

Low temperature nanolaboratory of materials magnetic properties

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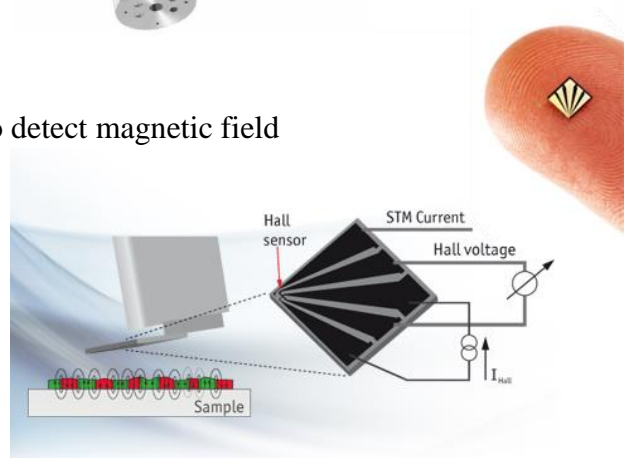
Scanning Hall probe microscope - SHPM

is a combination of miniature Hall probes and scanning tunnelling microscope (STM). Local magnetisation measurements of a sample are obtained during scanning the sample underneath the Hall sensor in a close proximity to the sample surface. It enables noninvasive mapping of magnetic properties of superconductors and magnetic materials with unrivalled sensitivity.



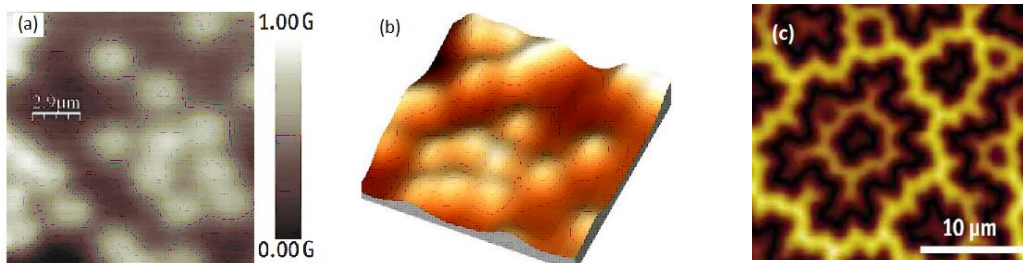
Basic characteristics:

- submicron semiconducting Hall sensors to detect magnetic field
- piezo-crystals for fine scanning
- STM tracking distance detection
- high magnetic field resolution
- space resolution $< 1 \mu\text{m}$
- large scan range ($30 \times 30 \mu\text{m}^2$)
- lowest operation temperature 1.6 K
- highest magnetic field 8 T



Applications:

- local magnetisation measurements at very low temperatures and high magnetic fields
- vortex distribution and pinning measurements in pnictides, cuprates and other superconductors
- local field measurements on magnetic nanoparticles
- research of bit patterned media, magnetic domains...



(a) Irregular vortex structure on a surface of exotic superconductor SrRuO_4 .

(b) 3D view of (a).

(c) SHPM image of BaFeO at 4.2K. The color scale spans 106 mT (dark to bright).

[attocube application labs,2011]