



Swiss Science Concentrates

A CHIMIA Column

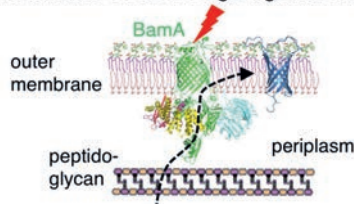
Short Abstracts of Interesting Recent Publications of Swiss Origin

Chimeric Peptidomimetic Antibiotics against Gram-negative Bacteria

A. Luther *et al.*, *Nature* **2019**, 576, 452. Polyphor AG, University of Zurich, University of Basel, ETH Zurich

The emergence of antimicrobial resistance is a global concern, creating an urgent need for new antibiotics against Gram-negative pathogens resistant to last resort antibiotics. Robinson, Obrecht and co-workers discovered a new family of synthetic chimeric peptidomimetic antibiotics containing a β -hairpin macrocycle. Their mechanism of action involves binding to both lipopolysaccharide and BamA, the main component of the β -barrel folding complex, which is essential for the integrity of the outer membrane of Gram-negative bacteria. After optimization, derivatives showed potent activity and favorable drug-like properties. The lead candidate is currently undergoing preclinical studies and has the potential to resolve a major unmet medical need.

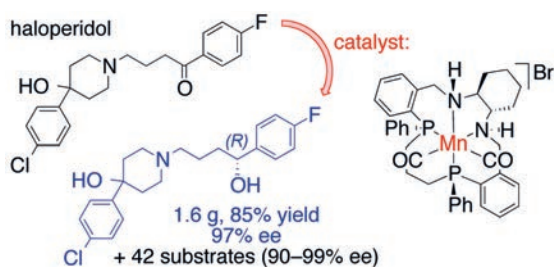
Outer Membrane Protein-Targeting Antibiotics



The Manganese(I)-Catalyzed Asymmetric Transfer Hydrogenation of Ketones: Disclosing the Macrocyclic Privilege

A. Passera and A. Mezzetti,* *Angew. Chem. Int. Ed.* **2020**, 59, 187. ETH Zurich

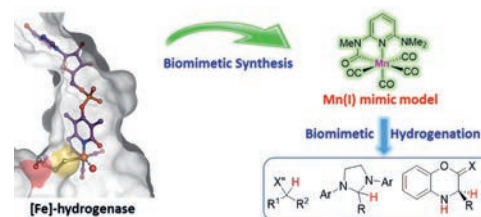
Asymmetric hydrogenation has a long record of accomplishment in the industrial production of advanced chiral pharmaceutical intermediates. In the last decade, efforts have been made to replace precious metals with nontoxic first-row transition-metals in hydrogenation catalysts. In this work, the authors report a Mn^I catalyst supported by a chiral (NH)₂P₂ macrocycle displaying high yields and enantioselectivities for the transfer hydrogenation (from 2-propanol) of a very broad scope of (hetero)aryl alkyl ketones. The utility and high functional group tolerance of this catalyst was demonstrated by the reduction of the drug haloperidol on a gram scale with 97% ee and 85% yield.



Biomimetic Hydrogenation Catalyzed by a Manganese Model of [Fe]-Hydrogenase

H.-J. Pan and X. Hu,* *Angew. Chem. Int. Ed.* **2019**, DOI: 10.1002/anie.201914377. EPFL

Precious metal-catalyzed hydrogenation is one of the most frequently used transformations in chemical industry. Many iron complexes have been designed in order to mimic [Fe]-hydrogenase, a naturally occurring highly efficient hydrogenation catalyst, but only few of these complexes are able to activate H₂. Pan and Hu report a Mn(I)-complex showing the best activity and scope (ketones, aldehydes, imines) among [Fe]-hydrogenase mimics. This catalyst was successfully used for the hydrogenation of imidazolium salts analogous to the natural substrate of [Fe]-hydrogenase. Finally, hydrogenation of a chiral hydride transfer agent by the Mn(I)-complex enabled an enantioselective relay hydrogenation of benzoxazines and benzoxazinones.



Stable Ultraconcentrated and Ultradilute Colloids of CsPbX₃ (X = Cl, Br) Nanocrystals Using Natural Lecithin as a Capping Ligand

F. Krieg, Q. K. Ong, M. Burian, G. Rainò, D. Naumenko, H. Amenitsch, A. Süess, M. J. Grotevent, F. Krumeich, M. I. Bodnarchuk, I. Shorubalko, F. Stellacci, and M. V. Kovalenko,* *J. Am. Chem. Soc.* **2019**, 141, 19839. ETH Zurich, EMPA, EPFL, PSI and Graz University of Technology

Colloidal ligand-capped nanocrystals (NCs) of cesium lead halide perovskites (CsPbX₃; X = Cl, Br) are quantum-confined semiconductors with high light-emissivity, appealing for applications as classical light sources and single-photon sources. Concentrated NC colloids are required to obtain thick, dense and homogeneous films, whereas highly dilute NC systems are suited for engineering quantum light sources. The authors demonstrated that zwitterionic soy lecithin, a mass-produced phospholipid, can be used as a surface capping ligand that ensures high synthesis yield and colloidal stability of CsPbX₃ NCs (6-10 nm) in a broad range of concentrations (from a few ng/ml to over 400 mg/ml).

