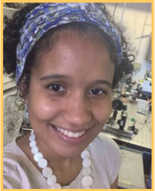

Model nanosystems to progress in the understanding of hard magnetic materials

CONTACT
isabelle.de-moraes@neel.cnrs.fr

Isabelle De-Moraes (PhD student), Nora Dempsey (thesis supervisor), Thibaut Devillers, Dominique Givord

LABORATORY : NEEL

There is significant growth in demand for high performance magnets for use in green energy technologies (e.g. in (hybrid) electrical vehicles and wind turbines) and robotics, while the demand for mid-range magnets is also growing. The coercivities achieved in today's magnets are typically only 10-20% of their theoretical values, and improved performance is required for long term sustainable development with respect to the materials used. All studies related to coercivity analysis point to the importance of understanding the subtle link between a material's nanostructure and the magnetization reversal processes at play.

The aim of this thesis (started Oct 2017) is to study original nanostructured model samples to improve our understanding of coercivity. We plan to exploit exchange, Zeeman and shape anisotropy in combination with magnetocrystalline anisotropy. Work to date has focused on the preparation of model hard-soft nano-composites, through nano-lithography of soft magnetic (Co, FeCo) elements and the development of very thin hard magnetic matrix layers based on the $Nd_2Fe_{14}B$ phase (see figure).

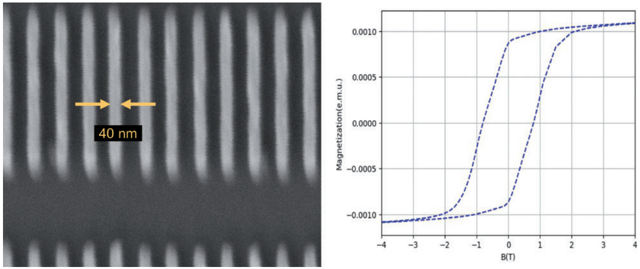

Fig.: SEM image of an array of Co nano-rods produced by e-beam lithography and hysteresis loop of a 50 nm thick NdFeB layer.

OUTCOMES

Presentations at ANR-SHAMAN meetings

Poster presentation at JEMS 2018

PHD GRANT