Biocatalysis in Cellular Systems

- Elucidation and manipulation of complex bio-catalytic processes in cellular systems by skillful combination of synthetic chemistry and genetic code engineering
- Synthesizing non-canonical amino acids (ncAAs) with unique side chain chemistries for incorporation into the target proteins by expanding the genetic code
- Transferring the chemical synthetic laboratory into the biochemistry of living cells
- Large-scale biological production of tailored peptide antibiotics
- Expanding our synthetic and biosynthetic approaches to combinatorial biosynthesis with nonribosomal peptide synthetases to further overcome the limits of ribosomal peptide synthesis
- Elucidating and steering light-gated enzymes in physiological reaction cascades

**BIG-NSE: Unicat’s Graduate School**

Unicat promotes young scientists and students. The Berlin International Graduate School of Natural Sciences and Engineering is an important part of Unicat. Excellent students are encouraged to apply for a fellowship.

www.big-nse.tu-berlin.de

**BasCat: Unicat-BASF Joint Lab**

In 2011 Unicat and the chemical company BASF founded the new Unicat-BASF Joint Lab, or BasCat for short. BasCat is dedicated to the development of new catalytic processes for raw material change.

www.bascat.tu-berlin.de

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**Contact**

**UniCat**

Technische Universität Berlin
Institut für Chemie, Sekr. BEL 4
Straße des 17. Juni 135
10623 Berlin, GERMANY
Phone: +49 (0)30 314-28590
Fax: +49 (0)30 314-28594

**Chair**

Prof. Dr. Matthias Driess
Phone: +49 (0)30 314-29731
E-mail: matthias.driess@tu-berlin.de

**Vice Chair**

Prof. Dr. Peter Hildebrandt
Phone: +49 (0)30 314-21419
E-mail: hildebrandt@chem.tu-berlin.de

**PR**

Dr. Martin Penno
Phone: +49 (0)30 314-28592
E-mail: martin.penno@tu-berlin.de
Catalysis is a Key Technology

Activation of Methane

- Elucidation of the molecular mechanism of oxidative coupling of methane (OCM), including identification of reactive intermediates and active sites
- Understanding of the interaction of surface-confined and gas phase elementary reactions
- Comprehensive kinetic and mechanistic description of OCM at all relevant time and length scales from model systems to the mini-plant level
- Synthesis of molecular model systems for comparative mechanistic analysis of enzymes and chemical catalysts converting carbon oxides: CO, CO₂, HCOOH, CH₃COOH
- Mechanistic analysis of enzymes converting the above mentioned carbon oxides, including identification, characterization and modification of active sites for specific functions
- Engineering of enzymes and enzyme complexes towards novel functions in the activation of small molecules
- Stabilization of enzymes for biofuel cell applications: engineering of oxygen tolerant enzymes, reverse the reaction of enzymes by modulation and generation of mini-enzymes

Activation of Carbon Oxides

- Elucidation of the molecular mechanism of dry reforming of methane (DRM), including identification of reactive intermediates
- Comprehensive kinetic and mechanistic description of dry reforming at all relevant time and length scales from model systems to the mini-plant level
- Synthesis of molecular model systems for comparative mechanistic analysis of enzymes and chemical catalysts converting carbon oxides: CO, CO₂, HCOOH, CH₃COOH
- Mechanistic analysis of enzymes converting the above mentioned carbon oxides, including identification, characterization and modification of active sites for specific functions
- Engineering of enzymes and enzyme complexes towards novel functions in the activation of small molecules
- Stabilization of enzymes for biofuel cell applications: engineering of oxygen tolerant enzymes, reverse the reaction of enzymes by modulation and generation of mini-enzymes

Activation of H/O Systems

- Fundamental coordination chemistry studies by combining essential features of [NiFe]-Hydroge-...