Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Laboratorium für Physikalische Chemie (LPC))

Einladung zu einem Kolloquium

Datum/Zeit:	**Dienstag, 05.03.2024, 16.45 Uhr**
Referent:	**Prof. Karl-Heinz Ernst** Empa - Swiss Federal Laboratories for Materials Science and Technology, Dübendorf, Schweiz
Titel:	*Magneto-Chiral Phenomena and Topological Self-Assembly of Helical Aromatics on Surfaces*
Ort:	**HCI J3**

Soon after his seminal discovery of molecular chirality Pasteur suggested physical fields as its origin and assumed that magnetic fields must be the source of chirality in the universe. Lord Kelvin refuted Pasteur's suggestions and made clear that magnetism has no chirality. In 1894, Pierre Curie proposed that parallel and antiparallel alignments of electric and magnetic fields will induce chirality, but such chiral influence must vanish under conditions of thermodynamic equilibrium. We report that single helical aromatic hydrocarbons, so-called helicenes, undergo enantioselective adsorption on ferromagnetic cobalt surfaces. Spin- and chirality sensitive scanning tunneling microscopy (STM) reveals that molecules of opposite handedness prefer adsorption onto cobalt islands with opposite out-of-plane magnetization. As mobility ceases in the final chemisorbed state, it is concluded that enantioselection must occur in a physisorbed transient precursor state. Such observation suggests electron spin-depend van-der-Waals forces. Simultaneous measurements of the tunneling current through both enantiomers on a given Co nanoisland yields a magneto-chiral specific conductance of up to 50% for single helicene molecules, thus refuting previously proposed ensemble effects as origin of the so-called chirality-induced spin selectivity (CISS). Our results open the opportunity towards new single-molecule spin-valve devices and shine light into the origin of CISS. In addition, open-shell helicenes offer an exciting route to study enantioselective spin-orbit coupling in helical aromatic hydrocarbons. We present first results of single molecule Kondo scattering of such helicenes on a gold surface. The outlook for potential effects in single molecule ESR is discussed.

Gäste sind willkommen