

The aim of the HE-2116 experiment was to investigate the magnetic properties of gold in Fe-Au nanoclusters embedded in silica. Despite the Fe and Au species are immiscible in bulk phase, Fe-Au alloy clusters are obtained by the sequential ion implantation technique of both species in silica. Previous EXAFS experiments at ESRF (08 01 682) show that (a) Fe-Au clusters with different local structures/compositions or separated Au and Fe nanostructures are obtained depending of the amount of implanted species and (b) thermal treatments induce the de-alloying or alloying of both species in the clusters. The XAS and XMCD measurements were performed mainly in the $L_{2,3}$ edges of Au and show, for first time, the induced ferromagnetism in Au atoms due to the electronic hybridation with Fe in the clusters. The measurements have been realized at 10 K in 3 as-implanted samples prepared with three Fe:Au doses and the respective samples annealed at 600° C. Hysteresis loops, that is magnetic field dependence of the XMCD signal, were measured in 3 cases.

The first results are the next:

- XMCD signal is obtained in all the samples but with different values. XMCD signal appears as an imprinting of the Fe-Au alloying.
- Au presents a ferromagnetic order indepently of the cluster composition and cluster size.
- The orbital versus spin magnetic moment ratio values were between 0.4 to 0.2.
- The XMCD hysteresis measurements show reversal of the magnetization and coercive field like in SQUID measurements. The magnetic field dependence at high field shows saturation or unsaturation, depending on Fe-Au composition.

Data analysis are still in progress to determine the $\langle L \rangle$ and $\langle S \rangle$ of gold and to obtain correlations between the magnetic properties and the local structure data obtained from EXAFS studies.