

NANO-BME Seminar

Time: 4:00PM Thursday, Feb 10

Location: EP253 and <https://sdsmt.zoom.us/j/94046899625>

Real-time measurements of dynamic single-molecule interactions: from DNA-binding proteins to molecular motors

Anahita Haghizadeh, Ph.D. | Scientist | LUMICKS USA

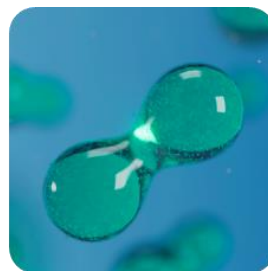
Abstract: Biological processes emerge from mechanisms at the molecular scale. While biophysical techniques (e.g., X-ray crystallography, cryoEM) with bulk biochemical assays (e.g., enzymatic reactions, fluorescent reporters) have helped to better understand emergent structure-function relationships, the complete picture of molecular-scale mechanisms is often missed. In addition, the existing techniques often do not provide tools to observe and manipulate a biological system simultaneously and understand mechanisms from the molecular to the cellular level. In this talk, I will introduce a single-molecule tool, the C-Trap, which enables users to observe and manipulate biological systems in real-time. This technology combines two Nobel prize-winning techniques (optical tweezers and super-resolution STED microscopy), integrated with easy-to-use microfluidics, that allows users to perform single-molecule studies on a broad range of biological systems. I will present some case studies to highlight the role of C-trap in looking at DNA/RNA-proteins interactions, proteins/RNA-structure dynamics, nucleic acid/protein condensates, and cellular mechanics, structure, and transport. The presented case studies and workflows serve as a framework for measuring and visualizing complex and dynamic biological systems, that would be extremely challenging to study using conventional biophysical techniques.



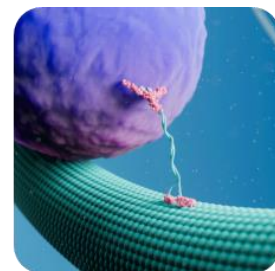
DNA/RNA-protein interaction



Protein folding & conformational changes



Protein droplets & phase separation



Cellular structure & transport