Contribution ID: **997** Type: **Contributed talk**

Catching Catalysts in Action

Friday 30 August 2024 08:30 (45 minutes)

The ability to activate and functionalize C-H bonds in controlled and sustainable fashion remains one of the holy grails of chemistry. It is here that nature provides much inspiration, with enzymes such as methane monooxygenases enabling the direct and selective oxidation of methane to methanol - utilizing either a copper active site in the particulate form or a dinuclear iron site in the soluble form of the enzyme. Our understanding of the nature of these active sites and their mechanisms has greatly benefited from spectroscopic developments. Herein, I will present recent work utilizing both rapid freeze quench and microfluidic mixers to characterize these enzymatic intermediates in methane monooxygenases and lytic polysaccharide monooxygenases. In addition, recent static and time-resolved spectroscopic studies of homogeneous C-H bond activating catalysts will be presented. These will include 2p3d resonant inelastic X-ray scattering (RIXS) spectroscopic studies as a probe of two-state reactivity and femtosecond X-ray absorption (XAS) and X-ray emission (XES) spectroscopic studies of high-valent iron oxos. The implications of these studies for rational catalytic design will be discussed.

I plan to submit also conference proceedings

No

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Track Classification: 2. Beamline Innovations