



Swiss Science Concentrates

A CHIMIA Column

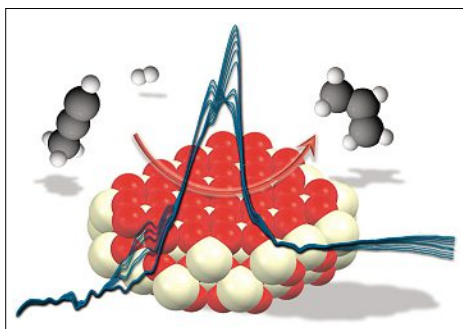
Short Abstracts of Interesting Recent Publications of Swiss Origin

Ceria in Hydrogenation Catalysis: High Selectivity in the Conversion of Alkynes to Olefins

G. Vilé, B. Bridier, J. Wichert, and J. Pérez-Ramírez*, *Angew. Chem. Int. Ed.* **2012**, *51*, 8620.

ETH Zurich

Often ceria (CeO₂) acts as a critical enhancer or co-catalyst in many oxidation reactions; however, the recent report by Pérez-Ramírez and coworkers highlights the use of ceria as a stand-alone heterogeneous catalyst for the selective gas-phase hydrogenation of alkynes to olefins. The mechanism was investigated by diffuse reflectance infrared Fourier transform spectroscopy. The excellent yields were ascribed to the high surface area and the controlled degree of surface reduction. This work has implications for olefin purification in steam cracking as an alternative to the traditionally used palladium-based catalysts. It also opens perspectives for exploring this oxide as a catalyst for hydrogenating other functional groups.

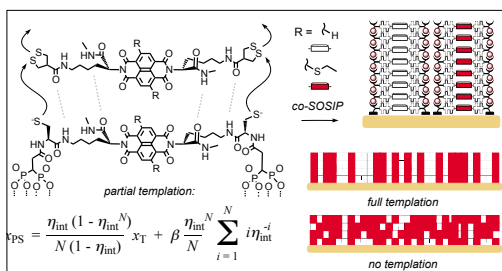


A Quantitative Model for the Transcription of 2D Patterns into Functional 3D Architectures

E. Orentas, M. Lista, N.-T. Lin, N. Sakai, and S. Matile*, *Nature Chem.* **2012**, *4*, 746.

University of Geneva

Patterning of organic molecules on solid surfaces is well-established to create surfaces with advanced properties. However, some applications like organic optoelectronic materials require thicker, well-ordered layers of material. The authors now describe a theoretical model and the corresponding experimental method to obtain such 3D coatings. To this end, binary mixtures of different initiators for self-organizing surface-initiated co-polymerization (co-SOSIP) were applied as a molecular layer to ITO surfaces. The samples were then incubated in a mixture of SOSIP monomers. Axial self-sorting, templating, and polymerization resulted in stacks of molecules, with an effective templation efficiency up to 47% for 70 layers. This corresponds to 97% intrinsic templation efficiency, a non-empirical, thickness-independent value introduced to quantify the per-layer fidelity of transcription.

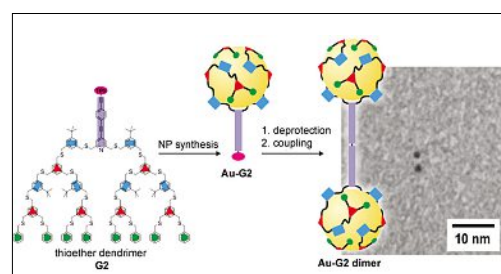


Monofunctionalized Gold Nanoparticles Stabilized by a Single Dendrimer Form Dumbbell Structures upon Homocoupling

J. P. Hermes, F. Sander, U. Fluch, T. Peterle, D. Thompson, R. Urbani, T. Pfohl, and M. Mayor*, *J. Am. Chem. Soc.* **2012**, *134*, 14674.

University of Basel

Gold nanoparticles (NP) have found numerous applications in nanoelectronics, sensor technology and catalysis. In order to achieve a desired function, selective preparation of NPs is crucial. With this goal in mind, the authors designed dendritic multidentate ligands, which control the particle formation and allow the introduction of a controlled number of functional groups on the NP surface. Furthermore, the designed ligands contain a peripheral protected acetylene, which exclusively provides dimers of NPs interlinked by a diethynyl bridge after a wet-chemical deprotection/oxidative acetylene coupling. This concept not only enables access to novel organic/inorganic hybrid architectures but also promises new approaches in labeling technology.



Fluorinated Organocatalysts for the Enantioselective Epoxidation of Enals: Molecular Pre-organisation by the Fluorine-Iminium Ion *Gauche* Effect

E.-M. Tanzer, L. E. Zimmer, W. B. Schweizer, and R. Gilmour*, *Chem. Eur. J.* **2012**, *18*, 11334. ETH Zurich

The development of new organocatalysts is a fast-growing field in asymmetric synthesis. In this paper Gilmour and coworkers report the results of a systematic molecular editing of fluorine containing proline-derived catalysts and their use for the enantioselective epoxidation of α,β -unsaturated aldehydes. The epoxidation of challenging substrates was achieved with excellent levels of enantiocontrol (up to 98% ee) thanks to a catalyst bearing a (fluorodiphenyl)methyl group. This result originates from the fluorine-iminium *gauche* effect that is generated in the β -fluoriminium intermediate resulting from condensation of the catalyst with the α,β -unsaturated aldehyde.

