Imaging the electronic structure of long acenes generated on-surface

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We present the fabrication of acenes (polycyclic hydrocarbons formed by the linear fusion of several benzene rings) on metallic surfaces. Here, on-surface reduction of specifically designed precursors pushes the boundaries set by stability and allows single molecule investigations beyond pentacene. In particular, scanning tunneling microscopy and spectroscopy of single hexacene molecules is performed to directly visualize the frontier orbital resonances and to capture their narrow energy gap [1]. Due to the high reactivity of hexacene under ambient conditions, scanning probe investigations at the single molecule level could not be obtained so far. In this work, we proof the scalability of a recently introduced on-surface reaction [2] to generate and stabilize long acenes directly on Au(111) by making use of oxygen-containing precursors (see Figure 1). In the last part of this contribution, we analyze the electronic resonances of hexacene and beyond on Au(111) as function of the length.

Figures

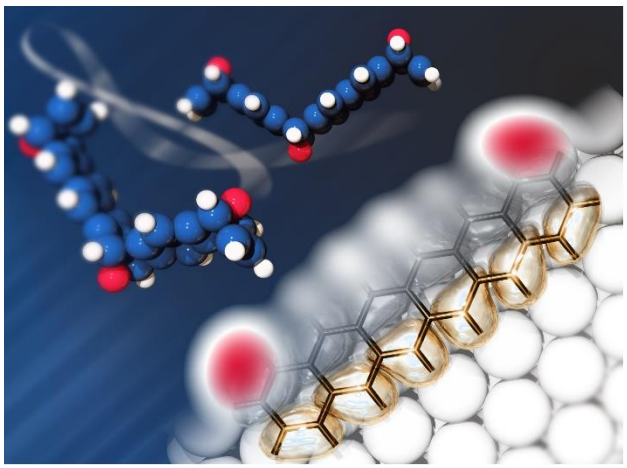

Figure 1. On-surface reduction of air-stable precursors allows the single-molecule investigations of hexacene.

References

[1] J. Krüger, F. Eisenhut *et al.*, Chem. Commun., **2017**, 53, pp 1583-1586
[2] J. Krüger, N. Pavliček *et al.*, ACS Nano **2016**, 10 (4), pp 4538-4542