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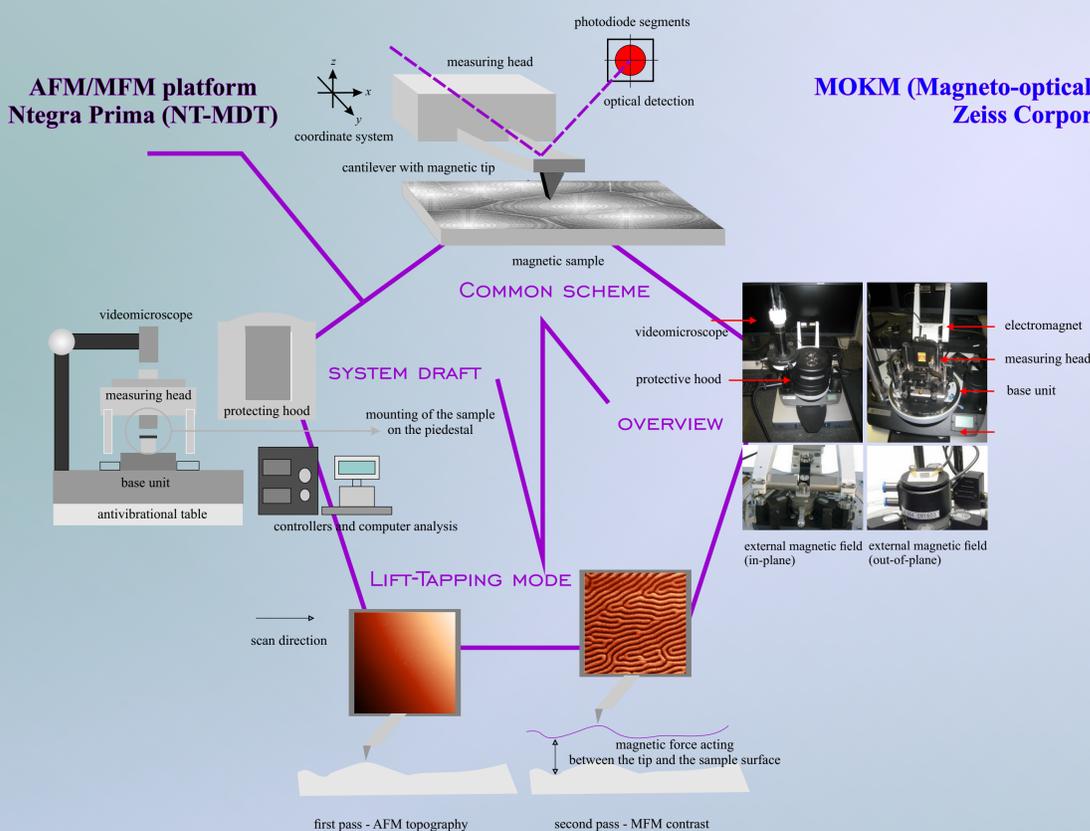
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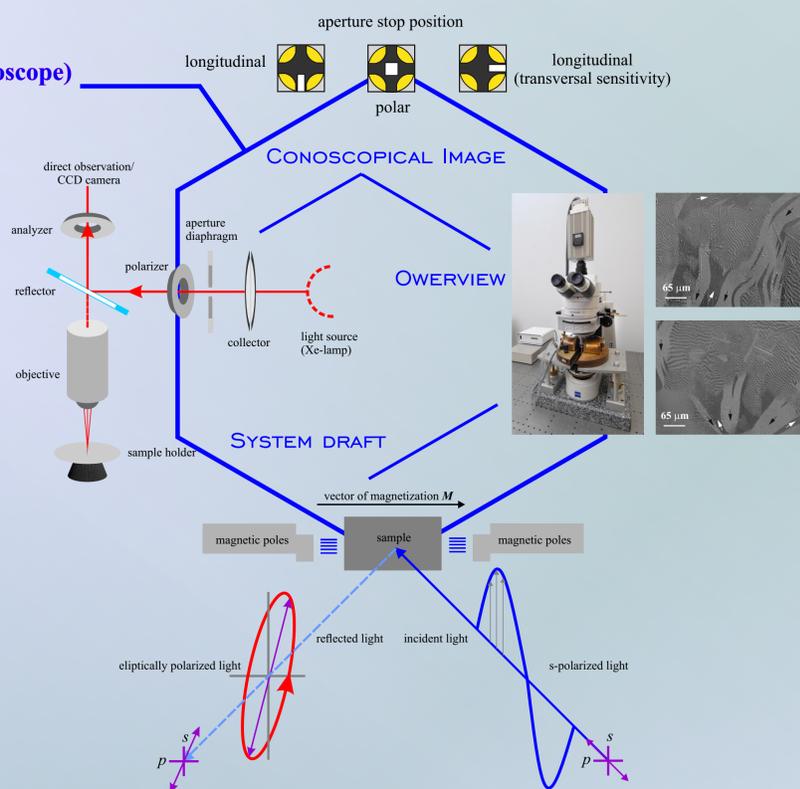
INSTRUMENTATION

AFM/MFM - atomic force/magnetic force microscopy - scanning probe-like microscopy used for studying the surface properties of various materials up to the atomic dimensions. The mechanical probe that scans the specimen is affected by interacting forces acting between the tip and the surface.

MOKM - magneto-optical Kerr microscope - methodology is based on the magneto-optical Kerr effect, where the rotation of plane-polarized light, while reflected from a nontransparent magnetic specimen, is converted in to domain image.



MOKM (Magneto-optical Kerr microscope) Zeiss Corporation



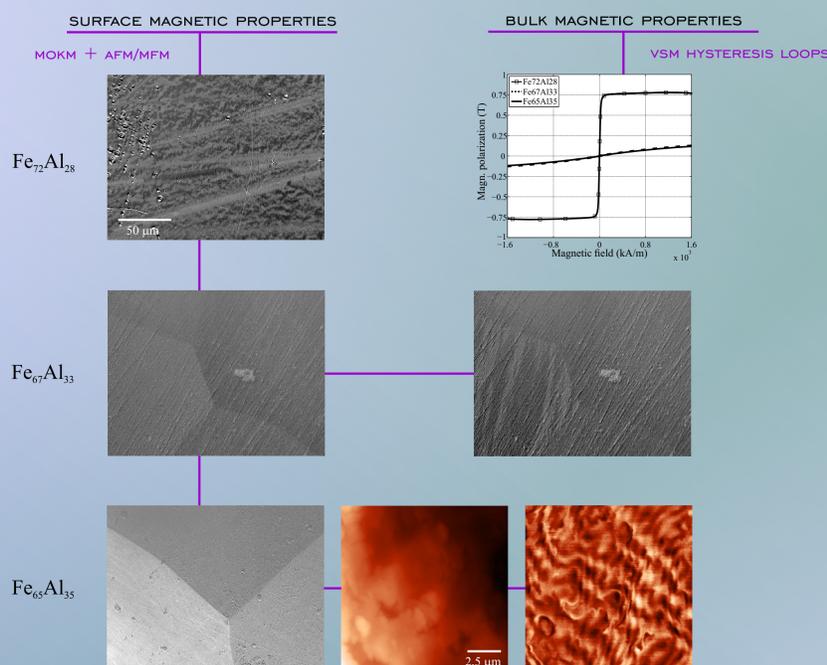
MATERIALS

Fe-Al based alloys

- from pure Fe and Al elements - arc melting in Ar atmosphere
- ingots were cut into round samples (10 mm in diameter, thickness of 50 μm)
- final fabrication of the surface - grinding and polishing
- three different composition:
 - $\text{Fe}_{72}\text{Al}_{28}$ (assumed phase - A2,D03)
 - $\text{Fe}_{67}\text{Al}_{33}$ (assumed phase - B2,D03)
 - $\text{Fe}_{65}\text{Al}_{35}$ (assumed phase - B2,D03)

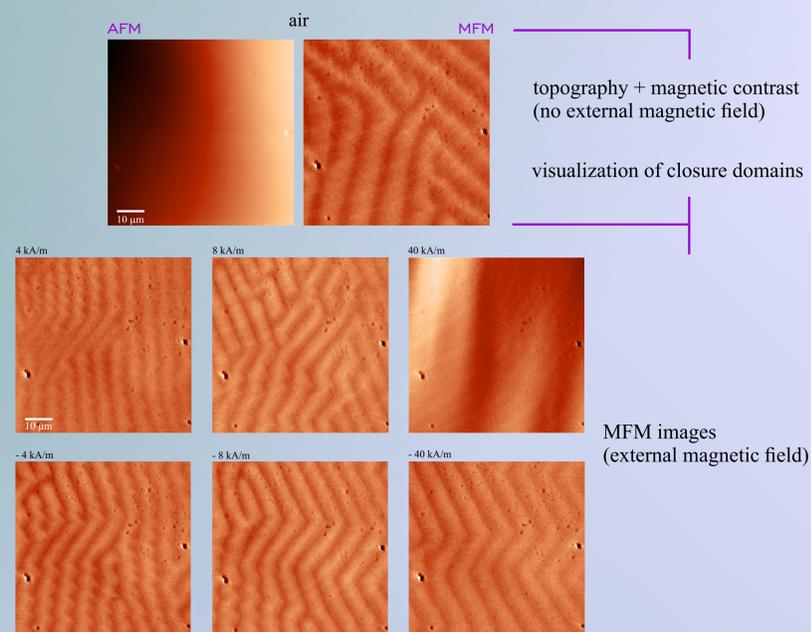
Fe based bilayered ribbons

- planar flow casting (PFC) method, crucible divided into two chambers
- 36 μm thick and 8 mm wide
- composition: $\text{Fe}_{74.5}\text{Nb}_3\text{Si}_{13.5}\text{B}_9$ (wheel) / $\text{Fe}_{77.5}\text{Si}_{7.5}\text{B}_{15}$ (air)
- air side (contact with surrounding atmosphere), wheel side (contact with the rotating wheel)



- differences between the **bulk** and **surface** magnetic properties
- bulk** magnetic properties in agreement with phase diagram
 - + $\text{Fe}_{82}\text{Al}_{18}$ ferromagnetic behavior
 - + $\text{Fe}_{67}\text{Al}_{33}$, $\text{Fe}_{65}\text{Al}_{35}$ paramagnetic behavior
- surface** magnetic properties (higher Al content) document magnetic transformation

Explanation : formation of the oxide layer at the surface and/or depletion of the surface layers by aluminium atoms



the change of magnetic interaction due to mutual influence between the magnetic tip and the sample affected by external magnetic field

