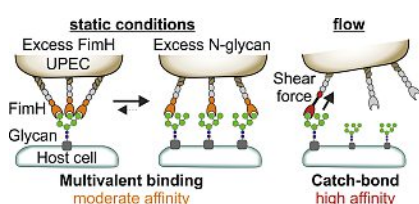




Binding of the Bacterial Adhesin FimH to Its Natural, Multivalent High-Mannose Type Glycan Targets

M. M. Sauer, R. P. Jakob, T. Luber, F. Canonica, G. Navarra, B. Ernst, C. Unverzagt, T. Maier, and R. Glockshuber,* *J. Am. Chem. Soc.* **2019**, *141*, 936. ETH Zurich, University of Basel, and University of Bayreuth

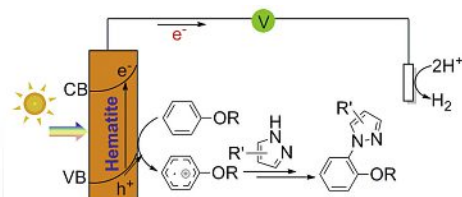
Adhesins play a crucial role in the attachment of pathogens to their target cells and competitive antagonists thereof are promising antimicrobial drugs. In this collaborative work, the authors disclose a detailed structural and kinetic study of the interactions between the fimbrial adhesin FimH of uropathogenic *E. coli* strains and target glycans of the urinary epithelium. A highly dynamic binding *via* multiple kinetically labile FimH ligand interactions prevents irreversible bacterial attachment to the initial site of infection and allows pathogen migration in the urinary tract. During urine excretion, shear forces cause domain-separation in FimH. This domain-separated state exhibits 2000-fold higher affinity towards binding epitopes and prevents pathogen elimination by urination. These results provide a solid basis for the development of effective FimH antagonists.



Photoelectrocatalytic Arene C–H Amination

L. Zhang, L. Liardet, J. Luo, D. Ren, M. Grätzel, and X. Hu,* *Nature Catalysis* **2019**, doi:10.1038/s41929-019-0231-9. EPFL and Nankai University

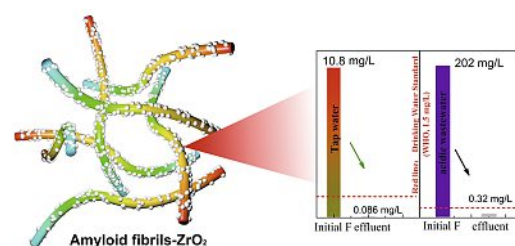
Photoelectrochemical cells (PEC) are widely studied for solar energy conversion but have been rarely used in organic chemistry, despite their ability to generate high reducing or oxidizing power. In this collaborative work, Hu and co-workers report a new methodology for non-directed arene C–H amination under mild photoelectrochemical conditions, using abundant and robust haematite as photoanode. Under illumination, photogenerated holes in haematite oxidize electron-rich arenes to radical cations, which further react with azoles to yield nitrogen heterocycles of great medicinal interest. Noteworthy, unusual and hard-to-reach *ortho* selectivity was observed. This pioneer work is highly promising for future uses of PEC in photoredox catalysis.



Selective and Efficient Removal of Fluoride from Water by *in-situ* Engineered Amyloid Fibrils-ZrO₂ Hybrid Membranes

Q. Zhang,* S. Bolisetty, Y. Cao, S. Handschin, J. Adamcik, Q. Peng, and R. Mezzenga,* *Angew. Chem. Int. Ed.* **2019**, doi: 10.1002/anie.201901596. ETH Zurich and Yanshan University.

Fluoride pollution in water is a current worldwide issue of concern. Mezzenga and co-workers present a new hybrid membrane composed of ZrO₂ nanoparticles (<10 nm) nucleated *in situ* on amyloid fibrils, which shows a very high selectivity for fluoride against various competitive ions compared to commercial alternatives. Its efficiency is greater than 99.5% in the removal of fluoride ions in both low (several mg/L) and high (~200 mg/L) concentrations, making the membrane suitable to purify tap water and wastewater, respectively. The membrane was successfully tested on real water sources, which makes it a highly promising technology to reduce the global fluoride contamination in water.



Streptavidin Interfacing as a General Strategy to Localize Fluorescent Membrane Tension Probes in Cells

A. Goujon, K. Straková, N. Sakai, and S. Matile,* *Chem. Sci.* **2019**, *10*, 310. University of Geneva

A demanding challenge from the biology, which awaits a solution from chemistry, is the fluorescence imaging of physical forces in living cells. Previously Matile and co-workers introduced the concept of planarizable push-pull probes. For their application in biological systems, they have to be localized to specific environments of cellular membranes. In this study, the authors investigate streptavidin as a versatile linker between biotinylated flipper probes and targets. Extra binding sites on streptavidin had to be protected with exchangeable desthiobiotin for the successful delivery to biotinylated membranes. The biological compatibility of this method was confirmed by experiments performed on HeLa cells.

