

## EINLADUNG

Im Rahmen der gemeinsamen Kolloquien der Fakultät für Chemie und Chemische Biologie der Technischen Universität Dortmund und des RESOLV Cluster of Excellence – EXC 2033 hält

### Herr Prof. Dr. Joost NH Reek

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einen Vortrag mit dem Thema:

### “Formation of $M_nL_{2n}$ nanospheres and their application in catalysis: Solvent effects in formation and control of symmetry and supramolecular structure”

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.[1] In this context we have intensively explored the use of well defined nanospheres[2,3] that form by self-assembly in transition metal catalysis. These nanospheres create catalysts (and substrates) at high local concentration, just like in enzymes, higher reaction rates are observed for several reactions that operate via binuclear mechanism. Also, they provide new tools to control catalytic events in complex media, showing substrate selective catalysis, effector controlled catalysis and catalysis with feed back loops.

In this presentation I will focus on **1)** mechanistic aspects in the formation of  $M_nL_{2n}$  nanospheres by self-assembly including solvent effects. **2)** The use of  $Pt_2L_4$  cages that are active in cyclization reactions. The cage offers a binding place for effector molecules at the inside, thereby controlling the reaction rate of cyclization reactions that takes place at the outside of the cage. We demonstrate that we can up- and down-regulate the rate, and that we can use substrates as effectors which convert during the course of the reaction, and thereby also the effector is changing during the course of the reaction. In addition, the  $Pt_2L_4$  cage is orthogonally coupled to a diacid-catalyzed carbodiimide-hydration cycle. The orthogonal diacid-catalyzed carbodiimide hydration cycle produces transiently diverse guests that influence the rate of the Pt-catalyzed cyclization reaction to different extents. **3)** solvent depend behavior of cages such as cage-in-cage formation and symmetry breaking of  $M_2L_4$  cages.

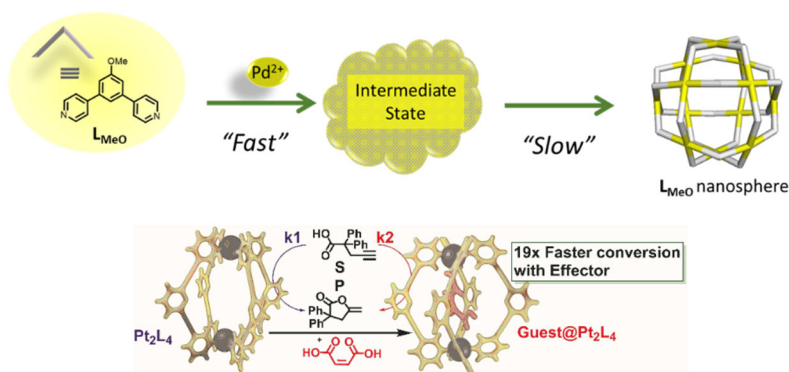


Figure 1: Top: formation of nanospheres. Bottom: an example of a nanospheres and effector-controlled catalysis using nanospheres

[1] For reviews see: 1) Reek et al, *Nature Chemistry*, **2010**, *2*, 615. 2) Reek et al, *Chem. Soc. Rev.*, **2015**, *44*, 433 – 448 3) *Chem. Soc. Rev.* **2008**, *37*, 247. 4) Reek et al., *Acc. Chem. Res.* **2018**, *51*, 2115. 5) *ACS Catal.* **2018**, *8*, 3469. 6) *ChemAsianJ.* **2021**, *16*, 3851. 7) *Chem. Sci.*, **2021**, *12*, 50

[3] Pioneering work on nanospheres: Fujita, et al. 1) *Angew. Chem. Int. Ed.* **2004**, *43*, 5621 2) *Science* **2010**, *328*, 1144 3) *Chem. Commun.* **2009**, *13*, 1638. 4) J.P. Stang et al. *J. Am. Chem. Soc.* **1999**, *121*, 10434. [3] For some of our work on nanospheres: 1) J.N.H. Reek et al., “*Nature Chemistry*, **2016** *8*, 225-230; 2) *Angew. Chem., Int. Ed.*, **2014**, *52*, 13380; 3) *Angew. Chem., Int. Ed.*, **2018**, *57*, 11247; 4) *Chem. Sci.*, **2019**, *10*, 1316. 5) *J. Am. Chem. Soc.* **2020**, *142* (19), 8837. 6) *Angew. Chem. Int. Ed. Engl.* **2020**, *59*, 18485 7) *Nature Chemistry*, **2023**, under review.

**Zeit:** Donnerstag, 13.03.2025, 17.15 Uhr  
**Ort:** Campus Nord, Chemiegebäude, Hörsaal 1

Für die Dozierenden der Chemie

Im Auftrag des Dekans

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