Transition metal L-edge spectroscopy on biological and related systems enabled by LCLS-II

J. Kern
Lawrence Berkeley National Laboratory, MSDS Division, Berkeley, CA 94706, USA

Transition metals play a crucial role in the active site of a many important enzyme systems. To fully understand the factors contributing to the high efficiency and specificity often encountered in these systems a detailed understanding of the changes in electronic structure (especially the valence orbitals) of the metal centers during the course of the catalytic cycle is crucial in addition to structural knowledge. I will describe initial experiments at LCLS to obtain such information using L-edge spectroscopy and will describe the possible experiments at LCLS-II, especially at the new NEH 2.2 instrument, to study not only the steady state electronic structure of metal centers in biological systems and related models but also how time resolved spectroscopy under physiological conditions will help to follow the reaction pathways in these systems. I will also discuss how the combination of future hard X-ray and soft X-ray studies at LCLS-II can be beneficial to a better understanding of such systems.