

Supramolecular Chemistry for Catalysis and Vice Versa

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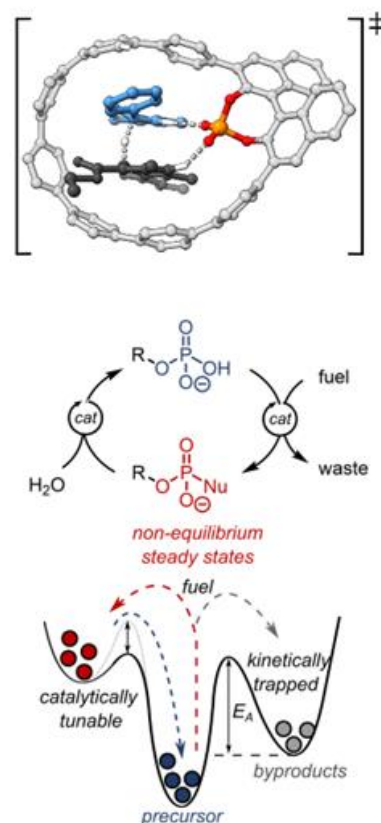
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Abstract: catalysis is central to biological function and technological processes alike. In this talk, I will make the case that contemporary supramolecular chemistry has much to offer and to gain in respect to advances in catalysis.

Building on our work on confinement effects for selective fullerene functionalization reactions,^[1a] we recently demonstrated the first use of a chiral “nanohoop” in asymmetric organocatalysis.^[1b] To this end, we integrated a BINOL-derived phosphoric acid into the [9]CPP scaffold and employed the nanohoop as catalyst for the asymmetric transfer hydrogenation of 2-aryl substituted quinolines (pioneered by Rueping^[2]). We found that the chiral macrocycle shows excellent catalytic activity with near-quantitative yields and enantioselectivities up to 99% ee, which is far superior to comparable non-cyclic reference catalysts. DFT studies revealed the importance of a ternary, highly confined transition state (Figure, top).

I will also present our ongoing work on the generation of chemically fuelled steady states featuring activated organophosphorus species (Figure, bottom).^[3] I will emphasize the importance of catalysis (on different levels) in the ongoing quest for artificial analogues of the breathtaking examples of transient self-assembly (e.g. microtubules) and molecular machines (e.g. kinesin) in nature.



References

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- [3] (a) A. Englert, F. Majer, J. L. Schiessl, A. J. C. Kuehne, M. von Delius, *Chem* **2024**, *10*, 910. (b) A. Englert, J. F. Vogel, T. Bergner, J. Loske, M. von Delius, *J. Am. Chem. Soc.* **2022**, *144*, 15266. (c) P. Hoffmann, S. Saha, J. Sun, A. Englert, M. von Delius, *manuscript under review*.

Bio: Max von Delius is Professor of Organic Chemistry at Ulm University. He obtained his PhD at the University of Edinburgh and was a Postdoctoral Fellow at the University of Toronto, before establishing his independent research group at FAU Erlangen-Nürnberg. His research interests include supramolecular chemistry, systems chemistry and the synthesis of functional organic materials. He has been awarded an ERC Starting Grant and has received the Cram-Lehn-Pedersen Prize.