Oxidation Chemistry in Nucleic Acids and Bioimaging

Oxidation of nucleic acids and other biomolecules are deeply involved in many pathogenetic processes, including aging, inflammatory diseases and cancers. With respect to nucleic acids, guanine damage is recurrently elevated under oxidative stress and can be allocated to biological significant genome regions via DNA-mediated charge transport (CT). In order to elucidate the mechanism of DNA CT, characteristic features of CT were investigated by DNA systems with photosensitizer as oxidative charge donor and nucleobase derivatives as kinetic electron traps, and led to a conformation-gated domain hopping model. In the field of bioimaging, oxidation chemistry are widely applied to the studies of human diseases via in vivo imaging of reactive oxygen species. Near infrared dual channel probes were developed to specifically response to HOCl, a myeloperoxidase (MPO) generated ROS. These agents are able to detect HOCl and MPO activity in vivo in an intraperitoneal inflammation mouse models.

About the Speaker

Dr. Fangwei Shao obtained her B.S. in Chemistry and M.S. in Physical Chemistry at Fudan University. In 2002, she joined Professor Jacqueline K. Barton’s research group at California Institute of Technology as a graduate student to study the electronic properties of duplex DNA and its redox reactions with transition metal complexes. After she completed her doctoral studies, Dr. Shao moved to Boston in 2007 and became a postdoctoral research fellow in the laboratory of Professor Scott Hilderbrand in the Center for Systems Biology/Center for Molecular Imaging Research at Harvard Medical School and Massachusetts General Hospital to study near infrared (NIR) imaging agents for the detection of reactive oxygen species and related diseases in vivo.