



GESELLSCHAFT DEUTSCHER CHEMIKER
ORTSVERBAND HANNOVER

Einladung zum GDCh-Colloquium des Ortsverbandes Hannover

Das Colloquium findet um 17h c.t. im Dr.-Oetker-HS (Raum 007, Gebäude 2504) der Leibniz Universität Hannover, Institut für Physikalische Chemie und Elektrochemie, Callinstraße 3a, D-30167 Hannover statt.

09.11.2023 **Prof. Dr. Oliver Trapp**
Department Chemie, Ludwig-Maximilian-Universität München

Prebiotic Organocatalysis: Emergence, Evolution and Function

All evolutionary biological processes lead to a change in heritable traits over successive generations. The responsible genetic information encoded in DNA [1] is altered, selected, and inherited by mutation of the base sequence.

While this is well known at the biological level, an evolutionary change at the molecular level of small organic molecules is unknown but represents an important prerequisite for the emergence of life.

Here, I present a class of prebiotic imidazolidine-4-thione organocatalysts [2,3], formed from oxygenated organic compounds from meteorite catalysis [4], able to dynamically change their constitution and potentially capable to form an evolutionary system. These catalysts functionalize their own building blocks and dynamically adapt to their (self-modified) environment by mutation of their own structure. This is related to self-amplifying and autocatalytic processes [5,6].

Depending on the environmental conditions, they show pronounced and opposing selectivity in their formation. Remarkably, the preferentially formed species can be associated with different catalytic properties, which enable multiple pathways to the formation of nucleotides, oligomers, and lipids for the transition from abiotic matter to functional biomolecules [7]. Moreover, these catalysts might be the key to an enantioselective formation of building blocks [8] and an inherited replication of oligomers overcoming randomized oligomer sequences [9].

[1] J. S. Teichert, F. M. Kruse, O. Trapp, *Angew. Chem. Int. Ed.* **2019**, *58*, 9944-9947.

[2] A. C. Closs, E. Fuks, M. Bechtel, O. Trapp, *Chem. Eur. J.* **2020**, *26*, 10702-10706.

[3] A. C. Closs, M. Bechtel, O. Trapp, *Angew. Chem. Int. Ed.* **2022**, *61*, e202112563.

[4] S. Peters, D. A. Semenov, R. Hochleitner, O. Trapp, *Sci. Rep.* **2023**, *13*, 6843.

[5] L. C. Mayer, S. Heitsch, O. Trapp, *Acc. Chem. Res.* **2022**, *55*, 3345-3361.

[6] O. Trapp, S. Lamour, F. Maier, A. F. Siegle, K. Zawatzky, B. F. Straub, *Chem. Eur. J.* **2020**, *26*, 15871-15880.

[7] M. Bechtel, E. Hümmer, O. Trapp, *ChemSystemsChem* **2022**, *4*, e202200020.

[8] M. Haas, S. Lamour, S. B. Christ, O. Trapp, *Communications Chemistry* **2020**, *3*, 140.

[9] F. Sauer, M. Haas, C. Sydow, A. F. Siegle, C. A. Lauer, O. Trapp, *Nature Communications* **2021**, *12*, 7182.

Prof. Dr. Jens-Uwe Grabow
Vorsitz OV Hannover

Vor dem Vortrag findet eine ‚Kaffeerunde‘ in der Bibliothek des PCI statt.