

EXAFS Studies of Non-heme Iron Enzymes

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Beamline(s): X9B

Introduction: The diiron center in non-heme enzymes active oxygen to carry out many different important metabolic transformations. We have been using X-ray absorption spectroscopy to obtain structural information on the intermediates of the reaction of these non-heme iron proteins with oxygen.

Methods and Materials: Δ^9 desaturase peroxo intermediate and Ferritin peroxo intermediate and their precursor and the decayed forms were measured. Data were collected in Fluorescence from EXAFS cup, which can do Mössbauer measurement with the same cup.

Results: The data analysis of Δ^9 desaturase peroxo intermediate shows that there is definitely no short Fe-Fe distance (2.5 Å) as reported for ferritin peroxo intermediate¹, although they have very similar Mössbauer and Raman data. We observed a longer Fe-Fe distance (4.2 Å) both in reduced sample as well as in the peroxo intermediate sample containing 46 % ferrous species. The peroxo-cycled sample has a short Fe-O scatter at 1.8 Å corresponding to an oxo bridge.

Ferritin peroxo intermediate from *E. Coli* was also measured. The results are not clear due to the concentration of the sample is relatively low.

References: J. Hwang, C. Krebs, B. Huynh, D. Edmondson, E. Theil, J. Penner-Hahn, Science 287, 122, 2000.