

Spin-polarized scanning tunneling microscopy

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We have considered the spin of the tunneling electrons. In fact, the tunneling current can become spin-dependent, as first shown by Tedrow and Maservey using planar ferromagnet - oxide - superconductor tunnel junctions [1, 2].

Recently, fundamental studies in spin-polarized scanning tunneling microscopy (SP-STM) and spectroscopy (SP-STs) have led to more effective insight into magnetism at the nanometer length scale. Correlation between structural, local electronic and local magnetic structure can be shown. Investigation of the magnetism of ultra-thin layers is not only important for their applications but also for general understanding of the interplay between the nanoscale structure and magnetic properties.

We show the experimental results on the topographic and magnetic structure of the epitaxial thin films by the SP-STM and SP-STs techniques. A brief description of the experimental setup, tip and sample preparation procedures also will be given. The magnetic domain walls in atomic layers of iron and the intrinsic width of magnetic vortices are also discussed [3].

[1] P. M. Tedrow and R. Maservey, Phys. Rev. Lett. **26** (1971) 192.

[2] E. L. Wolf, Principles of Electron Tunneling Spectroscopy, Oxford University Press, (1985) 328.

[3] A. Wachowiak *et al.*, Science **298** (2002) 577.

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