2nd Cycle Integrated Project in Engineering Physics

inesc mn
Microssistemas e Nanotecnologias

Magnetoresistive devices for industrial applications: improvement of thermal robustness

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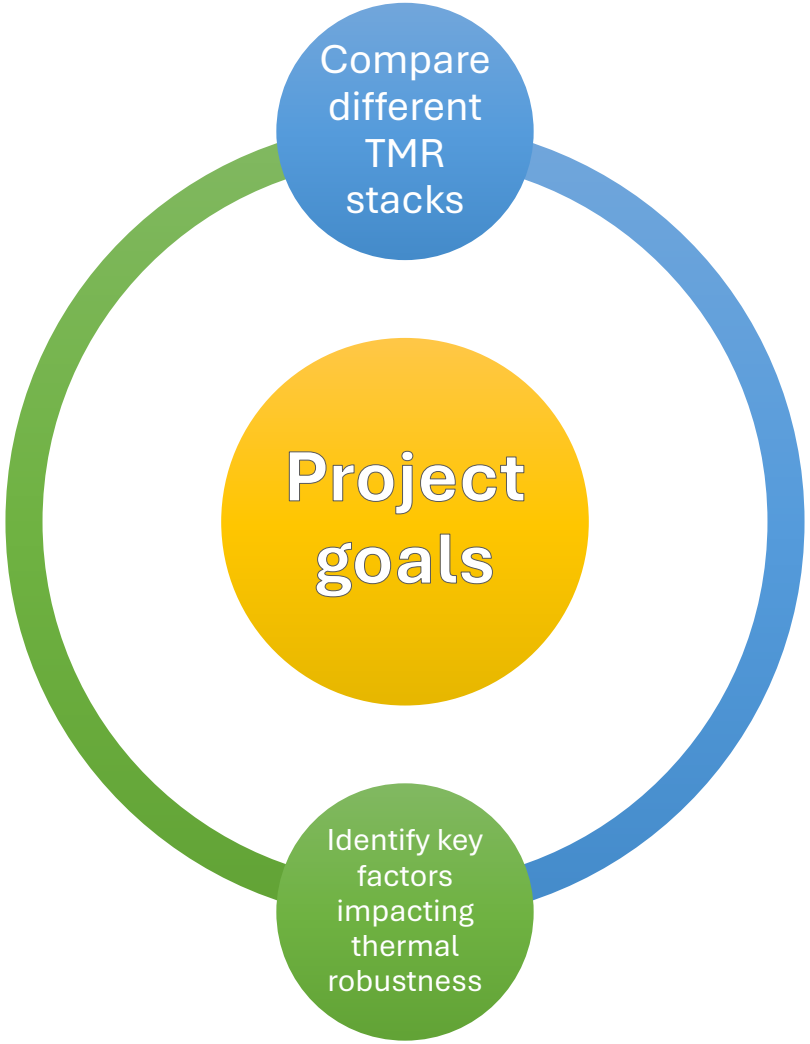
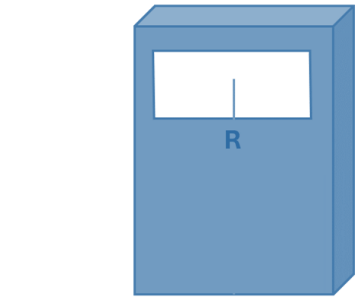
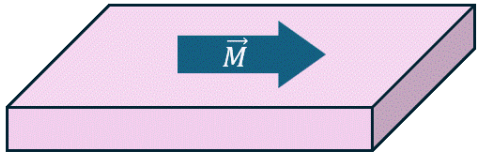
Project Goals: Recap

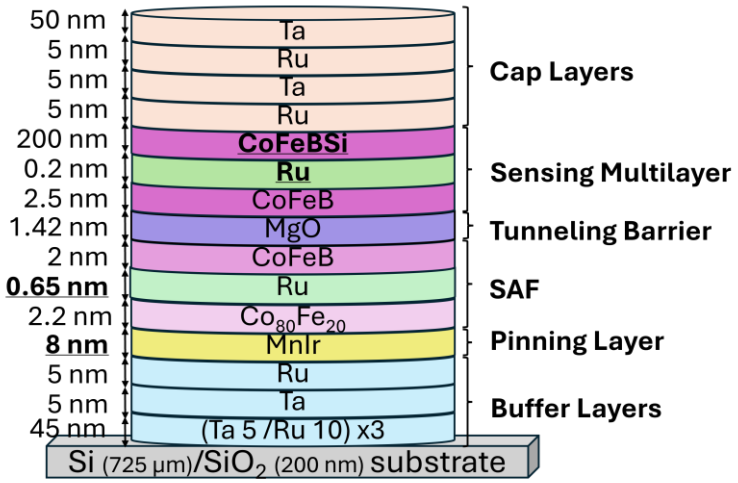




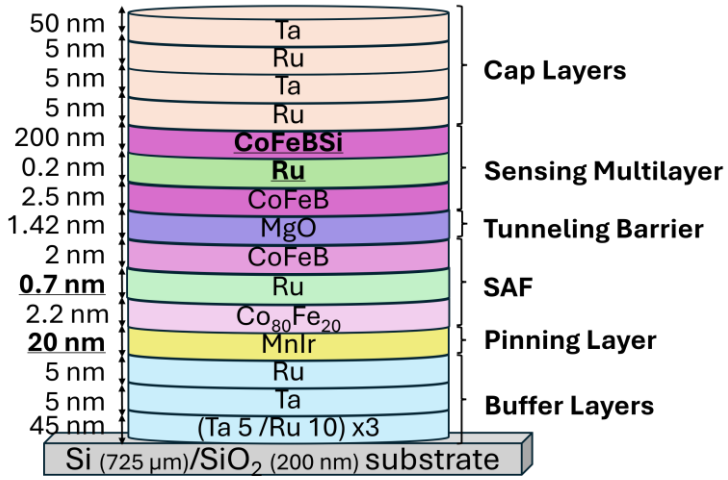


Experimental Work: Samples and their differences

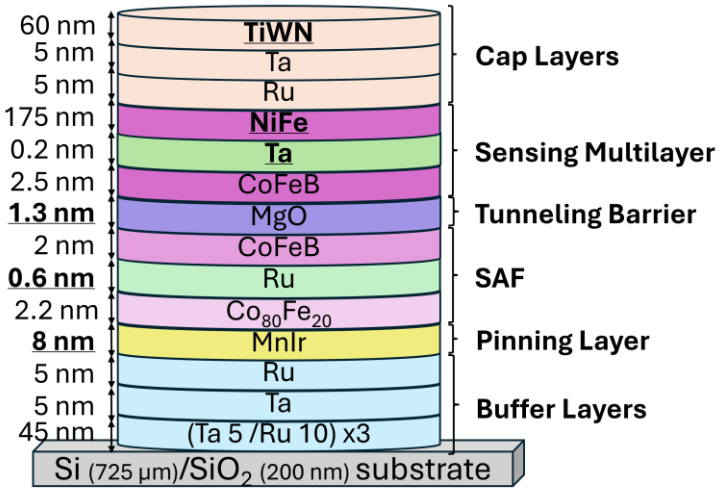
Sample 10252



Sample 10261



Sample 8985

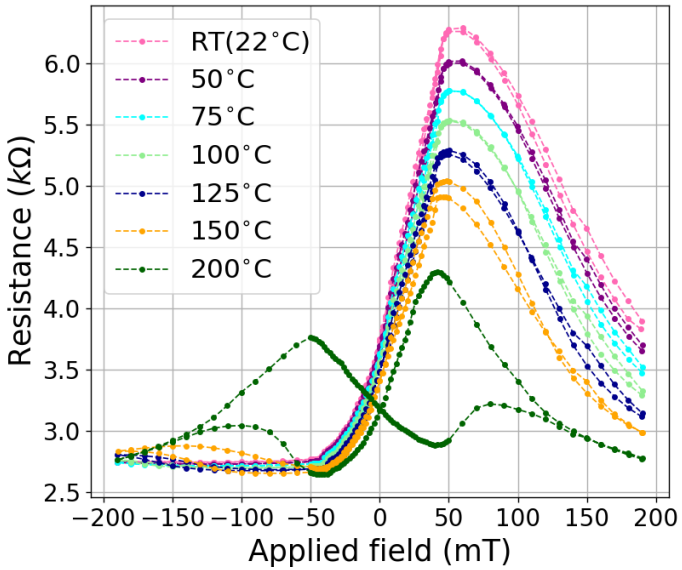


Main Differences

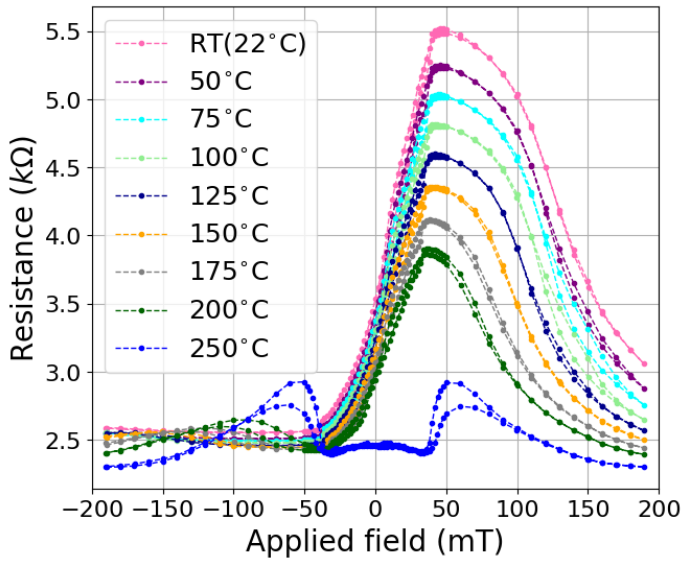
- AFM Thickness (pinning layer)
- SAF spacer thickness (Ru)
- Tunneling barrier thickness
- Sensing multilayer materials
- Cap Layers
- Deposition techniques

2kOe setup: Resistance as a function of the applied field

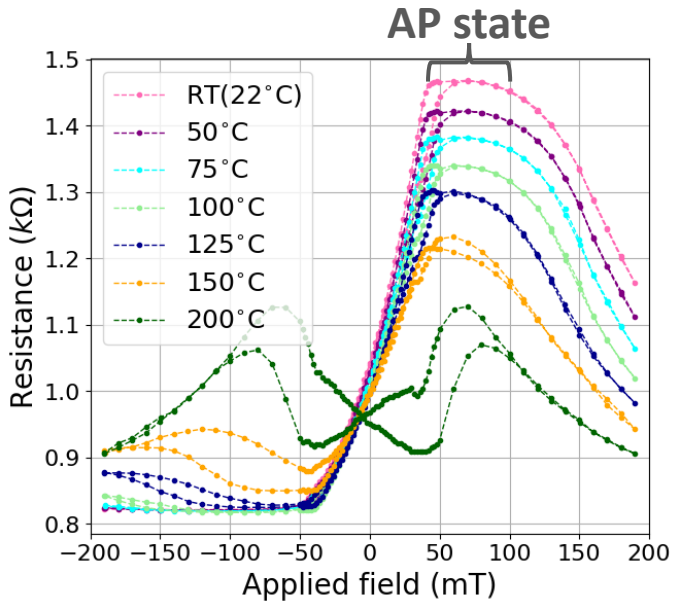
Sample 10252



Sample 10261



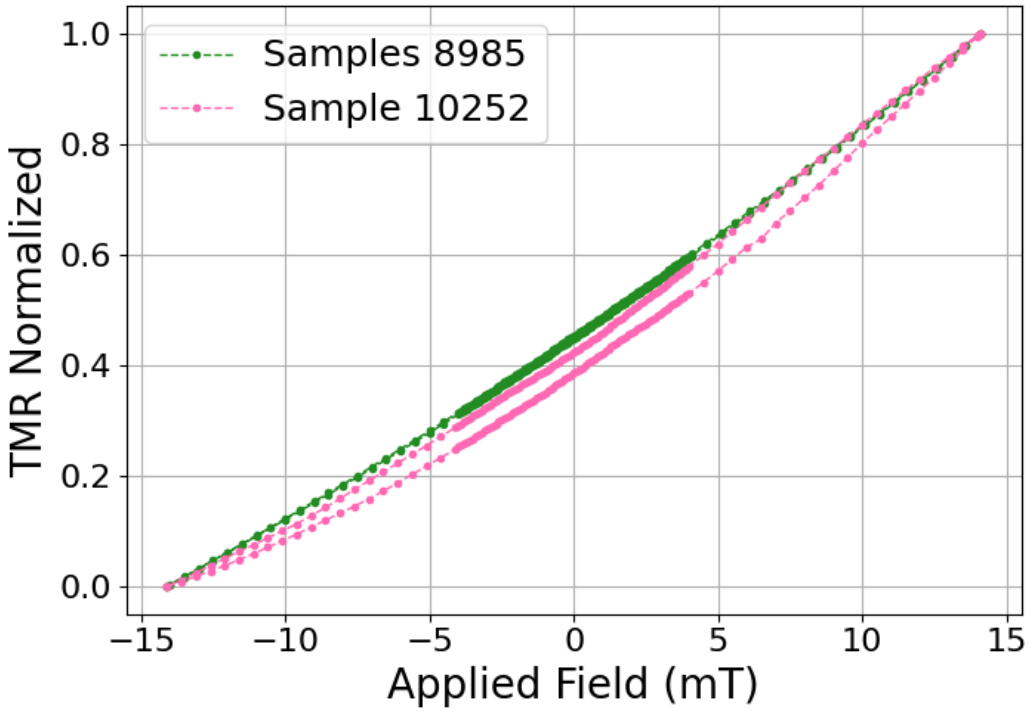
Sample 8985



10261 vs 8985

- working temperature
- AP state stability

140Oe Setup: Detailed look into samples 10252 & 8985



Sample	Linearity (%)
8985	95.9
10252	91.7

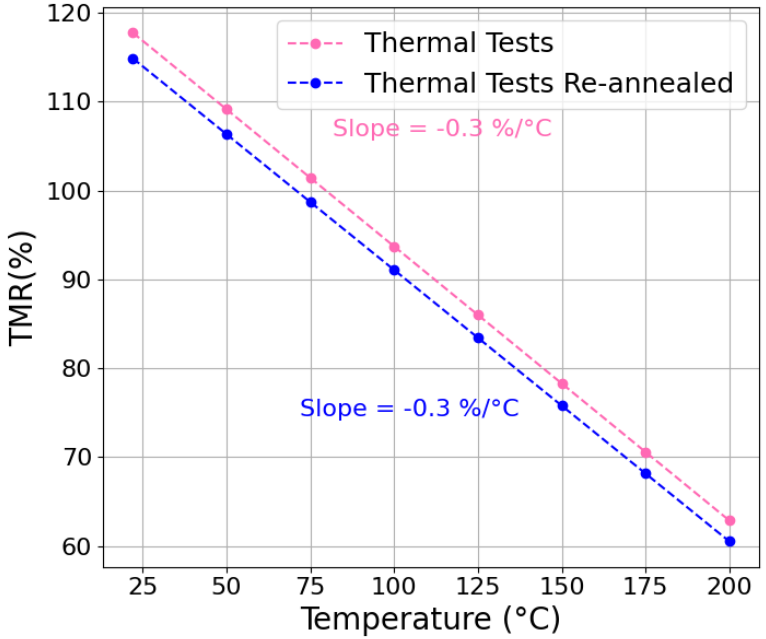
Sample	$H_c(mT)$
8985	0.06
10252	0.56

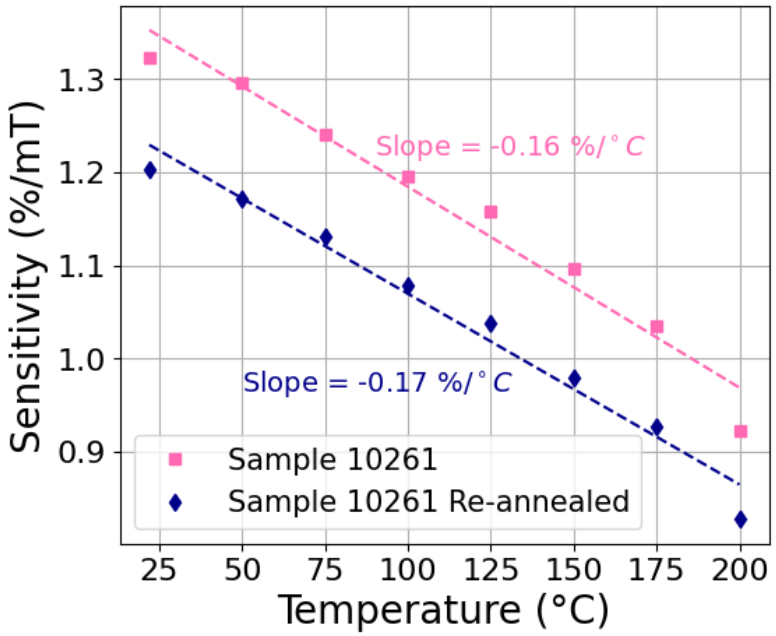
Coercivity & Linearity

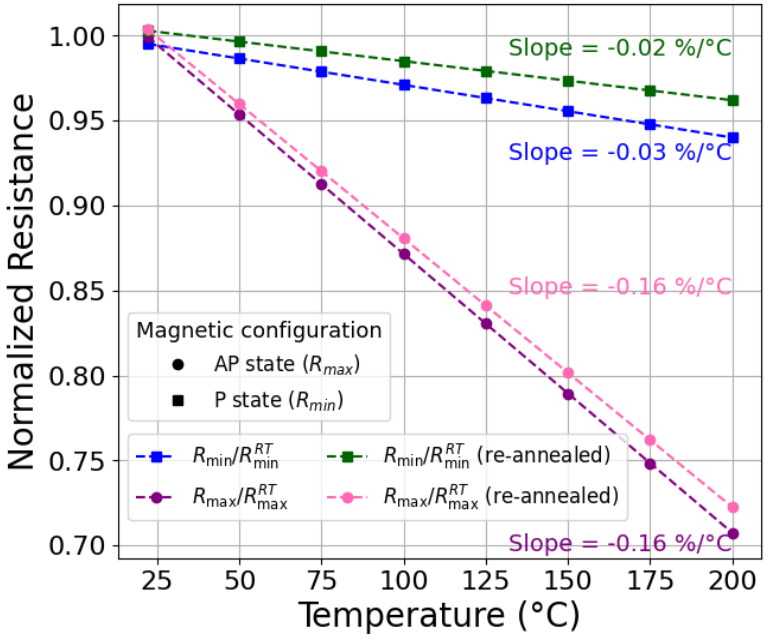
- Reduced H_c values
- High linearity

→ Magnetic Vortex State

Reversibility Study: Sample 10261



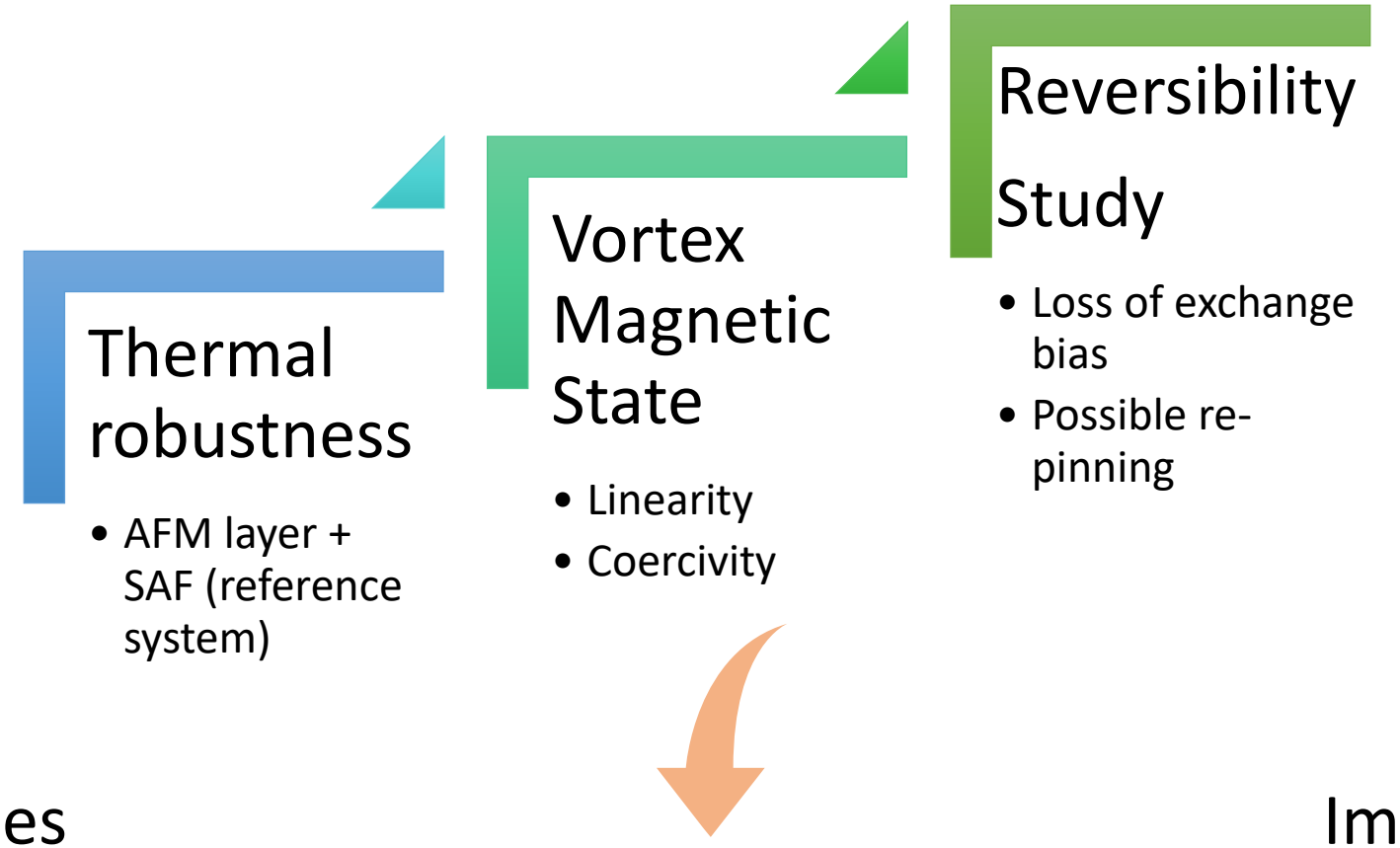




Thermal tests after re-annealing

- Similar results
- Differences are within experimental uncertainty, due to sensor-to-sensor variation

Conclusions and Outlook



Additional Samples

Improved devices

Different measurements

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Questions?

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