Surface states of Co and Cu nanostructures on Cu(111): a spin-polarized STS study

S. Ouazi, Y. Nahas, M. Corbetta, S. Wedekind, H. Oka, D. Sander and J. Kirschner

Max-Planck-Institut für Mikrostrukturphysik, Weinberg 2, D-06120 Halle, Germany

The dispersion relation and lifetime of surface states on noble metals have been widely investigated by ARPES and STS. Close to defects like monoatomic step edge or scattering centers, the local density of surface states (LDOS) is spatially modulated. The wavelength of the resulting standing waves can be measured by dI/dV maps and its energy dependence gives access to the dispersion relation E(k)[1].

We performed STS and spin-polarized STS measurements in magnetic fields on Co islands deposited on Cu(111) and on the Cu surface between neighbouring Co islands.

Electrons can be confined in nanostructures of Cu and Co, and consequently their wave vector k is quantized[2]. We extracted the dispersion relation E(k) from dI/dV maps measured between Co islands and investigated the influence of the distance between the Co islands. I will compare the E(k) for different confinement geometries.

Electron confinement can be spin dependent. Spin-polarized STS measurements provide the spatial modulation of the spin-polarization of surface states, as in reference 3. I will present the spin-polarized STS measurements on Co islands as well as on Cu(111) between adjacent Co islands and discuss the origin of spin-dependent quantum interference in nanostructures.

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