

## Neutron Scattering Investigation Of Co- And Fe-Based Amorphous Alloys

Dokukin E.B.<sup>1</sup>, Beskrovnyi A. I.<sup>1</sup>, Dokukin M.E. <sup>\*2</sup>, Perov N.S.<sup>2</sup>, Chong-Oh Kim<sup>3</sup>, CheolGi Kim<sup>3</sup>

<sup>1</sup> Frank Laboratory of Neutron Physics, JINR, 141980, Dubna, Russia

<sup>2</sup> Faculty of Physics, Moscow State University, Leninskie Gory, Moscow, 119992, Russia

<sup>3</sup> Department of Materials Science and Engineering, Chungnam National University, Daejeon, 305-764, Korea

\*Corresponding author: e-mail: max@magn.phys.msu.ru, Phone: +7-095-939-1847, Fax: +7-095-939-4787

It is known that cryogenic treatment (CT) of amorphous magnetic alloys lead to changes in their macroscopic properties [1, 2] such as conductivity, magnetization, mechanical characteristics, etc. We present the results of the magnetic and neutron investigations of the structural relaxation in the Co- and Fe-based metallic alloys after annealing and cryogenic treatment.

The measurement of the coercive force  $H_c$  and saturation magnetization  $M_s$  were made with a vibrating sample magnetometer. It was found that the amorphous ribbons improved their soft magnetic properties ( $H_c$  decreases and  $B_s$  increases) after CT.

The neutron diffraction experiments were made at the time-of-flight diffractometer DN-2 at the IBR-2 reactor of JINR (Dubna). The total structure factor  $S(Q)$  and the total pair correlation function  $g(r)$  in amorphous magnetic metal alloys were measured. The samples with composition  $Co_{66}Fe_4B_{15}Si_{15}$  and  $Fe_{76.8}Ni_{1.2}Si_{8.8}B_{13.2}$  before and after cryogenic treatment were investigated. The effect of the annealing was investigated also.

It was found that CT leads to the atoms redistribution and the decrease of the distance between atoms. The long distance changes (for distances of over  $\approx 40$  nm) were mainly observed only for the annealed samples. The cryogenic treatment changed the structure only in the nearest environment on distances no more than 1.2 nm. The origin of the correlation between the macroscopic properties changes and the short-range order of the amorphous structure after CT was discussed.

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### References

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