

Editorial



This special issue is dedicated to the interdisciplinary field of **biocatalysis**, which harnesses the power of enzymes to drive a green and sustainable approach to chemical synthesis. Biocatalysis has gained significant traction in both industrial and academic settings within Switzerland in recent years, thanks to our accelerating ability to tailor desired enzymatic properties, or as Uwe Bornscheuer (Universität Greifswald) set forth “Biocatalysis combines the elegance of nature’s design with the ingenuity of human innovation, unlocking the full potential of enzymatic reactions for industrial applications.”



Already 40 years ago, Novartis began to harness enzymes to catalyze specific steps in the synthesis of active pharmaceutical ingredients. The article by **Radka Snajdrova and coworkers** (Novartis) highlights key biocatalytic applications during this period, which rely on the exquisite selectivities exhibited by enzymes. The flavor and fragrance industry has a similarly long history of building on Nature’s catalysts to produce fine chemicals. In this context, **Eric Eichhorn and coworkers** (Givaudan) provide an overview about how enzymes facilitate synthesis at Givaudan.

Preclinical testing of candidate drug substances involves characterization of their metabolites. Yet, the synthesis of these metabolites is not always straightforward by chemical or biocatalytic means. **Martin Held and coworkers** (D-BSSE ETHZ) describe the use of microaerobic growth conditions to produce up to 680 nmol L⁻¹ recombinant CYP3A4 facilitating access to the desired compounds.

High enantioselectivity is a key criterium in chemical synthesis. **Lucia Robustini** and **Francesca Paradisi** (University of Bern) describe how by adjusting reaction conditions in flow catalysis the enantioselectivity of enzymes can be tuned.

Can enzymes be harnessed to access sustainable building blocks? **Thomas Pielhop** (ZHAW) discusses how lignocellulose can be reused and what the potential role of enzymes in this process could be, while **Patrick Shahgaldian and coworkers** (FHNW) show the production of galactooligosaccharides from lactose (available from dairy production) using a flow reactor.

Continued biocatalytic innovation requires the identification of novel enzymes and the development of novel techniques. **Serina Robinson and coworkers** (Eawag) highlight the biocatalytic potential of urinary tract bacteria by describing xenobiotic biotransformations and how the microbial community is influenced by the environment or drugs. **Zrinka Raguz Nakic** and **Christin Peters** (ZHAW) delineate recent advances in our ability to clone whole pathways into *E. coli* using the ‘Golden Gate Assembly’ while **Sandro Giger** and **Rebecca Buller** (ZHAW) showcase advances in the construction of xenobiotic enzymes by the incorporation of non-canonical amino acids broadening Nature’s synthetic toolbox.

We hope that the captivating applications showcased by the authors of this special issue will inspire you, stimulate fresh ideas and foster novel collaborations within and beyond the vibrant field of biocatalysis.

We wish you an enjoyable reading!

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The Editorial Board of CHIMIA warmly thanks Prof. Rebecca Buller and Dr. Katrin Hecht for planning and realizing this issue on Biocatalysis highlighting the great potential of this vital research sector for a green and sustainable future.