



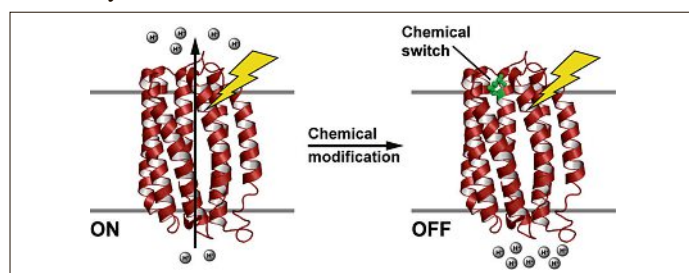
Swiss Science Concentrates

A CHIMIA Column

Short Abstracts of Interesting Recent Publications of Swiss Origin

Engineering a Chemical Switch into the Light-driven Proton Pump Proteorhodopsin by Cysteine Mutagenesis and Thiol Modification

D. Harder, S. Hirschi, Z. Ucurum, R. Goers, W. Meier, D. J. Müller, and D. Fotiadis*, *Angew. Chem. Int. Ed.* **2016**, *55*, 8846. University of Bern

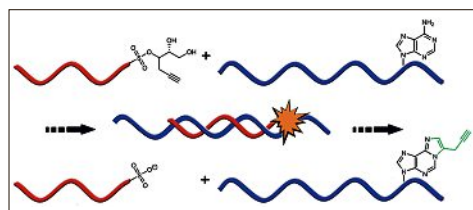


In synthetic biology, the bottom-up assembly of biomolecular nanofactories relies on the availability of modules with specific and controllable functionalities. Of particular importance are energizing modules, which can establish an electrochemical gradient across a vesicular membrane, thus acting as an energy source for powering other modules. Light-driven proton pumps like proteorhodopsin (PR) are excellent candidates for an efficient energy conversion. Fotiadis and collaborators have extended the versatility of PR by implementing an on/off switch based on the reversible chemical modification of a site-specifically introduced cysteine residue. This PR mutant represents the first light-driven proton pump that can be chemically switched on/off depending on the requirements of the molecular system.

Sequence-Specific Post-Synthetic Oligonucleotide Labeling for Single-Molecule Fluorescence Applications

D. Egloff, I. A. Oleinich, M. Zhao, S. L. B. König, R. K. O. Sigel, and E. Freisinger*, *ACS Chem. Biol.* **2016**, *11*, 2558. University of Zürich

The sequence-specific fluorescence labelling of nucleic acids is a prerequisite for many different methods including single-molecule FRET. Freisinger and collaborators now report a new labelling strategy for the post-synthetic incorporation of a bioorthogonal group into single stranded regions of both DNA and RNA. An alkynyl-modified adenine is sequence selectively formed using DNA-templated synthesis, followed by fluorophore conjugation via copper-catalyzed azide-alkyne cycloaddition. To prove the universal use of the method, Cy3 labeling of a 633 nucleotide-long RNA molecule was demonstrated.

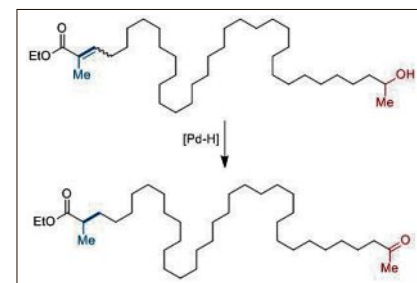


Palladium-Catalyzed Long-Range Deconjugative Isomerization of Highly Substituted α,β -Unsaturated Carbonyl Compounds

L. Lin, C. Romano, and C. Mazet*, *J. Am. Chem. Soc.* **2016**, *138*, 10344. University of Geneva

The remote functionalization of an organic molecule by alkene isomerization along a carbon skeleton has witnessed increased interest recently. The long-range deconjugative isomerization of a broad range of α,β -unsaturated amides, esters and ketones by an *in situ* generated palladium hydride catalyst is now described by Mazet and coworkers.

This redox-economical process is triggered by a hydrometallation event and thermodynamically driven by the refunctionalization of an alcohol to a carbonyl. Di-, tri- and tetrasubstituted carbon-carbon double bonds react with similar efficiency. Furthermore, the system is tolerant towards a variety of functional groups and olefin migration can be sustained over 30 carbon atoms.



From 1D to 3D – Macroscopic Nanowire Aerogel Monoliths

W. Cheng, F. Rechberger, and M. Niederberger*, *Nanoscale*, **2016**, *8*, 14074. ETH Zürich

Inorganic nanowires have been intensively studied for their applications in the fields of electronics, optoelectronics, sensing, catalysis, and energy storage and conversion. However, the preparation of bulk materials from preformed nanowires under preservation of the unique structural and functional properties of the nanowires remains an open question. In this paper, Niederberger and coworkers present a strategy for the assembly of one-dimensional nanostructures into a three-dimensional architecture on the centimeter scale. With the assistance of centrifugation, they successfully gel ultrathin $W_{18}O_{49}$ nanowires with diameters of 1 to 2 nm and aspect ratios larger than 100 into highly porous, crystalline 3D networks. Considering that tungsten oxide is a versatile material for many applications, in which surface area plays a major role, it can be expected that such macroscopic architectures will be highly beneficial.

