



## Swiss Science Concentrates

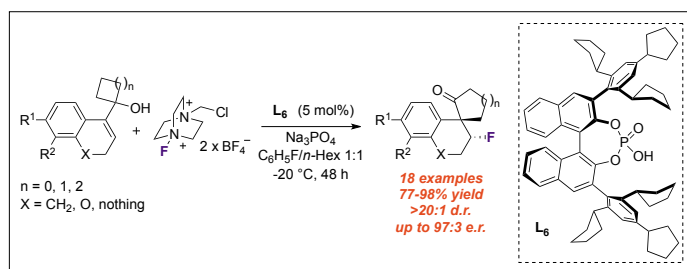
A CHIMIA Column

Short Abstracts of Interesting Recent Publications of Swiss Origin

### Enantioselective Organocatalytic Fluorination-Induced Wagner-Meerwein Rearrangement

F. Romanov-Michailidis, L. Guénée, and A. Alexakis\*, *Angew. Chem. Int. Ed.* **2013**, *52*, 9266. University of Geneva

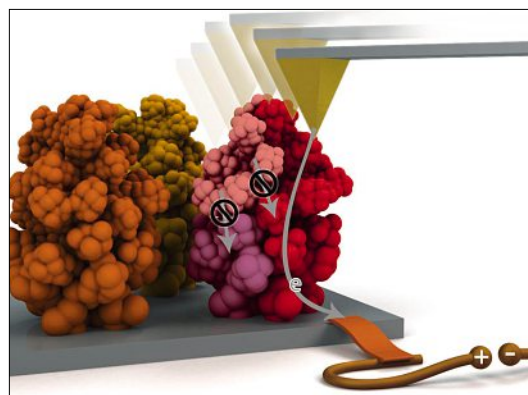
Fluorine substituents have become a very popular structural feature in modern pharmaceuticals and agrochemicals. A synthetic method which introduces these *via* a fluoronium-ion-promoted Wagner-Meerwein rearrangement of strained allylic alcohols is reported by Alexakis and co-workers. Following the concept of anionic phase-transfer catalysis (PTC) and relying on chiral phosphoric acids in combination with Selectfluor, the products are formed with exquisite enantioselectivities. The results are the best reported to date for this type of reaction.



### Identifying Champion Nanostructures for Solar Water-Splitting

S. C. Warren\*, K. Voïtchovsky, H. Dotan, C. M. Leroy, M. Cornuz, F. Stellacci, C. Hébert, A. Rothschild, and M. Grätzel, *Nat. Mater.* **2013**, *12*, 842. EPF Lausanne

Understanding the impact of nanostructures on charge transport properties across micrometer distances is crucial for improving the functionality of fuel cells, batteries and solar-energy conversion devices. Thus far however, this task has proven challenging. The authors report on a new strategy for scrutinizing nanocrystalline mosaics by combining Dark Field-TEM and Conducting-AFM. By combining these two methods, champion nanoparticle aggregates were identified and were shown to be responsible for the high photon to current efficiencies, approaching the theoretical limit. Structural variations that naturally arise in materials composed from nanoparticles significantly simplify the

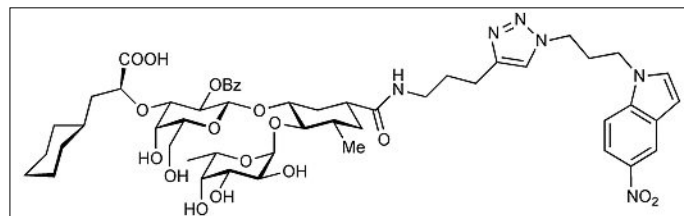


identification of the characteristics that condition the champion performance.

### Nanomolar E-Selectin Antagonists with Prolonged Half-Lives by a Fragment-Based Approach

J. Egger, C. Weckerle, B. Cutting, O. Schwardt, S. Rabbani, K. Lemme, and B. Ernst\*, *J. Am. Chem. Soc.* **2013**, *135*, 9820. University of Basel

Selectins, a family of C-type lectins, play a key role in inflammatory diseases including asthma and arthritis. The tetrasaccharide sialyl Lewis<sup>x</sup> (sLe<sup>x</sup>) is the carbohydrate epitope common to all physiological selectin ligands. Ernst and co-workers report on a novel, fragment-based drug discovery approach resulting from linking a sLe<sup>x</sup> mimic to an adjacent second site ligand, which was identified by <sup>1</sup>H-NMR. By joining these two fragments *via* click chemistry, they identified potent selectin antagonists, displaying low nanomolar activity and impressive half-lives. The successful application of this fragment-based technique is a promising alternative in the search for glycomimetics.



### Peptide Dendrimer/Lipid Hybrid Systems Are Efficient DNA Transfection Reagents: Structure-Activity Relationships Highlight the Role of Charge Distribution Across Dendrimer Generations

A. Kwok, G. A. Eggimann, J.-L. Reymond\*, T. Darbre\*, and F. Hollfelder\*, *ACS Nano*, **2013**, *7*, 4668. Universities of Cambridge and Bern.

The emerging field of gene therapy is relying on novel transfection reagents that can deliver DNA into cells efficiently. To address this challenge, Darbre, Reymond and co-workers developed amino acid-based dendrimers that are shown to improve transfections rates by 6-10 fold over commercial reagents. These non-cytotoxic and water-soluble dendritic peptides are easy to prepare and differ from previous devices in the placement of the cationic charge patterns. Since this platform allows decoration with cell-targeting moieties, its transfection rates and cell specificity could be increased even further.

