

IMAGING MAGNETIC NANOSTRUCTURES BY SPIN-POLARIZED STM

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Spin-polarized scanning tunneling microscopy (SP-STM) is an experimental technique that combines the high lateral and vertical resolution of STM with sensitivity to the spin of the tunneling electrons. This allows the imaging of surface spin-structure of different ferro- and antiferromagnetic surfaces and ultrathin films with a spatial resolution down to the atomic level. Namely, I will present results obtained on the topological antiferromagnet Cr(001), on self-organized Fe-nanowires, on superparamagnetic Fe islands, and on the antiferromagnetic monolayer of Mn/W(110). I will demonstrate that in-plane and out-of-plane spin-contrast can be achieved by choosing appropriate magnetic tip coatings and that the use of an antiferromagnetic tip material avoids any influence of the tip's magnetic stray field on the sample's domain structure. In contrast to most other electron-based microscopic techniques SP-STM as a near-field method can be applied even in large external magnetic fields up to several Tesla allowing the investigation of hysteresis effects in magnetically hard materials. Very recently we found that spin-orbit effects can be used to image the domain structure of a magnetic surface even with non-magnetic tips.