MA 28 Invited Talks Brune / Moritz

Time: Thursday 14:00–15:00 Room: HSZ 03

Invited Talk MA 28.1 Thu 14:00 HSZ 03

Surprises in the Magnetism of Surface Supported Nanostructures — •Harald Brune — EPFL, CH-1015 Lausanne

We use self-assembly during atomic beam epitaxy to create two-dimensional metallic islands with sizes from a few thousands of atoms down to the single atom limit. We show how the magnetic properties, such as anisotropy energy, spin- and orbital moments, as well as spin-polarization, evolve as function of size. Measurements with Magneto-Optical Kerr Effect (MOKE), X-ray Magnetic Circular Dichroism (XMCD), and STM reveal a giant increase in anisotropy with reduced coordination. As a consequence, the low-coordinated atoms are at the origin of magnetic anisotropy in nanostructures on single crystal surfaces. We present model systems exploring the ultimate density limit of magnetic information storage. They are characterized by uni-axial out-of-plane magnetization, narrow anisotropy distributions, and the absence of dipolar interactions. Spin-polarized STM measurements show up to 850% tunnel magnetoresitance (TMR) and 80% spin-polarization on single domain islands.

Invited Talk MA 28.2 Thu 14:30 HSZ 03

Discrete media made from pre-patterned wafers: a promising route towards ultra high density magnetic recording — •Jerome Moritz, Mohamed Asbahi, Vincent Baltz, Bernard Rodmacq, Jean-Pierre Nozieres, and Bernard Dieny — SPINTEC, URA 2512 CEA/CNRS, Grenoble, France

Patterned media have been proposed as a route to increase the areal density in magnetic storage devices towards 1 Tbit/in2 because they allow circumventing the super-paramagnetic limit, which is expected to appear in conventional media at densities ˜300 GB/in2. Pre-patterned media are prepared by classical lithography or nanoimprinting at the Silicon wafer level, followed by magnetron sputtering of Co/Pt multilayers. A bit binary value (0 or 1) is associated with the orientation of the magnetization carried by each dot. It is also possible to stack several layers with different coercive properties on top of the dots and to obtain 2ˆN stable states (N being the number of layers). An octet could then be coded on only one dot for instance, which leads to a drastic increase in the information density. The recording performances have been studied by using a quasi-static tester equipped with commercial write/read heads. The pulse width of the write field was varied from 1 s down to 1 nanosecond. The possibility of high data transfer rates was demonstrated. The signal to noise ratio of the readback signal is competitive with classical continuous media especially at small bit length. The improvements in nanoimprint lithography make this approach based on pre-patterned wafers promising for future ultrahigh density hard disk drives.