F. Djeghloul et al., J Nanomater Mol Nanotechnol 2018, Volume 7
DOI: 10.4172/2324-8777-C6-035

Breakdown of the electron-spin motion upon reflection at metal-organic or metal-carbon interfaces

F. Djeghloul, P. Dey, A. Hallal and W. Weber
Institut de Physique et Chimie des Matériaux de Strasbourg, CNRS -Strasbourg, France

For a better understanding of the spin-dependent electron transport across an organic/ferromagnetic interface, we performed spin-polarized electron scattering experiments on different metal-organic and metal-carbon interfaces. We observe a completely unexpected behavior of the spin-polarized reflection properties of these interfaces. Submonolayer amounts of organic molecules or pure carbon makes the reflection of electrons independent of the spin; i.e., both the reflectivity and the reflection phase become spin independent. Such a behavior is expected for non-magnetic organic films of several monolayers (ML) thickness, but not for such low coverage as studied in this work. Our findings show that this behavior is a very general phenomenon which is independent of the electron energy and the choice of the metal as well as of the organic molecules and thus does not depend on the choice of the specific interface. This breakdown phenomenon (BP) appears in experiments with ferromagnetic systems, as well as in experiments with heavy nonmagnetic materials in which only spin-orbit interaction can lead to a spin dependence of the reflected intensity. We note that the observation of the BP is not at all in contradiction to our recent spin-resolved photoemission experiments, in which highly spin-polarized interface states are observed in ferromagnetic metal-organic and metal-carbon systems. In fact, the BP is only revealed in experiments in which the behavior of the spin-dependent electron reflection is studied, which is neither the case in photoemission spectroscopy nor in many other experimental methods which have been used in the past to study ferromagnetic metal-organic interfaces. Thus, it does not come as a surprise that the BP is not observed by other experimental methods. Despite this extensive study, we have no physical explanation for this intriguing behavior at the moment.

Biography:

Fatima djeghloul has done his PhD from Strasbourg University in 2013. She became an Assistant Professor of Department of Technology, University of Ferhat Abbas Setif in 2014 and was promoted to Associate Professor in 2016., Her areas of interest are Material science, Spintronics and atoms, Magnetic, Spinterfaces, Electron-spin motion, metal-organic or metal-carbon interfaces spin- engineering, Thin film growth , Thin films and Nanotechnology, Metal-Organic Vapor Deposition, Magnetic materials and Magnetism, Photoemission experiments.

djeghloul.fatima@gmail.com

Notes: