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Swiss Science Concentrates

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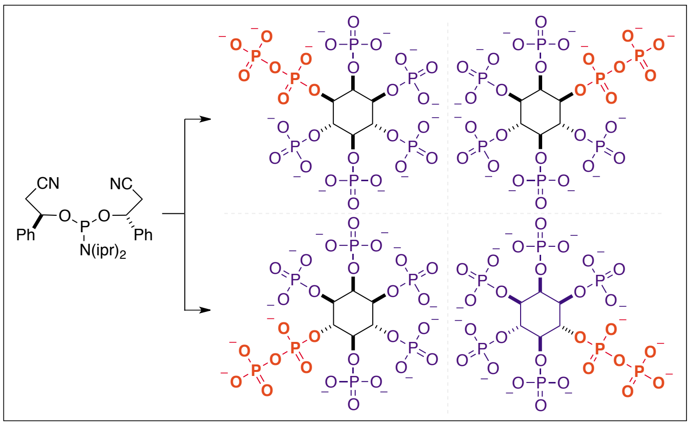
Short Abstracts of Interesting Recent Publications of Swiss Origin

Synthesis of Unsymmetric Diphospho-Inositol Polyphosphates

S. Capolicchio, D. T. Thakor, A. Linden, and H. J. Jessen*, *Angew. Chem. Int. Ed.* **2013**, *27*, 6912. University of Zurich

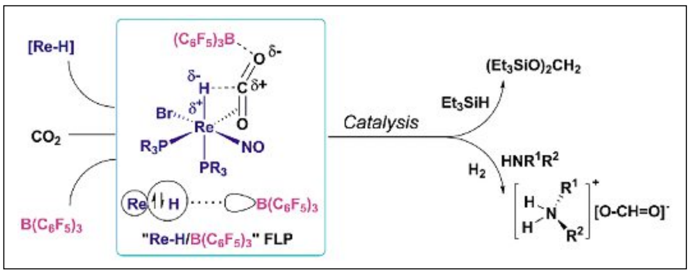
Myo-inositol phosphate esters play a critical role in cellular signaling events in all domains of biology, ranging from archaea to mammals. These super-hydrophilic molecules bearing up to thirteen negative charges are challenging synthetic targets. Jessen and co-workers report on an elegant and concise synthesis and biological evaluation of diphospho-inositol polyphosphates. Towards this goal, they developed a novel and C_2-symmetric phosphoramidite protecting group which additionally acts as a chiral auxiliary thus allowing the synthesis of all four diphospho-inositol pentaphosphates in few steps and high optical purity.



Catalytic CO_2 Activation Assisted by Rhenium Hydride/$B(C_6F_5)_3$ Frustrated Lewis Pairs—Metal Hydrides Functioning as FLP Bases

Y. Jiang, O. Blacque, T. Fox, and H. Berke*, *J. Am. Chem. Soc.* **2013**, *135*, 7751. University of Zurich

Frustrated Lewis Pairs (FLP) offer a new means of activating small inert molecules. Thus far, most of the effort has been centered around main group Lewis acids and bases. Recognizing the isolobal analogy between a sterically crowded M–H fragment and a Lewis base, Berke and co-workers report on a unique rhenium hydride acting as a Lewis base that forms an FLP with $B(C_6F_5)_3$. Exposure of this {Re–H}/$B(C_6F_5)_3$ FLP to a CO_2 atmosphere (1 bar) leads to the reversible formation of a six-coordinate 18 e$^-$ intermediate characterized by an η^2-CO_2 moiety further interacting with $B(C_6F_5)_3$. In the presence of a hindered base, this intermediate was shown to catalyze the reduction of CO_2 using either Et_3SiH or hydrogen gas.



Hybrid Nanocomposites of Gold Single-Crystal Platelets and Amyloid Fibrils with Tunable Fluorescence, Conductivity, and Sensing Properties

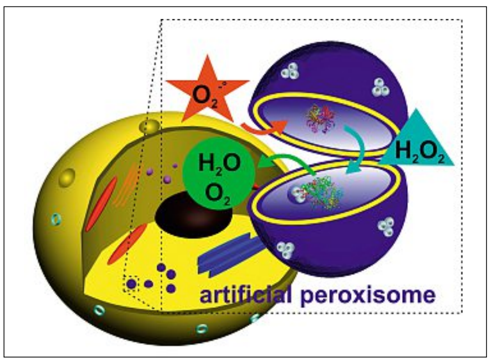
C. Li, S. Bolisetty, and R. Mezzenga*, *Adv. Mat.* **2013**, *25*, 3694. ETH Zurich

Gold nanoparticles are finding increasing use as catalysts, sensor- and optoelectronic devices. In this context, the synthesis of gold nano-objects with defined size and geometry as well as specifically tuned properties is highly desirable. Herein, the authors outline an original three-step approach to hierarchically self-assembled hybrid nanocomposite films resulting from gold nanoplatelets templated around amyloid fibrils. The proteinaceous helical bundles serve to i) ensure high colloidal stability for the gold, ii) enable their assembly in homogenous composites and iii) increase the processability of the obtained films. The resulting materials display well defined structures, tunable conductivity, high reflectivity, fluorescence- and surface plasmon features and thus may find application in new electronics-, mechanical- and biological devices.

Aiding Nature's Organelles: Artificial Peroxisomes Play Their Role

P. Tanner, V. Balasubramanian, and C. G. Palivan*, *Nano Lett.* **2013**, *13*, 2875. University of Basel

Artificial organelles functioning as cell implants to combat various pathologies may allow to radically change medical treatment. Towards this ambitious goal, the authors report a highly efficient biocompatible nanoreactor encapsulating two enzymes working in concert. The trafficking of substrates and products is ensured by insertion of protein channels within the membrane of the nanoreactor, which was shown to function in Hela cells. The artificial organelle is able to combat oxidative stress by mimicking the cell's peroxisomes, thus paving the way towards a wide range of medical applications.



Prepared by N. Bruns, P. Burch, V. Köhler, R. Reuter, M. Spulber, P. Tosatti, A. von der Höh and T. R. Ward

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