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Department of Chemistry

Seminar

9:45 a.m. Thursday, September 12, 2013 • 331 Smith Hall



Assistant Professor

Valerie C. Pierre

Department of Chemistry
University of Minnesota

Imaging Metal-Induced Oxidative Stress: Inorganic Chemistry to the Rescue

Research interests: design, develop and promulgate new probes for cell biology and for medicine.

Website: <http://www.chem.umn.edu/groups/pierre/research.html>

Abstract

Oxidative stress is involved in the pathogenesis of a wide variety of disorders including neurodegenerative diseases such as Alzheimer's and Parkinson's, stroke, epilepsy, inflammation, reperfusion injury, bacterial infection, and cancer. Reactive oxygen and nitrogen species (ROS and RNS) are key components of oxidative stress, but a complete understanding of the physiological role and of the complex interplay between these transient species is still lacking due to the difficulty of imaging them in cells and the inability to do so *in vivo*. The presence or absence of ROS and RNS is often linked to miscompartmentalization of metal ions, notably copper in the case of Alzheimer's disease, and calcium, potassium, and sodium in ischemic stroke. Accurate visualization of these metals, both at the cellular level and *in vivo*, remains problematic. The long-term goal of our research is to understand the complex interplay between metals, oxidative stress and brain pathologies such as ischemic stroke. To this end, our group uses organic and inorganic chemistry, material science and chemical biology to design, develop and promulgate new probes for cell biology and medicine. We are developing novel luminescent lanthanide complexes which enable simultaneous detection of multiple species so as to obtain a better understanding of processes at the cellular level. Understanding of physiological processes *in vivo* is best achieved by molecular magnetic resonance imaging. The design and evaluation of novel responsive MRI contrast agents to image the spatial and temporal distribution of metals and reactive oxygen and nitrogen species will be presented and discussed. The promulgation of these probes to biomedical research is anticipated to yield a deeper understanding of metals and oxidative stress in neurological disorders and will, in turn, lead to novel approaches to therapy and diagnosis.

Refreshments will be served prior to the seminar.