

Enzymes are Nature's catalysts to run important chemical processes. Typically, they contain single metal sites, but those bearing two metal centers in proximity (having binuclear active sites) are also known. Enzymes bearing binuclear active sites are responsible for various chemical processes, such as methane oxidation as is observed for particulate methane monooxygenase which contains two copper ions in its active site or soluble methane monooxygenase containing two iron ions in its active center. In the current project we aim at the exploration of the reactivity of the binuclear sites introduced into the zeolitic matrices as inorganic analogues of the bimetallic sites in enzymes.

Zeolites are aluminosilicates, which offer the possibility of controlled introduction of metal cations. The project relies on the recent advancement in the synthesis of metallozeolite developed in the J. Heyrovský Institute of Physical Chemistry, Prague. The J. Heyrovský Institute of Physical Chemistry group demonstrated the possibility to incorporate different metal cations into zeolite structure in such a way they form pairs. These systems are capable to activate dioxygen and  $N_2O$  by splitting, which results in the formation of highly active oxygen species,  $\alpha$ -oxygen. The reactivity of these systems is very little explored. Up to now, only methane oxidation by the active  $\alpha$ -oxygen formed on the binuclear centers in zeolites is reported. In the current project we plan to combine experiments and theory to study the mechanism of activation of  $O_2$  and  $N_2O$  by these active sites as well as to use them as enzyme mimics in selective oxidation of light hydrocarbons.