Determination of spin injection and transport in a ferromagnet/organic semiconductor heterojunction by two-photon photoemission — Mirko Cinchetti, Kathrin Heimer, Jan-Peter Wüstenberg, Oleksiy Andryshev, Michael Bauer, Stefan Lach, Christiane Ziegler, Yongli Gao, and Martin Aeschlimann — University of Kaiserslautern, Germany

Optimized spin-injection and detection in lateral all-metal spin-valve devices with integrated tunnel barriers — Andreas Vogel, Jeannette Wulfhorst, and Guido Meier — Institut für Angewandte Physik und Zentrum für Mikrostrukturforschung, Universität Hamburg, Jungiusstrasse 11, 20355 Hamburg

Injection, manipulation, and detection of spin-polarized currents are fundamental issues in spintronics. We study the spin-dependent transport in lateral all-metal spin-valve devices with different tunnel barriers at the interface between the ferromagnetic electrodes (NiFe/Fe) and the interconnecting metal strip (Al or Cu). A tunnel barrier can enlarge the spin polarization of the injected current [1–3]. Different total conductivities per cross-sectional area $\Sigma_C$ of the aluminum oxide tunnel barriers are achieved by varying the oxygen pressure, the oxidation time, and the thickness of the naturally oxidized Al film. The spin-dependent transport in nonlocal geometry is described theoretically [3]. Transport measurements at temperatures of liquid helium are performed and compared to the theoretical description. A nonlinear increase of the spin polarization in the normal metal is observed for a decreasing tunnel conductance $\Sigma_C$. We experimentally verify a saturating behavior for lower $\Sigma_C$.


Study of the Spin Properties of the Organic Semiconductor CuPc doped by Alkali Metals — Sabine Neuschwander, Jan-Peter Wüstenberg, Alexander Fischer, Mirko Cinchetti, and Martin Aeschlimann — Department of Physics and Research Center OPTIMAS, University of Kaiserslautern, 67663 Kaiserslautern, Germany

It has been recently shown [1], that the spin-resolved two-photon photoemission (SR-2PPE) is a method allowing to collect direct experimental information about the spin properties of interfaces with OSC, such as the spin injection efficiency and the spin transport properties of OSC. Such knowledge is a fundamental prerequisite for the implementation of OSC-based spintronics devices [2]. Following the approach presented in [1], we considered the model system of a namely the heterojunction between a cobalt thin film and the OSC copper phthalocyanine (CuPc). We present methods for the determination of OSC-based spintronics devices [2]. Following the approach presented in [1], we considered the model system of a namely the heterojunction between a cobalt thin film and the OSC copper phthalocyanine (CuPc). According to [3] the electronic structure of CuPc can be modified by alkali metal doping. In particular, it is known that Cs and Na doping results in the lowering of the the energy of the unoccupied molecular orbital (LUMO) and highest occupied molecular orbital (HOMO) of CuPc. This reduction can be specifically tuned in order, to study the spin injection and transport in the LUMO+1 state with SR-2PPE. Our results show that, resonant excitation from an occupied 3d-bulk band into the LUMO+1 gives rise to an almost 100% spin injection efficiency and to an extremely high quasi-elastic spin-flip length in CuPc.