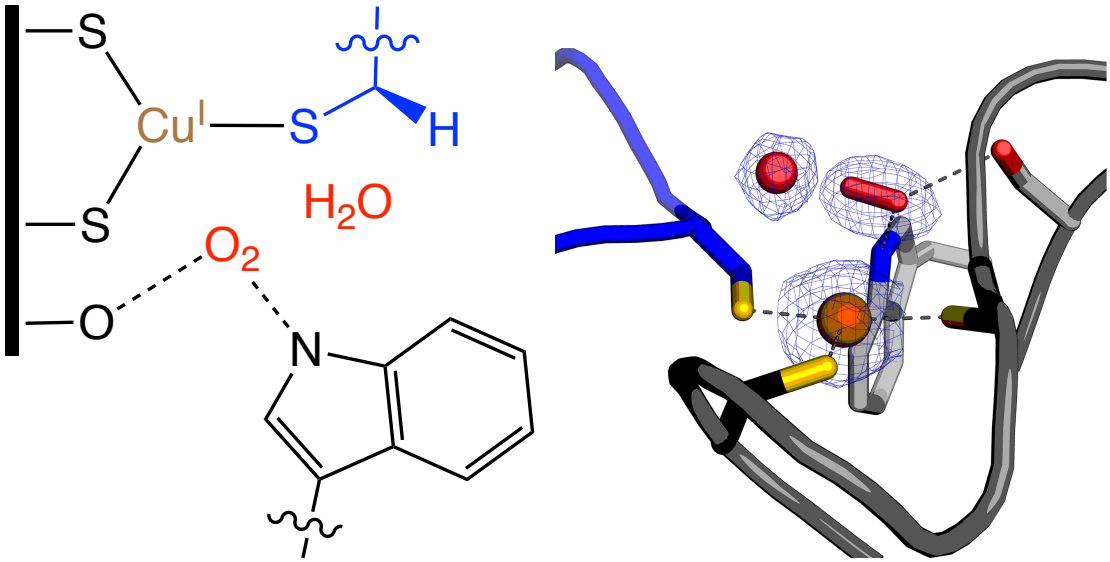
Structural characterization of reaction intermediates of the copper-dependent formylglycine-generating enzyme

Florian Leisinger,[1] Dzmitry A. Miarzlou,[1] Matthias Knop[1] and Florian P. Seebeck[1]

[1]Departement for Chemistry, University of Basel, Basel, Switzerland, florian.seebeck@email



Molecular oxygen (O_2) is a sustainable oxidation reagent. O_2 is strongly oxidizing but kinetically stable and its final reaction product is water. For these reasons learning how to activate O_2 and how to steer its reactivity along desired reaction pathways is a longstanding challenge in chemical research. Activation of ground-state diradical O_2 can occur either via conversion to singlet oxygen or by one-electron reduction to superoxide. Many enzymes facilitate activation of O_2 by direct formation of a metal-oxygen coordination complex concomitant with inner sphere electron transfer. The formylglycine generating enzyme (FGE) is an unusual mononuclear copper enzyme that appears to follow a different strategy. In this presentation I will summarize our past and present efforts to visualize the individual states of the enzyme on its path from the resting state to the reactive Michaelis Menten complex and beyond.[1-4]

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[3] Miarzlou, D. A., Leisinger, F., Joss, D., Häussinger, D., and Seebeck, F. P. (2019) Structure of formylglycine-generating enzyme in complex with copper and a substrate reveals an acidic pocket for binding and activation of molecular oxygen., *Chem. Sci. 10*, 7049 - 7058.
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This research has been funded by the ERC (ERC-2013-StG 336559) and the NCCR for Molecular Systems Engineering, and the SNF (182023)