



DEPARTMENT OF CHEMISTRY AND
BIOCHEMISTRY – Spring '25

THE SALZBERG CHEMISTRY SEMINAR SERIES



The City College
of New York



Monday, March 3 2025 @ 12:00 noon – MR1027

Probing photo-induced electron transfer in Metal Organic Frameworks

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Abstract: Metal organic frameworks (MOFs) are hybrid solid state materials composed of metal ions or clusters connected by organic molecules to form crystalline microporous networks. Their diversity in chemical makeup and tunable, permanent porosity make MOFs attractive candidates for traditional adsorption-based applications such as chemical separation and storage. Efforts to engender redox or photoredox properties offer new opportunities for applications that rely on MOF conductivity, stable electron transfer and/or long-lived charge separation such as resistive sensors, electrochromic devices, and single site electro- or photocatalysis. Synthetic strides in developing frameworks with these properties have, however, far outpaced the progress in advancing the fundamental understanding of their electronic structure and photophysics. Consequently, there are often significant ambiguities in the structure/function relationships that give rise to their utility. In our research, we use a targeted set of spectroscopy methods to make those connections by producing molecular level understanding of observed MOF behavior. Specifically, the talk will focus on two types of photoredox active MOF systems. In the first part, a set of Ti-based redox active frameworks will be introduced and our efforts to elucidate the nature and dynamics of their charge-separated excited states using X-ray transient absorption spectroscopy will be presented. In the second part of the talk, I will focus on a series of porphyrin-based MOFs that demonstrate electron donor-acceptor behavior upon post synthetic introduction of fullerene guest species. For this series, steady state and time-resolved optical spectroscopy methods help elucidate the binding location/strength and photo-induced charge transfer dynamics and in these host-guest systems.

Biography: Jenny Lockard received her bachelor's degree in chemistry from Vassar College in 2000. In 2005, she completed her PhD in Chemistry at the University of California, Los Angeles under the supervision of Prof. Jeffery Zink. Her thesis work focused on applications of time-dependent theory of spectroscopy to excited state mixed valence systems. From 2005 to 2008 she received a Petroleum Research Fund – Alternative Energy Post-Doctoral Fellowship to work in the lab of Prof. Michael Wasielewski in the Chemistry Department at Northwestern University where her research focused on ultrafast spectroscopy investigations of electron donor-acceptor molecules. She held a second post-doc appointment at Argonne National lab from 2008-2010 where she held an Argonne Director's Post-Doctoral Fellowship and worked under the supervision of Prof. Lin Chen in the Chemical Sciences Division on research involving steady state and time resolved X-ray absorption spectroscopy. Jenny began her independent career at Rutgers-Newark in 2011. Her research involves spectroscopic investigations of metal-organic frameworks (MOFs), a class of porous hybrid materials, particularly those with interesting host-guest, redox or photoredox properties.

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