ESRF	**Experiment title:** Tensile stress induced magnetoelastic effects in FeZrB metallic glasses studied by magnetic dichroism	**Experiment number:** HE-252
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Report:

A recent study on FeZrB amorphous ribbons [l] shows the existence of large influence of the applied stress on the Curie temperature that increases with increasing the tensile stress. The hyperfine field distribution, revealed by Mössbauer spectroscopy [l], also follows the same trend. The latter result roles out any possible artifac of the magnetic measurements related to the induction of magnetoelastic anisotropies or other domain effects of the tensile stress. However, the origin of this complex behaviour is not clear.

In order to get a further insight on this problem, we have also performed Fe K-edge Magnetic Circular X-ray Dichroism (MCXD) under tensile stress in FeZrB amorphous alloys. K-edge MCXD is a local probe of the magnetic properties. Although the interpretation of K-edge MCXD is still far from being resolved, it can distinguish withouth any doubth the ferromagnetic character of the absorbing atom.

For this purpose, we have prepared two different samples, Fe88Zr8B4 (B4) and Fe87Zr6B6Cu1 (B6), and we have recorded the Fe K-edge Magnetic Circular X-ray Dichroism (MCXD) under tensile stress at the energy dispersive beam line ID24 at Grenoble.

We have prepared a sample holder that allows to apply tensile stress up to 2GPa, by means of a spring system. **We** could get strains in the range of 1% with perfect elastic recovery. The deformation, ε, were measured with a strain gage. The absorption spectra at room temperature were measured in transmission geometry with a magnetic field applied traverse to the ribbon. The intensity of the magnetic field varies between 0 and 1.1Tesla. The effect of the tensile stress on the dichroism signal can be well observed in fig. la. The maximum amplitude of the dichroism signal, obtained with a magnetic field of 1.1 T, increases linearly with the deformation, in both samples $Fe_{88}Zr_8B_4$ (B4) and $Fe_{87}Zr_6B_6Cu_1$ (B6).

On the other hand, we have measured in a SQUID magnetometer the magnetizatization of the samples at room temperature in the same condition used to obtain the dichroism signal, that is with the magnetic field applied traverse to the ribbon. In fig. lb, we present the magnetization as a function of the maximum amplitude of the MCXD signal, both measured at the same magnetic field, ($\mu_0 H$ = 0.25, 0.58, 0.83 and 0.95 Tesla for B4 and $\mu_0 H$ = 0.67,0.95, 1.1 Tesla for B6). The linear behaviour found stablishes unambiguously that the maximum amplitude of the dichroism signal is correlated to the magnetic moment of the absorbing atom.

In the B6 sample, we have also observed small changes in the integrated intensities of the positive peak, Al, and the negative peak, A2, of the Fe K-edge dichroism signal. The ratio between both peaks, Al/A2, increases slighly with the tensile stress up to 1 GPa (ε=3x10^{-3}), from 2.6 to 3.2 and is saturated at higher tensile stress, fig.lc. This indicates that the stress can influence in the ferromagnetic character of Fe.

[l] - J.M. Barandiaran, P. Gorria, I. Orue, M.L. Fdez-Gubieda, F. Plazaola, Phys. Rev B 54 (1996) 3026.

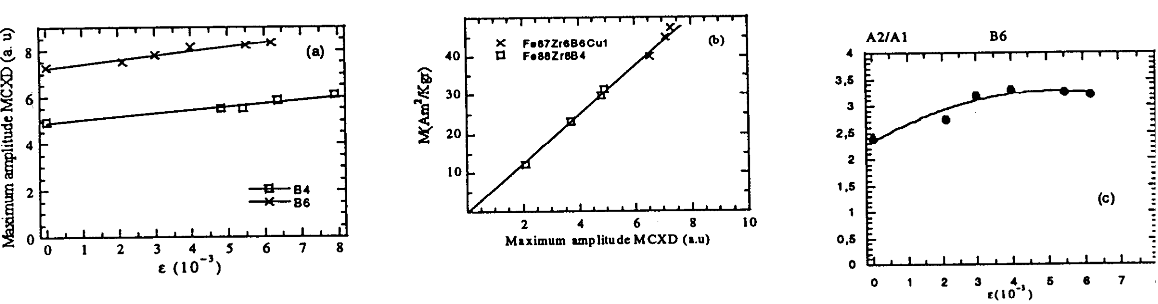

Fig. 1. (a) - Maximum amplitude of MCXD signal as a function of deformation, ε. (b) - magnetization as a function of the maximum amplitude of MCXD signal. (c) - ratio between integrated intensities for B6 sample