Molecular Lego for functional 2D Materials: Designing ultra-stable and highly crystalline two-dimensional organic networks

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Two-dimensional (2D) materials, beyond graphene, comprise a growing field of scientific activity. Organic thin films, fabricated with molecular precision via bottom-up methods, are highly attractive as functional surfaces in a wide range of applications. These involve, e.g. holding few-atomic clusters and proteins for single cluster and single molecule investigations in most advanced Scanning Transmission Electron Microscopy and in investigations with X-ray Photons at Synchrotrons and Free Electron Lasers.[1] Recently, we introduced the concept of stabilization of Langmuir Blodgett (LB) films by supramolecular clips[2]. More recently we reported about the first crystalline 2D metal organic coordination network of a complex calixarene derived amphiphile (**1**) and a copper metal node at the air-liquid interface.[3] In this lecture, we show the first reported two-dimensional supramolecular organic network stabilized via only weak dipole-dipole interaction using a modified building block (**2**). Remarkably, macromolecules of **2** form a free-standing and crystalline 2D supramolecular organic network in *absence* of any organic or inorganic linkers.[4] Characterization of the transferred monolayers onto solid substrates have been carried out by means of atomic force microscopy (AFM), surface ellipsometry, contact angle measurements, transmission electron microscopy, *X*-ray photoelectron and near-edge *X*-ray absorption fine structure spectroscopy.

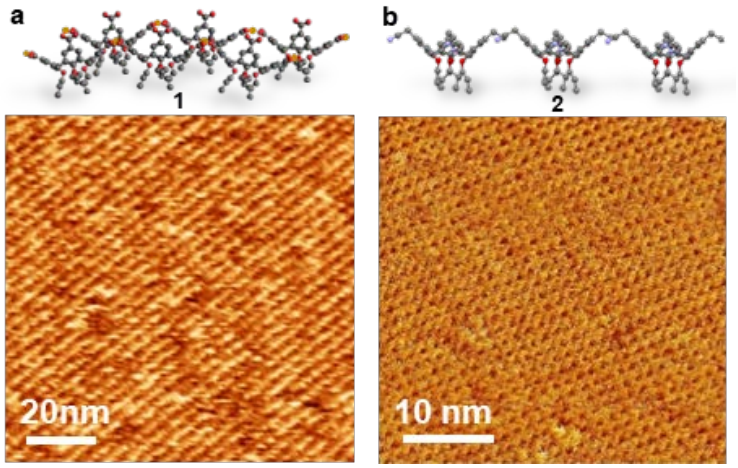

Figure 1. AFM images of the crystalline self-assembled networks of **1** (**a**) and **2** (**b**) and the corresponding molecular models.

References

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