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Report:

Granular alloys composed of magnetic granules embedded in a metallic non magnetic matrix present giant magnetoresistance (GMR), that is, their electrical resistance decreases notably under an applied magnetic field. The GMR is closely correlated to the microstructure of the samples, in particular, the magnetic clusters size and size-distribution, concentration and interfacial roughness. Therefore, a complete knowledge of the microstructure of the samples is imperative for understanding the mechanisms that give rise to the GMR response and accordingly find the microstructural attributes that mean an optimum GMR response of the samples. The XAS based techniques are particularly suited for the analysis of these granular alloys, as we have corroborated in previous studies on melt-spun CoCu granular ribbons [1,2].

We are studying Fe_xAg_{100-x} (x =20, 30) thin films fabricated by the laser ablation technique. Such a rapid quenching preparation method is needed because Fe and Ag are inmiscible and otherwise would not form a metastable solid solution. In order to change de microstructure of the as-deposited samples and correlate it to the magnetotransport response we have changed two parameters intervening in the deposition process, which are the target angular speed (ω, in r.p.m.) and the laser pulse frequency (ν, in Hz). The resulting FeAg samples are thin films ($\approx$ 5000 Å thick) on a SiO_2 substrate.

All the EXAFS experiments were performed in Total Electron Yield (TEY) geometry on the Fe-K edge and at low temperature (liquid nitrogen) in order to minimize effects of thermal disorder.

The $x = 30$ samples display different magnetotransport response when the magnetic field direction is perpendicular or contained in the plane of the sample surface. This

suggests that there must be also an anisotropic microstructure in both directions. Therefore, we made use of the polarization of the synchrotron light and collected EXAFS spectra of the $x = 30$ samples both in perpendicular and grazing incidence (electric field in the plane and perpendicular to the sample surface, respectively) so that we could get microstructural information in both directions.
Figure 1 displays the recorded EXAFS signals obtained for the $x = 30$ samples (identified by pairs (ν,ω)) and their corresponding Fourier transforms. It is evident at a first sight that different deposition parameters induce very different microstructures, see for example the $4 \leq k \leq 6$ Å^{-1} range. On the other hand, the spectra remind that of the Febcc one, mainly in (20,15) and (10,6) samples, what suggests that most of the Fe atoms must be forming clusters and not diluted into the Ag matrix. This fact is also confirmed by the XANES spectra. Finally, differences are also observed between in-plane and out-of-plane measurements for each (ν,ω) pair.

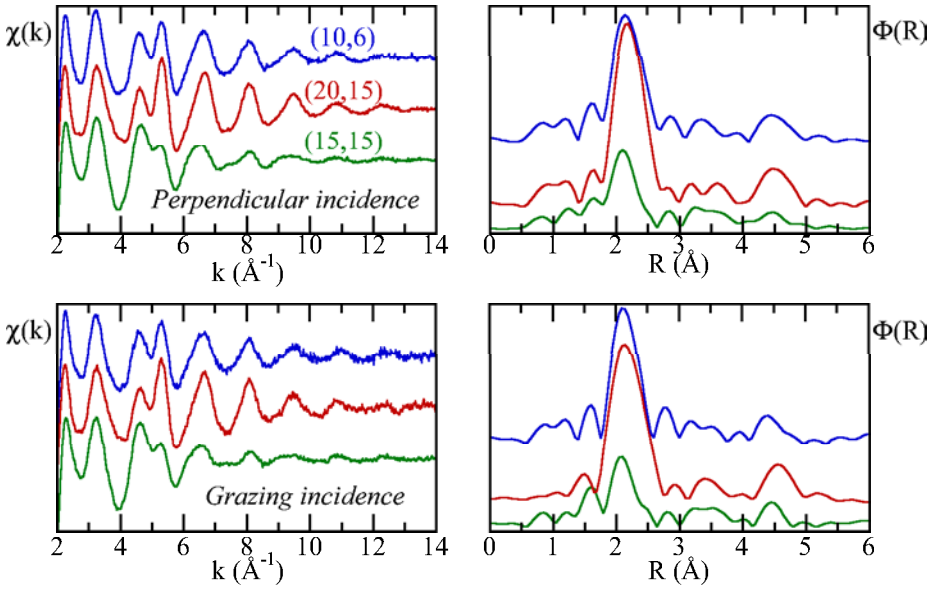

FIGURE 1 EXAFS signals (left) and Fourier transforms (right) on the Fe-K edge in perpendincular and grazing incidence of $Fe_{30}Ag_{70}$ samples with deposition parameters (ν,ω)=(15,15); (20,15); (10,6).

Preliminar fittings on the $x = 30$ (20,15) samples confirm that most of the Fe atoms are forming Febcc clusters ($\approx 83\%$), being the rest diluted into the Ag matrix, and that these Fe clusters are planar shaped [3]. Figure 2 displays an example of the fitting.

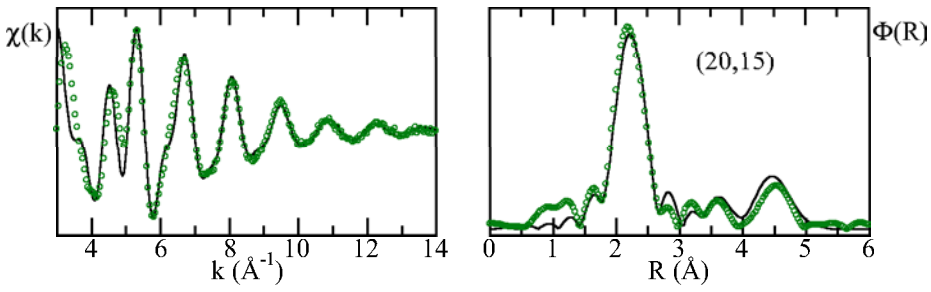

FIGURE 2 Fitting of the $Fe_{30}Ag_{70}$ (20,15) EXAFS signal in perpendicular incidence.

[1] M.L. Fdez-Gubieda et al., Europhys. Lett. **59** (2002) 855
[2] A. García Prieto et al., Phys. Rev. B **67** (2003) 224415
[3] M.L. Fdez-Gubieda et al., J. Magn. Magn. Mat. *in press*