Honeycomb Networks as Templates for Magnetic Nanostructures

Harald Brune
Institute of Condensed Matter Physics (ICMP), Station 3, Ecole Polytechnique
Fédérale de Lausanne (EPFL), CH-1015 Lausanne, Switzerland

We discuss hexagonal boron nitride, graphene, and metal-organic honeycomb network surfaces. The focus will be on their template function and on the properties of adsorbed atoms, molecules, and nanostructures. We will show two examples how inelastic electron tunneling spectroscopy with the STM can be used to access these properties. The first will be spin excitations giving access to the Landé *g* factor, to the zero-field splitting related to the magnetic anisotropy energy, and to the effective spin moments of atoms. We find that the easy magnetization axes of Co atoms on graphene can be adjusted by the substrate onto which graphene is grown. The second example will be the spectroscopy of molecular rotations for physisorbed H2 and its isotopes, where we are able to discern the nuclear spin isomers ortho and para. Finally, we will show an example where we have reached the magnetic anisotropy limit of a 3*d* metal atom given by the spin-orbit coupling. This example nicely illustrates the complementarity of XMCD and STM spin excitation spectroscopy.