

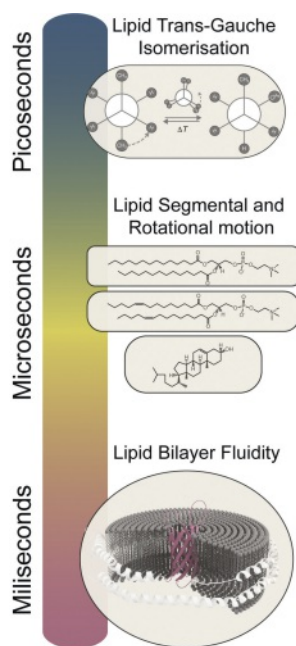


Swiss Science Concentrates

A CHIMIA Column

Short Abstracts of Interesting Recent Publications of Swiss Origin

Time-Scale-Specific Modulation of Outer Membrane Protein Dynamics in Lipid Bilayers



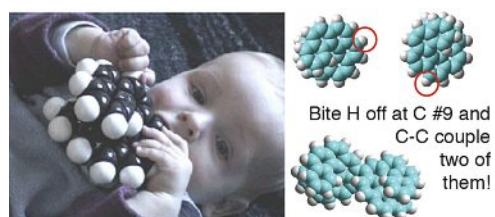
L. Frey, S. Hiller, R. Riek*, and S. Bibow*, *J. Am. Chem. Soc.* **2018**, *140*, 15402. ETH Zurich and University of Basel

Lipid dynamics are crucial for membrane protein function and can therefore impact biological activity. The groups of Bibow and Riek have employed ^{15}N -based NMR time-scale-specific relaxation techniques with residue-resolution to obtain a better understanding of the effects of lipid dynamics on membrane proteins on milli-, micro-, nano-, and picosecond timescales. This study demonstrated how changes in lipid ordering by temperature or cholesterol were translated to the embedded protein. Time-scale-specific changes to the protein's ^{15}N -values were specific to lipid phases that exhibited different *trans-gauche* isomerization rates, segmental and rotational motion, and fluidity. These results open the door to understanding the coupling of lipid membrane and membrane protein dynamics.

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Diastereoselective Ullmann Coupling to Bishelicenes by Surface Topochemistry

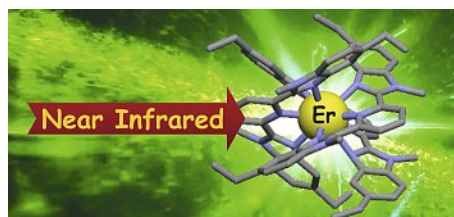
A. Mairena, C. Wäckerlin, M. Wienke, K. Grenader, A. Terfort, and K.-H. Ernst*, *J. Am. Chem. Soc.* **2018**, *140*, 15186. Empa
The functionalization of surfaces with helical aromatic hydrocarbons, so-called helicenes, is of interest for new organic electronic devices, such as chiroptical sensors or electron spin filters. Beyond self-assembly of helicenes, on-surface synthesis toward larger and more robust aggregates is increasingly applied as strategy for preparing more stable films. In particular, the Ullmann reaction has been applied for the formation of covalent C–C bonds on surfaces. In this study, the dimerization of bromoheptahelicene to bisheptahelicene on a gold surface was found to yield predominantly heterochiral combinations. This diastereoselectivity was the consequence of topochemistry caused by the surface-alignment of the precursor material.



Room-Temperature Linear Light Upconversion in a Mononuclear Erbium Molecular Complex

B. Golesorkhi, H. Nozary, L. Guénée, A. Fürstenberg, and C. Piguet*, *Angew. Chem. Int. Ed.* **2018**, *57*, 15172. University of Geneva

Linear light upconversion is the successive absorption of low energy photons *via* long-lived excited states to give upconverted emissions in the visible range. This phenomenon holds great potential in biological imaging and photonic devices, but it has thus far been limited to low-phonon solid materials and nanoparticles. Here Piguet and coworkers present the first example of a mononuclear metal complex that undergoes upconversion via excited state absorption. This was achieved by the synthesis of a nine-coordinate erbium complex bound to three N-donor ligands. The resulting complex can be excited in the near infrared at 801 or 966 nm resulting in upconverted green emission at 542 nm.



A Nickel(II)-Containing Vitamin B12 Derivative with a Cofactor-F430-type π -System

C. Brenig, L. Prieto, R. Oetterli, and F. Zelder*, *Angew. Chem. Int. Ed.* **2018**, *57*, 16308. University of Zurich

Here the Zelder group reports the first partial chemical synthesis of a cobalamin-like derivative containing a metal other than cobalt starting from vitamin B12 (B12). The key step of the synthesis was simultaneous demetallation and ring closure of a 5,6-secocobalamin. The resulting 'nibalamin' derivative shares spectroscopic features with coenzyme F430 that were attributed to structural similarities of the tetradentate ligand framework. The reported coordination chemistry of this Ni-containing B12 derivative support pioneering work of the Eschenmoser group regarding why nature has combined Ni with a corphin and not a corrin ligand for challenging nickel-catalyzed biochemical transformations.

