The Department of Chemistry and Biochemistry

Seminar Series

Presents a Seminar Titled:

"Using Analytical Tools to Assess Binding between Nanomaterials and Proteins"

Presented By

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With the rapid advancement of nanotechnology, engineered nanoparticles (NPs) have found enormous applications in diverse areas including molecular sensing, energy production, biomedical imaging, and drug delivery. On the other hand, the increasing production of NPs augments their release to the environment and raises great safety concerns. Both trends call for more profound understanding of how NPs interact with biosystems to ensure effective and safe employment of NPs. Since such interactions are in fact mediated by the biomolecules, especially proteins, adsorbed on the NPs once they enter the biosystem, our group has been utilizing various analytical technologies to study NP-protein interaction. We developed a capillary electrophoresis-based method to measure the binding affinity, which offers fast running speed, high resolution power, and non-destructive separation of the nanoparticle-protein complex. We also employed mass spectrometry (MS) coupled with the crosslinking chemistry to identify the binding epitope of the Fe_3O_4 NPs on human serum albumin. Furthermore, we developed a field-flow fractionation-based technique to help study the dynamic feature of protein adsorption on NPs. Currently, we utilized two isolation methods to study protein corona formed outside of NPs carrying drug molecules, trying to elucidate the roles of nanocarriers for improved drug efficacy. With all these analytical tools developed in our group, we can systematically study the dependence of protein affinity, binding consequence, and corona formation on the physicochemical properties of NPs, gaining more knowledge about the interaction driving force and possible consequences.

Friday, March 14, 2014 at 3:00 p.m. in OCNPS 100