

**INFLUENCE OF FIELD ANNEALING ON AC MAGNETIC PROPERTIES OF
NANOGRANULAR FeCo-ALN FILMS.***Oleksandr Chayka, Luděk Kraus**Institute of Physics ASCR, Na Slovance 2, CZ-18221 Prague 8, Czech Republic*[*chayka@fzu.cz*](mailto:chayka@fzu.cz)

The permanent increase of operational frequency of modern electronic devices implies an increasing demand of highly efficient soft magnetic films. Nanogranular Fe–Co based films with an insulating (oxide or nitride) intergranular phase, prepared by magnetron sputtering, well satisfy these requirements. In this work we present the investigation of FeCo-ALN films prepared by an alternative method with emphasize on modification of their AC magnetic properties under field annealing.

A series of nanogranular magnetic FeCo-ALN films was fabricated by plasma jet technique. X-ray diffraction and chemical analysis revealed that the films consist of crystalline FeCo grains with the size of about 10 nm and amorphous ALN matrix. Hysteresis loops were measured by an AC hysteresis loop tracer at 101 Hz. The frequency dependence of permeability was investigated in the range of 0.1 – 2 GHz by a strip line permeameter.

Magnetization curves of as-deposited samples show the presence of weak in-plane anisotropy and the easy axis distribution in the film plane. The last is confirmed by magneto-optical measurements. In order to improve magnetic properties (to induce strong uniaxial anisotropy and decrease the coercive field H_c , which is important for high frequency applications of these materials) annealing in Ar atmosphere under applied magnetic field was done. The influence of field annealing on magnetic, electrical and high frequency permeability is analysed.

Measurements of magnetic and electrical properties were done after each field annealing treatment of the films at 250, 300, 350 and 400°C. It was found that the critical annealing temperature T_c is around 300°C from the magnetic point of view. After field annealing at T_c the natural ferromagnetic resonance frequency f_r is 1.2GHz and the permeability μ has the highest value. Annealing at highest temperatures results in degradation of magnetic properties, the coercive field is increases and permeability decreases, although ferromagnetic resonance frequency slightly increases.