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Swiss Science Concentrates

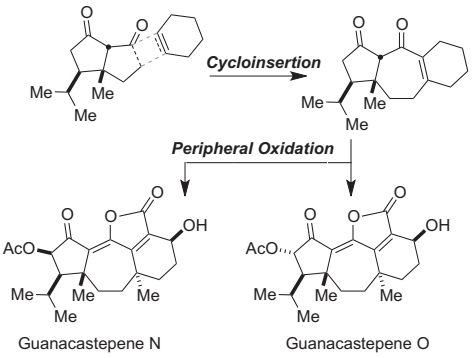
A CHIMIA Column

Short Abstracts of Interesting Recent Publications of Swiss Origin

Total Synthesis of Guanacastepenes N and O

C. M. Gampe and E. M. Carreira*, *Angew. Chem. Int. Ed.* **2011**, *50*, 2962
ETH Zürich

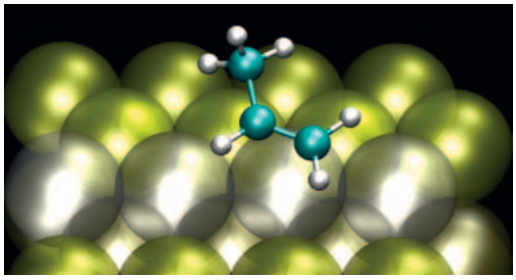
Guanacastepenes, a structurally diverse family of terpenes initially reported in 2001, show an unprecedented tricyclic carbon scaffold which has attracted the interest of the synthetic community. In this article, the authors describe their success in applying the cycloinsertion of cyclohexyne into a pentalene, which enabled access to the carbon scaffold of the guanacastepenes in nine steps. Subsequently, a late-stage diversifying oxidation of the core structure by employing Mn^{III} or Os^{VIII} allowed for the synthesis of guanacastepene N and the first total synthesis of guanacastepene O.



Single-Molecule Chemistry and Analysis: Mode-Specific Dehydrogenation of Adsorbed Propene by Inelastic Electron Tunneling

M. Parschau, K.-H. Rieder, H. J. Hug, and K.-H. Ernst*, *J. Am. Chem. Soc.* **2011**, *133*, 5689
EMPA, Dübendorf

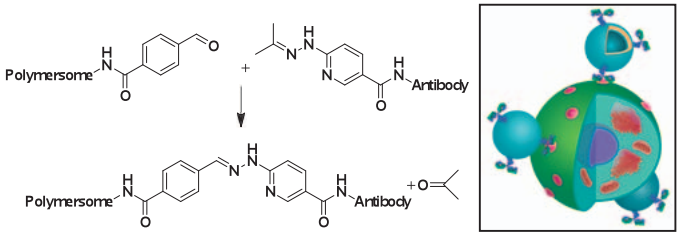
Heterogeneous catalysis is – despite its industrial relevance – still not understood in precise detail since it is notoriously difficult to study. The placement of a single propene molecule between the tip of a scanning electron microscope (STM) and a Cu(211) surface and subsequent heating by inelastically tunneling electrons allowed the reaction to be studied in more detail. Dehydrogenation to allene occurred only after the highest vibrational energy mode (ν_{as}-CH_2) had been excited. The product was identified by inelastic electron tunneling action spectroscopy (IETAS) and exclusion of propyne as product.



Biocompatible Functionalization of Polymersome Surfaces: A New Approach to Surface Immobilization and Cell Targeting Using Polymersomes

S. Egli, M. G. Nussbaumer, V. Balasubramanian, M. Chami, N. Bruns, C. Palivan, and W. Meier*, *J. Am. Chem. Soc.* **2011**, *133*, 4476
University of Basel

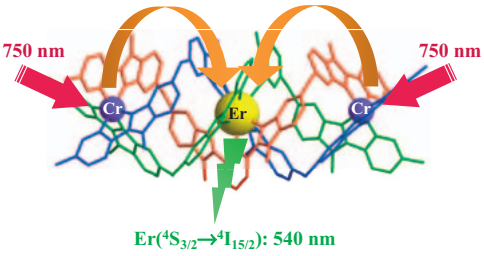
Polymer vesicles are ideal nano-containers for drug-delivery; they can be used as nanoreactors and even as artificial organelles. Many of these applications call for a surface decoration of the vesicle membrane with targeting ligands, such as antibodies. The authors introduce a non-toxic and biocompatible conjugation chemistry to covalently bind antibodies and other proteins to polymer vesicles, based on the formation of a bis-aryl hydrazone bond. This conjugation strategy is a superior alternative to click chemistry approaches, as it does not require any harmful copper reagents. The vesicle-antibody conjugates were successfully used to target cancer cells and antigens on surfaces.



Near Infrared → Visible Light Upconversion in a Molecular Trinuclear d–f–d Complex

L. Aboshyan-Sorgho, C. Besnard, P. Pattison, K. R. Kittilstved, A. Aebischer, J.-C. G. Bünzli, A. Hauser*, and C. Piguet*, *Angew. Chem. Int. Ed.* **2011**, *50*, *in press*
University of Geneva and EPFL

Since living tissues are transparent to low energy photons, near infrared radiation is particularly attractive for the design of photoactive bioprobes. A rigid molecular triple helicate consisting of an erbium (III) center flanked by two chromium (III) centers displays unprecedented sequential energy transfer upconversion. Two near infrared photons (750 nm) serve to excite the transition metal sensitizers which transfer their energy to the central lanthanide ion, which, in turn, emits at 540 nm. The authors speculate that such systems may be adapted to achieve three-photon upconversion.



Prepared by N. Bruns, V. Köhler, R. Kramer, P. Mauleón, F. Monnard and T. R. Ward
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