6th Lecture on Molecular Engine
第6回発動分子科学セミナー

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"Endowing Organometallic Catalysis with A Genetic Memory: Artificial Metalloenzymes"

Artificial metalloenzymes (ArMs) result from the incorportation of a catalyst precursor within a host protein, see Scheme. The resulting hybrid catalysts display features that are reminiscent of both homogeneous catalysts and enzymes. The optimization of the catalytic performance of ArMs is achieved by combining both chemical- and genetic means. The versatility of this chemo-genetic optimization strategy will be illustrated with selected examples including: transfer-hydrogenation, C–H activation, olefin metathesis, hydroamination etc.[1]

With the aim of integrating artificial metalloenzymes *in vivo*, the second part of the talk will present our efforts to combine ArMs with natural enzymes to mimic essential features of the metabolism including: cascade reactions as well as up- and cross-regulation. Having identified the critical metabolites leading to ArM's inhibition *in cellulo*, our efforts towards performing catalysis in the periplasm of *E. coli* will be highlighted.[2]

References
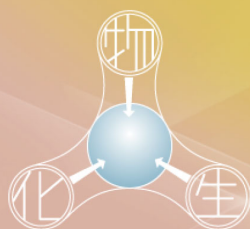[1] T. Heinisch, T. R. Ward, *Acc. Chem. Res.* 2016 , 49 , 1711.
[2] M. Jeschek, R. Reuter, T. Heinisch, C. Trindler, J. Klehr, S. Panke, T. R. Ward, *Nature* 2016 , 537 , 661.

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