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Changes in the magnetic domains of hard and soft magnetic materials in a bilayer setup

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Strontium ferrite (SFO, $SrFe_{12}O_{19}$) is a ferrite employed commercially for permanent magnets due to its high magnetocrystalline anisotropy, low cost, and low toxicity. However, its saturation magnetization is moderate [1]. A possible avenue for improving such property is combining it with a magnetically soft layer with a high saturation magnetization. It is well-known that the rigid coupling between a magnetically hard and a soft material can improve the overall magnetization while avoiding a high cost in coercitivity loss. However, attempts in this direction have given disappointing results. Thus, in order to understand the magnetic behavior in such bilayer systems we have carried out two different sets of experiments. In one of them, a Co layer is deposited on top of SFO platelets which present an out-of-plane magnetization [2]. We observed no correlation between the magnetic domains of the metal and those of the SFO platelets. As one reason might be the competition between the magnetodipolar field created by the SFO platelet with the shape anisotropy of the metal layer, we devised the second experiment using in-plane magnetized SFO films, again combined with a cobalt overlayer [3]. We have grown and characterized both bilayer systems using different spectroscopy, diffraction and microscopy techniques and in particular employing element and angle-resolved magnetization maps using x-ray circular dichroism in a photoemission electron microscope.

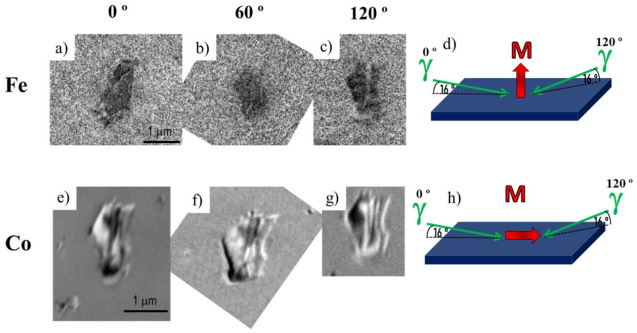

Figure 1. Upper line: XMCD-PEEM images for a) 0º, b) 60º and c) 120º azimuthal angles obtained at the Fe L_3-edge maximum (third dichroic peak). Lower line: XMCD-PEEM images for e) 0º, f) 60º and g) 120º azimuthal angles obtained at the Co L_3-edge maximum. On the right side, schemes of the magnetization of the platelet d) and Co layer h) with two azimuthal angles of incoming photons are sketched.

Acknowledgement

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References

[1] G. D. Soria et al, Sci. Rep. **9** 1–13 (2019)
[2] G. D. Soria et al, Submitted
[3] G. D. Soria et al, J. Phys. D: Appl. Phys. **53** 344002 (2020)

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