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Supramolecular approaches to control selectivity in transition metal catalysis via the second coordination sphere

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The interface between supramolecular chemistry and transition metal catalysis has received surprisingly little attention in contrast to the individual disciplines. It provides, however, novel and elegant strategies that lead to new tools for the search of effective catalysts, and as such this has been an important research theme in our laboratories. In this presentation, I will focus on supramolecular strategies to control activity and selectivity in transition metal catalysis, which is especially important for reactions that are impossible to control using traditional catalyst development. For substrates with functional groups we use substrate orientation effects to control selectivity, whereas for non-functionalized substrates we create cages around the active transition metal. What these strategies have in common is the contribution of the second coordination sphere to the catalytic properties, which is quite different from the traditional ligand effects. More recently, we also explored the use of large nanospheres that allows to perform catalysis at high local concentrations, leading to rate acceleration for several different reactions. These nanospheres can also be used for electrochemical events and as such for proton reduction catalysis. The lecture will focus on our most recent results.

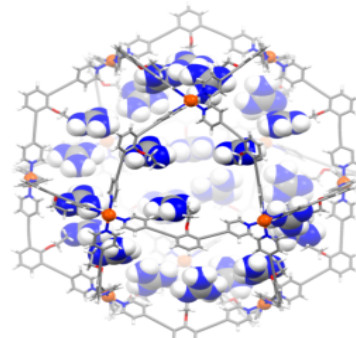
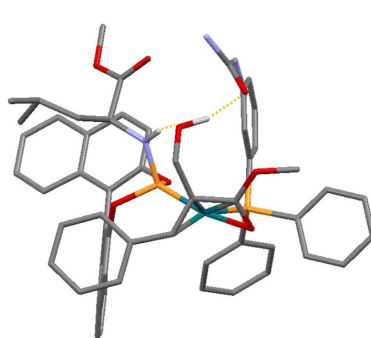
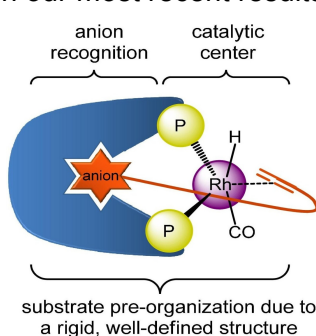


Figure An example of substrate pre-organization at the metal complex for selective hydroformylation, for selective hydrogenation and a nano-cage for catalyst/substrate pre-organization

References

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