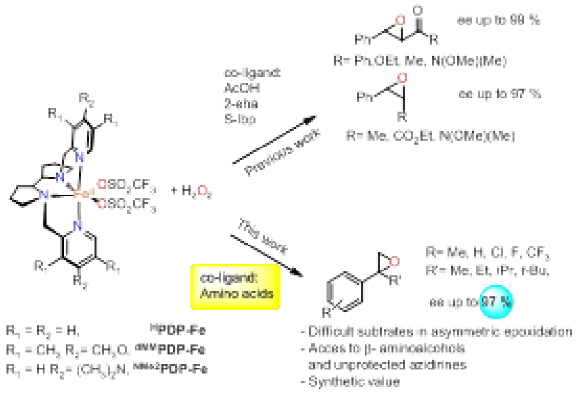
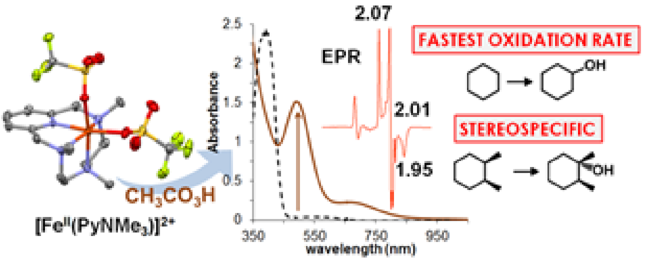
Biologically inspired approaches to the cleavage and formation of the O-O bond with coordination complexes

Miquel Costas
Institut de Química Computacional I Catalisi (IQCC) and Departament de Química,
Universitat de Girona. Facultat de Ciències, Campus de Montilivi, 17071, Girona
Miquel.costas@udg.edu, anna.company@udg.edu

Biologically inspired catalysts are currently explored with the aim to produce selective oxidation reactions. The quest for catalytic methodologies that provide novel reactivities and selectivities that could complement those attained with traditional oxidants, or that could represent a more efficient alternative constitute major reasons of interest for this approach.[1-3] Towards this end, iron coordination complexes ligated to amine and oxygen containing functionalities, and that could be viewed as a minimalistic model of iron coordination sites in non heme iron dependent oxygenases, are employed as catalysts for the oxidation of organic substrates. By control of their structure and electronic properties, catalysts have been designed by our research team that engage in controlled O-O lysis of H_2O_2 to form highly electrophilic high valent metal-oxo species that are finally responsible for enzyme-like selective oxidation chemistry.[4] Principles of catalyst design and use of these catalysts in selective C-H and C=C oxidation reactions, and reaction intermediates involved in these reactions[5] will be discussed.





References

1. L. Que, W. B. Tolman, *Nature* **2008**, *455*, 333
2. K. P. Bryliakov, E. P. Talsi, *Coord. Chem. Rev.* **2014**, *276*, 73
3. Z. Codola, J. Lloret-Fillol, M. Costas, in *Prog. in Inorg. Chem.: 59*, John Wiley & Sons, Inc., **2014**, 447.
4. a) O. Cussó, I. Garcia-Bosch, X. Ribas, J. Lloret-Fillol, M. Costas, *J. Am. Chem. Soc.* **2013**, *135*, 14871. b) O. Cussó, X. Ribas, J. Lloret-Fillol, M. Costas, *Angew. Chem. Int. Ed.* **2015**, *54*, 2729-2733. c) O.Cussó, M. Schiafanelly, X. Ribas, R. Klein Gebbink, M. Costas, **2016**, *138,* 2732
5. J. Serrano-Plana, W. Oloo, L. Acosta-Rueda, K Meier, B. Verdejo, E. Garcia-España, M. G. Basallote, E. Münck, L. Que, Jr., A. Company, M. Costas, *J. Am. Chem. Soc.* **2015**, *137*, 15833.