DS 33: Molecular Spintronics - Current Status and Challenges II (Focused Session)

Time: Thursday 15:00–16:00 Location: H2

Topical Talk DS 33.1 Thu 15:00 H2

Spin-dependent tunneling through a single molecule with intramolecular resolution — •Roland Wiesendanger — Institut für Angewandte Physik und Interdisziplinäres Nanowissenschafts-Centrum Hamburg, Universität Hamburg, D-20355 Hamburg, wiesendanger@physnet.uni-hamburg.de, www.nanoscience.de

Molecular spintronics based on the injection, transport, and detection of spin currents through a single magnetic molecule opens up fascinating perspectives for future nanoscale storage or logic devices. Progress in this exciting field of research depends on a detailed characterization of the electrode-molecule interface at high spatial resolution. We have applied spin-polarized scanning tunneling microscopy (SP-STM) and spectroscopy (SP-STS) [1] to study the energy- and spin-dependent tunneling through individual phthalocyanine molecules as function of their orientation with respect to the substrate lattice and as function of the magnetization states of substrate and SP-STM tip. Interestingly, a strong spin-dependent intramolecular contrast is observed related with a significant difference in spin-dependent current flow through the central metal ion and the surrounding ligands. Our experimental results are in good agreement with first-principles calculations including the van-der Waals interaction between molecule and substrate.

[1] R. Wiesendanger, Rev. Mod. Phys. 81, 1495 (2009).

Topical Talk DS 33.2 Thu 15:30 H2

Tunneling through magnetic molecules: what can we learn from the master equation? — •Carsten Timm[1], Florian Elste[2], and Binhe Wu[3] — [1]Technische Universität Dresden, Germany — [2]Columbia University, New York, USA — [3]Max-Planck-Institut für Physik komplexer Systeme, Dresden, Germany

Progress in molecular spintronics requires an improved understanding of electronic transport through magnetic molecules far from the linear-response regime. For weak hybridization with the electronic leads, the method of choice for the theoretical description is the master equation. A number of effects relevant for spintronics, such as spin blockade and spin amplification, will be reviewed. The master equation also sheds light on the spin *dynamics*, as will be illustrated by the examples of spin relaxation and the current-noise spectrum.