

The VLS⁸⁰ MFM in-plane field option

The magnetization configuration of single nano-structures can be investigated by Magnetic Force Microscopy (MFM). The NanoScan VLS⁸⁰ offers an in-plane 360° rotatable magnetic field option with fields up to 250 mT.

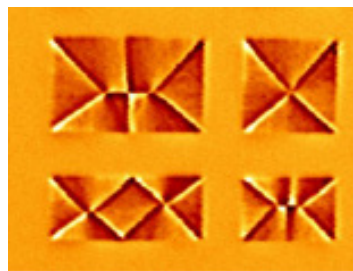
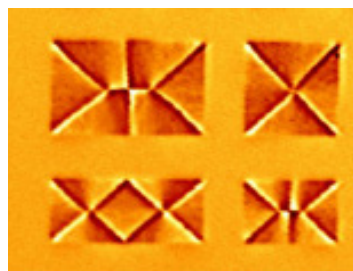
MFM imaging of magnetic nanostructures at different intensities and directions of the in-plane magnetic field gives valuable information about magnetic parameters, such as magnetic anisotropy and exchange interaction.

In-plane 360° rotatable magnetic field

The magnetization patterns of Permalloy rectangular nanostructures were investigated by variable in-plane magnetic field. The height of the magnetic structures is 60 nm. The direction of the field can be aligned to the long axis of the nanostructures by means of the 360° rotational module, on which the sample is mounted. The rotational module angle resolution is $15 \mu^\circ$ and the magnetic field can be applied in the sample plane from 0 up to 250 mT with a step size smaller than $20 \mu\text{T}$.

The color contrast in the images rises from the interaction between the magnetic stray field generated at the magnetic domain walls and the tip magnetization.

By increasing the magnetic field, the domains with the magnetization pointing in the same direction of the field increase in size while the others shrink, leading to asymmetrical magnetization configurations in the nanostructures.



-7.5 Hz

+4.3 Hz

MFM images of four Permalloy rectangular nanostructures performed at 0 (upper), 4.6 mT (middle) and 6.8 mT (lower) in-plane magnetic field. Image size is $12 \times 9 \mu\text{m}^2$.