UNIVERSITY OF CENTRAL FLORIDA

NANOSCIENCE TECHNOLOGY CENTER
ADVANCED MATERIALS PROCESSING & ANALYSIS CENTER

GRADUATE RESEARCH SEMINAR SERIES

Friday
October 9, 2015

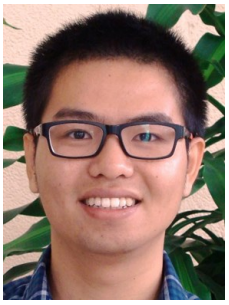
12:15 PM

Research Pavilion
NSTC
Conference Room 475

Pizza and drinks will be provided

A Simple and Fast Method to Study the Hydrodynamic Size of Proteins using Gold Nanoparticles and Dynamic Light Scattering

Tianyu Zheng
Dr. Qun Huo's Group



The size of a protein is one of the most important characteristics of a protein molecule, because the size of a protein is closely associated with its tertiary structure. Knowing the protein size would help better understand the physical structure and biological function of proteins. Currently, several analytical technique are available to characterize protein size, including analytical ultracentrifuge (AUC), size exclusion chromatography (SEC), as well as dynamic light scattering (DLS). However, these existing techniques have many limitations and problems, or are difficult to use. Here, we report a gold nanoparticle-enabled dynamic light scattering assay (NanoDLSay) for protein size analysis. NanoDLSay, based on the exceptional light scattering property of gold nanoparticle, prompts the detection of chemical and biological target analytes including proteins, DNAs and small molecules in a washing-free and label-free fashion. NanoDLSay is rather simple, fast, with excellent sensitivity and reproducibility. Human protein-disulfide isomerase (hPDI) is a protein located within the endoplasmic reticulum. PDI assists in folding, unfolding and translocation of many disulfide-containing proteins by displaying oxidoreductase activities. Several literature reports they have found that the hydrodynamic size of PDI decreases when PDI changes from oxidized state to reduced state while catalyzing the sulfide bond-disulfide bond exchange of other proteins. However, the hydrodynamic dimension of PDI in oxidized and reduced state has not been reported. Here we report our study of using NanoDLSay technique to measure the hydrodynamic diameter of oxidized and reduced PDI in aqueous solution. Our study revealed that the reduced PDI is smaller than oxidized PDI, a conclusion that is in agreement with findings based on X-ray crystallography diffraction study. The overall advantages of using NanoDLSay for protein size analysis compared to other techniques will be discussed in the presentation.