



## Swiss Science Concentrates

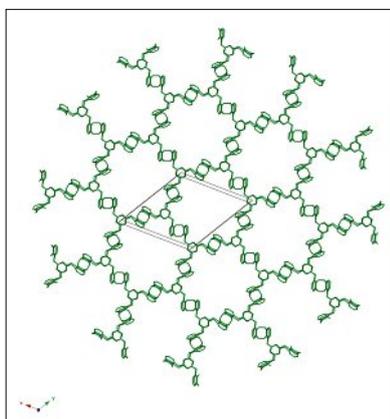
A CHIMIA Column

Short Abstracts of Interesting Recent Publications of Swiss Origin

### Gram-scale Synthesis of Two-dimensional Polymer Crystals and their Structure Analysis by X-ray Diffraction

M. J. Kory, M. Wörle, T. Weber, P. Payamyar, S. W. van de Poll, J. Dshemuchadse, N. Trapp, and A. D. Schlüter\*, *Nat. Chem.* **2014**, *6*, 779. ETH Zurich.

Two-dimensional polymers have fascinated chemists long before the discovery of graphene. Their controlled synthesis has however remained elusive. Schlüter and coworkers report on the synthesis of a two-dimensional polymer based on polymerization within a crystal of a photoreactive monomer, followed by a delimitation step. This elegant design strategy will allow to systematically investigate structure-property relationships for this emergent class of two-dimensional materials.



### Direct Synthesis of Formic Acid from Carbon Dioxide by Hydrogenation in Acidic Media

S. Moret, P. J. Dyson, and G. Laurency\*, *Nat. Commun.* **2014**, doi:10.1038/ncomms5017. EPFL Lausanne.

In times of climate change, carbon capturing has become an attractive means to reduce the rise of CO<sub>2</sub> levels. Besides the storage of CO<sub>2</sub> in porous rock formations, its conversion to high value chemicals, including formic acid, is an attractive alternative. Laurency and coworkers present a catalyst for the direct hydrogenation of CO<sub>2</sub> to formic acid in unprecedentedly high concentrations (up to 1.9 M in DMSO). The Ru(II) catalyst system bearing water-soluble phosphine ligands can be recycled several times without loss of activity. Most importantly, it does not require the presence of base.

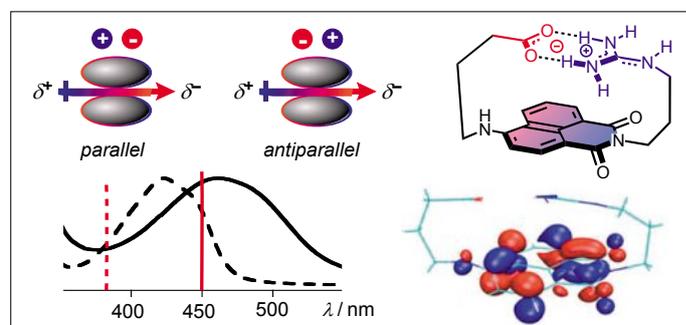


### Anion- $\pi$ and Cation- $\pi$ Interactions on the Same Surface

K. Fujisawa, C. Beuchat, M. Humbert-Droz, A. Wilson, T. A. Wesolowski, J. Mareda, N. Sakai, and S. Matile\*, *Angew. Chem. Int. Ed.* **2014**, *53*, 11266. University of Geneva.

The mechanism of cell-penetration of certain peptides is still

under debate. One theory proposes anionic- $\pi$  and cationic- $\pi$  interactions on the same surface of biological moieties, especially for guanidinium-rich peptides. Matile and co-workers addressed this question relying on both computational- and synthetic investigations. For this purpose, they enforced 'ionpair- $\pi$ ' interactions (carboxylate-guanidinium moiety) on push-pull chromophores. An intramolecular Stark effect, resulting from ionpair interactions, of +43 nm was observed in CCl<sub>4</sub>, which is in near agreement with the calculated value. Protonation of the carboxylate reversibly weakens or cancels the red shifts. These results provide elegant theoretical and experimental support that anion- $\pi$  and cation- $\pi$  interactions can occur on the same surface.



### An Octadentate Bifunctional Chelating Agent for the Development of Stable Zirconium-89 Based Molecular Imaging Probes

M. Patra, A. Bauman, C. Mari, C. A. Fischer, O. Blacque, D. Häussinger, and G. Gasser\*, T. L. Mindt\*, *Chem. Commun.* **2014**, *50*, 11523. Universities of Zurich and Basel.

Molecular imaging agents based on the radionuclide zirconium-89 (<sup>89</sup>Zr) hold great promise as novel radiotracers in nuclear medicine using high-resolution positron emission tomography. However, insufficient *in vivo* stability of currently used radiometal complexes employing hexadentate chelators is a safety concern in view of clinical applications. Now a consortium of researchers of the Universities of Basel and Zurich report the facile synthesis and evaluation of the first octadentate bifunctional chelating agent for the development of <sup>89</sup>Zr-labelled (bio)conjugates with remarkably improved stability profiles.

