**On-surface synthesis of single-molecule magnets**

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Organic molecular nanostructures adsorbed onto various surfaces are of interest for prospective applications ranging from nanoscale electronics and solar cells to energy or data storage devices. One challenge is the creation of those variable and flexible structures on the surface: Notably for more complex molecules standard UHV methods such as thermal evaporation can lead to unwanted modifications of the adsorbate. This problem can be overcome by on-surface synthesis from smaller building blocks, using carefully chosen preparation parameters to obtain the desired properties. The first part of the presentation is dedicated to an example of in vacuo metallation of tetrapyrrole molecules, which is a convenient way to build tetrapyrrole-based metal-organic structures on metal surfaces. We use this technique for the synthesis of rare earth tetrapyrrole double deckers, which are characterized using X-ray emission and absorption spectroscopy methods (namely, XPS, NEXAFS, XMCD) to probe the electronic and magnetic properties and scanning tunneling microscopy (STM) to analyse the ordering of the molecules. Another challenge is the modification of the molecules by adsorption onto a substrate. The interaction between single-molecule magnets and the surface can lead to a quenching of the magnetic properties due to a multitude of different effects such as hybridization with the surface or interactions with phonons. The second part of the presentation discusses some of those effects for the well-known single-molecule magnet terbium phthalocyanine double decker adsorbed on different substrates.