

Title: Watching single enzyme at work

Lecturer: Dr. Cuifeng Ying Nottingham Trent University

Abstract:

Conformational dynamics are critical for the function of many proteins including molecular motors, ion channels, transporters, intrinsically disordered proteins, and many enzymes. Ideally, experiments aiming to understand the role of conformational changes for protein function proceed on the single-molecule level since averaging makes it impossible to resolve individual steps, their dynamics, and rare events. Interrogating conformational dynamics of single proteins remains, however, exquisitely challenging, and typically requires site-directed chemical modification combined with rigorous minimisation of possible artifacts. This talk introduces an approach that traps single unmodified proteins from solution in a plasmonic hotspot and makes it possible to assign changes in local refractive index to changes in protein conformation while monitoring these changes for minutes to hours with a temporal resolution at least as fast as 40 us. Our single-molecule data reveal that apo-calmodulin thermally unfolds and refolds in steps by conformational fluctuations of individual protein domains, that adenylate kinase employs a hidden enzymatic sub-cycle during catalysis.

Bio: Dr. Cuifeng Ying is a senior lecturer at the Department of Engineering at the School of Science and Technology <https://www.ntu.ac.uk/staff-profiles/science-technology/cuifeng-ying>. Cuifeng has been working on designing and applying engineered nanoscale structures for biosensing applications. Specifically, her research focuses on using plasmonic/dielectric nanostructures and nanopore technology for DNA sensing and protein characterisation at a single-molecule level. She has authored/co-authored 28 peer-reviewed journal papers with a total citation of 878 and an h-index of 13. She has been the first to observe single enzyme conformational dynamic for hours without labelling. She serves as a Co-guest Editor for the journal *nanomaterials* and a regular reviewer for several journals of the American Chemical Society (ACS) such as *ACS sensors*, *ACS applied nanomaterials*.

