CHEMICAL DYNAMICS CAPTURED WITH ATOMIC SPECIFICITY AND RESOLUTION USING ULTRAFAST X-RAY SPECTROSCOPY AND SCATTERING

KELLY GAFFNEY, *Stanford PULSE Institute, SLAC National Accelerator Laboratory, Menlo Park, CA, USA*.

Electronic excited states enables novel non-equilibrium pathways to chemical transformations. The complexity of potential outcomes for light-driven reactions has made harnessing electronic excited states for chemistry challenging. One approach to addressing this challenge is advancing the tools we have for capturing the complex dynamics of electronic excited states. I will discuss how advances in ultrafast x-ray sources and experimental methods provide a pathway to capturing the non-equilibrium trajectories of electronic excited states with precision, particularly for transition metal complexes.

Of particular importance for 3d metal compounds is characterizing the population dynamics of charge-transfer (CT) and metal-centered (MC) electronic excited states and understanding how the inner coordination sphere structural dynamics mediate the interaction between these states. I will focus on the value of using simultaneous X-ray emission spectroscopy (XES) and X-ray solution scattering (XSS) studies to disentangle the electronic and structural dynamics.