

REGIONAL CENTRE OF ADVANCED TECHNOLOGIES AND MATERIALS LECTURES

Wednesday, October 10, 2018, 2:30 pm
Seminar room of RCPTM (room No. 314), Šlechtitelů 27, Olomouc



Prof. Dr. Karl-Heinz Ernst

Empa - Nanoscale Materials Science

Dübendorf, Switzerland



Chirality in flatland: intermolecular recognition, spin filtering and molecular machines at surfaces

Molecular recognition among chiral molecules on surfaces is of paramount importance in biomineralization, enantioselective heterogeneous catalysis, and for the separation of chiral molecules into their two mirror-image isomers (enantiomers) via crystallization or chromatography. Understanding the principles of molecular recognition in general, however, is a difficult task and calls for investigation of appropriate model systems. One popular approach is thereby studying intermolecular interactions on well-defined solid surfaces, which allows in particular the use of scanning tunneling microscopy (STM). Examples of chiral amplification via the so-called 'sergeant-and-soldiers' effect as well as manipulation of chiral adsorbates via inelastic electron tunneling will be presented. In a Pasteur-type experiment at the nanoscale, molecules that constitute a dimer are spatially separated with a molecular STM tip and their absolute handedness is determined with submolecular resolution STM. Moreover, we report spin-dependent filtering of electrons by monolayers of these helical molecules. Finally the first successful electrical current-driven, unidirectional motion of a synthetic molecule will be presented (Fig. 1).

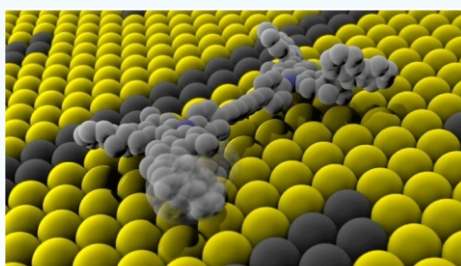


Fig. 1: Sketch of the 'nanocar' on a surface.