

***In situ* resonant x-ray scattering at the French “CRG-IF” beamline at ESRF**

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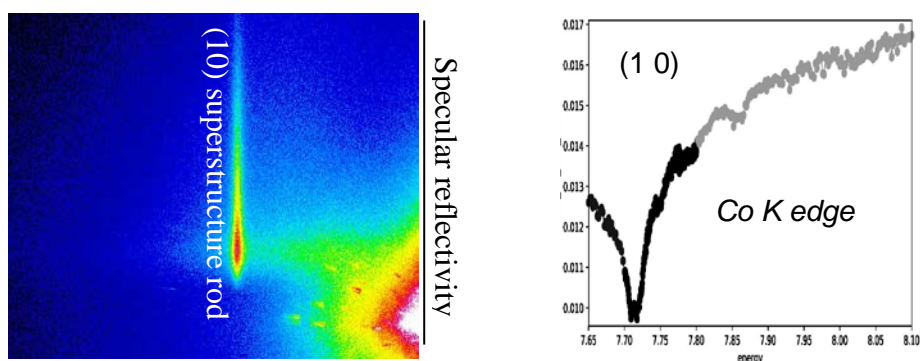
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ABSTRACT

We show two examples of resonant x-ray scattering experiments performed *in situ* on the INS2 end-station of the BM32 beamline at ESRF. In the first one the inversion parameter of thin cobalt ferrite films grown on Ag (001) by oxygen-assisted MBE is found. In spinel structure this parameter quantifies the distribution of divalent and trivalent cations on tetrahedral and octahedral sites, and strongly influence the electronic and magnetic properties of the ferrite. By measuring grazing incidence resonant x-ray diffraction intensity versus energy of several spinel peaks at the iron and cobalt K-edges and comparing with theoretical calculations performed with the FDMNES code, we could find that cobalt occupies mostly octahedral sites, resulting in an inversion parameter of 0.88(5).¹ In the second experiment we studied Co-Pt nanoparticles self-organized on an ultrathin aluminum oxide film on Ni₃Al(111), a template with a 4.1 nm hexagonal surface lattice. Co and Pt were subsequently deposited on the template layer seeded with a few Pd atoms per unit cell. Bimetallic nanoparticles organize at the corners of the oxide hexagonal surface cell giving sharp peaks in the small angle x-ray scattering pattern. The analysis of the RXD measured at the cobalt K edge on these SAXS features evidences then a core-shell structure.



GISAXS of 0.15 nm Co on alumina template (Pd seeded), and RXD of the (10) reflection (Co K edge).

These examples demonstrate the capabilities of BM32 for *in situ* resonant scattering studies. At short term, they will be improved with the installation of a crystal analyser

REFERENCES

1. M. De Santis *et al.*, Acta Cryst. (2019). B75, 8-17, <https://doi.org/10.1107/S2052520618016177>