American Institute for Medical and Biological Engineering (AIMBE) and has received awards for research and teaching, including a DARPA Young Faculty Award. Her work has been featured by CNN, the Wall Street Journal, WIRED, and MIT Technology Review.