Catalytic mechanism of a novel type of copper-dependent formylglycine generating enzyme

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Copper is a versatile catalyst for the transfer of electrons from organic matter to molecular oxygen. Some copper-oxygen adducts can cleave very strong C-H bonds. Understanding the nature of these catalytic species is a major scientific objective and allows controlling their specific activities by proteins or synthetic ligands. Mononuclear copper enzymes are a particularly promising class of such catalysts. The formylglycine generating enzyme (FGE) as a novel type of copper-dependent oxidase participates in activation of pro- and eukaryotic sulfatases by converting specific Cys residue into formylglycine (fGly) [1].

The proposed catalytic cycle of FGE *T. curvata* involves the stereo selective C-H bond abstraction as the rate limiting step that was proved by significant KIE = 3.7 ± 0.1 [2]. Recent structural and kinetic evidences identify that Cu(I), bounded to two Cys in the active site of FGE, plays a role of redox cofactor [3].

In this presentation, we will discuss our recent efforts in deciphering the catalytic mechanism of this enzyme.

[1] Jens Fey, et al., *J Biol Chem*, **2001**, 276(50), 47021-8.
[2] Matthias Knop, et al., *Chembiochem*, **2015**, 16(15), 2147-50.
[3] Matthias Knop, et al., *Chembiochem*, **2017**, 18(2), 161-165.